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Impact of Consumer Health Informatics Applications

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome comments on this evidence report. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by e-mail to **epc@ahrq.gov.**

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Structured Abstract

Objective. The objective of the report is to review the evidence on the impact of consumer health informatics (CHI) applications on health outcomes, to identify the knowledge gaps and to make recommendations for future research.

Data sources. We searched MEDLINE®, EMBASE®, The Cochrane Library, Scopus™, and CINAHL® databases, references in eligible articles and the table of contents of selected journals; and query of experts.

Methods. Paired reviewers reviewed citations to identify randomized controlled trials (RCTs) of the impact of CHI applications, and all studies that addressed barriers to use of CHI applications. All studies were independently assessed for quality. All data was abstracted, graded, and reviewed by 2 different reviewers.

Results. One hundred forty-six eligible articles were identified including 121 RCTs. Studies were very heterogeous and of variable quality.

Four of five asthma care studies found significant positive impact of a CHI application on at least one healthcare process measure.

In terms of the impact of CHI on intermediate health outcomes, significant positive impact was demonstrated in at least one intermediate health outcome of; all three identified breast cancer studies, 89 percent of 32 diet, exercise, physical activity, not obesity studies, all 7 alcohol abuse studies, 58 percent of 19 smoking cessation studies, 40 percent of 12 obesity studies, all 7 diabetes studies, 88 percent of 8 mental health studies, 25 percent of 4 asthma/COPD studies, and one of two menopause/HRT utilization studies. Thirteen additional single studies were identified and each found evidence of significant impact of a CHI application on one or more intermediate outcomes.

Eight studies evaluated the effect of CHI on the doctor patient relationship. Five of these studies demonstrated significant positive impact of CHI on at least one aspect of the doctor patient relationship.

In terms of the impact of CHI on clinical outcomes, significant positive impact was demonstrated in at least one clinical outcome of; one of three breast cancer studies, four of five diet, exercise, or physical activity studies, all seven mental health studies, all three identified diabetes studies. No studies included in this review found any evidence of consumer harm attributable to a CHI application.

Evidence was insufficient to determine the economic impact of CHI applications.

Conclusions: Despite study heterogeneity, quality variability, and some data paucity, available literature suggests that select CHI applications may effectively engage consumers, enhance traditional clinical interventions, and improve both intermediate and clinical health outcomes.

Contents

Appendixes

Appendixes and Evidence Tables for this report are provided electronically at http://www.ahrq.gov/clinic/tp/chiapptp.htm**.**

Executive Summary

Many people are excited about the potential to improve the health of the public by using health information technology (health IT) and eHealth solutions that are tailored to consumers. Despite growing interest in this field referred to as consumer health informatics (CHI), the value of CHI applications has not been rigorously reviewed. The objectives of this report were to review the literature on the evidence of the influence of currently developed CHI applications on health and health care process outcomes, to identify the gaps in the CHI literature, and to make recommendations for future CHI research. For the purposes of this review, CHI is defined as any electronic tool, technology, or electronic application that is designed to interact directly with consumers, with or without the presence of a health care professional that provides or uses individualized (personal) information and provides the consumer with individualized assistance, to help the patient better manage their health or health care.

The specific Key Questions were:

1. What evidence exists that CHI applications impact:
    a. Health care process outcomes (e.g., receiving appropriate treatment) among users?
    b. Intermediate health outcomes (e.g., self-management, health knowledge, and health behaviors) among users?
    c. Relationship-centered outcomes (e.g., shared decisionmaking or clinician-patient communication) among users?
    d. Clinical outcomes (including quality of life) among users?
    e. Economic outcomes (e.g., cost and access to care) among users?
2. What are the barriers that clinicians, developers, consumers, and their families or caregivers encounter that limit utilization or implementation of CHI applications?
3. What knowledge or evidence exists to support estimates of cost, benefit, and net value with regard to CHI applications?
4. What critical information regarding the impact of CHI applications is needed to give consumers, their families, clinicians, and developers a clear understanding of the value proposition particular to them?

The best evidence available to answer Key Question 1 is found in randomized controlled trials (RCTs). However, RCTs are not the best study design for addressing Key Question 2, so for this question we included articles on any study that was designed to look at barriers to use of CHI, including but not limited to the RCTs that addressed Key Question 1. Key Question 3 addressed knowledge and evidence deficits regarding needed information to support the estimation of costs, benefits, and value regarding CHI applications. Key Question 4 addresses critical information regarding the effect of CHI applications needed to give consumers, their families, clinicians, and developers a clear understanding of the value of CHI applications.

To identify articles that addressed Key Question 1, we searched computerized literature databases using terms relevant to our definition of CHI applications, combined with terms relevant to our definition of "consumer," combined with terms identifying RCTs as the study design of interest. To search for articles that were relevant to Key Question 2, we used terms relevant to our definition of CHI applications, combined with terms relevant to barriers; the search was not limited by study design. Our comprehensive search included electronic searching

of MEDLINE®, EMBASE®, The Cochrane Library, Scopus™, and CINAHL® databases. We also looked for eligible studies by reviewing the references in pertinent reviews, by querying our experts, and by searching grey literature sources such as conference proceedings.

Studies were eligible for inclusion in the review if they applied to Key Question 1 or 2 and did not have one of the following reasons for exclusion: no health informatics application, health informatics application does not apply to the consumer, health informatics applications is for general information only (e.g., general Web site) and is not tailored to individual consumers, study of a "point of care" device (defined as requiring a clinician to use or obtain and is part of the regular provision of care), or no original data.

We assessed the eligible studies on the basis of the quality of their reporting of relevant data. For the RCTs, we used the study quality scoring system developed by Jadad et al. For the other studies, we used a form to identify key elements that should be reported when reporting results. The quality assessments were done independently by paired reviewers.

We then created a set of detailed evidence tables containing information extracted from the eligible studies. We stratified the tables according to the applicable Key Question and subquestion (for Key Question 1). We did not quantitatively pool the data for any of the outcomes because of the marked heterogeneity of target conditions of interest and the wide variety of outcomes studied.

Data were abstracted by one investigator and entered into online data abstraction forms using SRS (Mobius Analytics, Inc., Ottawa, Ontario, CA) Second reviewers were generally more experienced members of the research team, and one of their main priorities was to check the quality and consistency of the first reviewers' answers.

At the completion of our review, we graded the quantity, quality, and consistency of the best available evidence for each type of outcome in each clinical area, using an evidence grading scheme recommended by the GRADE Working Group and modified for use by the Evidence-based Practice Centers (EPC) Program. For each outcome of interest, two investigators independently assigned a grade, and then the entire team discussed their recommendations and reached a consensus.

Throughout the project, the core team sought feedback from external experts with expertise in systematic reviews, CHI, consumer advocacy, decision aids, and ethics. A draft of the report was sent to the external experts. The EPC team addressed the comments of the external experts before submitting the final version of the evidence report.

Results

Our literature search identified 146 articles that were eligible for inclusion in this report: 121 for Key Question 1 and 31 for Key Question 2; 6 articles were eligible for both Key Question 1 and Key Question 2. All of the Key Question 1 eligible studies were RCTs. The 31 articles addressing barriers to use of CHI applications fell under a variety of study designs and data collection types. Data on barriers was collected mostly in non-validated surveys and qualitative studies from trial data.

In terms of types of applications studied, 55 percent of studies evaluated interactive Web-site–based applications or Web-based tailored educational Web sites. Another 15 percent of studies evaluated computer-generated tailored feedback applications. Interactive computer programs and personal monitoring devices were evaluated in approximately 8 percent of studies each. Finally, health risk assessments, decision aids, cell phones, laptops, CD ROMs, personal

digital assistants (PDA/smartphones), short message system texting (SMS/text), discussion/chat groups and computer-assisted imagery were evaluated in less than 5 percent of studies each. In terms of participant age groups, 77 percent (76/99) of studies reporting age of participants targeted adult CHI users. Approximately 12 percent of studies targeted adolescents/teens, 3 percent of studies targeted seniors and another 3 percent of studies targeted children. Five percent of studies targeted participants from overlapping age groups. In terms of intervention delivery setting or location, 58 percent of studies reporting delivery location evaluated CHI applications that were used in the home or residence. A minority of evaluations were completed in schools (15 percent), clinical settings (17 percent), communities (3 percent), online (5 percent) or kiosks (2 percent). Finally, of studies reporting the race of the participants 92 percent (49/53) of the studies employed populations that were greater than 50 percent white/Caucasian. There was only one study with greater than 50 percent African-American participants and no studies with a majority of participants who were Hispanic, American Indian/Alaska Native, or Asian/Pacific Islander.

Key Question 1: What is the evidence of impact of CHI applications on health outcomes?

First, we sought to understand the impact of CHI applications on health care process outcomes (Key Question 1a). There were only five studies that met the inclusion-exclusion criteria and thus were available to shed light on this question. Five of these studies focused on asthma and one additional study focused on contraceptive medication utilization. All of the asthma studies showed a significant positive effect of the CHI application on at least one health care process measure. The oral contraceptive medication use application failed to reduce contraceptive discontinuation. No study found any evidence of harm.

This review identified 108 studies that addressed the influence of CHI applications on intermediate health outcomes (Key Question 1b). These 108 studies evaluated the effects of CHI applications on intermediate outcomes in the context of nine categories of diseases or health conditions. Intermediate outcomes were evaluated related to breast cancer in three studies, diet, exercise, physical activity, not obesity in 32 studies, alcohol abuse in seven studies, smoking cessation in 19 studies, and obesity in 11 studies, diabetes mellitus (or diabetes with associated conditions) in seven studies, mental health in eight studies, asthma/chronic obstructive pulmonary disease (COPD) in four studies, and miscellaneous health conditions in another 15 studies.

With regard to breast cancer, evaluated intermediate outcomes included social support, information competence, level of conflict, and satisfaction. All three studies reported significant positive effect on at least one intermediate health outcome. No study found any evidence of harm.

In terms of diet, exercise, physical activity, not obesity, evaluated intermediate outcomes included self-management, knowledge, program adherence, and change in health behaviors. Eighty-nine percent of these studies demonstrated significant positive effect on at least one intermediate health outcome related to diet, exercise, and physical activity. No study found any evidence of harm.

Evaluated intermediate outcomes related to alcohol abuse included self-management, knowledge attainment, and change in health behaviors. All studies found significant positive

effect on at least one intermediate outcome related to alcohol abuse. No study found any evidence of harm.

With regard to smoking cessation, intermediate outcomes assed in these smoking cessation CHI trials included self-management, knowledge attainment, and change in health behaviors. Fifty-seven percent of these studies demonstrated a positive effect on at least one intermediate outcome related to smoking cessation. No study found any evidence of harm.

Evaluated intermediate outcomes of interest related to obesity included weight loss behaviors and body composition. Only 36 percent of studies demonstrated positive effect on intermediate outcomes related to obesity. No study found any evidence of harm.

Seven studies were identified to evaluate the influence of CHI on intermediate outcomes related to diabetes mellitus. Intermediate outcomes of interest included perceived self- efficacy, satisfaction, and readiness to change, perceived competence, exercise minutes per day, and self-reported global health. All seven studies found evidence of effect of CHI applications on one or more intermediate outcomes related to diabetes mellitus. No study found any evidence of harm.

Eight studies were identified to evaluate the effect of CHI applications on intermediate outcomes related to mental health issues. Intermediate outcomes of interest included work and social adjustment, perceived stress, self-rated self-management, sleep quality, mental energy, and concentration. Seven of the eight studies found evidence of positive effect of CHI applications on at one or more intermediate outcomes related to mental health. No study found any evidence of harm.

Four studies were identified to evaluate the effect of CHI applications on intermediate outcomes related to asthma/COPD. Intermediate outcomes of interest included adherence, knowledge, change in behavior, dyspnea knowledge, and self-efficacy. Only one of the four studies demonstrated a significant effect on any intermediate outcome related to asthma/COPD. No study found any evidence of harm.

Two studies were identified to evaluate the effect of CHI applications on intermediate outcomes related to menopause or hormone replacement therapy (HRT). Only one study found evidence of significant effect on an intermediate outcome related to menopause/HRT utilization.

Finally, an additional 15 studies were identified to evaluate the influence of intermediate health outcomes in other clinical areas. These intermediate outcomes were in health areas related to arthritis, back pain, behavioral risk factor control, contraception, cardiovascular disease, cancer, caregiver decisionmaking, fall prevention, health behavior change, headache, HIV/AIDS, and adolescent risk behaviors. Each of these studies found evidence of significant effect of the CHI application on intermediate outcomes related to the health condition under study. No study found evidence of harm.

Another subquestion of this key question this review sought to answer was regarding the effect of CHI applications on relationship centered outcomes (Key Question 1c). Eight studies were identified that met the inclusion-exclusion criteria. Relationship centered outcomes of interest included social support, quality of life, decisionmaking skill, social support, positive interaction with the provider, and satisfaction with care. These relationship centered outcomes were evaluated in the context of HIV/AIDS, cancer, osteoarthritis, and pregnancy. Just over 60 percent (5/8) of studies demonstrated significant effect of CHI on at least one aspect of relationship centered care. No study found any evidence of harm.

Twenty-eight studies addressed the question about the impact of CHI applications on clinical outcomes (Key Question 1d). Clinical outcomes evaluated in the identified studies included disease-specific outcomes in the context of cancer (three studies), diabetes mellitus (three

studies), mental health (seven studies), diet, exercise, or physical activity (five studies), and Alzheimer's disease, arthritis, asthma, back pain, aphasia, COPD, HIV/AIDS, headache, obesity, and pain (one study each). Over 80 percent of studies found significant influence of CHI applications on at least one clinical outcome. Three studies evaluated the effect of CHI applications on breast cancer clinical outcomes, but only one found any evidence of significant CHI impact. Of the five studies that evaluated the effect of CHI applications on clinical outcomes related to diet, exercise or physical activity, four studies found a significant positive effect on one or more clinical outcomes. Among the seven studies that evaluated the effect of CHI applications on mental health clinical outcomes, all seven found evidence of significant effect of CHI on one or more clinical outcomes. Three studies evaluated the effect of CHI applications on diabetes mellitus clinical outcomes. All three studies found evidence of significant effect of CHI on at least one clinical outcome. The remaining nine studies evaluated a CHI application in different health areas including Alzheimer's disease, arthritis, asthma, back pain, aphasia, COPD, headache, HIV/AIDS, and general pain. With the exception of the general pain study, the eight remaining studies all found evidence of significant effect of CHI on one or more clinical outcomes. None of these 27 studies found any evidence of harm attributable to a CHI application.

The fifth subquestion of this key question was about the evidence of impact of CHI applications on economic outcomes (Key Question 1e). Three studies addressed this question. Economic outcomes evaluated in these studies included cost of program delivery, cost of computer information system with manual data extraction versus cost of the computer system with use of the electronic patient record, materials costs, total costs, and incremental cost-effectiveness. These outcomes were evaluated in the context of asthma, cancer, and obesity. Each of these studies used different economic metrics and methodologies. One study failed to provide any cost estimates for the control group. One study was done in an adult population, another in a pediatric population, and the third study did not provide any details regarding the age of study participants. Given the very small number of studies and the significant limitations and heterogeneity of these studies, no conclusions regarding the economic impact of CHI applications can be made.

Key Question 2: What are the barriers that clinicians, developers, consumers, and their families or caregivers encounter that limit utilization or implementation of CHI applications?

Thirty-one studies addressed the barriers to CHI applications. Studies focused on a wide variety of clinical conditions including cancer, HIV/AIDS (and sexually transmitted disease), mental health, physical activity/diet/obesity, smoking cessation, prostate cancer, and hypertension. The methodology used to identify barriers included validated and nonvalidated surveys, and qualitative and empirical research. Because CHI applications involve the participation of consumers, their caregivers, clinicians, and often developers, barriers can apply to any of the participants and the type and impact of the barrier may vary significantly between providers, developers, patients, and their caregivers. Thus, this analysis of the barriers included barriers that impede participation of any of the above groups.

In terms of systems-level barriers, six studies addressed Internet access at home or in the community and six found this to be a barrier. One study identified hardware requirements and

another study identified mobile device shape/design/configuration as a systems-level barrier. Another five studies cited incompatibility with current health care as a barrier.

Identified individual-level barriers included clinic staff who feared increased workloads, lack of built-in social support, forgotten passwords, automated data entry inability to allow for back entry of old data, lack of adequate user customization, and substantial financial investment. Nineteen studies queried application usability or user-friendliness and all 19 found evidence of this barrier. Eleven studies explored patient knowledge, literacy, and skills to use the CHI application. All found these deficits to be barriers while one study found no evidence that literacy or knowledge deficits were a barrier. Six studies considered the possibility that users would find the application too time-consuming and five of these studies cited the evidence in the results section, while the one additional study cited too many emails to participants as a barrier. Utilization fees were also identified as a barrier. Five studies sought information about privacy concerns and four reported concerns over privacy as a barrier. These studies also found concerns over the control of information or lack of trust to be barriers. Only two studies queried for potential cultural barriers and one study found evidence of this. The expectations of consumers including acceptability, usefulness, credibility, expectations, and goals were found to be barriers in eight studies. Cost was mentioned as a barrier in only one study and only one study found evidence that physical or cognitive impairment resulted in barriers to the use of CHI applications. Finally, anxiety over the use of computers, complaints about lack of personal contact with clinicians and the belief that health IT would not be an improvement to current care were mentioned in two studies as barriers.

Key Question 3: What knowledge or evidence deficits exist regarding needed information to support estimates of cost, benefit, and net value with regard to consumer health informatics applications?

The literature was at a very early stage of development. Many questions have only been evaluated by one study. Thus, confirmatory studies have generally not been done. In addition, no high quality studies have been conducted regarding several important questions. Broadly, these questions can be grouped into at least one of four categories: patient-related questions; CHI utilization factors; technology-related issues (i.e., hardware, software, and platform related issues, and health-related questions).

Patient-related questions. The literature is relatively silent on the question of whether or not significant differences in patient preferences, knowledge, attitudes, beliefs, needs, utilization and potential benefits exists across gender, age and race/ethnicity. The same could be said for potential gender and race or ethnicity-based differences. Beyond these demographic differences, the field of CHI is developing within the context of a global emergence of technology based realities including Web 2.0/Web 3.0 and ubiquitous computing which are enabling an unprecedented level of user determined interactivity and functionality. The degree to which this functionality could be harnessed for the health benefit of consumers is unknown. The targeted uses of CHI applications must increasingly be focused on more than just the index patient. The role of sociocultural and community factors will likely exert significant effect on access, usability, desirability and benefit of CHI applications. Issues related to trust, security, confidentiality need to be further explored. Because the bulk of the currently available research has been conducted on the 18-to 65-year-old adult population, more work needs to be done among the populations that may have the most potential for using CHI applications. Seniors may

stand to benefit from those applications that reduce social isolation and independence. Adolescents are some of the most intense technology users. Their natural affinity for technology may prove advantageous to CHI applications that could be developed in the future. Finally, most of the currently CHI research is being conducted among predominately white/Caucasian populations. Early evidence suggests that differential utilization patterns and preferences exist by race. Such differences could potentially lead to differential efficacy of emerging CHI applications. This could have the unintended consequence of enhancing rather than reducing some racial and ethnic disparities in health care. Age and race/ethnicity subgroup differences need to be netter understood and those differences incorporated into the development of emerging applications to ensure efficacy among all population subgroups.

CHI utilization factors. Despite a rapid increase in access to broadband services among all population groups, age groups and geographic regions of the country, differential access to broadband internet access may have significant implications in terms of health benefits that may be derived from these tools and applications. While many in the younger generations become very technically savvy at an early age, many Americans still have limited health literacy. These CHI utilization factors suggest the need for a more robust evaluation of the epidemiology of broadband access and technology literacy in the United States.

Technology-related issues. The majority of CHI applications are designed for use on personal computers as Web-based applications. Many more potential platforms exist that have not been evaluated. In addition, emerging evidence is suggesting that the CHI applications and functionality that consumers want and need are not always what health care practitioners think they need. As a result, important sociocultural and human computer interface design elements may not get incorporated adequately into emerging CHI applications and therefore lead to CHI applications with limited efficacy.

Health-related questions. Finally, most CHI applications that have been evaluated tend to focus on one or more domains of chronic disease management. Insufficient attention has been given to the role of CHI applications in addressing acute health problems. The role of CHI applications in primary, secondary, and tertiary prevention also needs to be more adequately explored. Sociocultural factors are increasingly important determinants of health care outcomes. The potential influence on social factors including social isolation and social support and perhaps even broader social determinants of health need to be evaluated and may prove useful in helping consumers address specific health concerns in the home and community-based setting.

Key Question 4: What critical information regarding the impact of consumer health informatics applications is needed in order to give consumers, their families, clinicians, and developers a clear understanding of the value proposition particular to them?

Several critical information needs must be addressed to enable a clear understanding of the value proposition of CHI applications. It is likely that the knowledge gaps needed to establish a value proposition, while overlapping, are not identical across all potential stakeholders. Because providers are often most concerned about clinical outcomes and costs, it seems reasonable that questions of the impact of CHI applications on provider or health care processes, costs, and outcomes as addressed in this report will need to be more definitively characterized. In addition, the potential liability a provider might incur from a patient using a CHI application will also need to be addressed.

Patients often cite convenience and anonymity as the primary reasons the Internet has become such a major source of health information. It is likely that the more these elements can be incorporated into emerging CHI applications, the more likely they will be considered of value by consumers. Other related factors such as usability, portability, and patient-centered functionality are likely important characteristics of CHI applications that may help drive utilization. Those technologies that exist and enable consumers to accomplish tasks (empower) without further complicating individuals' lives may ultimately prove to be the most widely valued CHI applications. By expanding the number of platforms available to consumers, CHI applications may become more appealing to a broader consumer base and thus prove valuable to those consumers who could most benefit, but may not otherwise use a more traditional CHI application.

Discussion

Overall, despite the significant heterogeneity and limited nature of the literature, the following themes were suggested by the studies included in this review. First, there may be a role for CHI applications to reach consumers at a low cost and obviate the need for some activities currently performed by humans. In addition, the data suggest that CHI applications may also be used to enhance the efficacy of interventions currently delivered by humans. Several studies compared the use of a CHI application and traditional therapy against traditional therapy alone. Many found that the group receiving traditional therapy with a CHI application had more benefit than traditional therapy alone. Thirdly, the studies evaluated in this review tended to support the finding that at least three critical elements are most often found in those CHI applications found to exert a significant effect on health outcomes. These three factors are (1) individual tailoring, (2) personalization, and (3) behavioral feedback. Personalization involves designing the intervention to be delivered in a way that makes it specific for a given individual. Tailoring refers to building an intervention in part on specific knowledge of actual characteristics of the individual receiving the intervention. Finally, behavioral feedback refers to providing consumers with messages regarding their progression through the intervention. Interestingly, it is not clear from this literature that CHI-derived behavioral feedback is any better than feedback originating from human practitioners or others. Rather, it appears that the feedback must happen with an appropriate periodicity, in a format that is appealing and acceptable to the consumer, not just the provider.

Finally, despite the paucity of studies in many areas of this emerging field and because of the methodological limitations found in many of the studies, the body of the available scientific evidence suggests that CHI applications may hold significant future promise for improving outcomes across a wide variety of diseases and health issues. In terms of health care processes and relationship centered outcomes, the literature is positive but very limited. Most of the currently available research has evaluated the impact of CHI applications on intermediate health outcomes. Due in part to the number of studies conducted to date, the evaluation of both short-term and longer-term outcomes, the utilization of significant sample sizes, appropriate statistics, the near uniformity of dependent variables across studies, and cogent articulation of the theoretic bases of the CHI content and methodology in most studies, the literature appears strongest for CHI applications targeting intermediate outcomes related to smoking cessation. In terms of clinical outcomes, the weight of the evidence appears strongest for the use of CHI applications

on mental health outcomes. Evidence-based conclusions regarding economic outcomes can not be made at this time.

Despite the positive nature of some of the available evidence, significant research opportunities and knowledge gaps exist in terms of understanding the role of CHI applications targeting children, adolescents, the elderly, and specifically nontraditional (family members, friends, allied health workers) patient caregivers. The role of Web 2.0, social networking, and health gaming technology in CHI has not been adequately evaluated. Much more work needs to be done to understand consumer desires and needs versus provider perceptions of patient desires and needs in terms of emerging CHI applications and tools. Similarly, much more work is needed to explicate the effect of CHI applications on health outcomes among racial and ethnic minority populations, low-literate populations, and the potential effect of these applications on health care disparities.

Finally, CHI research would be greatly enhanced with standardization and widespread utilization of a transdisciplinary CHI nomenclature and a CHI evaluation registry to facilitate uniform reporting and synthesis of results across emerging CHI applications, interventions, and evaluations.

Evidence Report

Chapter 1. Introduction

Consumer Health Informatics

Interest is emerging concerning the potential of technology and eHealth solutions that are tailored to consumers. This emerging field has been referred to as consumer health informatics (CHI) (see Appendix A[1] for a list of acronyms). It has been defined by Eysenbach as a branch of medical informatics that "analyzes consumers' needs for information, studies and implements methods of making information accessible to consumers, and models and integrates consumers' preferences into medical information systems."[1] In 2001, Houston et al[2] conducted a survey of members of the American Medical Informatics Association (AMIA) to generate a consensus definition of CHI. Respondents indicated that CHI incorporated a broad range of topics, the most common being patient decision support and patient access to their own health information. Despite this growing interest, the value of CHI has not been rigorously reviewed. We will review the evidence regarding the proposed questions, focusing on several kinds of outcomes.

For the purpose of this review, we define CHI applications as any electronic tool, technology, or system that is: 1) primarily designed to interact with health information users or consumers (anyone who seeks or uses health care information for nonprofessional work) and 2) interacts directly with the consumer who provides personal health information to the CHI system and receives personalized health information from the tool application or system; and 3) is one in which the data, information, recommendations or other benefits provided to the consumer, may be used with a healthcare professional, but is not dependent on a healthcare professional. As such, for the purposes of this review, we have excluded point of care devices (e.g., glucometer, remote monitoring devices), prescribed clinical devices that are part of the provision of clinical care, general information websites, message boards, and applications that are designed for use in a work environment.

This definition has the following advantages:

1) It keeps the focus of the review on how CHI applications meet the needs of consumers rather than the needs of clinicians;
2) It helps avoid a categorical disease-oriented evaluation of every clinical technological development for every disease which is not necessarily focused on the needs of consumers;
3) It helps to keep the focus of the review on studies that demonstrate impact, value or efficacy from the perspective of consumers;
4) It facilitates categorization of CHI applications in ways that may be more meaningful for patients.

Potential categories of CHI tools/technologies/applications include but may not be limited to:

a. Applications and technologies that facilitate knowing/tracking/understanding clinical parameters (disease management);
b. Applications and technologies that facilitate knowing/tracking/understanding observations of daily living (ODL's);
c. Applications and technologies that facilitate calendaring (lifestyle management assistance);
d. Applications and technologies that facilitate prevention and health promotion;

Appendixes and evidence tables cited in this report are available at: http://www.ahrq.gov/clinic/tp/chiapptp.htm.

e. Applications and technologies that facilitate self-care; and
f. Applications and technologies that facilitate assisted care and caregiving.

Purpose of Evidence Report

The objective of the report is to review the literature on the evidence of the impact of currently developed CHI applications on health and health care process outcomes, to identify the gaps in the literature, and to recommend future research endeavors to better assess these information technology (IT) applications. The specific Key Questions were:

1. What evidence exists that CHI applications impact:
    a. Health care process outcomes (e.g., receiving appropriate treatment) among users?
    b. Intermediate health outcomes (e.g., self management, health knowledge, and health behaviors) among users?
    c. Relationship-centered outcomes (e.g., shared decision making or clinician-patient communication) among users?
    d. Clinical outcomes (including quality of life) among users?
    e. Economic outcomes (e.g., cost and access to care) among users?
2. What are the barriers that clinicians, developers and consumers and their families or caregivers encounter that limit utilization or implementation of CHI applications?
3. What knowledge or evidence exists to support estimates of cost, benefit, and net value with regard to CHI applications?
4. What critical information regarding the impact of CHI applications is needed in order to give consumers, their families, clinicians, and developers a clear understanding of the value proposition particular to them?

We will discuss gaps in research, including specific areas that should be addressed. We also will suggest possible public and private organizational types to perform the research and/or analysis.

Chapter 2. Methods

The objective of the report is to review and synthesize the available evidence regarding the impact of currently developed CHI applications on health and health care process outcomes. This report will also identify barriers to the use of CHI applications. This review will help to identify the gaps in published information on costs, benefits, and net value of these applications in existing research on CHI applications. Additionally, we will use this report to identify what critical information is needed for consumers, their families, clinicians, and developers to clearly understand the value of CHI applications.

Recruitment of Technical Experts and Peer Reviewers

We assembled a core team of experts from Johns Hopkins University (JHU) who have strong expertise in health information technology IT, including: clinical IT and health sciences IT; clinical trials; systematic literature reviews; epidemiological studies; and general medicine. We recruited two advisors who have done extensive research in the areas of open access, health policy, eHeath, and CHI. We recruited seven external technical experts, referred to as a "Technical Expert Panel" (TEP), from diverse professional backgrounds including consumer advocates, a methods expert for another Evidence-based Practice Center (EPC), and academic experts in ethics, decision aids, CHI, and CHI user acceptance. An additional group of two peer reviewers was identified to provide comments on the report. Peer reviewers differed from the TEP members in that they were not involved during the project development phase of the project (See Appendix B[1], List of Internal Advisors, Technical Experts, and Peer Reviewers).

Key Questions

The core team worked with the external advisors, technical experts, and representatives of the Agency for Healthcare Research and Quality (AHRQ) to refine a set of key questions originally proposed by AHRQ for this project. These Key Questions are presented in the "The Purpose of This Evidence Report" section of Chapter 1 (Introduction). Before searching for the relevant literature, we clarified the definitions of these Key Questions and the types of evidence that we would include in our review.

Key Question 1 addresses the impact CHI applications have on health and health care process outcomes. Based on conversations with AHRQ, the external advisors and the TEP, there was agreement that the best evidence available to answer this question would be found in randomized controlled trials (RCTs).

Key Question 2 addresses the barriers that users of a CHI application might encounter. Based on conversations with AHRQ, the external advisors, and the TEP, we agreed that RCTs were not the best study design to identify and evaluate barriers. We decided to include articles on any study design whose specified purpose was to look at barriers to use of CHI. All RCTs evaluated for Key Question 1 were reviewed to determine whether barriers were assessed as well.

Key Question 3 addresses knowledge and evidence deficits regarding needed information to support estimation of costs, benefits, and value regarding CHI applications. Key Question 4 addresses the identification of critical information regarding the impact of CHI applications to

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Appendixes and evidence tables cited in this report are available at: http://www.ahrq.gov/clinic/tp/chiapptp.htm.

give consumers, their families, clinicians, and developers a clear understanding of the value of CHI applications. There was agreement amongst the core team, external advisors, AHRQ, and the TEP that the answers to these two questions (regarding knowledge deficits and missing information) would emerge from our review of the evidence on Key Questions 1 and 2.

Conceptual Framework

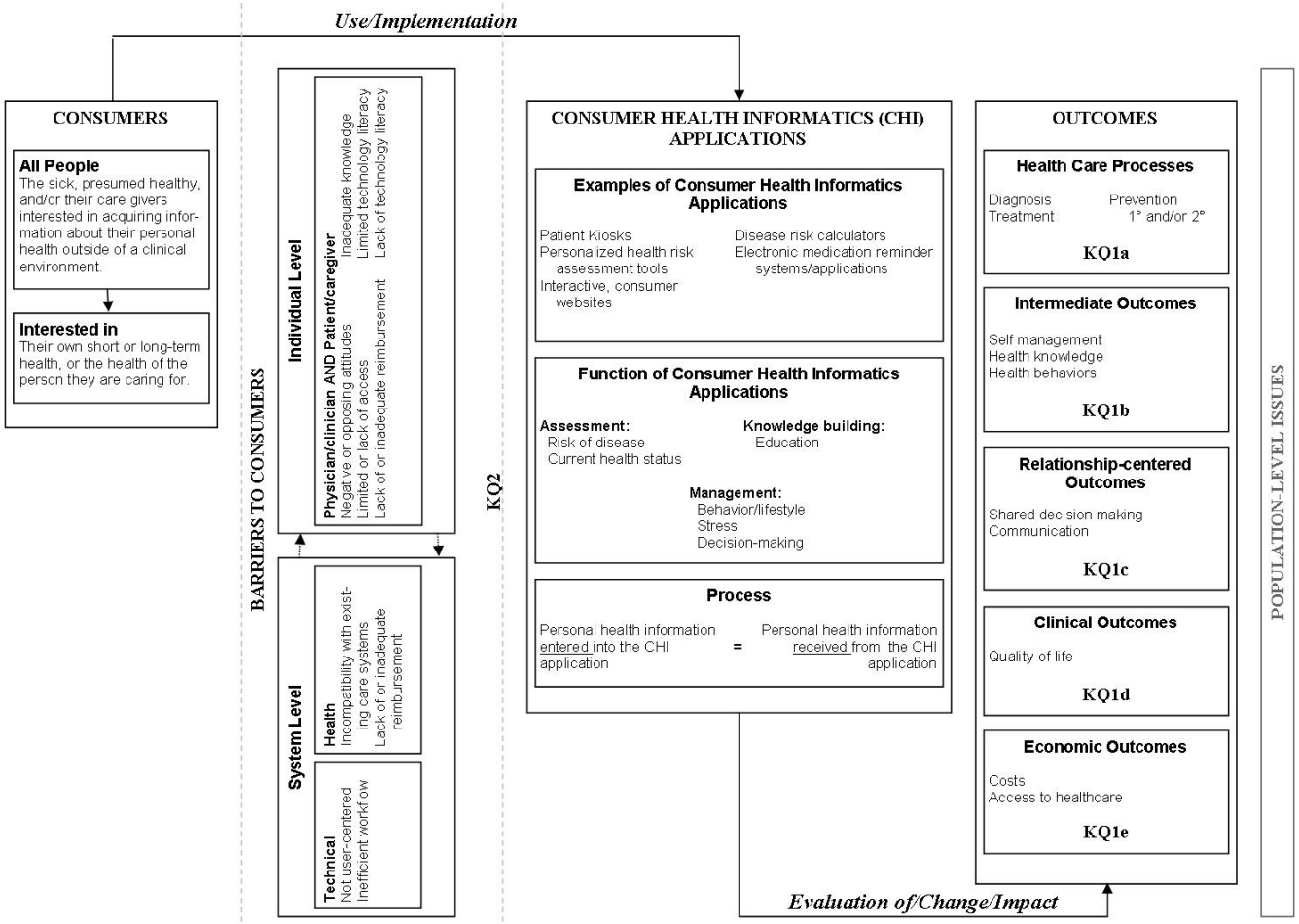
Experts from medical informatics, public health, health services research, behavioral sciences, human factors, and primary care were consulted to assist the EPC in the development of a conceptual framework to address the key questions (above). During the process, we evaluated several different types of conceptual models. We ultimately developed a model that incorporates barriers to CHI use as well as health outcomes, health care process measures, intermediate outcomes, relationship-centered outcomes, and economic outcomes. The barriers as well as the health care process measures were incorporated based on the key questions presented to us. Our purpose was to focus the model to direct our review of the relevant literature and to assist reviewers in understanding which articles applied to our strict criteria for inclusion.

Knowing that CHI applications are being employed across the spectrum of health and illness, we aimed to encompass activities that are not traditionally considered preventive health but are emerging as potentially important to patient health concerns such as observations of daily living (a personal log of activities such as sleep, diet, exercise, mood, etc.). The final framework encompassed selected concepts of CHI applications (Figure 1).

Literature Search Methods

Searching the literature involved identifying reference sources, formulating a search strategy for each source, and executing and documenting each search. For the searching of electronic databases, we used medical subject heading (MeSH) terms. To identify articles that that were potentially relevant to Key Question 1, we searched for terms relevant to our definition of CHI applications (see Chapter 1, Introduction), combined with terms relevant to our definition of "consumer" (see Chapter 1, Introduction), combined with terms identifying RCTs as the study design of interest. To identify articles that that were potentially relevant to Key Question 2, we searched for terms relevant to our definition of CHI applications (see Chapter 1, Introduction), combined with terms relevant to barriers; the search was not limited by study design. We used a systematic approach to searching the literature to minimize the risk of bias in selecting articles for inclusion in the review.

We also looked for eligible studies by reviewing the references in pertinent reviews, by querying our experts, and by taking advantage of knowledge shared at core team meetings



Key questions 3 (knowledge or evidence deficits) and 4 (critical information regarding CHI applications) are not included in this conceptual framework.

Figure 1. Conceptual model addressing Key Questions 1 and 2: Impact of CHI on health and health care process outcomes, and barriers to use of CHI.

Sources

Our comprehensive search included electronic searching of peer reviewed literature databases and grey literature databases as well as hand searching. On December 22, 2008, we ran searches of the MEDLINE®, EMBASE®, The Cochrane Library, Scopus, and Cumulative Index to Nursing and Allied Health Literature **(**CINAHL) databases. This search was updated after the submission of the draft report to ensure we included the most current relevant articles; this search was extended to June 1, 2009. A supplemental search targeting grey literature sources was conducted on January 7, 2009; it was also extended to June 1, 2009. Sources searched were: Health Services Research Projects in Progress, The Institute of Electrical and Electronics Engineers (IEEE) Conference Proceedings, Institution of Engineering and Technology (IET) Conference Proceeding, Proceedings of the American Society for Information Science and Technology (Wiley InterScience), World Health Organization (WHO) –International Clinical Trials Registry Platform, American Public Health Association (APHA) 2000-2008**,** OpenSIGLE –System for Information on Grey Literature in Europe**,** and The New York Academy of Medicine – Grey Literature.

Search Terms and Strategies

Search strategies specific to each database were designed to enable the team to focus the available resources on articles that were most likely to be relevant to the Key Questions. We developed a core strategy for MEDLINE®, accessed via PubMed, on the basis of an analysis of the medical subject heading (MeSH) terms and text words of key articles identified *a priori*. The PubMed strategy formed the basis for the strategies developed for the other electronic databases (see Appendix C, Detailed Search Strategies; and Appendix D, Grey Literature Search Strategies).

Organization and Tracking of the Literature Search

The results of the searches were downloaded into ProCite® version 5.0.3 (ISI ResearchSoft, Carlsbad, CA). Duplicate articles retrieved from the multiple databases were removed prior to initiating the review. From ProCite, the articles were uploaded to SRS 4.0 (TrialStat© 2003-2007). SRS is a secure, Web-based collaboration and management system designed to speed the review process and introduce better process control and scientific rigor. In February of 2009, the SRS system was transferred to new owners, Mobius Analytics (Ottawa, Canada). Functionality of the system was unchanged. We used this database to store full articles in portable document format (PDF) and to track the search results at the title review, abstract review, article inclusion/exclusion, and data abstraction levels.

Title Review

The study team scanned all the titles retrieved. Two independent reviewers conducted title scans in a parallel fashion. For a title to be eliminated at this level, both reviewers had to indicate that it was ineligible. If the first reviewer marked a title as eligible, it was promoted to the next

elimination level, or if the two reviewers did not agree on the eligibility of an article, it was automatically promoted to the next level (see Appendix E, Title Review Form).

The title review phase was designed to capture as many studies as possible that reported on either the impact of CHI applications on process or clinical outcomes, or on barriers to consumer use of CHI applications. All titles that were thought to address the above criteria were promoted to the abstract review phase.

Abstract Review

The abstract review phase was designed to identify articles that applied to Key Questions 1 and/or 2. An abstract was excluded at this level if it did not apply to one of these Key Questions or for any of the following reasons: no health informatics application; health informatics application does not apply to the consumer; health informatics application is for general information only (e.g., general website, message board, survey, etc.) AND is not tailored to the individual consumer; study of a "point of care" device (requires a clinician to use or obtain and is part of the regular provision of care, such as a device or telemedicine used at the point of care); no original data (letter to the editor, comment, systematic review); not an RCT (this is only an exclusion for KQ1, any article that may apply to KQ2 should not be excluded based on study design);or non-English language (Appendix E, Abstract Review Form).

Abstracts were promoted to the article review level if both reviewers agreed that the abstract could apply to one or more of the Key Questions and did not meet any of the exclusion criteria. Differences of opinion were resolved by discussion between the two reviewers.

Article Review

Full articles selected for review during the abstract review phase underwent another independent review by paired investigators to determine whether they should be included in the full data abstraction. At this phase of review, investigators determined which of the Key Question(s) and sub-question(s) each article addressed (see Appendix E, Article Inclusion/Exclusion Form). If articles were deemed to have applicable information, they were included in the data abstraction. Differences of opinion regarding article eligibility were resolved through consensus adjudication.

Data Abstraction

Once an article was included at this level, reviewers were given a final option to exclude the article if it was found to be inapplicable once the data abstraction was underway. This process was used to eliminate articles that did not contribute to the evidence under review (see Appendix E, General Data Abstraction Form). If an article was excluded at this level by the data abstractor, it was moved from this level to the previous level (article review) and tagged with the appropriate reason for exclusion.

We used a sequential review process to abstract data from the final pool of articles. In this process, the primary reviewer completed all the relevant data abstraction forms. The second reviewer checked the first reviewer’s data abstraction forms for completeness and accuracy. Reviewer pairs were formed to include personnel with both clinical and methodological

expertise. The reviews were not blinded in terms of the articles' authors, institutions, or journal.[3] Differences of opinion that could not be resolved between the reviewers were resolved through consensus adjudication.

For all articles, reviewers extracted information on general study characteristics: study design, location, disease of interest, inclusion and exclusion criteria, description of the consumers under study, and description of the CHI application (see Appendix E, General Form). Specific participant (consumer) characteristics were abstracted: information on intervention arms, age, race, gender, education, socioeconomic status, and other related data on the application under study.

Outcomes data were abstracted from the articles that were applicable to Key Question 1 regarding a CHI application's impact on a health or health care process outcome (see Appendix E, KQ1 CHI (categorical) variables, and KQ1 CHI (continuous) variables). Articles addressing Key Question 2 on barriers to CHI were abstracted to capture data on the condition of interest, the CHI application, data collection/study design, and barriers identified (see Appendix E, KQ2 CHI barriers).

Quality Assessment

We assessed the included studies on the basis of the quality of their reporting of relevant data. For the RCTs, we used the scoring system developed by Jadad et al.[4] The 5 questions (according to the Jadad criteria) used to assess the quality of RCTs were: 1) Was the study described as randomized (this includes the use of words such as "randomly," "random," and "randomization")? 2) Was the method used to generate the sequence of randomization described, and was it appropriate? 3) Was the study described as double-blind? 4) Was the method of double-blinding described, and was it appropriate? 5) Was there a description of withdrawals and dropouts?

Data Synthesis

We created a set of detailed evidence tables containing information extracted from the eligible studies. We stratified the tables according to the applicable Key Question, and sub-question (for Key Question 1). In addition, tables were further stratified to pool together the common target conditions of interest. Once evidence tables were created, we rechecked selected data elements against the original articles. If there was a discrepancy between the data abstracted and the data appearing in the article, this discrepancy was brought to the attention of the investigator in charge of the specific data set, and the data were corrected in the final evidence tables. We did not quantitatively pool the data for any of the outcomes because of the marked heterogeneity of the interventions, target conditions, and outcomes studied.

Data Entry and Quality Control

Data were abstracted by one investigator and entered into the online data abstraction forms (see Appendix E, Forms). Second reviewers were generally more experienced members of the research team, and one of their main priorities was to check the quality and consistency of the first reviewers' answers.

Grading of the Evidence

At the completion of our review, we graded the quantity, quality, and consistency of the best available evidence, addressing Key Questions 1 and 2 adapting an evidence grading scheme recommended by the GRADE Working Group[5] and modified in Chapter 11 of the EPC Manual currently under development.[6] We separately considered the evidence from studies addressing the 5 identified outcomes of Key Question 1: health care process outcomes, intermediate outcomes, relationship-centered outcomes, clinical outcomes, and economic outcomes. Each of these main categories was stratified into subcategories by target disease or conditions, and if a particular outcome was evaluated by at least two RCTs, we graded the evidence. If an outcome was evaluated by only one RCT, we did not grade the body of evidence, but rather narratively described the information available. The body of evidence addressing Key Question 2 included a variety of different study designs. Most of the articles under review in this category were not RCTs and were assessed differently.

We assessed the quality and consistency of the best available evidence, including an assessment of the risk of bias in relevant studies (using individual study quality scores), whether the study data directly addressed the Key Questions, and the precision and strength of the findings of individual studies. We classified evidence bodies pertaining to each Key Question into four basic categories: (1) "high" grade (high confidence that the evidence reflected the true effect; further research is very unlikely to change our confidence in the estimate of the effect); (2) "moderate" grade (moderate confidence that the evidence reflected the true effect; further research may change our confidence in the estimate of effect and may change the estimate); (3) "low" grade (low confidence that the evidence reflected the true effect; further research is likely to change the confidence in the estimate of effect and is likely to change the estimate); and (4) "insufficient" (evidence was either unavailable or did not permit the estimation of an effect).

Peer Review

Throughout the project, the core team sought feedback from the internal advisors and technical experts. A draft of the report was sent to the technical experts and peer reviewers as well as to representatives of AHRQ. In response to the comments from the technical experts and peer reviewers, we revised the evidence report and prepared a summary of the comments and their disposition for submission to AHRQ.

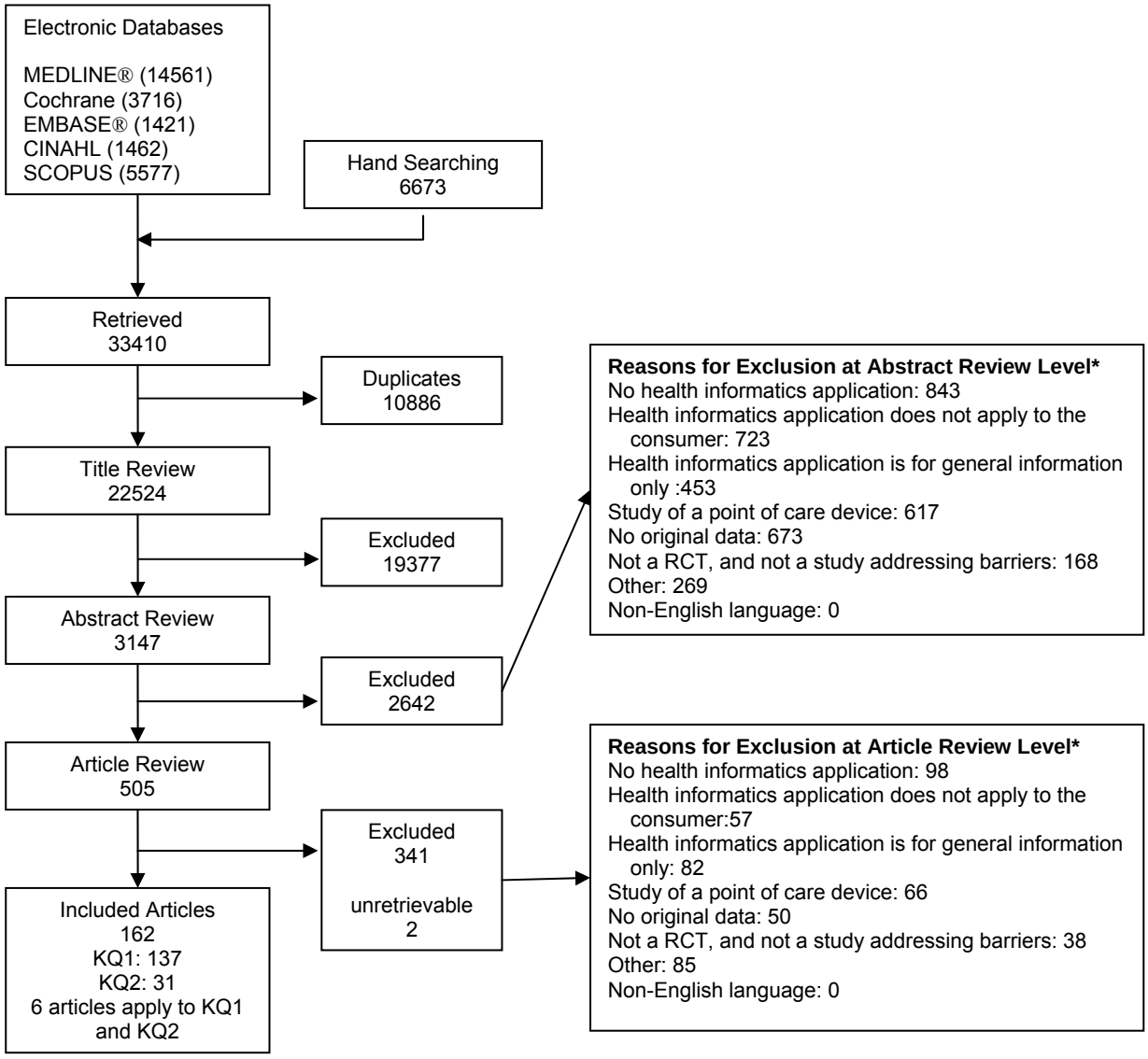
Chapter 3. Results

Results of the Literature Search

The literature search process identified 24,794 citations that were deemed potentially relevant to Key Questions 1 and/or 2 (see Figure 2) and 6673 additional articles were identified through hand searching, as described in Chapter 2. We identified no additional eligible articles in the grey literature. We excluded 8943 duplicate citations from the electronic search results. Most duplicates came from concurrently searching MEDLINE®, The Cochrane Library, EMBASE®, CINAHL, and SCOPUS. The search strategy used in all search engines was modeled on that which we used in MEDLINE®, with similar search terms (see Appendix C[1]). Additionally, the EMBASE® search engine allows the user to search the MEDLINE® database as well as EMBASE®, a strategy that often yields many duplicates between the two search sites. Our EPC employs this strategy to improve the sensitivity of the search.

In the title review process, we excluded 19,377 citations that clearly did not apply to the Key Questions. In the abstract review process, we excluded 2642 citations that did not meet one or more of the eligibility criteria (see Chapter 2 for details). At the article review phase, we excluded an additional 340 articles that did not meet one or more of the eligibility criteria (for a detailed list see Appendix F, list of excluded articles). Two more articles were removed from the pool of articles identified through the electronic databases at this stage due to difficulty in retrieving the article (Figure 2). Details on the grey literature search are available in Appendix D. The Johns Hopkins University Welch Library works with other libraries to ensure that University faculty and employees have access to nearly all published articles. Periodically, an article cannot be located through any of the cooperating libraries, and the EPC team goes directly to the authors to obtain the article — this was not possible for these two articles. Ultimately we were left with 162 articles that were eligible for inclusion in this report: One hundred thirty-seven for Key Question 1 and 31 for Key Question 2; six articles were eligible for both Key Question 1 and Key Question 2.

[1] Appendixes and evidence tables cited in this report are available at: http://www.ahrq.gov



* Total exceeds the # in the exclusion box because reviewers were allowed to mark more than 1 reason for exclusion

Figure 2. Summary of literature search (number of articles)

Description of the Types of Studies Retrieved

One hundred thirty-seven studies applied to Key Question 1. The EPC team along with the TEP and AHRQ agreed that the best evidence available to measure outcomes of the impact of CHI applications on consumers would be found in randomized controlled trials (RCTs). Therefore, all of the Key Question 1 eligible studies were RCTs. The above group agreed that all study designs should be included when searching for and including articles investigating barriers to the use of CHI applications. The 31 articles addressing barriers to use of CHI applications fell under a variety of study designs and data collection types. Data on barriers was collected most commonly in non-validated surveys (24) or qualitative studies (7).

Key Question 1a: What evidence exists that consumer health informatics applications impact health care process outcomes?

Summary of the Findings

Very few studies evaluated the impact of CHI applications on health care processes (Table 1). Measures included monitoring and therapeutic adherence, and health care utilization. The quality of these trials was variable, ranging from moderate to very low, as measured by the Jadad[4] criteria for RCT quality (Appendix F, Evidence Table 1). Postintervention followup duration varied from 12 weeks up to 1 year. The study results suggested a positive effect of CHI applications on monitoring and therapeutic adherence, and health care utilization.

Strengths and Limitations of the Evidence

Five studies assessed the impact of CHI applications on health care process outcomes in asthma, and another on the process outcome of contraceptive medication use. The asthma studies enrolled from 52[7] to 228[8] patients. The sample size in the contraception study was 949 (Appendix G, Evidence Tables 2-4).[9] The overall strength of the body of the evidence from the asthma studies was graded as moderate (Table 2) based on a modified version of the GRADE criteria"[5] and Chapter 11 of the EPC Manual[6]

General Study Characteristics

The asthma studies involved children as young as 17 years of age[8,10-12] while the contraception study participants were young women (20 yrs or younger). [9] One of the asthma studies involved a majority of female participants,[10] the others had a majority of male participants.[8,11,12] All of the asthma studies reported on race, one on caregiver education. The contraception study was conducted at two separate family planning clinic sites resulting in a highly diverse participant background in terms of race and socioeconomic status (Appendix G, Evidence Tables 2 and 3).

Table 1. Summary of studies of CHI applications impacting health care process outcomes (N=5).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI application*
Asthma	4	Bartholomew, 2000[12]	Watch, Discover, Think and Act (An Interactive multimedia application on CD-ROM)	Enhancement of self-management skills	0
		Guendelman, 2002[11]	Health Buddy(personal and interactive communication device)	Health and quality of life and process evaluation	+
		Jan, 2007[10]	Asthma education and an interactive asthma monitoring system	Monitoring adherence	+
				Therapeutic adherence	-
				Adherence to daily diary entry	+
				Therapeutic adherence: dry powder inhaler (DPI) or metered dose inhaler (MDI) plus spacer technique score	+
				Peak flow meter technique score	-
		Krishna,2003[8]	Internet-enabled asthma education program	Days of quick relief medicine	+
				Urgent physician visit	+
				Emergency room visit	+
Oral contra-ceptive use	1	Chewning, 1999[9]	Computerized decision aid	Oral contraceptive efficacy Chicago	0
				Oral contraceptive efficacy Madison	0

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome
DPI=dry powder inhaler; MDI=metered dose inhaler

Outcomes

Asthma. When evaluating therapeutic and monitoring adherence among children with asthma, Jan et al[10] found that the children using the Blue Angel for Asthma Kids application, an Internet based interactive asthma program , monitored their peak expiratory flows and adhered to an asthma diary significantly more than those receiving standard asthma education including written diary and instructions for self management at 12 weeks ($p < 0.05$) . Similarly their therapeutic adherence to inhaled corticosteroid treatment was significantly higher (63 percent among intervention vs. 42 percent among control group). In this intervention, participants received a self management plan from the Blue Angel program after entering their symptoms and peak flow measurement on a daily basis into the computer (Appendix G, Evidence Table 4).

Krishna et al[8] showed a positive impact[2] of an interactive computer program that delivers tailored educational messages in the form of brief vignettes for asthma education on health care utilization rates. This intervention was delivered in the clinic's waiting area and required no

"positive impact": the appropriate increase or decrease if a specific outcome that leads to a benefit to the consumer.

Table 2. Grade of the body of evidence addressing CHI impact on health care processes in asthma.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	High
2	Number of studies	4
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	-1
5	Were the studies sparse or imprecise? y (-1); n (0)	0
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Moderate

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

change in clinic flow or staffing levels. In this study, all participants in the intervention and control group also received standard education based on the National Asthma Education and prevention program. Participants in the intervention arm had significantly fewer emergency room visits (1.93 vs. 0.62 per year, p<0.01,) and a significantly lower daily dose of inhaled corticosteroids (434 vs. 754 μg, p < 0.01) possibly due to improved avoidance of asthma triggers. No statistically significant difference was found for the number of hospitalizations. Increased knowledge levels about asthma in both the control and intervention arms positively correlated with fewer urgent visits to physicians and reduced use of quick relief medications (correlation coefficient r = 0.37 and 0.30, respectively)

Guendelman et al[11] studied the impact of the Health Buddy (an interactive communication device) compared to an asthma diary on health related quality of life and health processes. This study demonstrated that the intervention group was significantly more likely to have no limitation of activity (p=0.03), significantly less likely to report peak flow readings in the yellow or red zone (p=.01) or to make urgent calls to the hospital (p=.05).

Finally Bartholomew et al[12] evaluated an interactive multimedia computer game designed to enhance self-management skills and thereby improve asthma outcomes. The study demonstrated that the intervention group had fewer hospitalizations, better symptom scores, increased functional status, greater knowledge of asthma management, and better child self-management behavior as compared to controls at baseline. (Appendix G, Evidence Table 4).

Oral contraceptive use. In this study involving two family planning clinics, increased knowledge about oral contraceptive methods as a result of using a decision support aid did not reduce discontinuation rates for oral contraceptives among female adolescents (Appendix G, Evidence Table 4). Although not a primary outcome in this study, it is interesting to note that the reasons for discontinuation of oral contraceptives, however, were mainly medication side effects and changes in sexual relationships altering perceived need for using contraceptives.[9]

Key Question 1b: What evidence exists that consumer health informatics applications impact intermediate outcomes?

Breast Cancer

Summary of the Findings

Three studies examined the impact of CHI in the context of breast cancer (Table 3), [13-15] and one of these was a study of multiple cancers that included breast cancer.[15] Outcomes examined were similar in two of the studies, which were from the same research group and involved the same CHI intervention (Comprehensive Health Enhancement Support System [CHESS]). These studies examined quality of life, as well as the woman's perception of social support, unmet information needs, information competence, and involvement in her own health care.[13,14] One additional study addressed satisfaction with the information, computer versus provider consultation preference, and anxiety and depression.[15]

Over the longer term, CHESS participants reported better social support and information competence than the comparison groups.[13,14] In the study comparing personalized computer information with two comparison groups -- general computer information and information booklets – patients given access to personalized information on the computer a few days after they were given information about their cancer were more satisfied than patients in the other two groups.

Strengths and Limitations of the Evidence

Only three studies examined intermediate outcomes in patients with breast cancer, and one included a spectrum of different types of cancer, with breast cancer patients representing about half of all patients. The test interventions and outcomes examined were identical or nearly so in two of the trials, with outcome measures designed to be short term. Sample sizes in each of these studies were modest. All three studies were randomized, with only one [15] providing the details of how the randomization sequence was generated (a random numbers table), and only one [14] providing details on how allocation was concealed (sealed envelopes). Intermediate outcomes were all self-reported, and masking of the patients was not possible. Dropouts and withdrawals over the study period were over 10 percent in the 2001 CHESS study, [13] and slightly less in the 1999 CHESS study, [14] and nearly 20 percent in the study by Jones and colleagues. [15] An intention-to-treat analysis was only performed in the 2008 CHESS study.[14] Overall, these studies were given a low study quality score according to the Jadad criteria[4] (See Appendix G, Evidence Table 1). The overall strength of this body of evidence was graded as low (Table 4) based on a modified version of the GRADE criteria"[5] and Chapter 11 of the EPC Manual[6]

Table 3. Results of studies of CHI applications impacting intermediate outcomes in breast cancer (N=3).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI application*
Breast cancer	3	Jones, 1999[15]	Computer-Personal Information via computer Computer - General information about cancer	Satisfaction Score >2, n(%) a few days after information given	+
				Prefer computer to 10 minute consultation with professional (at 3 months of follow up)†	-
		Gustafson, 2001[13]	CHESS	Social Support	+
				Information competence	0
				Unmet information needs	0
				Participation, behavioral involvement	+
				Participation, level of comfort	+
				Confidence in doctors	0
		Gustafson, 2008[14]	CHESS	Social support	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome
† A 10 minute professional consultation was preferred to the intervention, however, the group randomized to the internet group was more likely to prefer using it.
CHESS = Comprehensive Health Enhancement Support System

Table 4. Grade of the body of evidence addressing CHI impact on intermediate outcomes in breast cancer.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	Moderate
2	Number of studies	3
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

General Study Characteristics

The studies identified were evaluations of the impact of CHI applications on intermediate outcomes tested among adult populations with cancer. One study included patients younger than 61[13] (mean age about 44 years old), and the other two studies did not report patient ages. One study[16] reported on the percent of "Caucasian" study participants – about 75 percent

Outcomes

In the 2001 CHESS study,[13] patients allocated to CHESS reported statistically significantly greater social and information support, participation in health care, and confidence in the doctor, but not greater quality of life than patients with Internet access alone, at 2 months of followup. The positive effect of CHESS remained for social support at 5 months while no evidence of a beneficial effect of CHESS was observed at 5 months for information support, participation in health care, confidence in the doctor, or quality of life (Appendix G, evidence Table 7).

In the 2008 CHESS study,[14] patients allocated to CHESS reported greater social support during the 5-month intervention period than did those offered books and audiotapes or those in the Internet access group. At 9 months, about 4 months after the intervention period ended, the CHESS group reported greater quality of life, social support, and health and information competence compared with the control group offered books and audiotapes, but not compared with the group given Internet access (Appendix G, evidence Table 7).

Jones et al[15]found that at the time the intervention was offered, more patients in the Internet groups (both personal and general information), found information more easily than those offered booklets, and those given booklets felt more overwhelmed by the information. However, respondents allocated to the computer groups more often found the information available too limited, compared to those assigned to the booklets. At 3 months of followup, all three groups overwhelmingly preferred a 10 minute professional consultation to use of the computer, although those assigned to the computer were more likely to prefer the computer (29 percent of those receiving personal information on the computer vs. 20 percent general information vs. 10 percent booklet information). At 3 months of followup, significantly more patients assigned to the general computer information group reported anxiety and depression (Appendix G, Evidence Table 7).

Diet, Exercise, Physical Activity, not Obesity

Summary of the Findings

Thirty-two studies evaluated the impact of CHI applications on a variety of intermediate health outcomes related to diet, exercise, or physical activity, not obesity, including self-management, knowledge attainment (program adherence), and change in health behaviors (Table 5). The quality of these trials was highly variable with Jadad[4] study quality scores ranging from very low to moderately high (although only one of the 32 articles was scored as moderately high) (Appendix G, Evidence Table 1). Included in the 32 studies were two studies that evaluated the impact of CHI applications on outcomes related to eating disorders, one of which focused specifically on overweight and binge eating,

Table 5. Results of studies on CHI applications impacting intermediate outcomes in diet, exercise, or physical activity, not obesity (N=32).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet, exercise, physical activity, not obesity	32	Adachi, 2007‡[17]	Computer tailored program with 6-month weight and targeted behavior's self-monitoring, Computer tailored program only	Body Weight	+
				BMI	+
				Percent weight loss	+
		Anderson, 2001[18]	Computer kiosk nutrition intervention	Fat (% calories) Composites Scores	0
				Fiber (g/1,000kcals)	0
				Fruit and vegetables (servings/1000kcals)	0
				Self Efficacy/ Low-Fat Meals	0
				Self-Efficacy/ Low-Fat Snacks	0
				Self-Efficacy/Fruit, Vegetables, Fiber	0
				Outcome Expectations/Appetite Satisfaction	0
				Outcome Expectations/Budgetary Outcomes	0
				Outcome Expectations/Health Outcomes	0
		Brug, 1996[19]	Tailored feedback	Fat (points per day)	+
				Vegetables (servings per day)	0
				Fruit (servings per day)	0
				Positive attitude to increasing vegetables and fruits	+
		Brug, 1998[20]	Computer-tailored fat, fruit, and vegetable intake intervention	Fat (fat points per day)	+
				Fruit (servings per day)	+
				Vegetables (servings per day)	0
		Brug, 1999[21]	Computerized feedback on fat, fruit, and vegetable intake	Fat score	0
				Servings of vegetables	+
				Servings of fruit	0
				Intention to reduce fat intake	0
				Intention to increase vegetable intake	0
		Campbell, 1994[22]	Tailored nutrition intervention	Fat (g/day)	+
		Campbell, 1999[23]	Tailored multimedia intervention	Knowledge score of low fat foods	0
				Self-efficacy	0
				Fat score	0
				Stage of change- Precontemplation	+
				Stage of change- Contemplation	0
				Stage of change- Preparation	0
				Stage of change- Action/maintenance	0

Table 5. Results of studies on CHI applications impacting intermediate outcomes in diet, exercise, or physical activity, not obesity (N=32) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet, exercise, physical activity, not obesity (continued)		Campbell, 2004[24]	Computer based interactive nutrition education	Total Low-fat knowledge score	+
				Total Infant feeding knowledge score	+
				Total self-efficacy score	0
		Haerens, 2005[25]	CD-ROM based nutrition support	Fat intake (g/day, day 21)	0
				Fruit intake (pieces week)	0
				Soft drinks (glasses day)	0
				Water (glasses/day, day 21)	0
				Pre- and post-test intake levels for fat intake in girls	+
				Pre- and post-test intake levels (mean ^ SD) for % energy from fat in girls	+
		Haerens, 2007[26]	Computer tailored intervention	Dietary fat intake	0
		Haerens, 2009[27]	Computer-tailored exercise intervention	Cycling for transportation	0
				Walking for transportation	0
				Walking in leisure time	0
				Total moderate to vigorous activity	0
		Hurling, 2006[28]	Internet-based exercise motivation	Change in perception of exercise	+
				Change in ratings of expectation; satisfaction with motivation to exercise	+
				The mean change in ratings of the statement ‘‘I am very satisfied with my current level of motivation to do exercise’	0
		Hurling, 2007[29]	Had access to Internet and mobile phone	MET min/week	0
				Change in weekly hours spent sitting (MET min/week leisure time)	+
		Jones, 2008[30§]	Student Bodies 2 -BED	BMI	+
				BMIzScore	+
				Binge eating (OBEs and SBEs)	+
				Binge eating (OOEs)	0
				Weight and shape concerns	+
				Dietary fat intake	0
				Depressed mood	0
		King, 2006[31]	Interactive CD-ROM for health risk appraisal	Total physical activity	+
				Moderate physical activity	+

Table 5. Results of studies on CHI applications impacting intermediate outcomes in diet, exercise, or physical activity, not obesity (N=32) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet, exercise, physical activity, not obesity (continued)		Kristal 2000[32]	Computer-generated personalized letter for fruit and vegetable intake	Fat-related diet habit	+
				Fruit and vegetables (servings/day)	+
		Lewis, 2008[33]	Internet-based physical activity program	median number of logins	+
				5-itemWebsite Quality Questionnaire	+
		Low, 2006[34]	Student bodies with a moderated discussion group Un-moderated discussion group Program alone	EDI- Bulimia	+
				EDI-Body Dissatisfaction	+
				Weight and Shape Concerns	+
		Marcus, 2007[35]	Tailored Internet Standard Internet	Physical activity per week	0
				Improvement in functional capacity (estimated volume 0_2 at 85% of predicted maximum heart rate)(ml/kg per minute)	0
				150 minutes of physical activity per week	0
		Mangun-kusumo, 2007[36]	Internet Group	Evaluation of Health	0
				Evaluation of Fruit Advice (pleasant) (Likert Scale)	+
				Acceptability (Was fruit advice targeted to you?)	+
				Acceptability (Did you enjoy it?)	+
				Quality of Intervention (relevant)	0
				Quality of Intervention (credible)	+
				Quality of Intervention (useful)	+
		Napolitano, 2003[37]	Internet intervention	Minutes moderate physical activity	+
				Minutes, walking	+
				Stage of change, progression	+
		Oenema, 2001[38]	Web based tailored nutrition education	Intention to eat less fat	+
				Self-rated fat intake compared to others	+
				Self-rated fruit intake	+
				Self rated fat intake	+
				Self rated fruit intake compared to others	+
				Self-rated vegetable intake	0
				Self-rated vegetable intake compared to others	0

Table 5. Results of studies on CHI applications impacting intermediate outcomes in diet, exercise, or physical activity, not obesity (N=32) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet, exercise, physical activity, not obesity (continued)		Richardson, 2007[39]	Group receiving tailored feedback on lifestyle goals	Total Steps	0
				Bout Steps	0
		Silk, 2008[40]	Web site Video game	Likeability of learning materials (hypothesis 1) [authors identify 3 subscales -- attention, understanding, intention]	+
				Nutrition literacy scores (hypothesis 2) [authors identify 6 subscales: MyPyramid, Food groups, Food servings, Serving size, Food safety, Food cost]	+
		Smeets, 2007[41]	Intervention group, receiving one tailored letter	Fat consumption (gm)	+
				Fruit consumption (pieces/day)	+
		Spittaels, 2007[42]	On-line tailored Physical activity advice+ stage based reinforcement emails On-line tailored physical activity advice	Increase in total physical activity	+
				Increase in moderate to vigorous physical activity	+
				Increase in physical activity in leisure time	+
		Spittaels, 2007[43]	Website with computer tailored feedback on physical activity	Total moderate to vigorous physical activity scores	0
		Tate, 2006†[44]	Tailored Computer-Automated Feedback Human Email Counseling	Dietary intake (kcal/day)	+
				Fat intake (% day)	+
				Physical activity (kcal/week)	+

Table 5. Results of studies on CHI applications impacting intermediate outcomes in diet, exercise, or physical activity, not obesity (N=32).(continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet, exercise, physical activity, not obesity (continued)		Vandelanotte, 2005[45]	Sequential interactive computer tailored intervention Simultaneous interactive computer tailored intervention	Increase physical activity	+
				Decrease fat intake	+
		Verheijden, 2004[46]	Web-Based Targeted nutrition counseling and social support	Perceived support	0
				Social network	0
				BMI (kg/m^2)	0
				Systolic blood pressure	0
				Diastolic blood pressure	0
				Total cholesterol	0
		Winzelberg, 2000[47**]	Internet-delivered computer-assisted health education program	Body Shape Measure	+
				EDI-drive for thinness	+
				EDI-Bulimia	0
				EDE-Q Weight Concerns	0
				EDE-Q Shape Concern	0
				Saturated Fat (g/day)	+
				Vegetable/Fruit (servings/day)	+
		Wylie-Rosett, 2001[48]	Computer tailored lifestyle modification	Dietary Intake	0
				Exercise (Blocks walked daily)	0
				Exercise (min walked continuously)	0
				Weight (lb)	+
				BMI	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

† There were significant effects of human email counseling and computer-automated counseling on decrease in fat intake when compared to control; however, no treatment difference between the human email counseling and computer-automated counseling were demonstrated.

‡ Long-term effects of a 1-month behavioral weight control program assisted by computer tailored advice with weight and targeted behavior self-monitoring were more effective when compared to the behavioral weight control program assisted by computer tailored advice alone, an untailored self-help booklet with self-monitoring of weight and walking, and a self-help booklet alone.

§ study focuses on binge eating and overweight

‖ z score: "A z-score is the deviation of the value for an individual from the mean value of the reference population divided by the standard deviation for the reference population. Because z-scores have a direct relationship with percentiles, a conversion can occur in either direction using a standard normal distribution table. Therefore, for every z-score there is a corresponding percentile and vice versa."[49]

**Study focused on eating disorders.

BMI=body mass index; EDE-Q = Eating Disorder Examination—Questionnaire; EDI = Eating Disorder Inventory; g/day = grams per day; gm = gram; g/1,000 = grams per 1,000; kcal = kilocalorie; kg/m2 = kilogram per meter squared; lb = pound; ml/kg = milliliters per kilogram ; min/wk = minutes per week; OBE= objective binge episode; OOE= objective overeating episode; SBE= subjective binge episode; SD = standard deviation

Strengths and Limitations of the Evidence

Twenty-nine studies are available to evaluate CHI impact on intermediate health outcomes within the context of diet, exercise, or physical activity, not obesity. Additionally two studies were available to evaluate impact within the contexts of eating disorders and one study was available to evaluate the impact in the context of overweight and binge eating. Limitations included the occasional imprecision of study results due to wide-ranging confidence intervals. Many, though not all of these studies relied on very small sample sizes. (Appendix G, Evidence Tables 8-10). The overall strength of the body of this evidence (Table 6) on the impact of CHI applications on diet, exercise, or physical activity, not obesity was graded as moderate based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual[6] All of the studies were included in this grading of the evidence because they all had at least one outcome relevant to the effects on diet, exercise, or physical activity, not obesity.

Table 6. Grade of the body of evidence addressing CHI impacts on intermediate outcomes in diet, exercise, nutrition intervention (not obesity).

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	**High**
2	Number of studies	32
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Moderate

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

General Study Characteristics

The studies on the impact of CHI applications on intermediate health outcomes were generally conducted among adult, non-elderly populations. Five studies however were conducted specifically among adolescent populations [25,26,27, 25,27,30,36] (Appendix G, Evidence Tables 8 and 9).

Many studies were conducted among female participants. When reported, the race/ethnicity of respondents was generally such that the majority of subjects identified as Caucasian, with smaller percentages of Asian, Native American, African American or Black, or other groups reported. Educational level varied, with higher rates of higher education within studies conducted among young adults in the workplace or on college campuses. Patient post-intervention evaluation ranged from as little as immediately post-test to as long as twelve months. Upon

review, the body of scientific evidence from these studies indicated that most CHI applications evaluated to date had effects on intermediate health outcomes (Appendix G, Evidence Tables 8 and 9).

Outcomes

Diet, exercise, or physical activity, not obesity. Haerens et al[25] evaluated the effects of a middle-school healthy eating promotion intervention combining environmental changes and computer-tailored feedback, with and without an explicit parent involvement component. This study demonstrated that in girls, fat intake and percentage of energy from fat decreased significantly more in the intervention group with parental support, compared with the intervention alone group ($p = 0.05$) and the control group ($p=0.001$). No impacts were found in boys or in girls for fruit, soft drinks, and water consumption.

In another study by Haerens et al[27] evaluated the differences in effects of a computer tailored physical activity advice as compared to providing generic information among adolescents. After 4 weeks, most physical activity scores increased in both groups. No differences between groups were found. After 3 months, the generic intervention was more effective at increasing "walking in leisure time" among students not complying with recommendations. For all other physical activity scores, no differences between groups were found.

In a third study Haerens et al [26] investigated a computer-tailored dietary fat intake intervention for adolescents as compared to control and found no intervention effects for the total sample.

Marcus et al [35] investigated the effects of an internet-based tailored physical activity intervention, a standard internet physical activity intervention, and a tailored print physical activity intervention and found that all groups increased physical activity behavior similarly and no significant treatment effects were detected between groups.

When evaluating behavior change regarding changes in weekly hours spent sitting, Hurling et al[29] found that an Internet and mobile phone technology delivering an automated physical activity program was associated with greater perceived control and intention/expectation to exercise when compared to a control group than those who received no support ($p<0.001$) (Appendix G, Evidence Table 10).

Regarding a decrease in fat consumption and increase in fruit consumption, Smeets et al[41] found that a computer tailored intervention was associated with these behaviors at 3 months ($p<0.05$ and $p<0.01$, respectively). While this intervention did not enhance the health behaviors, it did reduce the decline in these behaviors over the followup period (Appendix G, Evidence Table 10).

Spittaels et al[42] found that an increase in total physical activity, increase in moderate to vigorous physical activity, increase in physical activity during leisure time, and decrease in body fat were behaviors more strongly associated with use of an online-tailored physical activity advice program with stage-based reinforcement emails when compared to online-tailored physical activity advice without reinforcement emails or on-line non-tailored standard physical activity advice ($p<0.001$, $p<0.05$, $p<0.001$, and $p<0.05$, respectively) (Appendix G, Evidence Table 10).

Tate et al [44] investigated the effects of human e-mail counseling, computer-automated tailored counseling, and no counseling in an internet weight loss program. Significant effects of human email counseling and computer-automated counseling on decrease in fat intake when

compared to control were demonstrated at 3 and 6 months ($p<0.04$ and $p<0.004$, respectively); however, no treatment difference between the human email counseling and computer-automated counseling were demonstrated. (Appendix G, Evidence Table 10)

Mangunkusumo et al[36] found that Internet-administered adolescent health promotion in a preventive-care setting was more effective when compared to a control of usual practice with paper and pencil for some outcomes but not for others. Subjects found the Internet-tailored fruit advice more pleasant, easy to use, personally targeted, and enjoyable but less credible when compared to generic preprinted advice ($p<0.01$) (Appendix G, Evidence Table 10).

Adachi et al[17] found that the long-term effects of a 1-month behavioral weight control program assisted by computer tailored advice with weight and targeted behavior self-monitoring was more effective when compared to the behavioral weight control program assisted by computer tailored advice alone, an untailored self-help booklet with self-monitoring of weight and walking, and a self-help booklet alone. While dietary habits and physical activity were improved in all subjects, the mean weight loss associated with these improvements was greatest in the behavioral weight control program assisted by computer tailored advice with weight and targeted behavior self-monitoring ($p<0.05$) (Appendix G, Evidence Table 10).

Vandelanotte et al[45] found that sequential and simultaneous interactive computer-tailored interventions were more effective when compared to a control group for producing higher physical activity scores and lower fat intake scores ($p<0.001$) (Appendix G, Evidence Table 10).

Verheijden et al [46] investigated Web-based targeted nutrition counseling and social support for patients at increased cardiovascular risk in general practice as compared to control treatment of usual care and found no significant treatment differences in outcomes (Appendix G, Evidence Table 10).

In another study, Oenema et al[38] found that a Web-based tailored nutrition education intervention had greater effect on self-rated fruit intake compared to others as well as intention to eat less fat when compared to a control group at post-test ($p<0.01$, $p<0.05$, and $p<0.01$, respectively) (Appendix G, Evidence Table 10).

Napolitano et al[37] found that an Internet-based physical activity intervention was more strongly associated with progression in stage of motivational readiness for physical activity when compared with a control group at one month ($p<0.05$) and at three months ($p<0.01$). Additionally, the Internet-based physical activity intervention was also more strongly associated with increases in walking minutes when compared with a control group at one month ($p<0.001$) and at three months ($p<0.05$) (Appendix G, Evidence Table 10).

Caroline et al[39] evaluated the effect of technology enhanced pedometers and interactive, tailored, Web based, feedback on physical activity among sedentary adults with Type II Diabetes. Individuals in all groups increased their physical activity from baseline, however no significant between group differences were achieved.

In a study conducted with patients attending family practice clinics in North Carolina Campbell et al[22] tested the effect of individually computer-tailored messages designed to decrease fat intake and increase fruit and vegetable intake. At 4 month followup, the data indicated that the tailored intervention produced significant decreases in total fat and saturated fat scores compared with those of the control group $p<0.05$). Fruit and vegetable consumption did not increase in any study group.

Kristal et al[32] evaluated a tailored, multiple-component self-help intervention designed to promote lower fat and higher fruit and vegetable consumption .The intervention consisted of a computer-generated personalized letter and behavioral feedback, a motivational phone call, a

self-help manual and newsletters and was compared to a no material control. The intervention significantly reduced fat intake ($p<0.001$) and significantly increased fruit and vegetable intake ($p<0.001$) as compared to controls.

Hurling et al[28] evaluated an Internet-based exercise motivation and action support system (Test system), relative to a group receiving no intervention (Reference) and another receiving a less interactive version of the same system (Control). Seven months after the intervention, participants who used the test system reported greater levels of increase in exercise motivation than the control or reference groups ($p < 0.05$).

Brug et al[21] evaluated the impact of two computer-tailored nutrition education interventions and tailored psychosocial feedback compared to computer tailored nutrition education alone, regarding reducing their fat consumption and increasing consumption of fruit and vegetables. No significant differences in consumption of fat, fruit, and vegetables were found.

In another study by Brug et al[20] the impact of individualized computer-generated nutrition information and additional effects of iterative feedback on changes in intake of fat, fruits, and vegetables was evaluated. The experimental group received computer-generated, tailored dietary feedback letters. Half of the experimental group received additional iterative tailored feedback. Controls received a single general nutrition information letter. The results indicated that Computer-tailored feedback had a significantly greater impact on fat reduction ($p<0.01$) and increased fruit ($p<0.01$) and vegetable intake ($p<0.01$) than did general information. Iterative computer-tailored feedback had an additional impact on fat intake ($p=0.02$).

Anderson et al [18] studied the impact of a self administered computer tailored nutrition intervention. The application was located in kiosks and involved local grocery store shoppers. The results indicate that while an immediate post test suggested that individuals in the intervention group were more likely to attain dietary fat ($p<0.001$), fiber ($p<0.001$), fruits and vegetable consumption goals ($p<0.05$), they were only more likely to achieve dietary fat ($p<0.05$) and fiber ($p<0.01$) goals at follow up.

Campbell et al[23] evaluated a tailored multimedia program designed to improve dietary behavior among low income women. The computer-based intervention consisted of a tailored soap opera and interactive 'infomercials' that provided individualized feedback about dietary fat intake, knowledge and strategies for lowering fat based on stage of change. Results from this study indicate that the intervention group participants had improved significantly in knowledge ($P < 0.001$), stage of change ($P < 0.05$) and certain eating behaviors ($P < 0.05$) compared to the control group.

In another study Campbell et al[24] evaluated a tailored nutrition education CDROM program for participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Results from this study indicate that intervention group members increased self-efficacy ($p<0.01$) and scored significantly higher ($p<0.05$) on both low-fat and infant feeding knowledge compared with controls. No differential effect was observed for dietary intake variables.

Lewis et al[33] evaluated the impact of instantaneous Web-based tailored feedback vs. general Websites currently available to the public among sedentary adults. The results indicated that individuals in the intervention group logged onto their Website significantly more times than the general Website controls (median 50 vs. 38; pb.05). Among participants in the intervention, the self-monitoring feature (i.e., logging) followed by goal setting were rated as the most useful Website components.

King et al[31] evaluated the impact of a computer-assisted, tailored self-management physical activity intervention compared with health risk appraisal with feedback on sedentary adults with

Type II Diabetes. At 2-month post intervention follow-up, the intervention significantly improved all physical activity ($p<0.01$) and moderate physical activity (metabolic equivalents > 3.0, $p<0.01$) relative to controls.

Spittaels et al[43] evaluated a Website-delivered physical activity intervention, that provides participants with computer-tailored feedback, to ascertain the impact of the intervention on physical activity in the general population. Potential participants were allocated to one of three study groups. Participants in group 1 and 2 received the tailored physical activity advice on their computer screen immediately following their baseline assessment with the option to visit other Website sections. Participants in group 1 also received non-tailored e-mails inviting them to visit a specific Website section by following a hyperlink. Group 3 was a delayed treatment control group. Participants in both intervention groups reported a significant increase in transportation (movement, walking or running) ($p<0.05$), leisure time physical activity levels ($p<0.05$), and decrease in time spent sitting ($p<0.05$) at 6-month follow-up compared with the control group.

Wilie-Rosett et al[48] evaluated the impact on weight loss of kiosk-based computer-tailored behavioral feedback versus the computer feedback plus in-person consultation versus a print workbook control. The results indicate that all groups had a significant decrease in energy and fat intake and increased physical activity ($p<0.01$). The greater the intensity of the intervention, the greater the increase or decrease.

When evaluating likeability of learning materials and nutrition literacy attainment, Silk et al[40] found that an interactive Web site modality was associated with higher scores among participants when compared with a computer game and an information pamphlet at 2 weeks ($p<0.05$) (Appendix G, Evidence Table 10).

When evaluating reduction of fat intake and positive attitudes regarding this behavior, Brug et al[19] found that a computer-tailored nutrition intervention with tailored feedback letters was more strongly associated with these outcomes when compared to a control group receiving general nutrition information at three weeks ($p<0.01$) (Appendix G, Evidence Table 10).

Eating Disorder. When evaluating drive for thinness and body shape concerns, Winzelberg et al[47] found that the Internet-delivered computer–assisted health education program Student Bodies was associated with a decrease in these behaviors when compared to a control group at three months ($p<0.05$ and $p<0.01$, respectively) (Appendix G, Evidence Table 10).

Low et al[34] found that decreases in self-reported bulimia, body dissatisfaction concerns, and weight and shape concerns were more strongly associated with the use of a computer-based interactive eating disorder prevention program (Student Bodies) with an unmoderated discussion group when compared to the Student Bodies program with a moderated discussion group, the Student Bodies program alone, or a control group ($p<0.05$) (Appendix G, Evidence Table 10).

Overweight and binge eating. When evaluating binge eating behaviors and concern with weight and shape, Jones et al[30] found that the Internet-facilitated intervention Student Bodies2-Binge Eating Disorder (SB2-BED) was associated with a decrease in these behaviors when compared to a wait-list control at 16 weeks ($p<0.05$) (Appendix G, Evidence Table 10).

Alcohol Abuse and Smoking Cessation

Summary of the Findings

Twenty-six studies evaluated the impact of CHI applications on a variety of intermediate health outcomes related to the use of alcohol and tobacco (Table 7). Outcomes of interest include self-management, knowledge attainment (program adherence), and change in health behaviors. The quality of these 26 trials was good. All were RCTs with sample sizes ranging from 83 to 288 respondents for the alcohol abuse studies and ranging from 139 to 3971 respondents for the tobacco use studies. Post-intervention evaluation ranged from as little as 30 days to as long as 24 months. Upon review, the body of scientific evidence from these studies indicates that most CHI applications evaluated to date had statistically significant effects on intermediate health outcomes.

Strengths and Limitations of the Evidence

Twenty-six studies were available to evaluate CHI impact on intermediate health outcomes related to use of alcohol and tobacco. Seven studies were available to evaluate CHI impact within the context of alcohol abuse and 19 studies were available to evaluate this impact within the context of tobacco use. The sample sizes yielded appropriate power in these studies, with sample sizes ranging from 83 to 288 respondents for the alcohol abuse studies and ranging from 139 to 3971 respondents for the tobacco use studies. The overall strength of the body of this evidence (Table 8) for the effects on intermediate outcomes was graded as high for smoking cessation and high for alcohol abuse based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual[6]. It is important to note that many of the intermediate outcome measures were patient-reported.

General Study Characteristics

The studies on the impact of CHI applications on intermediate health outcomes related to use of alcohol and tobacco were generally conducted among adult, non-elderly populations. Most of the respondents in these studies were under 40 years of age, although the mean age range of participants across studies was 18-70 years of age. Five studies [50-54] specifically targeted either adolescents or young adults (age range 11-26 years). Information regarding gender suggested that female participants represented a little over half of the study population. When reported, the race/ethnicity of respondents was generally Caucasian, with smaller percentages of Asian, Native American, African-American or Black, or other groups participating. Educational level and marital status was variable across studies. (Appendix G, Evidence Tables 11, 12, 14, 15).

Table 7. Results of studies on CHI applications impacting intermediate outcomes in alcohol abuse and smoking (N=26).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Alcohol abuse	7	Cunningham, 2005‡[55]	Internet plus self help book	Mean drinks per typical week	+
				Mean AUDIT test score	+
				Mean # of alcohol consequences	+
		Hester, 2005[56]	DCU/Immediate treatment group	Average drinks per day	+
				Drinks per drinking day	0
				Average peak BAC	+
		Kypri, 1999[51]	Computerized Assessment and Behavioral Intervention	Drinking Frequency	+
		Lieberman, 2006[57]	Multimedia	Number of modules complete	+
				Perceived helpfulness of the modules	0
		Neighbors, 2004[52]	Computerized normative feedback	Effect size in perceived norms	0
				Effect size in reduction in alcohol consumption	+
				Effect size in reduction in alcohol consumption	+
		Riper, 2008[58]	Intervention condition DL	Weekly alcohol consumption (second outcomes)	+
		Riper, 2008[59]	Web-based self-help intervention without therapist guidance	Mean alcohol consumption at 6 months and 12 months follwup	+
Smoking	19	An, 2008[53]	Real U‡ intervention	Percent abstinent for 30 days	+
		Brendryen, 2008 [60]	Happy ending program—internet delivered smoking cessation	Repeated Points of Abstinence (1 + 3 + 6 + 12 months)	+
		Curry, 1995 [61]	Computer-generated tailored feedback	7-day abstinence at 21 months	0
				Abstinent at 3, 12 and 21 months	0
		Dijkstra, 2005 [62]	Computer tailored letters	Affective attitude	+
				Cognitive attitude	+
				Quitting attempts	+
		Hang, 2009 [63]	Personalize smoking cessation via SMS	Number of cigarettes smoked per day	
				24 hour quit attempt	0
					0
		Japuntich, 2006[64]	CHESS SCRP	Abstinent	0
		Pattens, 2006[54]	Internet based intervention	Smoking abstinence	0
		Prochaska, 1993 [65]	Interactive computer support	Point Prevalence Abstinence, Precontemplation stage	0
				Point Prevalence Abstinence, Contemplation stage	0
				Point Prevalence Abstinence, Preparation stage	0

Table 7. Results of studies on CHI applications impacting intermediate outcomes in alcohol abuse and smoking (N=26) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Smoking (continued)		Prokhorov, 2008 [66]	CD-ROM smoking cessation	Smoking initiation rates at 18 months (nonsmokers at baseline)	0
				Smoking cessation rates at 18 months (smokers at BL)	0
		Severson, 2008[67]	Interactive, tailored Web-based intervention	Tobacco abstinence (complete case)	+
				Tobacco abstinence (intent-to-treat)	+
				Smokeless tobacco use abstinence (complete case)	+
				Smokeless tobacco use abstinence (intent-to-treat)	+
		Schiffman, 2000[68]	Computer tailored smoking cessation materials	Abstinence rates	+
		Schumann, 2006 [69]	Computer generated tailored letters	Average probability of progression (precontemplation and contemplation)	0
				Average probability of regression (precontemplation and contemplation)	0
		Schumann, 2008[70]	Computer-tailored smoking cessation intervention	Point-prevalence abstinence	0
				Prolonged abstinence	0
		Strecher, 2008[71]	High depth efficacy expectation Low depth efficacy expectation	Depth of efficacy expectation of smoking cessation intervention	0
				Depth of outcome expectation of smoking cessation intervention	0
				Depth of success stories of smoking cessation intervention	+
				Personalization of message source	+
				Timing of message exposure	0
		Strecher, 2006[72]	Web-based Committed Quitters Stop Smoking Plan (CQ Plan)	Tobacco related illness	+
				Non-smoking children in household	+
				Frequency of alcohol consumption	+
		Strecher, 2005 [73]	Computer-generated tailored letter	7-day abstinence at 12 months (intent to treat analysis)	+
				7-day abstinence at 12 months of subjects who were abstinent at 5 months (intent to treat analysis)	0
				7-day abstinence at 12 months of subjects who were abstinent at 5 months (per protocol analysis)	+
		Strecher, 2005[74]	CQ Plan	28 day abstinence rate	+
				10 week continuous rates	+
		Strecher, 1994 [75] Study 1	Computer-generated tailored letter	7-day abstinence (all smokers)	0
				7-day abstinence (light smokers)	+
				7-day abstinence (heavy smokers)	+

Table 7. Results of studies on CHI applications impacting intermediate outcomes in alcohol abuse and smoking (N=26) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
		Swartz, 2006[76]	Received immediate access to the Web site Behavioral intervention for smoking (intent to treat model)	Cessation of smoking at 90 days	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome
† significance of these outcomes was not reported
‡ Study investigates internet-based intervention with addition of self-help booklet compared to internet-based intervention alone
‡ a randomized trial testing a Web-assisted cessation intervention for college smokers
AUDIT = Alcohol Use Disorders Identification Test; BAC = blood alcohol concentration; BL = baseline;
CHESS SCRP= Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention;
CQ Plan = committed quitters plan; DCU = Drinker's Check-up; DL = drinking less

Table 8. Grade of the body of evidence addressing CHI impact on intermediate outcomes in alcohol abuse and smoking.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	(Alcohol abuse) High	(Smoking cessation) High
2	Number of studies	7	19
3	Did the studies have important **inconsistency**? y (-1); n (0)	0	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0	0
5	Were the studies sparse or imprecise? y (-1); n (0)	0	0
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0	0
	Overall grade of evidence‡	**High**	**High**

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Outcomes

Alcohol abuse. Riper et al[58] investigated the effects of a Web-based, multi-component, interactive self-help intervention for problem drinkers without therapist guidance compared to a control intervention consisting of receiving access to an online psychoeducational brochure on

alcohol use. Based on complete case analysis, the intervention group decreased their mean weekly alcohol consumption significantly more than the control group (p=0.001). In a subsequent secondary analysis of data from this study the authors demonstrated that at six and 12 month follow up women and those with higher levels of education were more likely to have lower alcohol consumption levels, based on self report, as compared to controls.[59] (Appendix G, Evidence Table 13).

Lieberman[57] investigated program adherence to an online alcohol-use evaluation among study participants. After completing four standard questionnaires to evaluate problem drinking, an intervention consisting of a multimedia condition involving a personified guide was compared with a control treatment of feedback from the questionnaire results in text form. Increased levels of program adherence, as assessed by completion of greater numbers of modules of the online alcohol-use evaluation, were more strongly associated with the multimedia feedback via the personified guide ($p<0.01$) (Appendix G, Evidence Table 13).

Cunningham et al[55] investigated the effects of an Internet-based personalized feedback intervention compared to the same intervention with the addition of a self-help book based on three outcomes: mean typical number of drinks per week, mean Alcohol Use Disorders Identification Test (AUDIT) scores, and mean number of alcohol consequences experienced. Study participants who received the additional self-help book reported decreased consumption of alcoholic drinks per week ($p<0.05$), a lower AUDIT score ($p<0.05$), and fewer alcohol-related consequences ($p<0.05$) compared to participants who received the Internet-based intervention alone (Appendix G, Evidence Table 13).

Hester et al[56] investigated the effect a computer-based brief motivational intervention, the Drinker's Checkup (DCU). The intervention was randomly assigned to participants in either an immediate treatment group or to a 4-week Delayed Treatment group and participants were followed over a 12-month period. Significant effects were reported for the Immediate group when comparing baseline measurement to measurement at 12 months for the outcomes of average drinks per day and average peak blood alcohol content (BAC) ($p=0.002$ and $p=0.001$, respectively). For the Delayed group, significant effects were also reported when comparing baseline measurement to measurement at 12 months for the outcomes of average drinks per day and average peak BAC ($p=0.008$ and $p=0.003$, respectively). Significance was not reported for the outcome of drinks per drinking day for either the Immediate or Delayed Treatment groups (Appendix G, Evidence Table 13).

Kypri et al[51] investigated the effects 10-15 minutes of Web-based assessment and personalized feedback for hazardous drinking as compared with a control treatment of an informational leaflet only. Six outcomes were measured at 6 weeks and 6 months: frequency of drinking; typical occasion quantity; total consumption; frequency of very episodic heavy drinking; personal, social, sexual, and legal consequences of episodic heavy drinking; and consequences related to academic performance. Significant effects of the intervention were seen on outcomes of total consumption at 6 weeks ($p=0.03$); frequency of very episodic heavy drinking at 6 weeks ($p=0.02$); and personal, social, sexual, and legal consequences of episodic heavy drinking at both 6 weeks and 6 months ($p=0.01$ and $p=0.03$, respectively). No significant effects of the intervention on other outcomes were demonstrated (Appendix G, Evidence Table 13).

Neighbors et al [52] investigated the effects of a computer-delivered personalized normative feedback intervention in decreasing alcohol consumption among heavy-drinking college students. Outcomes assessed were effect size in perceived norms and the effect size in reduction

in alcohol consumption. The effect size for the intervention effect on drinking was reported to be significant at 3 and 6 months ($p<0.01$). Significance of the effect size for the intervention effect on perceived norms was not reported.

Smoking cessation. When evaluating behavior change regarding smoking cessation, An et al. [53] found that an online college life magazine providing personalized smoking cessation messages and peer email support (the RealU intervention) was associated with a higher self-reported 30-day abstinence rate among college smokers when compared to a control group ($p<0.001$) . There was no difference reported between study groups for self-reported 6-month prolonged abstinence, however (Appendix G, Evidence Table 16).

Strecher et al[71] evaluated the effectiveness of web-based smoking cessation programs with experimentally manipulated depth of tailoring. The research team used the term "tailoring" to refer to a process consisting of 1) assessment of individual characteristics relevant to smoking cessation, 2) algorithms that use the assessment data to generate intervention messages relevant to the specific needs of the user, 3) a feedback protocol that delivers these messages to the participant in a clear format. The intervention was a web-based smoking cessation program plus nicotine patch with use of tailoring depth of the intervention based on five randomized components: high- versus low-depth tailored success story, outcome expectation, efficacy expectation messages, high- versus low-personalized source, and multiple versus single exposure to the intervention components. Although depth of tailoring with a web-based smoking cessation program plus nicotine patch was shown to influence rates of point-prevalence abstinence at 6-month follow-up, results were most significant for high- versus low-depth success story ($p<0.018$) and high- versus low-personalization of message ($p<0.039$) (Appendix G, Evidence Table 16).

In another study, Strecher et al[72] investigated the effects of a web-based computer-tailored smoking cessation program (CQ Plan) as compared to an intervention of nontailored web-based cessation materials (CONTROL) among nicotine patch users. Significant effects for increased rates of ten-week continuous abstinence at 12 week follow-up were seen with the CQ Plan intervention when the study groups were stratified according to presence or absence of tobacco-related illness ($p<0.001$ and $p<0.05$, respectively), presence or absence of non-smoking children in the household ($p<0.001$ and $p<0.10$, respectively), and frequency of alcohol consumption of greater than three times per week as compared to less than three times per week among participants ($p<0.001$ and $p<0.10$, respectively) (Appendix G, Evidence Table 16).

A third study by Strecher et al [74] found that an intervention of web-based tailored behavioral smoking cessation materials was more effective than a control of web-based non-tailored materials. Outcomes of 28-day continuous abstinence rates at 6 weeks and 10-week continuous abstinence rates at 12 weeks were more strongly associated with the intervention group ($p<0.008$ and $p<0.0004$, respectively) (Appendix G, Evidence Table 16).

Strecher et al[75] also evaluated the impact of computer tailored smoking cessation letters on smoking cessation behaviors among a group patients (n=51) recruited from a family practice clinic in North Carolina. At four month follow up smoking cessation rates differed significantly in the computer tailored group among patients who smoked less than 1 pack per day ($p<0.05$). No difference was seen among those who smoked more than 1 pack per day. In a similar study of a larger sample (n=1484) reported in the same paper again found significantly higher smoking cessation rates at 6 months follow up only among those who smoked less than one pack per day ($p<0.05$) (Appendix G, Evidence Table 16).

One additional study by Strecher et al[73] evaluated the efficacy of adding computer tailored letters to an established telephone based smoking cessation intervention. At 12 month follow up, the intervention failed to produce any additional impact on smoking cessation rates as compared to quitline only controls.

Severson et al. [67] found that an interactive, tailored web-based intervention (Enhanced Condition) when compared to a more linear, text-based website (Basic condition) was more effective for cessation of all forms of tobacco use as well as specifically for smokeless tobacco use at 3 and 6 months ($p<0.001$) (Appendix G, Evidence Table 16).

Schumann et al.[70] investigated a computer-tailored transthoretical model-based smoking cessation intervention in a general population setting in Germany and found the intervention to be ineffective (Appendix G, Evidence Table 16).

Japuntich et al.[64]investigated an internet-based intervention as an adjuvant treatment in a smoking cessation program as compared to a control group of pharmaceutical treatment and counseling alone and did not find significant intergroup effects (Appendix G, Evidence Table 16).

Patten et al.[54] found an internet-based intervention when compared to a brief office intervention did not produce significant treatment differences for smoking abstinence rates among adolescent study participants (Appendix G, Evidence Table 16).

Swartz et al [76]investigated a video-based internet site presenting strategies for smoking cessation and motivational materials tailored to the user's race/ethnicity, sex, and age. Rates of abstinence at 90-day follow-up were measured for participants using this intervention and compared with abstinence rates among participants using the control intervention of a 90-day wait period prior to accessing the internet program. Greater abstinence rates were associated with the intervention group as compared to the control group, using both complete case analysis ($p<0.002$) as well as intent-to-treat analysis ($p<0.015$). (Appendix G, Evidence Table 16).

Shiffman et al.[68] investigated the effects of computer-tailored materials offered to purchasers of nicotine polacrilex gum in the Committed Quitters Program (CQP) compared to the use of a brief untailored user's guide and audiotape in the starter package of the nicotine polacrilex gum . Outcomes of 28-day continuous abstinence rates at 6 weeks and 10-week continuous abstinence rates at 12 weeks were more strongly associated with the intervention group ($p\leq0.001$) (Appendix G, Evidence Table 16).

Dijkstra et al.[62] evaluated the efficacy of computerized smoking cessation messages that were either personalized, adapted or provided with personal feedback on smoking cessation rates at four months. Results of this investigation indicate that significantly higher rates of cessation were achieved in the personalization and feedback groups as compared to controls ($p>0.05$) (Appendix G, Evidence Table 16).

Hang et al[77] investigated the value of using individualized text messaging (short message service (SMS) for continuous individual support of smoking cessation among young adults. Post intervention analysis revealed no significant effect of text messaging on smoking behavior (Appendix G, Evidence Table 16).

Brendryen et al[60] sought to evaluate a multicomponent, one year smoking cessation intervention delivered via the Internet and cell phone and consisting of email contacts, Web pages, interactive voice response, text messaging technology and a craving telephone helpline. The results indicate that the intervention group achieved statistically significantly higher abstinence rates than control participants (20 percent versus 7 percent, odds ratio [OR] = 3.43, 95 percent CI = 1.60-7.34, $p=0.002$) (Appendix G, Evidence Table 16).

Prokhorov et al[66] evaluated the long term efficacy of a CD ROM based smoking initiation prevention program among urban inner city adolescents. The CD ROM contained embedded animations, video, and interactive activities and was composed of five weekly sessions in one semester and two ‘‘booster’’ sessions in the following semester (each 30 min in duration). At the beginning of each session, students were given a series of activities that were tailored to their stage of intention and designed to promote smoking cessation or reduced likelihood of initiation (for nonsmokers). At 18-month follow-up, smoking initiation rates were significantly lower in the intervention group compared to control (1.9 percent vs. 5.8 percent, p=0.05) (Appendix G, Evidence Table 16).

Schumann et al[69] evaluated a CHI application that involved up to 3 individualized feedback letters generated by special computerized expert-system software and additional stage-tailored self-help booklets. This intervention failed to demonstrate any significant effect on smoking rates (Appendix G, Evidence Table 16).

Prochaska et al[65] compared standardized self-help manuals, individualized manuals, an interactive computer system plus individualized manuals or personalized counselor calls plus manuals. As compared to the standardized self help manual control group the interactive computer group had a significantly larger impact on point prevalence abstinence than all other groups at 6 months ($p<0.05$), 12 months ($p<0.05$) and 18 months ($p<0.05$). The interactive computer group also significantly improved prolonged abstinence rates at 18 months ($p<0.05$) (Appendix G, Evidence Table 16).

Schneider [78] et al) tested the efficacy of an online personalized, comprehensive behavioral smoking cessation forum offered through a commercial computer networking business. The intervention was an asynchronous chat/discussion group moderated by a psychologist, a psychiatrist, and a lay ex-smoker. The results of this investigation indicated that the intervention did not significantly improve smoking cessation rates as compared to no intervention controls.

Curry et al[61] compared the efficacy three treatments on smoking cessation behavior: a self-help booklet alone; a self-help booklet with computer-generated personalized feedback; and a self-help booklet, personalized feedback, and outreach telephone counseling. Salivary cotinine levels were obtained to validate self reports at 12 month follow up. At three month follow up only the telephone counseling group achieved significantly higher 7 day cessation rates as compared to controls (p=0.02) (Appendix G, Evidence Table 16).

Obesity

Summary of the Findings

Eleven studies evaluated the impact of CHI applications on intermediate outcomes related to obesity (Table 9). The studies mostly addressed middle-class consumers across the United States (US) and United Kingdom (UK), while one study targeted lower socioeconomic status school children. The interventions often employed online, Web based technical platforms. In addition, one study employed a pocket computer device and another used a laptop computer. No application had a large effect on improving weight-loss behavior, weight change, or body composition. The quality of the studies investigating obesity was variable with Jadad study quality scores [4] ranging from moderately high (one study) to low. (Appendix G, Evidence Table 1)

Several studies employed Internet-based technical platforms while one study employed a pocket computer device and another utilized a laptop computer. Educational content used in the applications was custom designed by the investigators based on a range of Theoretic models: Precaution Adoption Process Model Theory of Planned Behavior,[79,80] evidence from obesity research,[81] and behavioral family-based treatment.[82,83] Other sites listed their features: social support,[84] ethnic-related sources,[83] or self-monitoring food exercises[85] (Appendix G, Evidence Tables 17-19). The overall strengths of the body of this evidence (Table 10) was graded as moderate based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

Strengths and Limitations of the Evidence

Eleven studies evaluated several domains of CHI impact on obesity. Enrolled study participants included adults (18-65) [80] middle-aged consumers[81,84-87] teenagers, [83] school aged adolescents,[88] overweight women[89,90] and overweight/obese men.[91] Several studies were restricted to consumers already obese on the basis of body mass index (BMI).[80] In terms of race/ethnicity,[81,83-86] studies enrolled American populations, European,[91] British[81] and Dutch[80] consumers. One study targeted African-Americans[83] and another targeted primarily African-Americans and Hispanics[88] (Appendix G, Evidence Tables 17-19).

General Study Characteristics

Across studies, the average age of enrolled consumers was early 40s. Williamson et al[83] however, recruited teens with an average age of 13 years (SD 1.4), and Frenn[88] recruited middle-school seventh graders aged 12-14. Five studies[80,88-90] targeted either predominately female or only female consumers. One study targeted only males. [91] In terms of educational levels, the Kroeze et al[80] study included participants who had the following distribution of educational attainment (tertiary 42 percent, higher secondary 37 percent, the remainder below that). A study by Hunter et al enrolled mostly Caucasian participants while Frenn's study enrolled approximately 30 percent African-American and 30 percent Hispanics (Appendix G, Evidence Tables 17 and 18).

Table 9. Results of studies on CHI applications impacting intermediate outcomes related to obesity (N=11).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Applications*
Obesity	11	Booth, 2008[87]	On-line weight reduction program including dietary advice plus exercise Exercise only program	Weight change	+
				Waist circumference change	0
				Physical activity	0
				Energy intake	0
		Burnett-Kent, 1985[90]	Computer Assisted method of providing feedback	Short term weight change: Baseline 2 wk period	0
				Short term weight change: Post-baseline 8 wk period	+
				Long term weight changes (24 wks)	+
				Long term weight changes (40 wks)	+
				Self-reported Caloric intake	+
				Self-reported physical activity	+
		Cussler, 2008[86]	Internet group	Weight change	0
				BMI	0
				Exercise energy expenditure	0
				Energy intake	0
		Frenn, 2005[88]	Internet based interactive model	Physical Activity	+
				Diet	+
		Hunter, 2008‡[85]	Behavioral Internet treatment(BIT)	Body weight	+
				BMI	+
				Waist circumference	+
				Body fat percentage	+
		Kroeze, 2008 †[80]	Interactive - tailored condition Print - tailored condition	Total fat intake	+
				Saturated fat intake	0
				Energy intake	+
		McConnon, 2007[81]	Internet intervention	BMI change at 12 months	0
				Loss of 5% or more body weight (12 months)	0

Table 9. Results of studies on CHI applications impacting intermediate outcomes related to obesity (N=11) (continued).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Applications*
Obesity (continued)		Morgan , 2009[91]	Internet-based weight-loss program	Physical activity (mean steps/day) 3 months	+
				Physical activity (mean steps/day) 6 months	+
				Energy intake (kJ/day) 3 months	+
				Energy intake (kJ/day) 6 months	+
		Taylor, 1991[89]	Computer Assisted Therapy	Weight Loss (Post-treatment 12weeks – Pretreatment)	0
				Weight Loss (followup at 6months – Pretreatment)	0
		Williamson, 2006[§83]	Interactive nutrition education program and Internet counseling behavioral therapy for the intervention group	Body weight	+
				Body composition	+
				Weight loss behavior	0
				BMI	+
		Womble, 2004[‖84]	ediets.com	Weight change percent	-
				Weight change (kg)	-

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

† positive impacts (where indicated) only at 3months post-intervention, at 6 months post-intervention all impacts were insignificant

‡ A positive impact indicates a decrease in any of the four listed outcomes

§ positive impacts (where indicated) only at 12 months post-intervention, at 24 months post-intervention all impacts were insignificant

‖ A negative impact indicates an increase in any of the two listed outcomes

BMI=body mass index; kJ/day = kilojoules per day; kg = kilogram; wk = week

Table 10. Grade of the body of evidence addressing CHI impact on intermediate outcomes in obesity.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	High
2	Number of studies	11
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Moderate

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Outcomes

Weight-loss behavior. Williamson et al[83] presented graphs on dieting change, exercise change, overeating change, and avoidance of fat food change, none of which favored the intervention, in either the teens or their parents. Cussler et al[86] similarly showed equivalent exercise energy expenditure in controls (mean164 [kcal/day], SD 268[kcal/day]) and interventions (mean 123 [kcal/day], SD 265 [kcal/day]) and equivalent change in energy intakes of 91 kcal/day (SD 33) and 74 kcal/day (SD 371) in the two groups, respectively. Kroeze and colleagues[80] measured food intake and found a decrease at 1 month equal to or greater than the effect of a printed resource. For instance, for total fat intake, the regression-coefficient confidence intervals (CIs) were (-18.6, -3.23) and (-15.59, -0.04) respectively. There were similar effects for saturated fat and energy. The effects were statistically indistinguishable from 0 at 6 months. Print resources were more effective for high-risk consumers, with effects lasting 6 months, and with the Internet group showing no statistically significant improvement. Booth et al[87] measured weight-loss behavior through changes in physical activity (number of steps counted per day) and changes in energy intake. Both the exercise-only and the online exercise and diet advice groups showed a significant increase in the number of daily steps taken. Both groups showed a decrease in energy intake at the 12-week measuring period, but the differences were not significant. Frenn et al [88] demonstrated a significant improvement in physical activity and significant reductions in dietary fat intake from an 8-session interactive Web-based intervention ($p=0.05$). Burnett-Kent et al[90] found that a laptop based computer assisted therapy system could enable participants to achieve a significantly higher mean weight loss at 8 week follow up ($p<0.05$) as compared to controls not using the computer assisted therapy system. The effect size was reported to be $r_m = 0.75$. The significant enhancement of weight loss by the computer assisted therapy was also found at 24 and 40 months ($p<0.2$ and $p<0.5$ respectively). Effect sizes were not reported for these longer term findings. The computer system did not have

a significant effect on self-reported caloric intake and physical activity. Finally Morgan et al[91] demonstrated a significant increase in physical activity and significant reductions in energy intake as compared to baseline in both the Internet based program and information session and program booklet as well as the information session and program-booklet-only control group at the 6-month followup (Appendix G, Evidence Table 19).

Weight change. Cussler et al[86] showed no difference in weight change: 1 kg (SD 4.6) loss for control, 0.7 kg (5.4) loss for the intervention. Hunter et al[85] documented a statistically significant difference in BMI change: in the internet group , a decrease of 1.3 kg/m^2 at 6 months, with an increase in the control groups of 0.5 kg/m^2 (initial BMI $\geq$ 27 kg/m^2) and 0.9 kg/m^2 (initial BMI $\leq$ 27 kg/m^2) (p value not stated). Womble et al[84] reported percent change in weight from baseline. Again, the effects were small (1-4 percent), with overlapping confidence intervals. Four studies reported BMI changes. Cussler et al[86] reported identical changes of 2 kg/m^2 at 4 and at 16 months. Hunter et al[85] also showed no change in BMI at 6 months (change statistically indistinguishable from 0 and overlapping CIs). McConnon et al[81] reported a mean change of 0.3 kg/m^2 (CI -0.5 to 1 kg/m^2, p=0.4) in favor of the Internet intervention, but not statistically significant. Williamson et al[83] also found a change of about 1 kg/m^2 for the two groups (1.2 kg/m^2 loss for the control group, 0.73 kg/m^2 loss for the intervention group, statistically not significantly different from each other) that became statistically nonsignificant at 18 months. Booth [87] reported that weight change in the exercise-only group had a higher percentage weight loss than online diet and exercise program group at 12 weeks; the difference between the two groups was not significant. Taylor et al[89] found no effect of a computer-assisted therapy application on weight loss at 12 weeks or at the 6-month followup. Finally, Morgan et al[91] found significant increases in weight loss from baseline in the Internet-based program and information session and program booklet as well as the information session and program-booklet-only control group at the 6-month followup (Appendix G, Evidence Table 19).

Body composition. Hunter et al[85] reported on body fat percentages. These, too, showed no difference between the control group (mean 34.7, SD 7.0) and the intervention group (mean 33.9, SD 7.3) at 6 months. Similarly, Williamson and colleagues[83] reported an increase in body fat, as measured by dual-energy x-ray absorptiometry (DXA), of 0.84 percent (SD 0.72) for the control group and a decrease of 0.08 percent (SD 0.71) for the intervention group. Results of the Booth study[87] found the exercise-only group had a greater change in waist circumference, but the difference between the two groups was not significant. Finally, Morgan et al demonstrated significant changes in body weight, waist circumference, and BMI as compared to baseline in both the Internet-based program plus information session and program booklet as well as the information session and program-booklet-only control group at the 6-month followup (Appendix G, Evidence Table 19).

Diabetes

Summary of Findings

Seven studies examined the effect of a CHI application on intermediate outcomes such as health knowledge and health behavior in people with diabetes mellitus (Table 11). One of the seven studies also included patients with heart disease and chronic lung disease. All studies were RCTs, but the studies had low study quality scores and did not always directly address one of our key questions. The findings were inconsistent across studies regarding the impact of a CHI application on intermediate outcomes related to diabetes, with four studies suggesting a benefit in terms of self-care, knowledge, physical activity adherence and satisfaction and three other studies indicating mostly a lack of benefit (Appendix G, Evidence Table 1).

Strengths and Limitations of the Evidence

Seven studies evaluated a wide range of effects of CHI applications on intermediate outcomes related to diabetes (Appendix G, Evidence Tables 20-22). All studies were RCTs, but the comparisons being made were not all directly relevant to our key question. All seven of the studies received low to very low study quality scores. This is a result of the difficulty in blinding participants, and often investigators, regarding the assignment to the control and intervention groups. Additionally, one study did not explain withdrawals.[4] The overall strength of the body of this evidence (Table 12) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

General Study Characteristics

Four of the studies were limited to type 2 diabetes, one was limited to gestational diabetes,[92] and two included both type 1 and type 2 diabetes.[93,94] Four of the studies evaluated an interactive consumer Web site,[92,93,95,96] two evaluated a personal monitoring and feedback device,[39,97] Another study evaluated an interactive computer program.[94] Comparisons were generally made between a control group and an intervention group that was exposed to a CHI application. However, in the study by Wangberg,[93] both groups received an Internet-based intervention, with one group receiving an intervention targeted at the area of self-care for which reported self-efficacy was lowest, and the other group receiving an intervention targeted at the area of self-care for which reported self-efficacy was highest (Appendix G, Evidence tables 20 and 21).

Table 11. Results of studies on CHI applications impacting intermediate outcomes in diabetes (N=6).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI applications*
Diabetes	6	Glasgow, 2003[97]	Tailored self-management	Kristal Fat and Fiber Behavior scale	-
		Homko, 2007[92]	Telemedicine	Self-efficacy (Diabetes Empowerment Scale (DES))	+
				Satisfaction and readiness to change	+
		McKay, 2001[95]	Internet-based physical activity intervention	Moderate-to-vigorous exercise	0
				Walking	0
		Richardson, 2007[39]	Computerized feedback mechanism	Total Step	+
				Bout Steps	+
				Satisfaction	+
				Usefulness	+
				Adherence (Likelihood of wearing a pedometer)	+
				Adherence (Mean hours of wearing a pedometer)	+
		Wangberg, 2006†[93]	Low self-efficacy	Summary of Diabetes Self Care Activities	+
				Perceived competence scale	-
			High self-efficacy	Minutes activity per day	0
		Wise, 1986[94]	Interactive computer assessment	Knowledge score	+
Diabetes with with heart disease and chronic lung disease	1	Lorig, 2006‡[96]	Online intervention	Change in health distress (0-5)	+
				Change in self-reported global health(0-5)	0
				Change in illness intrusiveness	0
				Change in self-efficacy	0

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

† study compares CHI targeting low self-efficacy items with CHI targeting high self-efficacy items: (+) indicates that there was an increase in self efficacy in both groups; (-) indicates a decrease in both groups

‡ study measures the use of a personal monitoring device with tailored self –management compared with no tailored self-management

Table 12. Grade of the body of evidence addressing CHI impact on intermediate outcomes in diabetes.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	Moderate
2	Number of studies	6
3	Did the studies have important **inconsistency**? y (-1); n (0)	-1
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	-1
5	Were the studies sparse or imprecise? y (-1); n (0)	0
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Outcomes

Self-efficacy, self-care, and self-management. Homko et al evaluated the feasibility of monitoring glucose control in indigent women with gestational diabetes mellitus (GDM) over the Internet. Women with GDM were randomized to either the Internet group (n=32) or the control group (n = 25). Patients in the Internet group were provided with computers and/or Internet access if needed. A Web site was established for documentation of glucose values and communication between the patient and the health care team. Women in the control group maintained paper logbooks. The results of this study indicate that women in the Internet group demonstrated significantly higher feelings of self-efficacy at the study's end [92] (Appendix G, Evidence Table 22).

In the Wangberg study,[93] the author assessed whether self-efficacy(SE) could function as a moderator of the effect of a tailored Internet-based intervention aimed at increasing self-reported diabetes self-care behaviors. There was a significant overall main effect of the intervention on self-care, $F(1,25) = 5.56$, $p=0.026$. A significant interaction between change in self-care and baseline self-efficacy was found, $F(1,25) = 4.67$, $p=0.040$, with lower baseline self-efficacy being related to greater improvements in self-care. A significant interaction between time and gender was observed, $F(1,25) = 4.78$, $p=0.038$, with men having greater improvements in self-care than women[93] (Appendix G, Evidence Table 22).

Lorig et al[96] evaluated the impact on self-efficacy of an Internet-based tailored chronic disease self-management program. The results indicate that the intervention group increased their self-efficacy significantly more than controls (0.40 [SD 1.98] p=0.051) This study also found that the mean Health Distress Score decreased significantly more in the intervention group (0.377 [SD 1.11] p=0.013) compared to controls[96]

Wise et al[94] compared the effects of an interactive computer program, graphic animations and personalized feedback vs. knowledge assessment and printed feedback vs. knowledge assessment

alone on knowledge and insulin control among insulin dependant and non insulin dependant diabetics (IDDM and NIDDM respectively). Among IDDM patients at 4-6 month follow up the printed feedback group and the computer program group showed significant increased in knowledge ($p<0.05$ and $p<0.01$ respectively). The same was also true among NIDDM patients ($0<0.1$ and $p<0.05$ respectively). In terms of glucose control all three treatment groups resulted in significant reductions in HbA1c (knowledge assessment only [9.1± 0.2 percent to 8.4±0.1 percent, $p<0.05$], knowledge assessment and feedback [9.3±to 8.1±0.4 percent, $p<0.05$] and interactive computer program [9.3±0.2 percent to 8.6±0.3 percent, $p<0.05$ percent]). Finally among NIDDM patients significant reductions in HbA1c were only seen in the knowledge assessment group and the feedback groups (knowledge assessment [9.6±0.4 percent to 8.8±0.3 percent, $p<0.05$] and feedback [9.2±0.4 percent to 7.9±0.4 percent, $p<0.01$]) (Appendix G, Evidence Table 22).

Physical activity. McKay et al[95] evaluated an Internet-based supplement (D-Net) to usual care that focused on providing support for sedentary patients with type 2 diabetes to increase their physical activity levels. The intervention group received goal-setting and personalized feedback, identified and developed strategies to overcome barriers, received and could post messages to an online "personal coach," and were invited to participate in peer group support areas. Results of this intervention indicate a significant increase in moderate to vigorous physical activity (minutes/day) ($p<0.001$) and walking (minutes/day) ($p<0.001$).[95] In a 10-month followup evaluation of the McKay intervention (D-Net), the data indicate significant improvements in the intervention group for physical activity ($p<0.000$)[97] (Appendix G, Evidence Table 22).

A study by Richardson[39] evaluated a pedometer hooked up to interactive computer-based feedback. The study failed to demonstrate an effect on actual steps taken, but did demonstrate a significant effect on patient satisfaction ($p=0.006$), usefulness ($p=0.03$), likelihood of wearing a pedometer ($p=<0.001$), and mean hours of wearing a pedometer ($p=0.038$) (Appendix G, Evidence Table 22).

Dietary habits. Glasgow et al[97]reports on additional dietary outcomes using the D-Net intervention described by McKay et al above. 10 month follow up evaluation of the intervention indicate significant improvements on the Kristal Fat and Fiber Behavior (FFB) scale ($P<0.000$), in daily dietary fat consumption ($p<0.000$), CES-D Depression scale scores ($p<0.000$), total cholesterol ($p<0.000$), LDL cholesterol ($p<0.000$), triglycerides ($p<0.000$) and Lipid ratios ($p<0.000$). The intervention did not significantly improve HDL cholesterol or HbA1c levels. (Appendix G, Evidence Table 22).

Mental Health

Summary of the Findings

Eight studies evaluated the impact of CHI applications on intermediate outcomes in mental health (Table 13). Studies evaluated the impact of CHI on three broad aspects of mental health. These included: 1) depression/anxiety, 2) phobia, and 3) stress. Across the three domains of mental health, the scientific evidence suggested that CHI applications may have a beneficial

Table 13. Results of studies on CHI applications impacting intermediate outcomes of mental health (N=8).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI applications
Depression/ anxiety	4	Christensen, 2004[99]	Blue Pages: Web site MoodGYM: Computer based CBT	Center for Epidemiologic depression scale	+
				Automatic thoughts	+
				Medical literacy	+
				Psychological literacy	+
				Lifestyle literacy	+
				Cognitive behavior therapy literacy	+
		Neil, 2009[106]	MoodGYM internet-based CBT	Warpy thoughts score	
				No. of exercises completed (0—28)	+
		Proudfoot, 2004[98]	Computerized Therapy	Depression (BDI)	+
				Anxiety (BAI)	+
				Work and Social Adjustment scale	+
				ASQ,CoNeg	+
				ASQ,CoPos	+
		Warmerdam, 2008[107]	Interactive computer tool based on CBT	Depression (CES – D)	+
				Anxiety using HADS	+
				QoL using EQ5D	+
				Depression (CES – D) Proportion reaching clinically significant change	0
Phobia	1	Schneider, 2005[108]	Computer aided cognitive behavior therapy with self-help exposure	Main Problem(self-rating)	+
				Main Goal(self-rating)	+
Stress	2	Chiauzzi, 2008[101]	MyStudent Body–Stress	Perceived Stress Scale	0
		Hasson, 2005[100]	Web-based stress management system	Self-rated stress management	+
				Self rated sleep quality	+
				Self rated mental energy	+
				Self rated concentration ability	+
				Self rated social support	+
				Biological marker	+
Stress management	1	Zetterqvist , 2003[105]	Interactive self help stress management program	Perceived Stress Scale	
				Hospital Anxiety and Depression Scale HADS	+
				Anxiety	+
				Depression	+
				LE (Life Events) (Holmes and Rahes Scale)	0
				Perceived Social Support PS-family	0
				Perceived Social Support PS-friends	0

ASQ=Attributional style questionnaire; BAI=Beck anxiety inventory; BDI= Beck depression inventory; CBT=cognitive behavioral therapy; CoNeg=composite index for negative situations; CoPos=composite index for positive situations; CES–D = Center for Epidemiologic Studies Depression Scale; EQ5D = EuroQoL; HADS = Hospital Anxiety and Depression Scale; QoL = quality of life; PS+ perceived social support system

Table 14. Grade of the body of evidence addressing CHI impact on intermediate outcomes in mental health.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	Moderate
2	Number of studies	8
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	-1
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

effect on depression/anxiety, phobias, and stress (Table 14, and Appendix G, Evidence Tables 23-25).

Strengths and Limitations of the Evidence

The volume of the literature in this area was small. Four studies evaluated several domains of CHI impact on intermediate outcomes related to depression or anxiety, [98,99] two studies evaluated the impact on stress,[100] one evaluated the impact on stress management, and [101]one study evaluated the impact on social phobia[102] (Appendix G, Evidence Tables 23-25). The quality of these eight trials was variable, ranging from moderate to very low study quality scores,[4] with several studies lacking in one or more methodological domains of RCT quality as measured by the Jadad criteria (Appendix G, Evidence Table 1). Postintervention evaluations ranged from as little as 1 month to as many as 6 months. The overall strength of the body of this evidence (Table 14) was graded as low, based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

General Study Characteristics

These studies involved predominately married or cohabitating female adults of varying race and ethnicities. They ranged from 13 to 75 years of age with widely varying educational backgrounds. Outcomes of interest included impact on depressive symptoms,[98 99 103,104] impact on anxiety levels, [98,103,104] change in the degree to which problems affect one's ability to conduct normal activities,[98] impact on dysfunctional thoughts,[99] improvements in knowledge of therapy including cognitive-behavioral theory (CBT),[99] changes in perceived stress scores,[101] self-rated self-management,[100,105] self-rated sleep quality,[100] self-rated mental energy,[100] self-rated concentration,[100] self-rated social support,[100] quality of life, [104] and change in measured biologic

marker levels.[100] Samples sizes were relatively small, ranging from 78[101] to 182[100] subjects per arm of the study (Appendix G, Evidence Tables 23 and 24).

Outcomes

Depression/anxiety. Proudfoot et al[98] evaluated the impact of Web-based cognitive-behavioral therapy (CBT) on patients with diagnoses of depression, anxiety, and/or mixed depression with anxiety. Use of the "Beating the Blues" online CBT intervention was associated with improvements on the Beck depression inventory (BDI) ($p=0.0006$),[98] Beck anxiety inventory (BAI) ($p=0.06$),[98] Work and Social Adjustment Scale ($p=0.002$),[98] and Attributional Style questionnaire ($p<0.001$ for negative situations and $p<0.008$ for positive situations).[98]

Christensen et al[99] also evaluated the impact of a Web-based CBT application among patients who scored above 22 on the Kessler psychological distress scale and who were not currently receiving any treatment. The MoodGYM CBT intervention was associated with improvements in depressive symptoms on the CES-D scores ($p=0.05$) and dysfunctional thoughts via the Automatic Thoughts Questionnaire ($p=0.05$) compared to controls (Appendix G, Evidence Table 25).

Neil et al[106] evaluated the impact of adherence to interactive consumer Web site-based therapy among depressed and/or anxious youth. The first adolescent sample consisted of 1000 school students who completed the MoodGYM program in a classroom setting over five weeks as part of n RCT. The second sample consisted of 7207 adolescents who accessed the MoodGYM program spontaneously and directly through the open Web-based access. The results of this evaluation indicate that adolescents in the school-based sample completed significantly more online exercises (mean = 9.38, SD = 6.84) than adolescents in the open-access community sample (mean = 3.10, SD = 3.85; $t1088.62= -28.39$, $p<0.001$).

Warmerdam et al [107] evaluated the effectiveness of Internet-based Cognative Behaviroal Therapy (CBT) vs. Internet-based Problem Solving Therapy (PST) on Depressive symptoms among community dwelling adults. Outcomes were evaluated at 5, 8 and 12 weeks post intervention. The results indicate significant improvements in between-group effect sizes for depressive symptoms, 0.54 for CBT after 8 weeks (95 percent confidence interval (CI): 0.25 - 0.84) and 0.47 for PST after 5 weeks (95 percent CI: 0.17 - 0.77) as compared to wait list controls. These effects were further improved at 12 weeks in both treatment groups (CBT: 0.69, 95 percent CI: 0.41 - 0.98; PST: 0.65, 95 percent CI: 0.36 - 0.95).

Phobia. FearFighter is an online CHI application designed to reduce symptoms of phobia/panic disorders (agoraphobia, social phobia, and specific phobias). [108] In this study FearFighter was compared to guided Internet-based self-help relaxation therapy (Managing Anxiety group [MA]). Both arms also received periodic phone or email followup from a therapist. At 1 month, patients in the FearFighter group scored better than those in the MA group on several phobia subscales as assessed by self-report and blinded raters using the main problems and goals subscale ($p<0.001$), FQ global phobias subscale ($p<0.001$), and FQ global impression score ($p<0.001$) (Appendix G, Evidence Table 25).

Stress. MyStudentBody is a Web-based CHI application, which is designed to reduce symptoms of stress among college students. Chiauzzi et al[101] evaluated the effects of this application as compared to use of a control Web site and a non-Internet Web site control group. No significance between group differences in perceived stress was detected at 6-month followup.

Hasson et al[100] conducted an evaluation of a Web-based health promotion tool on mental and physical well-being and stress-related biological markers. At 6-month postintervention followup, the intervention group had improved significantly compared to the reference group on ratings of ability to manage stress (p=0.001), sleep quality (p=0.04), mental energy (p=0.002), concentration ability (p=0.038), and social support (p=0.049). The anabolic hormone dehydroepiandosterone sulphate (DHEA-S) decreased significantly in the reference group as compared to unchanged levels in the intervention group (p=0.04). Neuropeptide Y (NPY) increased significantly (p=0.002), and Chromogranin A (CgA) decreased significantly in the intervention group (p=0.001) as compared to the reference group, while tumor necrosis factor α (TNFα) decreased significantly in the reference group compared to the intervention group (p<0.016). These results were consistent with a beneficial effect of this CHI application on several indicators of well-being and stress-related biomarkers (Appendix G, Evidence Table 25).

Zetterqvist et al [105] evaluated the effects of an internet-based self-help stress management program. The program was entirely delivered via the internet and included applied relaxation, problem solving, time management, and cognitive restructuring. The results of this investigation indicate that no measureable intervention effect was found in that both the treatment and control groups improved significantly at follow up in terms of perceived stress scores and the Hospital Anxiety and Depression Scale. In addition, participant attrition was significant.

Asthma and Chronic Obstructive Pulmonary Disease

Summary of the Findings

Three studies evaluated the impact of CHI applications on intermediate outcomes in asthma[8,10,109] and one in chronic obstructive pulmonary disease (COPD).[110] Outcomes of interest included adherence, change in behavior in relation to rescue inhaler availability, asthma knowledge, change in asthma knowledge, dyspnea knowledge, and self-efficacy in managing dyspnea (Table 15). Across these studies, the body of the scientific evidence suggested that most CHI applications intended for use by individuals with asthma or COPD had variable results. Significant changes were noticed in the areas of change in knowledge.

Strengths and Limitations of the Evidence

Overall the volume of the literature in this area is small. There were only three studies on asthma and one on COPD. They evaluated several domains of CHI impact on intermediate outcomes. Studies addressing intermediate outcomes in asthma had a wide range of study participants, ranging from very low (<30 participants per arm)[8] to low (>70 participants per arm).[10,109] The one study addressing intermediate outcomes of CHI applications on COPD had a small sample size (<30 participants per arm)[110](Appendix G, Evidence Tables 26-28). The quality of these four trials was moderate to low. All studies lacked information on blinding, were single blinded, and/or used inappropriate blinding methods as measured by the Jadad criteria[4] (Appendix G, Evidence Table 1). Consumer postintervention evaluations ranged from as little as 12 weeks to as many as 6 months. The overall strength of the body of this evidence (Table 16) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

General Study Characteristics

Studies that evaluated the impact of CHI applications on asthma-related intermediate outcomes looked at individuals under the age of 17 years, and/or their caregivers. The population of interest in the study addressing COPD was much older–greater than 68 years old. Information regarding gender across these studies was reported and can be found in Appendix G, Evidence Table 26. Information on race/ethnicity was reported in only one study[8] where the population was identified as mainly white, non-Hispanic. The education level of participants (children) in studies addressing asthma was not reported. In one study where caregivers were under evaluation,[10] over 50 percent of the caregivers had a high school diploma or below. The education level of caregivers in the other study[8] was not reported; education levels of the children were reported, but were not of value for this report (Appendix G, Evidence Tables 26 and 27).

Outcomes

Adherence. The impact of CHI applications on adherence was measured in two of the three articles addressing asthma. Jan et al[10] evaluated Blue Angel for Asthma Kids, an Internet-based interactive asthma educational and monitoring program. The intervention group was taught to monitor their peak expiratory flows (PEF) and asthma symptoms daily on the Internet. The also received an interactive response consisting of a self-management plan from the Blue Angel monitoring program. The control group received a traditional asthma care plan consisting of a written asthma diary supplemented with instructions for self-management. The results of this study indicate that the intervention group experienced significantly decreased nighttime (p=0.028) and daytime symptoms (p= 0.009); improved morning (p=0.017) and night peak expiratory flow (p=0.010); increased adherence rates (p<0.05); improved well-controlled asthma rates (p<0.05); improved knowledge regarding self-management (p<0.05); and improved quality of life (p<0.05) when compared with conventional management.

Joseph et al[109] evaluated a multimedia, Web-based asthma management program to specifically target urban high school students. The program uses "tailoring," in conjunction with theory based models, to alter behavior through individualized health messages based on the user's beliefs, attitudes, and personal barriers to change. The control group was given access to a generic asthma Website. The results of this investigation indicate that at 12 month follow up, the intervention group reported fewer symptom-days (p= 0.003), fewer symptom-nights (p=0.009), fewer school days missed (p=0.006), fewer restricted activity days (p=0.02) and fewer hospitalizations for asthma (p=0.01) when compared with control (Appendix G, Evidence Table 28).

Table 15. Results of studies on CHI applications impacting intermediate outcomes in asthma and COPD (N=4).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Applications*
Asthma	3	Jan et al 7007[10]	Asthma education and an interactive asthma monitoring system	Monitoring adherence (peak flow meter technique score)	0
				Monitoring adherence (asthma diary entries per month)	+
				Therapeutic adherence (DPI or MDI plus spacer technique score	0
				Therapeutic adherence	0
				Therapeutic adherence (adherence to inhaled corticosteroid)	0
		Joseph, et al 2007[109]	"Puff City" Internet intervention	Controller medication adherence:	0
				Positive, no negative, or negative behavior change	0
				Rescue inhaler availability: positive behavior, no negative, or negative behavior change	0
		Krishna et al 2003[8]	Internet-enabled asthma education program	Asthma knowledge score (caregivers of children 0-6 17years old)	+
				Asthma knowledge score (caregivers of children 7-17 17years old)	+
				Asthma knowledge score (children 7-17 17years old) †	+
				Change in knowledge (caregivers of children 0-6 17years old) †	+
				Change in knowledge (caregivers of children 7-17years old)	+
				Change in knowledge (children 7-1717years old)	+
COPD	1	Nguyen et al 2008[9]	Internet-based dyspnea self-management	Dyspnea knowledge score (range 0-15 17years old)	+
				Self-efficacy score for managing dyspnea (range 0-10 17years old)	0

***** (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

† while the CHI application showed positive impact in knowledge scores across groups, the change in scores was most significant in these two groups using the application

DPI=dry powder inhaler; MDI=metered dose inhaler

Table 16. Grade of the body of evidence addressing CHI impact on intermediate outcomes in asthma/COPD.

1	Protection against risk of bias (relates to study design, study quality, reporting bias)	Moderate
2	Number of studies	4
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Knowledge. Krishna et al[8] evaluated whether health outcomes of children who have asthma can be improved through the use of an Internet-enabled interactive multimedia asthma education program. Children and caregivers in both the intervention and control groups received traditional patient education. Intervention group participants also received self-management education through the Interactive Multimedia Program for Asthma Control and Tracking. Results indicate that the intervention significantly increased asthma knowledge of children ($p<0.001$) as compared to controls.

Nguyen et al [111] measured the efficacy of an Internet-based and face-to-face self management program in people living with COPD. The content of the two programs was similar, focusing on education, skills training, and ongoing support for dyspnea self-management. The only difference was the mode of administration (Internet/personal digital assistant (PDA) or face-to-face) of the education sessions, reinforcement contacts, and peer interactions. The results indicate that there were improvements in knowledge of dyspnea management strategies in both groups, however there were no significant group by time differences. (Appendix G, Evidence Table 28).

Self efficacy. Nguyen et al [111] also measured the efficacy of an Internet-based and face-to-face self management program to increase self efficacy among people living with COPD. As outlined above, the content of the two programs were similar, focusing on education, skills training, and ongoing support for dyspnea self-management. The only difference was the mode of administration (Internet/personal digital assistant [PDA] or face-to-face) of the education sessions, reinforcement contacts, and peer interactions. The results indicate that there were improvements in self-efficacy for managing dyspnea in both groups, however there were no significant group by time differences (Appendix G, Evidence Table 28).

Miscellaneous Intermediate Outcomes

Summary of the Findings

Sixteen studies evaluated the impact of CHI applications on intermediate outcomes across 13 other categorical diseases and health issues. These included cardiovascular disease,[112,113] arthritis,[114] back pain,[115] behavioral risk factor management,[116] cancer,[15,117], caregiver decision-making,[118] health behavior change,[119] headache,[120] HIV/AIDS,[121] menopause/hormone replacement therapy (HRT),[122,123] fall prevention,[124] adolescent risk behavior, [125] and contraception[9] (Appendix G, Evidence Tables 29-31). Across these studies, the CHI applications had varying effects on intermediate outcomes. The studies were too heterogeneous and the volume of studies on any single topic too few to support a conclusion about the effectiveness of CHI applications for these conditions.

Strengths and Limitations of the Evidence

The volume of the literature in this area is at a very early and incomplete stage of development. With the exception of studies focusing on cardiovascular disease, cancer, and menopause/HRT, which had two studies each, all other health issues had only one study evaluating an intermediate outcome for that topic area (Appendix G, Evidence Tables 29-31). The quality of these trials was variable with several studies lacking in one or more methodological domains of RCT quality as measured by the Jadad criteria[4] (Appendix G, Evidence Table 1). The overall grade of this body of evidence was insufficient based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

General Study Characteristics

Most of these studies involved adults of varying race and ethnicities, from 22 to 89 years of age, with widely varying educational backgrounds. One study[125] involved adolescent teens aged 13-17. Outcomes of interest included self-efficacy,[112,114,124] medication compliance,[126] activity limitation,[114] self-reported global health,[114] arthritic pain,[114] fat intake,[116] physical activity,[116] satisfaction with care,[15] receipt of Pap smear,[117] caregiver decisional confidence,[118,121] decisionmaking skill,[118,121] social isolation,[118,121] preventive care uptake,[119] headache symptoms,[120] depressive symptoms,[120] anxiety,[120] reduced health status decline,[121] knowledge,[9,122,123] satisfaction with decisions,[122] reduced decisional conflict,[122] realistic health expectations,[123] high cigarette use, frequent marijuana use, high alcohol use, problems at home, often feeling sad or upset, feeling sad or down lately, taking meds, having a love interest, having sex, desiring contraceptive information,[125] and behavioral intention.[127] Postintervention followup time ranged from immediate postintervention to 1 year. Samples sizes were generally small, ranging from 8 to 344 subjects per arm of the study, except for two larger studies which had sample sizes of 827 and 930 in each arm,[116] and 940 and1066 in each arm[119] (Appendix G, Evidence Tables 30 and 31).

Outcomes

Adolescent risk behavior. Paperny et al[125] evaluated the effect of a written Personalized Health Risk Assesment (HRA) (controls) that is shared with a clinician to a computerized HRA that was (intervention #2) or was not (intervention number 1) shared with a clinician. Over 75 percent of the participants were White or of Asian descent, 52 percent were males, and approximately 10 percent were receiving financial assistance. The results indicated that significant postintervention reductions in high cigarette use (p=<0.01/p=<0.03); reductions in frequent marijuana use (p=<0.04/p=<0.03); reductions in problems with parents (p=0.001/p=0.001); and reductions in often sad, upset, or unhappy feelings (p=0.001/p=0.007) were achieved in both treatment groups (did not share computerized HRA with clinician/shared computerized HRA with clinician) as compared to controls (written HRA shared with clinicians). Significant reductions in high alcohol use (p=<0.02/NS), feeling sad or down lately (p=<0.04/NS), and has a current lover (p=<0.03/NS) were only significant in the group that did not share their HRA with the clinician. Finally there was no measureable effect of the intervention on having sexual intercourse (NS/NS) or taking medications (NS/NS).

Arthritis. Lorig et al[114] conducted an evaluation of an Internet-based arthritis self-management program among patients with rheumatoid arthritis, osteoarthritis, or fibromyalgia. At 1-year postintervention, patients in the intervention group demonstrated significant improvement in health distress (p< 0.001), activity limitation (p< 0.001), self-reported global health (p=0.004), and pain (p<0.001) and self-efficacy (p=0.018). No impact was seen on health care utilization or health behaviors (Appendix G, Evidence Table 31).

Back pain. Buhrman et al[115] investigated the impact of an Internet-based cognitive-behavioral intervention with telephone support for chronic back pain. At 3-month postintervention followup evaluation there was significant improvement for several Coping Strategies Subscale items including praying and hoping (p=0.032), catastrophizing (p=0.005), control of pain (p<0.001), and ability to decrease pain (p<0.0001). In addition, significant improvement was also found on Multidimensional Pain Inventory subscales for life control (p<0.001) and decrease of punishing responses (p<0.05). Results on the Pain Impairment Rating Scale showed a significant reduction (p<0.01), while a significant decrease was also found on the Hospital and Anxiety Depression Scale (p<0.001) (Appendix G, Evidence Table 31).

Behavioral risk factor control. Oenema et al[116] evaluated the impact of an Internet-delivered, computer-tailored lifestyle intervention targeting saturated fat intake, physical activity (PA), and smoking cessation. At 1-month postintervention followup the intervention group had a significantly lower self-reported saturated fat intake (p<0.01) and a higher likelihood of meeting the physical activity guidelines among respondents who were insufficiently active at baseline (OR, 1.34, 95 percent CI, 1.001–1.80). No significant effects were found for self-reported smoking status (Appendix G, Evidence Table 31).

Contraception. Chewning [9] et al conducted a study to evaluate a computer-based contraceptive decision aid among young women. At 1-year postintervention followup, intervention participants demonstrated higher oral contraceptive knowledge than controls (p=0.00) (Appendix G, Evidence Table 31).

Cardiovascular disease. Kukafka et al[112] investigated if a tailored, Web-based, cardiovascular disease educational system could influence self-efficacy regarding a patient's likelihood of acting appropriately in response to acute myocardial infarction symptoms. At 3-months postintervention followup evaluation, patients in the Web-based intervention arm of the

study demonstrated significant increases in self-efficacy to label symptom sensations ($p<0.001$), self-efficacy to respond to symptom sensations ($p<0.05$), and cognitive control self-efficacy ($p<0.001$) (Appendix G, Evidence Table 31).

Cancer. Jones et al[15] conducted an investigation to compare the use and effect of a computer-based personalized information system for cancer patients using each patient's medical record with a computer system providing only general information and with information provided in booklets. At postintervention followup, patients in the personalized computer intervention group were more likely to learn something new ($p=0.03$), thought that the information was relevant ($p=0.02$), and had higher satisfaction scores ($p=0.04$) than patients in the general computer information group. In addition, patients who used the printed booklets were more likely to feel overwhelmed by the information ($p<0.001$) and felt that the information was too limited ($p<0.001$). Finally, at 3-months postintervention, patients who used the printed booklets were less likely to prefer the computer to a 10-minute, in-person consultation ($p<0.001$). Campbell et al[117] assessed the impact of computer-generated printed feedback on cervical screening among women who were under-screened for cervical cancer. Significant 6-month postintervention screening rates were demonstrated only among under-screened women between 50-70 years of age ($p<0.5$) (Appendix G, Evidence Table 31).

Caregiver decision. Brennan et al[118] evaluated CompuLink, which is an online support application, designed to enhance decisionmaking confidence and skill by provision of information, decision-support tools, and communication (email). An evaluation of this application documented an association between CompuLink and significantly improved decisionmaking confidence ($p<0.01$). However no change was seen in terms of decisionmaking skill, social isolation, or health status (Appendix G, Evidence Table 31).

Fall prevention. Yardley et al[124] conducted an evaluation of an interactive Web-based program that provides tailored advice about undertaking SBT activities among seniors 65-97 years of age. Postintervention evaluation suggests that there was a significant difference between the tailored and control groups on ratings of the personal relevance of the advice ($p =0.014$), self-efficacy for carrying out SBT ($p=0.047$), and intention to carry out strength and balance training ($p=0.039$). The intervention did not exert any measurable effects on reports of the advice being more suitable or interesting or expectation that the recommended activities would improve their balance (Appendix G, Evidence Table 31).

Health behavior change. Harari et al[119] conducted an RCT to evaluate the impact on health behaviors and use of preventive health care services of a computer-generated, tailored, health education system. At 1-year followup evaluation there were no significant differences in self-reported health risk behavior, except for a small but statistically significant difference in adherence with recommended levels of physical activity (at least 5 times per week moderate to strenuous) ($P = 0.03$). In terms of preventive health care uptake, there was a significant increase in pneumococcal vaccination rates ($P=0.04$) among patients enrolled in the computer-based intervention (Appendix G, Evidence Table 31).

Headache. Devineni et al [120] evaluated an Internet-delivered behavioral intervention versus a symptom monitoring waiting list control group among patients with chronic headache. Two-month postintervention evaluations indicated significant reductions in headache index scores ($p<0.05$). There were also significant improvements on the Headache Symptom Questionnaire ($p<0.01$) and the Headache Disability Inventory ($p<0.05$) (Appendix G, Evidence Table 31).

HIV/AIDS. Brennan et al[121] conducted a second study of CompuLink (see above) among persons living with HIV/AIDS. This investigation suggested an association between using CompuLink and reduced levels of social isolation ($p<0.01$) and improved decisionmaking confidence ($p<0.0$). However no change was seen in terms of decisionmaking skill or health status as compared to controls.

Menopause/HRT utilization. Shapira et al[122] conducted an RCT of a computer-based hormone therapy (HT) decision-aid versus print material among postmenopausal women. At 3-months postintervention followup evaluation, there was no measurable difference between groups with respect to knowledge, satisfaction with decision, decisional conflict, or hormone therapy use. Rostom et al [123] conducted an investigation to compare the efficacy of a computerized decision aid compared to an audio booklet among women considering long-term HRT. The results of a postintervention evaluation indicated that the computerized decision aid intervention significantly increased realistic expectations ($p=0.015$) and knowledge ($p=0.019$) among women considering long term HRT (Appendix G, Evidence Table 31).

Key Question 1c: What evidence exists that consumer health informatics applications impact relationship-centered outcomes?

Summary of the Findings

Eight studies evaluated the impact of CHI applications on various aspects of relationship-centered outcomes (Tables 17 and 19, and Appendix G, Evidence Tables 32-34). Outcomes of interest include social support, quality of life, health information competence, decision confidence, improved decision making skill, reduced social isolation, level of positive interaction with the provider, and satisfaction with care. These outcomes were examined in the context of five health problems, which include breast cancer, caregiver decision making, osteoarthritis, newborn birth and delivery, and HIV/AIDS. Across these studies, the body of the scientific evidence indicated that most CHI applications evaluated to date had equivocal effects on relationship-centered health outcomes.

Table 17. Studies of CHI applications impacting relationship-centered outcomes in women with breast cancer (N=4).

Target condition	N	Author, year	Interventions	Primary outcomes measured
Caregiver decision making	1	Brennan, 1995[118]	Experimental	Decision confidence
				Improved decision making skill
				Isolation
HIV/AIDS	1	Flatley-Brennan, 1998[121]	Computer Link	Improved decision making confidence
				Improved decision making skill
				Reduced social isolation
				Differential decline in health status
Arthritis	1	Sciamanna, 2005[131]	Patient satisfaction after intervention	Patient overall satisfaction score with the osteoarthritis care they are receiving
			Satisfaction with care	Peak consumption: max number of drinks per drinking day
Vaginal or c-section delivery	1	Montgomery, 2007[130]	Information	DCS at followup
			Decision analysis	Difference between groups in total score on DCS (decision vs. usual care)
				Odds ratio for caesarean (elective & emergency) vs. vaginal decision vs. usual care
				Satisfaction with decision (decision analysis vs. usual care)
				Mode of delivery - elective caesarean
				Delivery - emergency caesarean
				Delivery - vaginal birth

CHESS = Comprehensive Health Enhancement Support System; DCS= decisional conflict scale; IVD= interactive video disc system

Strengths and Limitations of the Evidence

Eight studies evaluated several domains of CHI impact on relationship-centered care outcomes. With the exception of breast cancer, for which there were four studies regarding relationship-centered outcomes,[13,14,128,129] all other topics were evaluated by a single study: HIV/AIDS,[121] newborn delivery,[130] osteoarthritis,[131] and Alzheimer's disease and caregiver decisionmaking.[118] Only one study[130] was large, with 147 to 201 subjects per arm of the study; all other studies relied on very small sample sizes (< 80 subjects per arm) (Appendix G, Evidence Tables 32-34). The quality of these eight trials was variable with several studies lacking in one or more methodological domains of RCT quality as measured by the Jadad[4] criteria (Appendix G, Evidence Table 32-34). Patient postintervention evaluations ranged from as little as 2 months to as many as 12 months. The overall strength of the body of this evidence (Table 18) was graded as moderate for studies on breast cancer based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

Table 18. Grade of the body of evidence addressing CHI impact on relationship-centered outcomes in breast cancer.

1	Protection against risk of bias (relates to study design, study quality, reporting bias	Moderate
2	Number of studies	4
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low): if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

General Study Characteristics

The studies that were evaluations of the impact of CHI applications on relationship-centered care generally were tested among an adult, non-elderly population. The mean age of study participants across studies was 32 to 52 years. One additional study was among participants with an average age of 64. Information regarding gender across these studies was generally not reported. Because 4 of the studies were conducted in the context of breast cancer[13,14,128,129] and a fifth study was conducted in the context of newborn birth decision,[130] it can be inferred that these six studies were completely among female participants. Only six studies reported on the race/ethnicity of study participants. Of these, 4 studies included only non-Hispanic white participants. One additional study included whites and African Americans while a final study included whites, African-Americans, Asian/Pacific Islanders and Hispanics (Appendix G, Evidence Tables 32 and 33).

Outcomes

Breast cancer. When evaluating social support, quality of life, and health confidence among women with breast cancer, Gustafson et al[14] found that the Comprehensive Health Enhancement Support System (CHESS) provided significantly more social support (p=0.003) and enabled greater quality of life (p=0.029) and health information competence (p=0.007) than Internet access alone at 2 months. The effect of CHESS remained for social support (p=0.027) and quality of life (p=0.047) at 4 months, while no effects of CHESS were observed at 9 months for social support, quality of life, or health information confidence.

Gustafson[13] also evaluated the effectiveness of the CHESS among younger underserved women. At the 2-month postintervention followup, CHESS had significant impact on patient

information competence ($p<0.05$), level of comfort with the health care system ($p<0.01$), and increased confidence in doctors ($p<0.05$).

Maslin et al[129] studied the effectiveness of a shared decision making computer program (interactive video disc) for women with early breast cancer contemplating surgical and chemotherapeutic options. Use of the interactive video disk did not have significant effect on the treatment decisions made by women participating in the study.

Green et al[128] compared the effectiveness of counseling alone versus counseling preceded by use of a computer-based decision aid among women referred to genetic counseling for a family or personal history of breast cancer. Postintervention evaluations suggested that participants rated 11 of 12 specific attributes of the effectiveness of the counseling sessions significantly higher ($P < 0.0001$) compared with the counselors. Overall, computer program use resulted in shorter face-to-face counseling sessions among women at low risk for carrying breast cancer gene mutations ($p=0.027$) (Table 19, and Appendix G, Evidence Table 34).

Table 19. Results of studies on CHI applications impacting relationship-centered outcomes in breast cancer (N=4).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Applications
Breast cancer	4	Green, 2005[128]	Counseling and Computer	Alter content of discussions	+
				Change the way they used their time	+
				Used time more efficiently	+
				Skip material typically present	+
				Effectiveness of counseling session	+
				Shorter counseling sessions	+
		Gustafson, 2008[14]	Internet CHESS	Social support	+
				Quality of life	+
				Health competence	+
		Gustafson, 2001[13]	CHESS	Information competence	+
				Participation	+
				Confidence in doctors	+
		Maslin, 1998[129]	IVD shared decision making	Anxiety and depression	+
				Satisfaction with treatment decision	0

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome
CHESS = Comprehensive Health Enhancement Support System; IVD = interactive videodisc system

Caregiver decisionmaking (Alzheimer's disease). CompuLink[118] is an online support application designed to enhance decisionmaking confidence and skill by provision of information, decision support tools, and communication (email). An evaluation of this application documented an association between use of CompuLink and significantly improved decisionmaking confidence ($p<0.01$). No change was seen in terms of decisionmaking skill, social isolation, or health status (Appendix G, Evidence table 34).

HIV/AIDS. In another study of CompuLink [121] among persons living with HIV/AIDS, data suggested an association between use of CompuLink and reduced levels of social isolation ($p<0.01$) and improved decisionmaking confidence ($p<0.0$). No change was seen in terms of decisionmaking skill or health status as compared to controls (Appendix G, Evidence table 34).

Osteoarthritis. Sciamanna et al[131] evaluated the effect of a Web-based osteoarthritis educational application on patients' perceptions of the quality of their osteoarthritis care. This application failed to produce a measurable effect on patient satisfaction with osteoarthritis care as compared to controls (Appendix G, Evidence table 34).

Newborn delivery. Montgomery et al[130] investigated the effects of two computer-based decision aids (an information program and individualized decision analysis) on decisional conflict and actual mode of delivery among a group of pregnant women with one previous caesarean section. The results of this study indicate that there was no significant effect of either of these computer-based decision aids on decisional conflict or mode of delivery (Appendix G, Evidence table 34).

Key Question 1d: What evidence exists that consumer health informatics applications impact clinical outcomes?

Breast Cancer

Summary of the Findings

Three studies addressed the impact of CHI applications on breast cancer clinical outcomes. Outcomes of interest include quality of life, well-being, physical functioning, and anxiety (Table 20). All three studies were RCTs and the quality of these studies varied from very low to low. Across these studies the body of the scientific evidence suggests that CHI applications intended for use by individuals with breast cancer have a neutral to positive impact.

Table 20. Results of studies on CHI applications impacting clinical outcomes in breast cancer (N=3)

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Breast Cancer	3	Gustafson, 2001[13]	CHESS	Social/family well being (quality of life)	0
				Emotional well-being (quality of life)	0
				Functional well-being (quality of life)	0
				Breast cancer concerns (quality of life)	0
		Gustafson, 2008[14]	CHESS	Quality of life	0
		Maslin, 1998[129]	IVD shared decision programme	Anxiety and depression†	+
				Physical functioning	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

† significant impact of CHI was seen in this outcome

CHESS= Comprehensive Health Enhancement Support System; IVD= interactive video disc system

Strengths and Limitations of the Evidence

Overall the volume of the literature in this area is small (three studies). Many domains of CHI application impact on clinical outcomes with individuals with breast cancer were measured. The three studies had low[13] to very low[14,129] numbers of study participants. Followup periods were either shot (2 months) or not reported (Appendix G, Evidence Tables 35-37). None of the studies contained any information on blinding as measured by the Jadad criteria[4] (Appendix G, Evidence Table 1). The overall strength of the body of this evidence (Table 21) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual[6]

General Study Characteristics

Studies that evaluated the impact of CHI applications on breast cancer clinical outcomes-outcomes looked at individuals between the ages of 44 and 52; age was only reported in two studies.[14,129] Information regarding gender across these studies was not reported. Information on race/ethnicity was reported in only in two studies as predominantly white, non-Hispanic. [14,129] (Appendix G, Evidence Tables 36 and 37).

Outcomes

To assess the impact of a computer-based patient support system on quality of life in younger women with breast cancer, 246 newly diagnosed breast cancer patients under age 60 were randomized to a control group or an experimental group that received Comprehensive Health Enhancement Support System (CHESS), a home-based computer system providing information, decision-making, and emotional support. At 5-month followup, no statistical difference was shown in quality of life between the control and CHESS group.[13] No significant improvement in quality of life was demonstrated by the same authors in another study in 257 breast cancer patients after 9-month followup.[14]

Another study evaluated the usefulness of a shared decisionmaking program for women with early breast cancer; looking at surgical and adjuvant treatment options (chemotherapy) using a personalized computerized interactive video system.[129] One hundred patients were randomized to an intervention group (n=51) or control group (n=49). The study showed improvement in the following clinical outcomes: a significant fall in anxiety after 9 months measured by the Hospital Anxiety and Depression Scale ($p<0.001$), improvement in the physical functioning sub-score of general quality of life measured by the Medical Outcomes Study Short Form 36 questionnaire (Table 22, and Appendix G, Evidence Table 37).

Table 21. Grade of the body of evidence addressing CHI impact on clinical outcomes in individuals with breast cancer.

1	Protection against risk of bias	Low
2	Number of studies	3
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	Very low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Diabetes Mellitus

Summary of the Findings

Three studies addressed the impact of CHI applications on clinical outcomes in individuals with diabetes mellitus. Outcomes of interest were the use of insulin therapy, and measures of hemoglobin A1c (HbA1c), total glucose, triglycerides, and fasting blood glucose. (Table 22) All three studies were RCTs and the quality of these studies was low (Appendix G, Evidence Table 1). There was no indication of significant impact of the CHI application on outcomes in two studies.[92,132] One study[94] showed a positive impact on HbA1c.

Strengths and Limitations of the Evidence

The volume of this literature is small. All three studies had a small number (<30) participants. Followup periods ranged from 37 weeks[92] to 12 months[132] (Appendix G, Evidence Tables 35-37). Blinding, as measured by the Jadad criteria,[4] was not reported in any of the studies (Appendix G, Evidence Table 1). The overall strength of the body of this evidence (Table 23) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual[6]

Table 22. Results of studies on CHI applications impacting clinical outcomes in diabetes mellitus (N=3).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diabetes	3	Homko, 2007[92]	Telemedicine	Insulin therapy	0
				FBS	0
				A1c at time of delivery	0
		Tjam, 2006[132]	Individuals with interactive Internet program	A1C (%)	0
				FBG (MMOL/L)	0
				TC (MMOL/L	0
				TG (MMOL/L)	0
		Wise et al [94]	Interactive computer assessment	HbA1c	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome
† significant impact of CHI was seen in this outcome
FBG = fasting blood glucose; FBS = fasting blood sugar; HbA1c = hemoglobin A1c; MMOL/L = millimoles per litre; TC = total cholesterol; TG = triglycerides

Table 23. Grade of the body of evidence addressing CHI impact on clinical outcomes in individuals with diabetes mellitus.

1	Protection against risk of bias	Low
2	Number of studies	3
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	0
	Overall grade of evidence‡	low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low): if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Outcomes

To demonstrate the feasibility of monitoring glucose control among indigent women with GDM over the Internet, women with GDM were randomized to either the Internet group (n=32) or the control group (n=25).[92] Patients in the Internet group were provided with computers and/or Internet access if needed. A Web site was established for documentation of glucose values and communication between the patient and the health care team. Women in the control group maintained paper log books, which were reviewed at each prenatal visit. There was no difference between the two groups in regards to either fasting or postprandial blood glucose values,

although more women in the Internet group received insulin therapy (31 percent vs. 4 percent; P<0.05). There were also no significant differences in pregnancy and neonatal outcomes between the two groups. [92]

Another study compared physiological outcomes between an interactive diabetes Internet program and the Diabetes Education Centers with respect to followup care for on-going diabetes management. Participants were followed for 1 year and were assessed at baseline, 3 months, 6 months, and 1 year. Triglyceride levels improved significantly in the intervention group from baseline to followup. Hemoglobin A1c levels were also significantly improved in the intervention group at 3 months, but this improvement was not sustained to the 6-month or 1-year time points.

Wise et al[94] evaluated the impact of an interactive computer program on process and clinical outcomes among insulin-dependent and noninsulin-dependent patients with diabetes. At 4-6 months, this application significantly improved HBA1c among both insulin dependent and non-insulin dependent (Appendix G, Evidence Table 37).

Diet, Exercise, Physical Activity, not Obesity

Summary of the Findings

Five studies addressed the impact of CHI applications on clinical outcomes related to diet, exercise, or physical activity, not obesity. Clinical outcomes of interest were weight loss, change in body weight, and change in body fat (Table 23). All of the studies were RCTs and four of the five had low study quality (Appendix G, Evidence Table 1). One study by Tate et al[44] received a Jadad score of high due to the fact that it was blinded. Overall the studies showed results indicating either no impact or a positive impact on one of the outcomes.

Strengths and Limitations of the Evidence

The volume of this literature is small, including only five studies addressing clinical outcomes in CHI applications focused on in diet, exercise, physical activity, not obesity. Four of the studies has small sample sizes of under 80 participants[17,81,83,85] On study had a large number of study participants; over 200.[44] Followup periods ranged from 6 to 24 months. Blinding, as measured by the Jadad criteria,[4] was reported in one[44] study but not in the remaining 4 of the other studies (Appendix G, Evidence Table 1). The overall strength of the body of this evidence (Table 24) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual.[6]

Outcomes

To assess computer-tailored feedback, 192 adults with a mean age of 49.2 years (SD 9.8) and a mean BMI of 32.7 (SD 3.5) were randomized to one of three Internet treatment groups: no counseling, computer-automated feedback, or human email counseling. All participants received one weight loss group session, coupons for meal replacements, and access to an interactive Web site. The human email counseling and computer-automated feedback groups also had access to an electronic diary and message board. The human email counseling group received weekly

Table 23. Results of studies on CHI applications impacting clinical outcomes in diet, exercise, physical activity, not obesity (N=5).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Diet/exercise/ physical activity	5	Adachi, 2007[†17]	Computer tailored program with 6-mos weight and targeted behavior's self-monitoring, (Group KM) Computer tailored program only, (Group K)	Percent weight loss	+
		Hunter, 2008[85]	BIT	Body weight (kg)	+
		McConnon, 2007[81]	Internet group	Loss of 5% or more body weight (12 months)	0
		Tate, 2006[44]	Tailored Computer-Automated Feedback Human Email Counseling	Weight loss	+
		Williamson, 2006[83]	Interactive Nutrition education program and Internet counseling behavioral therapy for the intervention group	Body weight [‡](kg)	0
				Body fat [‖](%)	+

* (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

[†] the greatest effect of the intervention was seen at the 1-month post intervention time interval

[‡] both parents and children showed a decrease in bodyweight at 6months, at the end of the followup period of 2 years all weight lost was regained and there was no difference between intervention and control.

[‖] positive impact of reduction of body fat was greater in children and was only reported for the first 6 months post-intervention

BIT= behavioral Internet treatment; BMI= body mass index: ; kg = kilogram

Table 24. Grade of the body of evidence addressing CHI impact on clinical outcomes related to diet, exercise, or physical activity, not obesity.

1	Protection against risk of bias	Low
2	Number of studies	5
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	-1
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	1
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

e-mail feedback from a counselor, and the computer-automated feedback group received automated, tailored messages. At 3 months, weight loss was greater for completers in both the computer-automated feedback group (mean 5.3 kg, SD 4.2 kg) and human email counseling group (mean 6.1 kg, SD 3.9 kg) compared with the no-counseling group (mean 2.8 kg, SD 3.5 kg), and the two intervention groups did not differ from each other. At 6 months, weight loss was significantly greater in the human email counseling group (mean 7.3 kg, SD 6.2 kg) than in the computer-automated feedback group (mean 4.9 kg, SD 5.9 kg) or no-counseling group (mean 2.6, SD 5.7 kg). Intent-to-treat analyses using single or multiple imputation techniques showed the same pattern of significance. Providing automated computer-tailored feedback in an Internet weight loss program was as effective as human email counseling at 3 months. [44]

Another study examined the long-term effects of a new behavioral weight control program (Kenkou-tatsujins, KT program) consisting of interactive communications twice in a month communications including computer-tailored personal advice on treatment needs and behavioral modification. Two hundred and five overweight Japanese women were recruited in an RCT comparing Group KM (KT program with 6-month weight and targeted behavior self-monitoring), Group K (KT program only), Group BM (an untailored self-help booklet with 7-month self-monitoring of weight and walking), and Group B (the self-help booklet only). Significant weight loss was observed in all groups. At 1 month, weight loss was greatest for Groups KM and K, but at 7 months, the mean weight loss was significantly more in Group KM than the other three groups. [17]

To evaluate the efficacy of an Internet-based program for weight loss and weight-gain prevention, 446 overweight individuals (222 men; 224 women) with a mean age of 34 years and a mean BMI of 29 were recruited from a military medical research center with a population of 17,000 active-duty military personnel. Participants were randomly assigned to receive a 6-month behavioral Internet treatment (BIT, n=227) or usual care (n=224). After 6 months, completers who received BIT lost a mean of 1.3 kg while those assigned to usual care gained a mean of 0.6 kg (<0.001). [85]

To determine the effectiveness of an Internet-based resource for obesity management, an RCT was conducted in a community setting, where obese volunteers were randomly assigned to an Internet group (n = 111) or usual care group (n =110). Data were collected at baseline, 6 months, and 12 months. Based on analysis conducted on all available data, the Internet group lost a mean of 1.3 kg, compared with a 1.9 kg weight loss in the usual care group at 12 months, a nonsignificant difference (difference = 0.6 kg; 95 percent CI: -1.4 to 2.5, p = 0.56). This trial failed to show any additional benefit of this Web site in terms of weight loss compared with usual care. [81]

To test the efficacy of an Internet-based lifestyle behavior modification program for African American girls over a 2-year period of intervention, 57 overweight African American girls (mean BMI percentile, 98.3; mean age, 13.2 years) were randomly assigned to an interactive behavioral Internet program or an Internet health education program, the control condition. Overweight parents were also participants in the study. Forty adolescent-parent dyads (70 percent) completed the 2-year trial. In comparison with the control condition, adolescents in the behavioral program lost more mean body fat (BF) (-1.12 percent, SD 0.47 percent vs. 0.43 percent, SD 0.47 percent , $p < 0.05$), and parents in the behavioral program lost significantly more mean body weight (-2.43 kg, SD 0.66 kg vs. -0.35 kg, SD 0.64 kg, $p<0.05$) during the first 6 months. This weight loss was regained over the next 18 months. After 2 years, differences in BF for adolescents (mean -0.08 percent, SD 0.71 percent vs. mean 0.84 percent, SD 0.72 percent) and weight for parents (mean -1.1 kg, SD 0.91 vs. mean -0.60 kg, SD 0.89 kg) did not differ between the behavioral and control programs. An Internet-based weight management program for African American adolescent girls and their parents resulted in weight loss during the first 6 months but did not yield long-term loss due to reduced use of the Web site over time [83](Table 23, and Appendix G, Evidence Table 37).

Mental Health

Summary of the Findings

Seven studies addressed the impact of CHI applications on mental health clinical outcomes (Table 25). Outcomes of interest include depression, anxiety, and serological measures. All of these studies were RCTs and received low scores according to the Jadad criteria (Appendix G, Evidence table 1). All of the studies indicated a positive impact of the CHI application on at least one of the reported outcomes. One study by Orbach et al[133] showed a positive impact on anxiety but no impact on the Hem reasoning test or general self efficacy.

Strengths and Limitations of the Evidence

The volume of this evidence is small, including only seven studies. Sample sizes in these studies ranged from very small (<20) in March et al[134]to greater than 100 participants in Chrstensen et al[99], Ker et al[135] and Hasson et al[100] Followup periods were not reported in all seven studies, but where they were reported, they ranged from 6 weeks[99] up to 12 months.[135] Blinding, as measured by the Jadad criteria,[4] was not reported in any of the studies (Appendix G, Evidence Table 1). The overall strength of the body of this evidence (Table 26) was graded as low based on a modified version of the GRADE criteria[5] and Chapter 11 of the EPC Manual[6]

Table 25. Results of studies on CHI applications impacting clinical outcomes in mental health (N=7).

Target condition	N	Author, year	Interventions	Primary outcomes measured	Effect of CHI Application*
Mental Health	7	Christensen, 2004[†99]	Blue Pages: Computer based psycho education Web site offering information about depression MoodGYM: Computer based Cognitive Behavior therapy	Center for Epidemiologic depression scale	+
		Hasson, 2005[100]	Web-based stress management system	DHE-S	+
				NPY	+
				CgA	+
				TNFα	+
		Kerr, 2008[135]	PACEi	CESD score	+
		March, 2008[134]	Web based intervention	Reduction in childhood anxiety	+
		Orbach, 2007[133]	Cognitive Behavior Therapy group (CBT)	Test Anxiety Inventory	+
				Anxiety Hierarchy Questionnaire	+
				Heim Reasoning Test	0
				General Self-Efficacy Scale	0
		Proudfoot, 2003[137]	beating the blues	BDI	+
				BAI	+
				Work and social adjustment scale	+
		Spek, 2008[136]	Group CBT Internet based intervention	Treatment response after 1 yr	+

***** (+) positive impact of the CHI application on outcome; (-) negative impact of the CHI application on outcome; (0) no impact or not a significant of the CHI application on outcome

[†] positive impact was seen in both intervention groups, but was significant only in the MoodGym group

BDI= Beck depression inventory; BAI= Beck anxiety inventory; CBT = Cognitive behavioral therapy; CESD= Center for Epidemiological Studies Depression ; CgA=chromogranin A; DHE-S=dehydroeoiandosterone sulphate; NPY=nueropeptide Y; PACEi= Patient-centered Assessment and Counseling for exercise and nutrition via the Internet; TNFα= tumor necrosis factor α

Table 26. Grade of the body of evidence addressing CHI impact on clinical outcomes in mental health.

1	Protection against risk of bias	Low
2	Number of studies	7
3	Did the studies have important **inconsistency**? y (-1); n (0)	0
4	Was there some (-1) or major (-2) uncertainty about the **directness** or extent to which the **people**, **interventions** and **outcomes** are similar to those of interest? Some (-1); major (-2); none (0)	0
5	Were the studies sparse or imprecise? y (-1); n (0)	0
6	Did the studies show strong evidence of **association between intervention and outcome**? "strong*" (+1); "very strong†" (+2); No (0)	1
	Overall grade of evidence‡	Low

* if significant relative risk or odds ratio > 2 based on consistent evidence from 2 or more studies with no plausible confounders
† if significant relative risk or odds ratio > 5 based on direct evidence with no major threats to validity
‡ (high, moderate, low):if above score is (+), increase grade; if above score is (-), decrease grade from high to moderate (-1) or low (-2).

Outcomes

A total of 191 women and 110 men (mean age 55 years, SD 4.6) with sub-threshold depression were randomized into Internet-based treatment, group CBT (Lewinsohn's Coping with Depression Course) or a waiting-list control condition.[136] The main outcome measure was treatment response after 1 year, defined as the difference in pretreatment and followup scores on the BDI. Simple contrasts showed a significant difference between the waiting-list condition and Internet-based treatment ($p=0.03$) and no difference between both treatment conditions ($p=0.08$).[136]

Another study assessed depressive symptoms in 401 participants in an RCT of a 12-month primary care, phone, and Internet-based behavioral intervention for overweight women. A one-way analysis of variance examining the mean change in Center for Epidemiological Studies Depression (CESD) score from baseline to 12 months, controlling for age, education, marital status, and employment, showed that those receiving the intervention significantly decreased their CESD scores ($p<0.03$) more than those receiving standard care.[135]

To evaluate the efficacy of an Internet-based cognitive-behavioral therapy (CBT) approach to the treatment of child anxiety disorders, 73 children with anxiety disorders, aged 7 to 12 years, and their parents were randomly assigned to either an Internet-based CBT (NET) or wait-list (WL) condition. The NET condition was reassessed at 6-month followup. At posttreatment assessment, children in the NET condition showed small but significantly greater reductions in anxiety symptoms and increases in functioning than WL participants. These improvements were enhanced during the 6-month followup period, with 75 percent of NET children free of their primary diagnosis. The conclusion was that Internet delivery of CBT for child anxiety offered promise as a way of increasing access to treatment for this population.[134]

To assess possible effects on mental and physical well-being and stress-related biological markers of a Web-based health promotion tool, 303 employees (187 men and 116 women, age 23–64 years) from four information technology and two media companies were enrolled. Half of

the participants were offered Web-based health promotion and stress management training (intervention) lasting for 6 months. All other participants constituted the reference group. Clinical outcomes consisted of different biological markers measured to detect possible physiological changes. After 6 months, the intervention group had improved statistically significantly compared to the reference group on ratings of ability to manage stress, sleep quality, mental energy, concentration ability, and social support. The anabolic hormone dehydroepiandosterone sulphate (DHEA-S) decreased significantly in the reference group as compared to unchanged levels in the intervention group. Neuropeptide Y (NPY) increased significantly in the intervention group compared to the reference group. Chromogranin A (CgA) decreased significantly in the intervention group as compared to the reference group. Tumour necrosis factor α (TNFα) decreased significantly in the reference group compared to the intervention group.[100]

To test the hypothesis that CBT, available on the Internet, could reduce test anxiety, 90 university students were randomly allocated to CBT or a control program, both on the Internet. Before and after treatment, the participants completed the Test Anxiety Inventory (TAI), an Anxiety Hierarchy Questionnaire (AHQ), the Exam Problem-Solving Inventory (EPSI), the General Self-Efficacy Scale (GSES) and the Heim reasoning tests (AH) as a measure of test performance. Of the CBT and control groups 28 percent and 35 percent, respectively, withdrew. According to the TAI, 53 percent of the CBT group showed a reliable and clinically significant improvement with treatment but only 29 percent of the control group exhibited such a change. On the AHQ, 67 percent of the CBT group and 36 percent of the control group showed a clinically significant improvement, more than two standard deviations above the mean of the baseline, a change in favor of CBT. Both groups improved on the GSES, in state anxiety during exams retrospectively assessed, and on the AHQ tests. The study supported use of CBT on the Internet for the treatment of test anxiety. [133]

A study by Christensen et al[99] studied the impact of two different Internet interventions (MoodGym and BluePages) on community-dwelling individuals with symptoms of depression. To measure symptom change after the intervention, the 20-item CESD score was the primary outcome measure. The mean change in score was greater in the Internet intervention groups than in the control group. The difference was significant in the MoodGym group but not the BluePages group.

To measure the impact of the "beating the Blues" (BtB) interactive multimedia CBT program on anxiety and depression, Proudfoot et al 2003[137] compared this program with usual treatment (or treatment as usual) for depression and anxiety. Three measures were used: the BDI, the BAI, and the Work and Social Adjustment (WSA) Scale. There was a significantly greater drop (of 5 points) in the BDI score in the BtB group compared to the usual care group. This drop was seen at 1 month post-intervention and was maintained over the six month followup period. Significance was not reported. A similar result was seen in the BAI score with a difference in reduction in score between the BtB group and usual care of 3 points. This change was sustained over the 6 month followup period. No significance was reported. Again, similar results were seen in the WSA score with a difference in reduction in score between the BtB group and usual care of 3 points. This change was sustained over the 6 month followup period. No significance was reported (Table 24, and Appendix G, Evidence Table 37).

Miscellaneous Outcomes

Summary of the Findings

Ten studies evaluated the impact of CHI applications on clinical outcomes in various other health conditions (Table 27). Outcomes of interest included quality of life and disease-specific clinical outcomes. These outcomes were examined in the context of the following health problems: Alzheimer's disease, arthritis, asthma, back pain, chronic adult aphasia, COPD, headache, HIV/AIDS, general pain, and obesity. The quality of these 10 studies was moderate to low.

Strengths and Limitations of the Evidence

The literature in this area had significant limitations. There were only a few studies for each particular condition. The disease-specific clinical outcomes evaluated for the same condition in different studies were not fully comparable. The same problem was true of the general quality of life measures used across various conditions in different studies. This limited the possibility of cross-study comparisons. The quality of these trials was variable with some studies lacking in one or more methodological domains of RCT quality as measured by the Jadad[4] criteria (Appendix G, Evidence Tables 35-37). The majority of the studies did not fully comply with CONSORT[138]guidelines or had low study quality scores. Several studies were based on a very small sample size or relied on a short follow up period. Sample size varied from as little as 16 in an entire study to 651. Postintervention evaluations ranged from as little as 6 weeks to as many as 24 months. Although there was sparse data for each target condition within this category of outcomes, we felt that grading the evidence was important due to the large number f studies. The overall strength of the body of this evidence was not graded as it was too heterogeneous.

Outcomes

Alzheimer's disease. This was a 24-week study of 46 mildly impaired patients suspected of having Alzheimer's disease receiving stable treatment with cholinesterase inhibitors (ChEIs). The patients were divided into three groups: 1) those who received three weekly, 20-min sessions of interactive multimedia Internet-based system (IMIS) in addition to eight hours per day of an integrated psychostimulation program (IPP); 2) those who received only IPP sessions; and 3) those who received only ChEI treatment. The primary outcome measure was the Alzheimer's Disease Assessment Scale-Cognitive (ADAS-Cog). Secondary outcome measures were: Mini-Mental State Examination (MMSE), Syndrome Kurztest, Boston Naming Test, Verbal Fluency, and the Rivermead Behavioral Memory Test story recall subtest. Although both the IPP and IMIS improved cognition in patients with Alzheimer's disease, the IMIS program provided an improvement above and beyond that seen with IPP alone, which lasted for 24 weeks[139](Appendix G, Evidence Table 37).

Arthritis. To determine the efficacy of an Internet-based Arthritis Self-Management Program (ASMP), randomized intervention participants were compared with usual care controls at 6 months and 1 year using repeated-measures analyses of variance. Patients with rheumatoid

Table 27. Studies of CHI applications impacting miscellaneous clinical outcomes (N=10).

Target condition	Number of studies	Author, year	Interventions	Primary outcomes measured
Alzheimer's disease	1	Tarraga, 2006[139]	IMIS,IPP, ChEIs IPP,ChEIs	Alzheimer's Disease Assessment Scale-Cognitive
Arthritis	1	Lorig, 2008[114]	Online intervention	Health distress
				Activity limitation
				Self reported global health
				Pain
				Self efficacy
Asthma	1	Jan, 2007[10]	Participants received asthma education and with interactive asthma monitoring system	Symptom score at nighttime
				Symptom score at daytime
				Morning PEF
				Night PEF
Back Pain	1	Buhrman, 2004[115]	Cognitive Behavior Intervention	CSQ-Catastrophizing
				CSQ-Ability to decrease pain
				CSQ-Control over pain
Chronic Adult Aphasia	1	Katz, 1997[140]	Computer reading treatment Computer stimulation	Porch Index of Communicative Ability (percentiles): Overall
				Porch Index of Communicative Ability (percentiles): Verbal
				Western Aphasia Battery Aphasia "Quotient"
				Western Aphasia Battery Aphasia "Repetition"
COPD	1	Nguyen, 2008[110]	Electronic dyspnea self management program	Score on CRQ subscale for dyspnea with ADLs
Headache	1	Trautman, 2008[141]	CBT	Frequency
				Duration
				Intensity
				Pain catastrophizing
HIV/AIDS	1	Gustafson, 1999[142]	CHESS	Active life
				Social support
				Participation in health care
Obesity	1	Morgan, 2009[91]	Tailored Web-site	Change in body weight at 3 and 6 months
				Change in waist circumference at 3 and 6 months
				BMI at 3 and 6 months
				Systolic blood pressure at 3 and 6 months
				Diastolic blood pressure at 3 and 6 months
				Resting heart rate at 3 and 6 months
Pain	1	Borckardt, 2007[143]	CACIS	Cold Pressor Tolerance

IMIS=interactive multi-media Internet-based system; IPP= integrated psychostimulation program; ChEIs = cholinesterase inhibitors; PEF= peak expiratory flow; CSQ= coping strategies questionnaire; CRQ= chronic respiratory questionnaire; ADL= activities of daily living; FBS= fasting blood sugar; FBG= fasting blood glucose; TC = total cholesterol; TG= triglycerides; BIT= behavioral Internet treatment; BMI= body mass index: CHESS= Comprehensive Health Enhancement Support System; CACIS computer assisted cognitive imagery system

arthritis, osteoarthritis, or fibromyalgia and Internet and email access (n=855) were randomized to an intervention (n=433) or usual care control (n=422) group. Measures included six clinical outcomes: pain, fatigue, activity limitation, health distress, disability, and self-reported global health. At 1 year, the intervention group significantly improved in four of six clinical outcomes as compared to baseline: health distress ($p<0.001$), activity limitation ($p < 0.001$), self-reported global health ($p<0.004$), and pain ($p<0.001$). The Internet-based ASMP proved effective in improving clinical outcomes in arthritis patients[114] (Appendix G, Evidence Table 37).

Asthma. To assess an Internet-based interactive asthma educational and monitoring program used in the management of asthmatic children, 164 pediatric patients with persistent asthma were enrolled and randomized into two study groups for a 12-week controlled trial. The intervention group had 88 participants who were taught to monitor their peak expiratory flows (PEF) and asthma symptoms daily on the Internet. Clinical outcomes were assessed by weekly averaged peak expiratory flow (PEF) values, symptom scores, asthma control tests, and quality of life. At the end of trial, the intervention group decreased the nighttime symptom score (range: 0=no asthma symptoms, 1=symptoms occurred several times but do not interfere with daily activities, 2=symptoms interfere with daily activities, 3= symptoms interfere with all activities), (mean change -0.08, SD 0.33 vs. 0.00, SD 0.20, $p<0.028$) and daytime symptom score (mean change -0.07, SD 0.33 vs. 0.01, SD 0.18, $p<0.009$); improved morning PEF (mean change 241.9 L/min, SD 81.4 vs. 223.1L/min, SD 55.5, $p<0.017$) and night PEF (mean change 255.6 L/min, SD 86.7 vs. 232.5 L/min, SD 55.3, $p<0.010$); improved the rate of having well-controlled asthma (70.4 percent vs. 55.3 percent, $p<0.05$); and improved quality of life on a 7-point scale (mean 6.5, SD 0.5 vs. 4.3, SD 1.2, $p<0.05$) when compared with conventional management. The Internet-based asthma telemonitoring program improved clinical outcomes in pediatric asthma patients[10] (Appendix G, Evidence Table 37).

Back pain. To investigate the effects of an Internet-based CBI with telephone support for chronic back pain, 56 subjects with chronic back pain were randomly assigned to either an Internet-based cognitive-behavioral self-help treatment or to a waiting-list control condition. The study period lasted 8 weeks and consisted of 1 week of self-monitoring prior to the intervention, 6 weeks of intervention, and 1 week of postintervention assessment. Treatment consisted of education, cognitive skill acquisition, behavioral rehearsal, generalization, and maintenance. The study showed statistically significant improvements in catastrophizing, control over pain, and ability to decrease pain. The findings indicated that Internet-based self-help with telephone support, based on established psychological treatment methods, holds promise as an effective approach for treating disability in association with pain [115] (Appendix G, Evidence Table 37).

Chronic adult aphasia. To examine the effects of computer-provided reading activities on language performance in chronic aphasic patients, 55 aphasic adults were assigned randomly to one of three conditions: computer reading treatment, computer stimulation, or no treatment. Subjects in the computer groups used a computer 3 hours each week for 26 weeks. Computer reading treatment software consisted of visual matching and reading comprehension tasks. Computer simulation software consisted of nonverbal games and cognitive rehabilitation tasks. Language measures were administered to all subjects at entry and after 3 and 6 months. Significant improvement over the 26 weeks occurred on five language measures for the computer reading treatment group, on one language measure for the computer stimulation group, and on none of the language measures for the no-treatment group. The computer reading treatment group displayed significantly more improvement on the Porch Index of Communicative Ability "Overall" and "Verbal" modality percentiles and on the Western Aphasia

Battery "Quotient" and "Repetition" subtest than the other two groups[140] (Appendix G, Evidence Table 37).

COPD. One study tested the efficacy of two 6-month dyspnea self-management programs, Internet-based (eDSMP) and face-to-face (fDSMP), on dyspnea with activities of daily living (ADL) in people living with COPD. Fifty participants with moderate to severe COPD who were current Internet users were randomized to either the eDSMP (n = 26) or fDSMP (n = 24) group. The content of the two programs was similar, focusing on education, skills training, and ongoing support for dyspnea self-management, including independent exercise. The only difference was the mode (Internet/personal digital assistant [PDA] or face-to-face) in which the education sessions, reinforcement contacts, and peer interactions took place. The primary clinical outcome was dyspnea with ADL that was measured with the Chronic Respiratory Questionnaire. The study was stopped early due to multiple technical challenges with the eDSMP, but followup was completed on all enrolled participants. Analysis of data available from the remaining 39 participants did not show significant differences between intervention and control groups[110] (Appendix G, Evidence Table 37).

Headache. Sixteen participants participated in a study to compare the efficacy of an on-line cognitive behavioral treatment (CBT) program with an Internet-based psychoeducational [141] intervention using chat groups (control) on pediatric headache. The main outcome measures were frequency, duration, intensity, and pain catastrophization. There were no significant differences in changes between the groups for all of the outcome measures. However, the frequency of headaches in the CBT group postintervention decreased. Headache duration and intensity did not change significantly for the CBT group. Pain catastrophizing was reduced significantly post treatment. At the 6-month followup, the treatment effects had not diminished (Appendix G, Evidence Table 37).

HIV/AIDS. To test a computerized system (CHESS: Comprehensive Health Enhancement Support System), which provided HIV-positive patients with information, decision support, and connections to experts and other patients, 204 HIV-positive patients (90 percent male, 84 percent White, most having at least some college education, and 65 percent experiencing HIV-related symptoms) were randomized to an intervention group (CHESS computers in experimental subjects' homes for 3 or 6 months) or control group (no intervention). The following quality of life sub-scores were significantly different between control and intervention groups in 6-month followup: active life (1.37 vs. 1.66, $p<0.034$), social support (4.24 vs. 4.47, $p<0.017$), and participation in health care (3.64 vs. 4.15, $p<0.020$)[142] (Appendix G, Evidence Table 37).

Pain. This study was designed to compare the effectiveness of a computerized pain management program over a distraction control. A computer-assisted cognitive/imagery system (CACIS) was used to assist subjects in pain management.[143] The control group used an identical system as the intervention group; the difference between the two being the control group group received a prerecorded story about migratory bird patterns with no animation in the visual presentation. The intervention group heard a male voice framing the experience as unpleasant instead of painful. An individual's pain was animated on the screen. Each group was subjected to an ice water bath for up to 150 seconds, depending on pain tolerance. The intervention group was able to tolerate the cold for 13 seconds longer than the control group, but this was not a significant difference (Appendix G, Evidence Table 37).

Key Question 1e. What evidence exists that consumer health informatics applications impact economic outcomes?

Summary of the Findings

Three studies evaluated the impact of CHI applications on economic outcomes (Table 28). These outcomes were examined in the context of 3 health problems including asthma, cancer (breast, cervical prostate and laryngeal), and obesity. Studies were very heterogeneous in respect to their target areas of interest and outcomes. They will be discussed individually below.

Table 28. Studies of CHI applications impacting economic outcomes (N=3).

Target condition	Number of studies	Author, year	Interventions	Primary outcomes measured
Asthma	1	Joseph, 2007[15]	Treatment	Cost of program delivery to developers
Cancer, breast, cervical prostate, and laryngeal	1	Jones, 1999[109]	General computer information	Cost of the computer information system—Manual extraction of Patient data
			Tailored computer information	Cost of the computer information system—use of electronic patient record
				Materials cost
Obesity	1	McConnon, 2007[81]	Web site (Internet group)	Total costs to user
				Incremental cost-effectiveness

Strengths and Limitations of the Evidence

Three studies evaluated six domains of CHI impact on economic outcomes. All of the studies addressing economic outcomes had relatively large sample sizes: greater than 300 for the study on asthma,[109] 152 in the control arm,162 in the intervention arm; greater than 450 in the study on cancer,[15] 162 in the control arm, 143 in the general information arm, and 162 in the tailored intervention; and more than 100 participants in the study on obesity[81] (Appendix G, Evidence Tables 38-40). The quality of these 3 trials was low to moderately low with studies lacking in one or more methodological domains of RCT quality as measured by the Jadad criteria [4] (Appendix G, Evidence Table 1). The body of evidence was not graded for this sub-question due to the small number of studies.

General Study Characteristics

The studies that were evaluations of the impact of CHI applications on economic outcomes generally were tested on an adult population (mean age: 47.4-48.1 years) in the study addressing obesity,[81] on a juvenile population in the study on asthma (mean age 15.3 years),[109] and not specified in the study on cancer.[15] Information regarding gender was only reported in the paper on asthma where 63 percent of the population was female.[109] None of the studies reported on the race/ethnicity, or socioeconomic status (SES) of study participants. The asthma study[109] reported on smoking status of greater than or equal to 2 cigarettes per day in 5.2 percent of the population,

and the obesity study[81] reported on weight, BMI, quality of life, and physical activity in each of the study groups (Appendix G, Evidence Tables 38 and 39).

Outcomes

Asthma. The economic measure in the study on asthma was identified as the "cost of program delivery." At the end of the study period (12 months), the cost of the referral coordinator (the only measurable cost of the study) was $6.66 per treatment per student. There was no cost estimate for the control group [109] (Appendix G. Evidence Table 40).

Cancer: breast, cervical, prostate, and laryngeal. There were three measures of cost in the study on cancer. The first measure was the actual cost of implementing the computer information system using manual entry of patient data. The authors found that the cost to manually extract patient data into a computer information system would cost 9 times as much as the control or a general information site. The next measure identified the cost of importing the electronic patient record into the tailored information system. There was no difference found in cost between the general information system and the tailored system using this method. The final measure of cost studied was material cost. The control group used paper (books) and the cost per book was estimated at £7. The cost of the general information system was estimated to be 40 percent of this, or £2.8 per patient. No information was provided for per user cost of the tailored information system[15] (Appendix G. Evidence Table 40).

Obesity. The obesity study measured total costs and incremental cost effectiveness. The total cost for the control group was £276.12 compared to the total cost for the Web site intervention group of £992.40. The authors pointed out that the difference in cost was due to the cost of developing the Web site. They stated that when this fixed cost was removed, the total costs of the intervention were lower. However, the actual estimate was not reported. Incremental cost-effectiveness was calculated for the intervention group, and was reported as £39,248 per quality-adjusted life-year[81] (Appendix G. Evidence Table 40).

Key Question 2: What are the barriers that clinicians, developers, and consumers and their families or caregivers encounter that limit implementation of consumer health informatics applications?

Thirty-one studies were reviewed that addressed the barriers to CHI applications, with a focus on studies that reported on CHI applications that were individualized to the consumers' or caregivers' needs. Documented barriers to CHI applications were identified, extracted, and tabulated.

Disease/Problem Domain

The CHI applications focused on a specific disease or problem domain. Two studies addressed more than one disease (breast cancer – all cancers[144]; HIV/AIDS – STDs[145]), but the remaining 20 studies focused on only one disease or problem domain. Diseases included breast cancer (4), [144,146-148] mental health (3),[149-151] physical activity/diet/obesity (4),[36,152-154] diabetes

(3),[93,155,156] HIV/AIDS (2),[145,157] prostate cancer (1),[158] all cancers (1),[144] hypertension (1), [159] STDs (1).[145] Problem domains included use of a personal health record (3)[160-162] and review of systems (1).[163]

For the purpose of further analysis, the study focusing on breast cancer and all cancers [144] was collapsed under "all cancers" (leaving three breast cancer related studies) and the study dealing with HIV/AIDS and STDs[145] under HIV/AIDS (leaving no study on STDs) (Appendix G, Evidence Tables 41-43).

Methodology

The methodology used to identify barriers varied across studies (Tables 29 and 30). There were four categories including validated survey, nonvalidated survey, qualitative research, and empirical research. Five studies used more than one methodology. [36,145,150,153,160] If a study used either a validated survey or empirical research, it was collapsed under "Validated survey / Empirical." Otherwise, it was assigned "Nonvalidated survey / Qualitative" as the research methodology (Appendix G, Evidence Tables 41-43).

CHI applications require participation of consumers, their caregivers, clinicians, and developers. Barriers can apply to any of the participants, and the type and impact of the barrier may vary significantly between providers, developers, patients, and their caregivers. Thus, an analysis of the barriers must include those that impede participation of any of the above groups.

Table 29. The distribution of methodologies for identifying barriers to the use of consumer health informatics by disease /problem domain.

Methodology Disease	Non-validated survey / Qualitative	Validated survey / Empirical	Total
All Cancers	2		**2**
Breast Cancer	1	2	**3**
Diabetes	5		**5**
HIV/AIDS	3		**3**
Hypertension	1		**1**
Mental Health		3	**3**
Personal health record	2	1	**3**
Physical Activity / Diet / Obesity	6	1	**7**
Prostate Cancer	1		**1**
Review of systems	1		**1**
Smoking Cessation	2		**2**
Total	**24**	**7**	**31**

Table 30. The distribution of methodology by barrier type.

Methodology Barrier	Non-validated survey / Qualitative	Validated survey / Empirical	**Total**
Systems & User Level	6	1	**7**
Systems level	3	2	**5**
User level	15	4	**19**
Total	**24**	**7**	**31**

Barriers

Barriers were divided between system-level and the individual-level barriers (Table 31):

1. System-level barriers were further divided into technical or health care system issues. Technical barriers included usability, work flow issues, and data security concerns. Health care system issues included the reimbursement system and incompatibility between patient applications and legacy systems in health care institutions.
2. Individual level barriers pertained to either the clinician or the consumer. Clinician endorsement affects consumer choice, and thus negative attitudes of clinicians may be a barrier to consumer use. Consumer issues included lack of access to the application (e.g., no home Internet access), concerns about privacy, limited literacy and knowledge, language hurdles, cultural issues, and lack of technologic skills (Appendix G, Evidence Tables 41-43).

Table 31. The distribution of barrier levels by disease/problem domain.

Barrier Disease/Problem Domain	Both levels	Systems level	User level	**Total**
All Cancers		1	1	**2**
Breast Cancer			3	**3**
Diabetes	2		3	**5**
HIV/AIDS	1		2	**3**
Hypertension			1	**1**
Mental Health	1	1	1	**3**
Personal health record	2		1	**3**
Physical Activity/ Diet / Obesity		3	4	**7**
Prostate Cancer			1	**1**
Review of systems	1			**1**
Smoking Cessation			2	**2**
Total	**7**	**5**	**19**	**31**

System-level barriers.

Technical system-level barriers. Nine studies explored lack of Internet access at home or in the community and six found this to be a barrier[147,152,153,156,159,160] (Appendix G, Evidence Table 43). One study identified hardware requirements as a systems level barrier.[164] and another study identified mobile device shape/design/configuration as a systems level barrier.[165]

Health care system-level barriers. Five studies cited incompatibility with current care as a barrier[145,157,159,160,163] (Appendix G, Evidence Table 43).

Individual-level barriers.

Clinicians. One study noted that the clinic staff feared more work. [151] Of note, the applications that were included in the literature review were applications that are operated independently by consumers, so there are no applications that require the physician to interact directly with the consumer through a CHI application (Appendix G, Evidence Table 43).

Developers. One study cited lack of built-in social support in the CHI application as a barrier. [93] One study noted that patients forgot their passwords by the time they had their followup visit. [151] One study cited lack of training and guidance in the use of the application. [160] Along the same lines, one study reported that electronic tools for data entry were a problem for users [144], whereas another cited the lack of automated data entry as a problem. [155] In one study users complained about a design that did not allow for back entry of old data.[165] Two studies discussed lack of user customization or making the content more relevant to the consumer and his or her community as a barrier[93,154] (Appendix G, Evidence Table 43). Two studies focused on the "substantial investment" required for the development and maintenance of CHI resources.[75,166]

Consumers and their caregivers. Nineteen studies queried application usability or user-friendliness and all nineteen found evidence of this barrier[36,147-149,151-158,160,161,163,167-169](Appendix G, Evidence Table 43).

Eleven studies explored patient knowledge, literacy, and skills to use the CHI application. Deficits in these areas were found by one study not to be a barrier. [146] The other ten, plus one study that had not initially considered these barriers in the study design, did find these deficits to be barriers [144,148,150,151,156,157,159-163] (Appendix G, Evidence Table 43).

Six studies considered the possibility that users would find the application too time-consuming and five of these reported this barrier in the results section. [152] In the same vein, one

study cited too many emails to participants as a barrier.[169]One study queried consumers about the acceptability of fees for use of an interactive portal and found that most participants were not willing to pay any fee for the service.[166]

Five studies sought information about privacy concerns and four reported concerns over privacy as a barrier in their finding.[144,145,151,161] The same four studies queried and found concerns over the control of information or lack of trust to be barriers[144,145,151,161](Appendix G, Evidence Table 43).

Two studies queried for cultural barriers and only one study found evidence of this. [146] One study found the language of the CHI application to be a barrier. [161]

The expectations of consumers figured prominently in the barriers analysis. The terms acceptability, usefulness, credibility, expectations, and goals were mentioned often and the lack thereof was found to indicate barriers in eight studies [20,93,165,167 36,147,151,157](Appendix G, Evidence Table 43).

One study of an interactive Web portal did not identify a barrier regarding usefulness, but found that most participants who had not used the portal expected a number of features to be useful, but less users of the portal actually rated these features as useful.[166]

Cost was mentioned as a barrier in only one study.[165]

Three studies investigated consumer disability, generally grouped as physical or cognitive. One did find evidence that physical or cognitive impairment resulted in barriers to the use of CHI applications. [162] One found that not reacting to visual preferences was a barrier. [158] Anxiety over the use of computers, complaints about lack of personal contact with clinicians and the belief that IT would not be an improvement to current care were mentioned in two studies as barriers[159,162] (Appendix G, Evidence Table 43).

Key Question 3: What knowledge or evidence deficits exist regarding needed information to support estimates of cost, benefit, and net value with regard to consumer health informatics applications?

Upon review of the results of the systematic review presented above, several important knowledge gaps became evident. In general, the literature was at a very early stage of development. Many questions have only been evaluated by one study. Thus, confirmatory studies have generally not been done. In addition, no high quality studies have been conducted regarding several important questions. Broadly, these questions can be grouped into at least one of the following four categories: patient-related questions, CHI utilization factors, technology/hardware/software/platform-related issues, and health-related questions. The major questions and outstanding issues of concern for each of these sections will be outlined below.

Patient-related Questions

Many questions about CHI applications at the patient level remain. The results of our review suggested that the literature is relatively silent on the question of whether or not significant differences in patient preferences, knowledge, attitudes, beliefs, needs, utilization, and potential benefits exists across gender, age, and race/ethnicity. Intuitively, we suspect some differences exist, especially as they relate to the senior population compared to the adolescent population.

However, these differences have not been definitively characterized, and the clinical and public health implications of these differences are largely unknown. The same could be said for potential gender- and race or ethnicity-based differences. Early evidence suggests that potentially significant differences exist that could have important health implications as we move toward a more technology-saturated society.[170,171] Beyond these potential demographic differences, the emerging field of CHI is developing within the context of a societal and even global emergence of technology-based realities, including Web 2.0/Web 3.0 and ubiquitous computing, which are enabling an unprecedented level of user-determined interactivity and functionality. The degree to which this functionality could be harnessed for the health benefit of consumers is largely unknown. Along these lines, with the predominance of chronic diseases and the burgeoning of the senior population in this country, there is an increasing reliance on nonprofessional family, community, and low-skilled caregivers providing ever increasing levels of care to patients. As such, the target users of CHI applications must increasingly be focused on more than just the index patient. Our review suggested that the majority (but not all) of the current RCT CHI literature is focused on the patient as the CHI user. Finally, given the increasing role of family members, friends, and other caregivers, sociocultural and community factors will likely exert significant impact on access, usability, desirability, and benefit of CHI applications. Issues related to trust, security, and confidentiality need to be further explored.

CHI Utilization-related Factors

Given the ubiquity of the Internet, the overwhelming majority of current and developing CHI applications will likely be reliant at least in part on the Internet. Increasingly this will require that consumers have broadband access to the Internet to take advantage of the full functionality that CHI applications potentially have to offer. Despite a rapid increase in both the availability and access to broadband services among all population groups, age groups, and geographic regions of the country (eHealth Solutions for Health Care Disparities Gibbons (ed) 2007 Springer Pub), differential access to broadband Internet access may have significant implications in terms of health benefits that may be derived from these tools and applications. Of equal concern, while many in the younger generations become very technically savvy at an early age, many Americans still have limited health literacy (eHealth Solutions for Health Care Disparities Gibbons (ed) 2007 Springer Pub). The combination of low technology expertise and low health literacy may pose insurmountable barriers for some individuals. The ability of these individuals to use and benefit from CHI applications, even when adequate access exists, should be evaluated. Taken together then, these CHI utilization factors suggest the need for a more robust evaluation and explication of the epidemiology of broadband access and technology literacy in the US.

Technology/Hardware/Software/Platform-Related Issues

The results of our review suggest that the majority of currently evaluated CHI tools and applications are designed for use on personal computers (desktop, laptop) as Web-based applications. While these technology platforms have certainly not been exhaustively studied, many more potential platforms exist, including interactive webTV, Video On Demand, smartphones, and health gaming to name a few. In the domestic literature, the potential of these platforms has not been evaluated. In addition, it appears that the CHI applications evaluated to date have been designed primarily by health care practitioners without sufficient training or

expertise in critical design areas such as human factors and user-centered design. As such, currently available tools may not be the best possible tools and may yield disappointing results despite well-designed evaluation studies. Emerging evidence from the Robert Wood Johnson Foundation's Project HealthDesign and other similar projects is suggesting that the CHI tools and applications and functionality that consumers want and need are not always what health care practitioners think they need.[172] Furthermore, many health care practitioners and entrepreneurs are likely ill-equipped to integrate the appropriate data, as suggested above, into the design process. As a result, important sociocultural and human computer interface design elements may not get incorporated adequately into emerging CHI applications and therefore may lead to CHI applications with limited efficacy.

Health-related Factors

Finally, the results of our review suggested that several important health-related questions remain regarding the potential utility of CHI applications. To date, most CHI applications that have been evaluated tend to focus on one or more domains of chronic disease management. While this is very important and clearly needed, insufficient attention has been given to the role of CHI applications in the acute exacerbation of symptomatology or other urgent and emergent problems that may occur in home- and community-based settings. While it remains clear that professional expertise is increasingly needed as the acuity of the problem increases, with the growing dominance of home- and community-based care and self-management, telephone and/or ambulance transfer to an emergency room may not represent the most efficient and cost effective way to access professional health care personnel and services. Along these lines, the role of CHI applications in primary, secondary, and tertiary prevention needs to be more adequately explored. Given the prevalence of mental health and psychiatric issues, the value of CHI applications in the context of mental health, coping, and stress should be evaluated. Finally sociocultural factors are increasingly important determinants of health care outcomes. The potential impact on social factors including social isolation and social support and perhaps even broader social determinants of health need to be evaluated and may prove useful in helping patients address select health concerns in the home- and community-based setting.

Key Question 4: What critical information regarding the impact of consumer health informatics applications is needed in order to give consumers, their families, clinicians, and developers a clear understanding of the value proposition particular to them?

The results of the current review suggest that several critical information needs still exist that must be filled to enable a clear understanding of the value proposition of CHI applications. It is likely that the knowledge gaps needed to establish a value proposition, while overlapping, are not identical across all potential stakeholders. We will address this question from 2 perspectives, that of the clinician or provider and that of the patient, family and caregiver.

Clinician and Provider Value Proposition Information Needs

While this review focused on CHI applications that are not dependent on a clinical provider, they at times may involve providers. It is well known that provider recommendations and support can be an important motivator for some patients to engage in a certain behavior. It may be that provider recognition and support of patient use of CHI could play an important role in the adoption and use of CHI applications by some patients. Because providers are often most concerned about clinical outcomes and costs, it seems reasonable that questions of the impact of CHI applications on provider or health care processes, costs, and outcomes as addressed in this report will need to be more definitively characterized. There is at least one additional critical knowledge need that is pertinent to providers. It is the potential liability a provider might incur from a patient using a CHI application. It is not clear at this point that any liability would exist under current law, particularly for those CHI applications that do not involve a health care professional. Yet it may be that this question will need some further clarification prior to widespread endorsement of CHI applications by many health care providers.

Patient, Family, and Caregiver Value Proposition Information Needs

While it is tempting to believe that patients want the exact same thing as their providers and health care practitioners, we know that this is not always the case. Indeed the growth of the Internet and its utilization first by consumers and then providers can be very instructive regarding value proposition needs of consumers.[173] This data and experience suggest that patients and caregivers are, except in the cast of an emergent problem, often most concerned with well-being issues, health care processes, costs, and then clinical outcomes. Patients most often cite convenience and anonymity as the primary reasons the Internet has become such a major source of health information.[173] Interestingly, both of these characteristics are largely lacking from our health care system today. It is likely that the more these elements can be incorporated into emerging CHI applications, the more likely they will be considered of value by consumers. Other related factors such as usability, portability, and patient-centered functionality are likely important characteristics of CHI applications that may help drive utilization. It has been suggested that the degree to which technology becomes "invisible," or becomes incorporated into an individual's lifestyle rather than creating additional tasks or processes, is the degree to which these tools will become more powerful. Those technologies that exist and enable consumers to accomplish tasks (empower) without further complicating individuals lives may ultimately prove to be the most widely used and valued CHI applications. Finally, by expanding the list of available platforms from which consumers can utilize CHI tools and applications (TV, WebTV, satellite, On Demand, health gaming), CHI applications may become more appealing to a broader consumer base and thus prove valuable to those consumers who could most benefit, but may not otherwise use a more traditional CHI application.

Research in Progress

Based on a search string developed early in the development of the project (see Appendix C), a similar search string was developed to search the grey literature for ongoing research (Health Services Research Projects in Progress database). Our search identified 180 titles that were reviewed for relevance to our study topic. Four ongoing and continuing research studies were

identified. The outcomes in these studies may provide additional information about the success of a consumer-centered approach to health care. All these studies were designed to develop Internet-based health informatics that in the end will be helpful in improving the quality of care and creating a more informed consumer. The results of these studies have not been published yet.

One study by Christakis,[171] is an ongoing study to develop an Internet-based patient-centered asthma management system. A critical feature of the study is to improve the quality of asthma care delivery by health care providers. The study will gauge the effectiveness of AsthmaNet, a Web-based asthma patient activation system, which will provide tailored clinical information to parents as well as give them decision aids to share with their providers.

In another study, which was completed in 2008, Lorig et al[174] evaluated the usefulness of translating evidenced-based small-group diabetes education on to an Internet platform. The main aims of the 2-year RCT were to: 1) develop, implement, and evaluate an Internet Diabetes Self-Management Program (IDSMP) compared with usual care; 2) compare the effects of the IDSMP with and without email discussion group reinforcement; 3) conduct cost-benefit analysis of the IDSMP compared with usual care, and the IDSMP with and without reinforcement; and 4) conduct a process evaluation of the use of the sections of the IDSMP and how usage, changes in behaviors, changes in self-efficacy, and patient characteristics are associated with intervention effects (health status and health care utilization) at 6 months and 2 years.

Another completed study completed in 2005, by Col[175] was designed to address the issues involved with menopause. The immediate goal was to develop a technology comprehensive Menopause Interactive Decision Aid System (MIDAS) that provides personalized feedback about menopausal symptoms, risks for common conditions, and the effects of different treatment options on the short- and long-term consequences of menopause. The main hypotheses of this study are that MIDAS can: 1) lead to better decisions and improve the quality of menopausal counseling; 2) improve compliance with a chosen menopausal plan; and 3) reduce medical errors associated with the use of menopausal therapies. The specific aims are to: 1) develop and optimize the utilization of MIDAS; 2) evaluate the impact of MIDAS on the decisionmaking process, including decisional conflict, knowledge, risk perception, anxiety, patient-physician communication, satisfaction with decisionmaking, the quality of menopause counseling, and medical errors related to menopausal therapy; and 3) evaluate the long-term impact of MIDAS on outcomes related to menopause.

In another study, which was completed in 2008, Sciamanna,[176] studied the efficacy of a computer program that creates: 1) patient-specific physical activity self-help reports for individuals, and 2) patient-specific reports to prompt and guide physician advice. The study was designed to assess the effects of the computer-generated physical activity reports (patient and physician) on the patients' physical activity and endurance fitness over a 6-month period as compared with usual care.

Chapter 4. Discussion

Summary of Key Findings

We have presented here the results of a systematic review of the literature regarding the impact of CHI applications. The CHI field is new and still evolving. As such, the literature in this field is very heterogeneous and challenging to summarize in well-described categories. Our review identified a total of 162 articles, of which 137 addressed Key Question 1 and 31 addressed Key Question 2. Overall, despite the heterogeneity and limited nature of the literature, the following themes emerged.

First, while there may be a role for CHI applications to reach consumers at a low cost and obviate the need for some activities currently performed by humans, it is likely that a more important role is to enhance the efficacy of interventions currently delivered by humans. Several studies compared the use of a CHI application with traditional therapy against traditional therapy alone. Many found that both groups exerted a significant effect on the outcome of interests, yet the CHI group had even more benefit that traditional therapy alone.

Secondly, in the aggregate, the studies evaluated in this review tended to support the finding that at least three critical elements are most often found in those CHI applications that exert a significant impact on health outcomes. These three factors are 1) individual tailoring, 2) personalization, and 3) behavioral feedback. Personalization involves designing the intervention to be delivered in a way that makes it specific for a given individual. Tailoring refers to building an intervention, in part, on specific knowledge of actual characteristics of the individual receiving the intervention. Finally, behavioral feedback refers to providing consumers with messages regarding their status, wellbeing, or progression through the intervention. These messages may come in many different forms. They can be motivational (You did great today!) or purely data driven (You completed 80 percent of your goal today). Interestingly, it is not clear from this literature that CHI-derived behavioral feedback is any better than feedback originating from human practitioners or others. Rather, it appears that the feedback must happen with an appropriate periodicity, in a format that is appealing and acceptable to the consumer, not just the provider.

This systematic review found that RCT evaluations to date suggest that CHI applications may positively impact healthcare processes such as medication adherence among asthmatics. CHI applications may also positively impact intermediate outcomes across a variety of clinical conditions and health behaviors, including cancer, diabetes mellitus, mental health disorders, smoking, diet, and physical activity. CHI applications may not have much impact on intermediate outcomes among individuals who are obese or suffer with asthma or COPD. The currently available RCT evidence is more equivocal regarding the impact of CHI applications on relationship-centered outcomes, while the evidence appears relatively strong in support of the positive impact of CHI on selected clinical outcomes. (Mental Health) The data are insufficient to determine the impact of CHI on economic outcomes.

Of note, studies have identified several barriers to utilization of CHI applications. The barriers include incompatibility with current care practices, professional staff perceptions of increased workload, poor social support, limited IT knowledge and literacy of consumers, cultural issues, and concerns about time, privacy, security, and control.

Appendixes and evidence tables cited in this report are available at: http://www.ahrq.gov/clinic/tp/chiapptp.htm.

While the use of CHI applications offers significant promise and potential, the nascent literature has important knowledge gaps that currently preclude claims of proven efficacy or unquestionably support a value proposition for the use of CHI applications. In the final analysis, the early work cited in this review is encouraging, but clearly more research is needed to substantiate these early findings and close the identified gaps in knowledge.

Limitations

This review has several important limitations. First our initial search for eligible studies proved to be challenging because of inconsistent use of terminology in the literature. We minimized this problem by searching multiple databases and supplementing our search with a review of selected journals and querying experts. The most important limitation was marked heterogeneity of interventions, populations and outcomes, making synthesis across studies difficult, and precluding meta-analysis. Inconsistent definitions and reporting of outcome measures further limited our ability to synthesize data, as many studies did not report enough data to support calculation of effect sizes. Another limitation is related to the design of CHI tools and applications. Because development involves an iterative process, it is sometimes difficult to synthesize results across studies. Two studies my have evaluated the same CHI tool or application however the tool itself may have been adapted or otherwise changed during the period of time after the first study but prior to the second study. Methodologic limitations of many of the RCTs limit the strength of conclusions. We evaluated the quality of the study using the criteria proposed by Jadad.[4] We also graded the strength of the body of the scientific evidence on each section. For a variety of reasons, the strength of the body of evidence was often graded as low. Because the distinction between CHI and patient-centered HIT has not been clearly articulated, it was at times challenging to distinguish between consumer HIT and patient-centered HIT. Patient centered HIT studies were excluded because they will be addressed in a separate evidence report. Finally, as indicated in the Research in Progress section of the Results chapter, several studies of CHI applications have been initiated or completed but not yet reported. The evidence report may need to be updated when the results of these studies are available.

Future Research Needs

The results of this review indicate that the scientific evidence base regarding the impact of CHI applications is at a nascent and evolving state. As such, several future research needs can be identified. More work needs to be done to confirm the preliminary findings identified in this review. In many areas, only one study has been done on a given question or issue, precluding definitive conclusions. Across studies, the reporting of the evaluations is non-uniform, often with critical features of the evaluation methodology or application details entirely lacking. To facilitate uniform reporting and improve the quality of the work in this field, consideration should be given to development of a national CHI applications design and development registry and CHI applications trials registry with uniform reporting requirements. However, the developers of these applications come from a wide and diverse array of backgrounds. Some have significant technical expertise while others do not. Furthermore, these studies are reported in a variety of journals with editors and editorial boards of widely differing technical expertise and reporting requirements. Research in this multidisciplinary field would be greatly enhanced by an

accepted vocabulary, nomenclature, or ontology. Currently there is much confusion and blurring of the lines between the technical platform upon which the application is built along with the technical specifications of the CHI application in question with both the goals and functions of the application and the educational or behavioral content included in the application. While a strict rendering of the current definitions of these elements allows for little conceptual overlap, the literature is replete with examples of investigators who describe the technical platform employed in a CHI application (cell phone) when describing the application, which by itself, sheds little light, regarding the nature of the CHI application. More work will need to be done to explicate the role of human factors, socio cultural factors, human computer interface issues, literacy, and gender.

The findings of this review indicate that most CHI research is being primarily conducted among white/Caucasian adult patients, and it is not clear how the findings apply to non-white populations. The importance of this limitation is heightened by the fact that the internet will be the primary means of the consumer's ability to use and take advantage of CHI tools. While technological platforms may vary, most CHI applications will, in one way or another, rely on the internet to perform its functions. Consumer internet familiarity and utilization trends will have significant impact on the ability of CHI applications to be successful across all consumer populations. Recent data suggests the internet and technology experiences of whites may not be the same as individuals from other racial/ethnic backgrounds. Differential experiences across racial groups may be associated with differential efficacy of a given CHI application and result in outcomes that are unexpected or unseen among white consumer groups. The evidence suggests, for example, that Internet and technology utilization has not yet become as essential or appealing to African-Americans as to whites. Just 36 percent of African-Americans with Internet access go online on a typical day compared to 56 percent of whites. Whites and blacks even have differing attitudes toward the internet with online African-Americans not being as fervent in their appreciation of the Internet as online whites.[173] African-American Internet users are also somewhat more likely than whites to have their Internet access come exclusively through their jobs. Finally, while online privacy has become a significant concern for a majority of Internet users, African-Americans tend to be less trusting than whites. They are also more concerned about their online privacy than whites and these heightened privacy concerns are reflected in what they choose to do online. Online African-Americans are less likely to participate in high-trust activities like auctions or to give their credit card information to an online vendor. They are also less likely than white Internet users to trade their personal information for access to a Web site. [173] The CHI and health implications of these findings are unclear.

The problem extends beyond African Americans. Fifty-six percent of Latinos in the U.S. use the Internet. This compares to 71 percent of non- Hispanic whites and 60 percent of non-Hispanic blacks who use the internet. [173] Among Latinos, the information and communications revolution is not limited to the computer screen. Some Latinos who do not use the internet are connecting to the communications superhighway via cell phone. Almost 60 percent (59 percent) of Latino adults have a cell phone and 49 percent of Latino cell phone users send and receive text messages on their phone.[173]

Finally, the issue is not just one of under-utilization or access. Asian-Americans who speak English are the most wired racial or ethnic group in America. They are also the Internet's heaviest and most experienced users. Over 5 million Asian Americans (75 percent) have used the internet. This compares to 58 percent of whites, 43 percent of African- Americans, and 50 percent of English-speaking Hispanics. [173] Typically Asians spend more time online than other

racial and ethnic groups. In addition, they engage the internet at a much higher level of intensity on a typical day than other groups and, as such, the internet represents an extremely important and fundament component of daily living for Asian-Americans. Overall, Asian-American men engage in online activities more than Asian-American women.[173] Even beyond race and ethnicity issues that may affect CHI mediated health outcomes; the importance of family, neighborhood, and environmental determinants of many clinical health outcomes is increasingly realized. We need to understand how these factors (social determinants) may impact CHI access, utilization, efficacy, costs, and/or outcomes at the individual level and healthcare disparities at the population level. The results of this review indicate that the realities and implications of these differences have not been adequately evaluated in the current scientific literature and much more formative and experimental work needs to be done to fill these critical knowledge gaps.
The results of this review also indicate that because most of the evaluative research being done is being conducted among middle aged adult populations, significant opportunities exist for additional research among other age groups of consumers. It may even be that the impact of CHI applications may be greater among non middle aged adult consumers because these consumers may be most likely to adopt CHI applications (children, adolescents, and young adults) and they may have the most to gain from using effective CHI applications (elderly).

Similarly, the results of this review indicate that most CHI applications evaluated to date are designed to run on desktop computers. More work will need to be done to understand the role of other technological platforms including cell phones, PDA's, TV, satellite, on Demand, Health Gaming platforms (Wii, XBOX, Gamecube etc). Related to technological platforms used for CHI applications is the potential role of social networking applications. Very few currently evaluated CHI applications explored the dynamics and potential utility of using social networking applications (Skype, Twitter, MySpace, Facebook, You Tube, blogs, Second life, Yoville and Farmville etc) to support behavior change or improve health outcomes. While it may be challenging to envision the elderly twittering, use of these applications may open opportunities to address health problems impacted by trust, social isolation, cognitive stimulation and low literacy) This type of research may inevitably lead to a broader array of interactivity among patients and their caregivers with measurable psychological and physiological health benefits for users and patients. In so doing, CHI applications may accrue greater appeal and effectiveness among patients because these applications are assisting patients to address real life issues that in the past may have been unrecognized barriers to achieving optimal health.

Implications

The results of this review have several important implications. In terms of the currently engaged and activated consumer, CHI applications and tools may in the future provide additional tools to facilitate efforts to optimize their health status. The rapid growth and development of the internet combined with the rapid rise in the use of the internet to search for health related information suggest that individuals are drawn to use convenient and anonymous technologies for health purposes. If CHI applications and tools become available in a wider array of platforms, it may become easier to engage more people who are not actively managing their health. Although CHI tools and applications, as we have defined them, do not require the involvement of a healthcare provider, it is likely that significant growth in the utilization of CHI tools will necessitate increasing provider and healthcare system competency with these emerging tools. Consumers will increasingly want more interactivity and functionality and the ability to work

interactively with traditionally collected health information at the time and place of their choosing. Providers and healthcare systems that are seen as not equipped to handle or address these issues are unlikely to be seen as the highest quality or highest performing providers and systems.

There are may be important implications for health policy decision makers, such as the National Coordinator of IT. To the extent that CHI applications help improve healthcare process and clinical outcomes, they cannot be considered outside the domain of the healthcare system or direct medical care. Growth in this area may necessitate the development of policy positions which support diffusion of HIT tools and applications among providers and healthcare systems, but also facilitate the diffusion of CHI tools and applications among healthcare consumers. In like fashion many state officials and governments have or are currently considering supporting regional Health Information Exchanges, state wide Electronic Medical Records systems and other medical technologies. These state level health leaders may soon need to consider supporting patient use of CHI tools as one strategy to facilitate health promotion. Yet, as the results of this review indicate, the current state of the scientific literature is promising, but largely preliminary and thus not able to provide evidence based guidance regarding cost effective utilization of scarce public or private resource dollars with respect to CHI.

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Appendix A

Appendix A: List of Acronyms

Acronym	Definition
ADAS-Cog	Alzheimer's disease assessment scale-cognitive
AHQ	Anxiety hierarchy questionnaire
AHRQ	Agency for Healthcare Research and Quality
AMIA	American medical informatics association
ANCOVA	Analysis of covariance
APHA	America public health association
ASMP	Arthritis self-management program
ASQ	Attributional style questionnaire
BAI	Beck Anxiety inventory
BDI	Beck Depression inventory
BMI	Body mass index
BtB	Beating the Blues
CBT	Cognitive behavioral theory
CESD	Center for Epidemiologic Studies-Depression
CES-D	Center for Epidemiologic Studies Depression
CgA	Chromogranin A
ChEIs	Cholinesterase inhibitors
CHESS	Comprehensive health enhancement support system
CHI	Consumer health informatics
CI	Confidence interval
CoNeg	Composite index for positive situations
CoPos	Composite index for negative situations
DHEA-S	Dehydroepiandosterone sulphate
DSMP	Dyspnea self-management programs
DXA	Dual-energy x-ray absorptiometry
EPC	Evidence-based Practice Center
EPSI	Exam problem-solving inventory
FFB	Kristal Fat and Fiber Behavior
HDS	Health distress scale
IEEE	Institute of Electrical and Electronics Engineers
IET	Industrial engineering technology
IMIS	Interactive multimedia internet-based system
IPP	Integrated psychostimulation program
ISI	International standards institute
IT	Information technology
MeSH	Medical subject heading
MMSE	Mini-mental state examination
NET	Internet-based CBT
NPY	Neuropeptide Y
PCS	Perceived competence scales
PDA	Personal digital assistant
PDF	Portable document format
RCT	Randomized controlled trial
SB2-BED	Student bodies 2-binge eating disorder
SD	Standard deviation
SDSCA	Summary of Diabetes Self Care Activities
TAI	Test anxiety inventory
TEP	Technical expert panel
TNFα	Tumor necrosis factor α
WHO	World Health organization
WSAS	Work and Social Adjustment Scale

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Appendix C

Appendix C: Detailed Search Strategies

Database	Terms	Date	Returns
PubMed	((("Medical Informatics Applications"[Mesh] OR "Informatics"[Mesh] OR "medical informatics"[mh] OR telemedicine[mh] OR informatics[tiab] OR internet[tiab] OR internet[mh] OR "Consumer Health Information"[Mesh] OR "Support systems"[tiab]) AND (consumer[tiab] OR "Patients"[Mesh] OR patients[tiab] OR patient[tiab] OR parents[mh] OR parents[tiab] OR parent[tiab] OR "age groups"[mh] OR Caregivers[mh] OR caregiver[tiab] OR "care giver"[tiab] OR "persons"[mh] OR persons[tiab] OR person[tiab] OR people[tiab] OR individual[tiab] OR individuals[tiab]) AND English[lang] AND ("randomized controlled trial"[pt] OR "randomized controlled trials as topic"[mh] OR "randomized controlled trial"[tiab] OR "randomised controlled trial"[tiab] OR "controlled trial"[tiab] OR "clinical trial"[tiab]) NOT (editorial[pt] OR letter[pt] OR comment[pt]) NOT (animal[mh] NOT human[mh]) AND (("1900/01/01"[PDat] : "2009/06/01"[PDat]))) OR (("Medical Informatics Applications"[Mesh] OR "Informatics"[Mesh] OR "medical informatics"[mh] OR telemedicine[mh] OR informatics[tiab] OR internet[tiab] OR "internet"[MeSH Terms] OR "Consumer Health Information"[Mesh] OR "Support systems"[tiab]) AND (consumer[tiab] OR "Patients"[Mesh] OR patients[tiab] OR patient[tiab] OR "parents"[MeSH Terms] OR parents[tiab] OR parent[tiab] OR "age groups"[mh] OR "caregivers"[MeSH Terms] OR caregiver[tiab] OR "care giver"[tiab] OR "persons"[mh] OR persons[tiab] OR person[tiab] OR people[tiab] OR individual[tiab] OR individuals[tiab]) AND (Access[tiab] OR barrier[tiab] OR facilitator[tiab] OR compatibility[tiab] OR incompatibility[tiab] OR "user-centered"[tiab] OR "user centered"[tiab] OR "work flow"[tiab] OR workflow[tiab] OR "reimbursement mechanisms"[mh] OR reimbursement[tiab] OR "attitude to computers"[mh] OR attitude[tiab] OR "health knowledge, attitudes, practice"[mh] OR "computer literacy"[mh] OR (computer[tiab] AND literacy[tiab])) AND English[lang] NOT (editorial[pt] OR letter[pt] OR comment[pt]) NOT ("animals"[MeSH Terms] NOT "humans"[MeSH Terms]) AND (("1900/01/01"[PDat] : "2009/06/01"[PDat])) AND (("1900/01/01"[PDat] : "2009/06/01"[PDat])))	June1st, 2009	14561
EMBASE	(('informatics':ti,ab OR telemedicine:ti,ab OR internet:ti,ab OR 'consumer health information':ti,ab) AND (consumer:ti,ab OR 'patients':ti,ab OR parents:ti,ab OR 'age groups':ti,ab OR caregivers:ti,ab) AND ('randomized controlled trial':ti,ab OR (controlled:ti,ab AND trial:ti,ab) OR (clinical:ti,ab AND trial:ti,ab))) OR (('informatics':ti,ab OR telemedicine:ti,ab OR internet:ti,ab OR 'consumer health information':ti,ab) AND (consumer:ti,ab OR 'patients':ti,ab OR parents:ti,ab OR 'age groups':ti,ab OR caregivers:ti,ab) AND (access:ti,ab OR barrier:ti,ab OR facilitator:ti,ab OR compatibility:ti,ab OR incompatibility:ti,ab OR 'user centered':ti,ab OR 'work flow':ti,ab OR reimbursement:ti,ab OR attitude:ti,ab OR (computer:ti,ab AND literacy:ti,ab))) AND ([article]/lim OR [editorial]/lim OR [review]/lim) AND [english]/lim AND [humans]/lim		1421
Cochrane Library	(("Medical Informatics applications":ti,ab,kw or "Informatics":ti,ab,kw or (telemedicine):ti,ab,kw or (internet):ti,ab,kw or "Consumer Health Information":ti,ab,kw or “Support systems”:ti,ab,kw) AND ((consumer):ti,ab,kw or "Patients":ti,ab,kw or (parents):ti,ab,kw or "age groups":ti,ab,kw or (Caregivers):ti,ab,kw) AND ((randomized controlled trial):ti,ab,kw or (controlled trial):ti,ab,kw or (clinical trial):ti,ab,kw)) OR (("Medical Informatics applications":ti,ab,kw or "Informatics":ti,ab,kw or (telemedicine):ti,ab,kw or (internet):ti,ab,kw or "Consumer Health Information":ti,ab,kw or “Support systems”:ti,ab,kw) AND ((consumer):ti,ab,kw or "Patients":ti,ab,kw or (parents):ti,ab,kw or "age groups":ti,ab,kw or (Caregivers):ti,ab,kw) AND ((Access):ti,ab,kw or		3716

	(barrier):ti,ab,kw or (facilitator):ti,ab,kw or (compatibility):ti,ab,kw or (incompatibility):ti,ab,kw or "user centered":ti,ab,kw or "work flow":ti,ab,kw or Reimbursement:ti,ab,kw or "attitude to computers":ti,ab,kw or “computer literacy”:ti,ab,kw))		
SCOPUS	((TITLE-ABS-KEY("Medical Informatics applications") OR TITLE-ABS-KEY(telemedicine) OR TITLE-ABS-KEY(internet) OR TITLE-ABS-KEY("Consumer Health Information")) AND (TITLE-ABS-KEY(consumer) OR TITLE-ABS-KEY("Patients") OR TITLE-ABS-KEY(caregivers)) AND (TITLE-ABS-KEY("randomized controlled trial") OR TITLE-ABS-KEY(“clinical trial”))) **OR** ((TITLE-ABS-KEY("Medical Informatics applications") OR TITLE-ABS-KEY(telemedicine) OR TITLE-ABS-KEY(internet) OR TITLE-ABS-KEY("Consumer Health Information")) AND (TITLE-ABS-KEY(consumer) OR TITLE-ABS-KEY("Patients") OR TITLE-ABS-KEY(caregivers)) AND (TITLE-ABS-KEY(access) OR TITLE-ABS-KEY(barrier) OR TITLE-ABS-KEY(facilitator) OR TITLE-ABS-KEY("user centered") OR TITLE-ABS-KEY("attitude to computers") OR TITLE-ABS-KEY(“computer literacy”) OR TITLE-ABS-KEY(“health knowledge, attitudes, practice”))) AND (LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "re") OR LIMIT-TO(DOCTYPE, "rp")) AND (LIMIT-TO(LANGUAGE, "English"))		5577
CINAHL	((TX "Informatics" or TX telemedicine or TX internet or TX "Consumer Health Information" or TX “Support systems”) AND (TX consumer or TX "Patients" or TX parents or TX "age groups" or TX Caregivers) AND (TX "randomized controlled trial" or TX “controlled trial” or TX “clinical trial”)) OR ((TX "Informatics" or TX telemedicine or TX internet or TX "Consumer Health Information" or TX “Support systems”) AND (TX consumer or TX "Patients" or TX parents or TX "age groups" or TX Caregivers) AND (TX Access or TX barrier or TX facilitator or TX compatibility or TX incompatibility or TX "user centered" or TX "work flow" or TX Reimbursement or TX Attitude or TX “computer literacy”))NOT ((PT editorial)or (PT letter) or (PT comment))		1462

Appendix D: Grey Literature Detailed Search Strategies

Database	Terms
Health Services Research Projects in Progress	(((informatics OR internet OR consumer health information) AND (consumer OR patients OR parents OR caregivers) AND (randomized controlled trial OR clinical trial)) OR ((informatics OR internet OR consumer health information) AND (consumer OR patients OR parents OR caregivers) AND (access OR barrier OR facilitator OR compatibility OR user centered)))
IEEE CNF IEEE Conference Proceeding IET CNF IET Conference Proceeding	((((((informatics or internet or consumer health information) and (consumer or patients or parents or caregivers) and (randomized controlled trial or clinical trial)) or ((informatics or internet or consumer health information) and (consumer or patients or parents or caregivers) and (access or barrier or facilitator or compatibility or user centered))))<in>metadata)) <and> (pyr >= 1990 <and> pyr <= 2009)
Proceedings of the American Society for Information Science and Technology (Wiley InterScience)	informatics OR “health information” OR “consumer health information” OR internet
WHO –International Clinical Trials Registry Platform	informatics applications OR consumer health information OR internet
American Public Health Association (APHA) 2000-2008	Consumer health information OR health information OR consumer
OpenSIGLE - System for Information on Grey Literature in Europe	(((informatics OR internet OR consumer health information) AND (consumer OR patients OR parents OR caregivers) AND (randomized controlled trial OR clinical trial)) OR ((informatics OR internet OR consumer health information) AND (consumer OR patients OR parents OR caregivers) AND (access OR barrier OR facilitator OR compatibility OR user centered)))
The New York Academy of Medicine – Grey Literature	informatics OR "consumer health information" OR "health info rmation application"

Appendix E

Previewing Only: You cannot submit data from this form

Previewing at Level 2

Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

Submit Data

Key Question 1: What evidence exisits that CHI applications impact: a. health care processes (e.g., receipt of appropriate treatment) b. intermediate outcomes (e.g., self-management, knowledge, health behaviors) c. relationship-centered outcomes (e.g., shared decision making, clinician-patient communication) d. clinical outcomes (e.g., quality of life) e. economic outcomes (e.g., cost, access to care)	Key Question 2: What are the barriers/facilitators that clinicians, developers, and consumers and their families or caregivers encounter that limit implimentation of CHI applications?

1. Does the abstract POTENTIALLY apply to Key Question 1 **OR** Key Question 2?

- (●) Yes (go to Question 2)
- ( ) No (Go to Question 3 and optionally 4)
- ( ) Unclear or No Abstract available (Go to Question 5)

Clear Selection

2. This abstract POTENTIALLY applies to:

- [ ] Key Question 1 (must be an **RCT** to apply to KQ1)
- [x] Key Question 2 (addresses **DIRECT** barriers to CHI)
- [ ] Key Question 2 (addresses barriers **NOT** specific to CHI)

If you have chosen any of the answers to question 2 (reasons for inclusion), **SUBMIT**. If you believe the abstract should be **EXCLUDED**, or you are **UNCLEAR/or no abstract is available**, please proceed.

---

3. Reason for Exclusion

- [ ] No health informatics application
- [ ] Health informatics application does not apply to the consumer
- [ ] Health informatics application is for general information only (e.g., general website, message board, survey, etc.) AND is not tailored to the individual consumer
- [ ] Study of a "point of care" device (requires a clinician to use or obtain and is part of the regular provision of care; e.g., device or telemedicine used at the point of care)
- [ ] No original data (letter to the editor, comment, systematic review)
- [ ] NOT a randomized controlled trial (this is **ONLY** an exclusion for KQ1, any article that may apply to KQ2 should NOT be excluded based on study design)
- [ ] Other
- [ ] Non-English (specify language)

4. FLAG excluded article:

(these answers are optional and should only be chosen if one of the above reasons for exclusion have been identified)

- Article of interest: use for background information
- Review of a relevant topic: pull for further evaluation of relevance to this review
- Other article of intereste: team members may flag personal articles of interest

Clear Selection

If you have chosen any of the answers to question 3 or optionally 4 (reasons for exclusion), **SUBMIT**. If you are **UNCLEAR/or no abstract is available**, please proceed.

---

5. Relevance to Key question 1 OR 2 is UNCLEAR or no abstract is available.

- Unable to determine eligibility based on the abstract alone: INCLUDE (move to next level for assessment)
- No Abstract: Title may apply to one of the Key Questions: INCLUDE (move to next level for assessment)
- No Abstract: Based on title, journal, and number of pages, this is a letter tot the editor, commentary, or other publication type that does not contain peer-reviewed data. EXCLUDE

Clear Selection

6. **Comments**

Enlarge Shrink

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Previewing at Level 4

Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

Save to finish later | Submit Data

GENERAL study and population characteristics

1. After full review of this article, does it apply to, and contain abstractable data to answer either Key Question1, or Key Question 2, or both?

If you answer "no" please contact Renee (rwilsob@jhmi.edu) immeditately with the refID.

- ☐ Yes Key Question 1 (go to question 2)
- ☐ Yes Key Question 2 (go to question 3)
- ☐ NO--does nto apply to either key question (contact Renee)

2. If this article applies to Key Question 1 (outcomes), please identify the subquestion it applies to:

- ☐ a. Healthcare process outcomes (e.g., diagnosis, treametn, prevetnion)
- ☐ b. Intermediate outcomes (e.g., self management, health knowledge, health behaviors)
- ☐ c. Relationship-centered outcomes (e.g., shared decision makig, communication)
- ☐ d. Clinical outcomes (e.g., quailty of life, safety)
- ☐ e. Economic outcomes (e.g., cost, access, reimbursement)
- ☐ f. Other (specifiy)

3. If this article applies to Key Question 2 (barriers), please identify the type or types of barriers it applies to:

- ☐ system-level barriers (e.g., not user-centric, inefficient workflow, incompatible with other systems, lack of or inadequate reinmbursement)
- ☐ Individual-level barrier (e.g., negative or opposing attitudes, lack of access, lack o for inadequate reimbursement, lack of knowledge, limited literacy)
- ☐ Other (specify)

4. Study design

- ○ RCT (ALL KQ 1 articles MUST be RCTs)
- ○ Other: define as identified by study authors)

Clear Selection

5. Study location

- ☐ Home/residence
- ☐ Remote location (e.g, library, internet cafe); specify
- ☐ Clinician office
- ☐ Not specified
- ☐ Other; specifcy

6. Year data collection began

- ○ Year
- ○ Not specified
- ○ Duration

Clear Selection

7. Who is the consumer?

- ☐ Individual interested in their own health care (add details if necessary)
- ☐ Non-medical caregiver (add details)

8. Identify the CHI application type:

- ○ Patient kiosk
- ○ Personal monitoring device
- ○ Disease specific sensor
- ○ Interactive consumer website
- ○ Disease risk calculator
- ○ Personalized health risk assessment tool
- ○ Electronic medication reminder
- ○ Other (specify)

Clear Selection

9. Identify the target condition, behavior, or barrier of interest.
(barriers should be listed as free text at teh end of the list of choices)

- ☐ Obesity
- ☐ Smoking
- ☐ Cancer (breast)
- ☐ Diabetes
- ☐ Hypertension
- ☐ Asthma
- ☐ Mental health
- ☐ Depression
- ☐ Substance abuse
- ☐ Alcohol abuse
- ☐ other (specify)
- ☐ Breast (other)
- ☐ menopause/HRT
- ☐ Diet/exercise/pysical activity NOT obesity
- ☐ HIV/AIDS
- ☐ BARRIER

Study participant inclusion/exclusion criteria (as defined in the article):

	Inclusion	Exclusion	Not specified
10. Age (specify)			
11. Race (specify)			
12. Gender (specify)			
13. Other (specify)			
14. Other (specify)			
15. Other (specify)			
16. Other (specify)			
17. Other (specify)			
18. Other (specify)			
19. Other (specify)			
20. Other (specify)			

Specify **ALL OUTCOMES** and **ALL TIME POINTS** measured in this study.

Be carful to categorize oucomes properly; thi swill impact which form reviewers will fill out next.

Are **CATEGORICAL** outcomes being studied? Describe below ○ Yes ○ No Clear Selection	Are **CONTINUOUS** outcomes being studied? Describe below ○ Yes ○ No Clear Selection	Identify (define) the timepoints where outcomes are measured. always use time point 1 as the baseline measure always use time point 6 as the final measure
Cat outcome 1	Cont outcome 1	Time point 1: always define as baseline
Cat outcome 2	Cont outcome 2	Time point 2: define
Cat outcome 3	Cont outcome 3	Time point 3: define
Cat outcome 4	Cont outcome 4	Time point 4: define
Cat outcome 5	Cont outcome 5	Time point 5 define
Cat outcome 6	Cont outcome 6	Time point 6: define
Cat outcome 7	Cont outcome 7	
Cat outcome 8	Cont outcome 8	
Cat outcome 9	Cont outcome 9	
Cat outcome 10	Cont outcome 10	

Define **ALL** Study Arms

	Define	No control group	
26. ARM A (control group)			Clear
27. ARM B (intervention)			Clear
28. ARM C (intervention)			Clear
29. ARM D (intervention)			Clear

Study population characteristics:

ARM *answers from above questions will populate these cells*	Age	Race/Ethnicity *If information is provided and it does not fit the NIH criteria, fill in the "other" categories at the bottom of the cell*	Annual Income *always identify units, always identify income range as reported in the article OR mean, meadian, SD*	Education	Socioeconomic status	Other 1	Other 2	Other 3	Other 4
ARM A (control group) Define No control group Clear Selection	Mean Median Range SD	Race not stated White, non-hispanic, n White, non-hispanic, % Black, non-hispanic, n Black, non-hispanic, % Latino/hispanic, n Latino/hispanic, % Asian/Pacific Islander, n Asian/Pacific Islander, % American Indian/Alaska Native, n American Indian/Alaska Native, % Other, n Other, % Other, n Other, %	Not specified UNITS income range, n (%) income range, n (%) income range, n (%) income range, n (%) income range, n (%) Mean income Median income SD	Not reported Less than 8 years, n(%) 8-12 years, n(%) 12-16 years, n(%) >16 years, n(%) Mean Median SD	Not specified Low (define), n(%) Middle (define), n(%) High (define), n(%)	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD
ARM B (intervention) Define Clear Selection	Mean Median Range SD	Race not stated White, non-hispanic, n White, non-hispanic, % Black, non-hispanic, n Black, non-hispanic, % Latino/hispanic, n Latino/hispanic, % Asian/Pacific Islander, n Asian/Pacific Islander, % American Indian/Alaska Native, n American Indian/Alaska Native, % Other, n Other, % Other, n Other, %	Not specified UNITS income range, n (%) income range, n (%) income range, n (%) income range, n (%) income range, n (%) Mean income Median income SD	Not reported Less than 8 years, n(%) 8-12 years, n(%) 12-16 years, n(%) >16 years, n(%) Mean Median SD	Not specified Low (define), n(%) Middle (define), n(%) High (define), n(%)	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD
ARM C (intervention) Define Clear Selection	Mean Median Range SD	Race not stated White, non-hispanic, n White, non-hispanic, % Black, non-hispanic, n Black, non-hispanic, % Latino/hispanic, n Latino/hispanic, % Asian/Pacific Islander, n Asian/Pacific Islander, % American Indian/Alaska Native, n American Indian/Alaska Native, % Other, n Other, % Other, n Other, %	Not specified UNITS income range, n (%) income range, n (%) income range, n (%) income range, n (%) income range, n (%) Mean income Median income SD	Not reported Less than 8 years, n(%) 8-12 years, n(%) 12-16 years, n(%) >16 years, n(%) Mean Median SD	Not specified Low (define), n(%) Middle (define), n(%) High (define), n(%)	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD
ARM D (intervention) Define Clear Selection	Mean Median Range SD	Race not stated White, non-hispanic, n White, non-hispanic, % Black, non-hispanic, n Black, non-hispanic, % Latino/hispanic, n Latino/hispanic, % Asian/Pacific Islander, n Asian/Pacific Islander, % American Indian/Alaska Native, n American Indian/Alaska Native, % Other, n Other, % Other, n Other, %	Not specified UNITS income range, n (%) income range, n (%) income range, n (%) income range, n (%) income range, n (%) Mean income Median income SD	Not reported Less than 8 years, n(%) 8-12 years, n(%) 12-16 years, n(%) >16 years, n(%) Mean Median SD	Not specified Low (define), n(%) Middle (define), n(%) High (define), n(%)	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD	Define category 1, n(%) category 2, n(%) category 3, n(%) category 4, n(%) Mean Median SD

70.

Comment

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Click a link below to review this article at these other levels.

5. KQ 1 CHI (categorical variables)
6. KQ 1 CHI (continuous variables)
7. KQ 2 CHI harriers
8. Jadad – RCT quality

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Form Last Modified: Mar 27 2009 4:00PM

Previewing Only: You cannot submit data from this form

Previewing at Level 5

Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

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KEY QUESTION 1

Report CATEGORICAL variables

What evidence exists that consumer health informatics applications impact health care process outcomes, intermediate outcomes, relationship-centered outcomes, clinical outcomes, or economic outcomes of its users?

Description of all **CATEGORICAL** outcomes being studied	Identify (define) the timepoints where outcomes are measured. always use time point 1 as the baseline measure always use time point 4 as the final measure
1. Cat outcome 1 Cat outcome 2 Cat outcome 3 Cat outcome 4 Cat outcome 5 Cat outcome 6	2. Baseline Time point 2: define Time point 3: define Time point 4: define Time pint 5: define (**ALWAYS** use this timepoint as the last/main measure timepoint when abstracting data)

CATEGORICAL Outctomes
see answers to question 1

Cat Outcome 1

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

				final/main measure		
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

Cat Outcome 2

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

		measure		95% CI at final/main measure		
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

Cat Outcome 3

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at	n at baseline n at time point 2 n at time point 3 n at timepoint 4	% at baseline % at time point 2 % at time point 3 % at time point 4 % at	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at	Enlarge Shrink

	final/main measure	n at final/main measure	final/main measure	at time point 4 95% CI at final/main measure	final/main measure	
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

Cat Outcome 4

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time	n at baseline n at time point 2 n at time point 3 n at	% at baseline % at time point 2 % at time point 3 % at time	95% CI at baseline 95% CI at time point 2 95% CI at time	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time	Enlarge Shrink

	point 4 N at final/main measure	timepoint 4 n at final/main measure	point 4 % at final/main measure	point 3 95% CI at time point 4 95% CI at final/main measure	point 4 *P* at final/main measure	
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

Cat Outcome 5

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define N randomized to this ARM	N at baseline N at time point 2 N at time	n at baseline n at time point 2 n at time	% at baseline % at time point 2 % at time	95% CI at baseline 95% CI at time	*P* at baseline *P* at time point 2 *P* at time	Enlarge Shrink

	point 3 N at time point 4 N at final/main measure	point 3 n at timepoint 4 n at final/main measure	point 3 % at time point 4 % at final/main measure	point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	point 3 *P* at time point 4 *P* at final/main measure	
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

Cat Outcome 6

ARM	Total N in ARM	n with outcome	% with outcome	95% CI	*P*	Comment
ARM A (control) N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM B Define	N at baseline	n at baseline	% at baseline	95% CI at	*P* at baseline	

N randomized to this ARM	N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at time point 2 % at time point 3 % at time point 4 % at final/main measure	baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM C Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink
ARM D Define N randomized to this ARM	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at timepoint 4 n at final/main measure	% at baseline % at time point 2 % at time point 3 % at time point 4 % at final/main measure	95% CI at baseline 95% CI at time point 2 95% CI at time point 3 95% CI at time point 4 95% CI at final/main measure	*P* at baseline *P* at time point 2 *P* at time point 3 *P* at time point 4 *P* at final/main measure	Enlarge Shrink

171.

COMMENTS

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4. GENERAL study and population characteristics
6. KQ 1 CHI (continuous variables)
7. KQ 2 CHI barriers
8. Jadad -- RCT quality

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Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

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KEY QUESTION 1

Report CONTINUOUS variables

What evidence exists that consumer health informatics applications impact health care process outcomes, intermediate outcomes, relationship-centered outcomes, clinical outcomes, or economic outcomes of its users?

Description of all **CONTINUOUS** outcomes being studied	Identify (define) the timepoints where outcomes are measured. always use time point 1 as the baseline measure always use time point 4 as the final measure
1. Cont outcome 1 Cont outcome 2 Cont outcome 3 Cont outcome 4 Cont outcome 5 Cont outcome 6 Cont outcome 7 Cont outcome 8	2. Time point: baseline Time point 2: define Time point 3: define Time point 4: define Time point: final/main measure

CONTINUOUS Outcome 1 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4	n at baseline n at time point 2 n at time point 3 n at time point 4	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4	Enlarge Shrink

	N at final/main measure n at final/main measure		value at final/main measure	**mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at final.main measure	
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at	n at baseline n at time point 2 n at time point 3 n at time point 4 n at	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at	Enlarge Shrink

	final/main measure	final/main measure		final/main measure	point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	final.main measure	

39. **Comments , outcome 1**

Enlarge Shrink

CONTINUOUS Outcome 2 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM D								

Define	N at baseline	n at baseline	Units (define)	value at baseline	**mean at baseline**	RR or OR (specify) at baseline	significance at baseline	
N randomized to this Arm	N at time point 2	n at time point 2		value at time point 2	**median** at baseline	RR or OR (specify) at time point 2	significance at time point 2	Enlarge Shrink
	N at time point 3	n at time point 3		value at time point 3	**range** at baseline	RR or OR (specify) at time point 3	significance at time point 3	
	N at time point 4	n at time point 4		value at time point 4	**SD** at baseline	RR or OR (specify) at time point 4	significance at time point 4	
	N at final/main measure	n at final/main measure		value at final/main measure	**mean** at time point 2	RR or OR (specify) at final/main measure	significance at final.main measure	
					median at time point 2			
					range at time point 2			
					SD at time point 2			
					mean at time point 3			
					median at time point 3			
					range at time point 3			
					SD at time point 3			
					mean at time point 4			
					median at time point 4			
					range at time point 4			
					SD at time point 4			
					mean at final/main measure			
					median at final/main measure			
					range at final/main measure			
					SD at final/main measure			

76. **Comments , outcome 2**

Enlarge Shrink

CONTINUOUS Outcome 3 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control)	N at baseline	n at baseline	Units (define)	value at baseline	**mean at baseline**	RR or OR (specify) at baseline	significance at baseline	
N randomized to this Arm	N at time point 2	n at time point 2		value at time point 2	**median** at baseline	RR or OR (specify) at time point 2	significance at time point 2	Enlarge Shrink
	N at time point 3	n at time point 3		value at time point 3	**range** at baseline	RR or OR (specify) at time point 3	significance at time point 3	
	N at time point 4	n at time point 4		value at time point 4	**SD** at baseline	RR or OR (specify) at time point 4	significance at time point 4	
	N at final/main measure	n at final/main measure		value at final/main measure	**mean** at time point 2	RR or OR (specify) at final/main measure	significance at final.main measure	
					median at time point 2			
					range at time point 2			
					SD at time point 2			
					mean at time point 3			
					median at time point 3			
					range at time point 3			
					SD at time point 3			
					mean at time point 4			
					median at time point 4			
					range at time point 4			
					SD at time point 4			
					mean at final/main measure			
					median at			

					final/main measure **range** at final/main measure **SD** at final/main measure			
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					measure **range** at final/main measure **SD** at final/main measure			
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

113. **Comments , outcome 3**

Enlarge Shrink

CONTINUOUS Outcome 4 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					range at time point 4 SD at time point 4 mean at final/main measure median at final/main measure range at final/main measure SD at final/main measure			
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure			
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

150. **Comments , outcome 4**

Enlarge Shrink

CONTINUOUS Outcome 5 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure			
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure			
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

187. **Comments , outcome 5**

Enlarge Shrink

CONTINUOUS Outcome 6 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at	Enlarge Shrink

	final/main measure	measure		final/main measure	point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	(specify) at time point 4 RR or OR (specify) at final/main measure	final.main measure
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at	Enlarge Shrink

	final/main measure	measure		final/main measure	point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	(specify) at time point 4 RR or OR (specify) at final/main measure	final.main measure	
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

224. **Comments , outcome 6**

Enlarge Shrink

CONTINUOUS Outcome 7 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment

ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM C								

Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

261. **Comments , outcome 7**

Enlarge Shrink

CONTINUOUS Outcome 8 (see answers to question 2)

ARM	Total N in ARM	n in ARM with outcome	Units	Value	Mean, Median, Range, SD	RR or OR (specifiy)	Significance	Comment
ARM A (control) N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM B Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					final/main measure **range** at final/main measure **SD** at final/main measure			
ARM C Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main measure **range** at final/main measure **SD** at final/main measure	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink
ARM D Define N randomized to this Arm	N at baseline N at time point 2 N at time point 3 N at time point 4 N at final/main measure	n at baseline n at time point 2 n at time point 3 n at time point 4 n at final/main measure	Units (define)	value at baseline value at time point 2 value at time point 3 value at time point 4 value at final/main measure	**mean at baseline** **median** at baseline **range** at baseline **SD** at baseline **mean** at time point 2 **median** at time point 2 **range** at time point 2 **SD** at time point 2 **mean** at time point 3 **median** at time point 3 **range** at time point 3 **SD** at time point 3 **mean** at time point 4 **median** at time point 4 **range** at time point 4 **SD** at time point 4 **mean** at final/main measure **median** at final/main	RR or OR (specify) at baseline RR or OR (specify) at time point 2 RR or OR (specify) at time point 3 RR or OR (specify) at time point 4 RR or OR (specify) at final/main measure	significance at baseline significance at time point 2 significance at time point 3 significance at time point 4 significance at final.main measure	Enlarge Shrink

					measure **range** at final/main measure **SD** at final/main measure			

298. **Comments , outcome 8**

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4. GENERAL study and population characteristics
5. KQ 1 CHI (categorical variables)
7. KQ 2 CHI barriers
8. Jadad -- RCT quality

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Previewing at Level 7

Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

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KEY QUESTION 2

What are the barriers that clinicians, developers, and consumers and their families or caregivers encounter that limit implementation of consumer health informatics applications?

1. This study provides evidence for:

- Existence of user-level barriers
- Existence of systems-level barriers
- Existence of other barriers (define)

User-level barrier: poor access to internet from home or community, lack of knowledge, poor literacy, culture, language, and other things which are not amenable to systems level solutions.
Systems-level barrier: design is not user-centered, poor workflow, incompatible with existing healthcare information management systems, no reimbursement for other actors, poor accessibility for patients.

Condition of interest	Barriers considered by authors (as described in the purpose or methods)	Barriers reported by authors as important (these may differ from previous column)	How were the barriers data collected?	Results (free text field)
Alcohol abuse Asthma Breast cancer Cancer, other than breast (specify) Depression Diabetes Eating disorder Headache HIV/AIDS Hypertension Menopaus/HRT (specify) Mental health (specify) Obesity Physical activity/diet (specify) Smoking/smoking cessation Other	Application usability (user friendliness) Care giver preferences (define) CHI application not designed for general use (only designed for the **sick**) CHI application not designed for general use (only designed for the **healthy**) CHI application use too time consuming Confidentiality/privacy Control of information (trust) Cost (patient) Cultural Disability Incompatibility with current care Knowledge literacy (**Care giver's** lack of skill	Application usability (user friendliness) Care giver preferences (define) CHI application not designed for general use (only designed for the **sick**) CHI application not designed for general use (only designed for the **healthy**) CHI application use too time consuming Confidentiality/privacy Control of information (trust) Cost (patient) Cultural Disability Incompatibility with current care Knowledge literacy (**Care giver's** lack of skill	Empirical based on trial data (e.g., log ins, # completed modules) Validated survey (e.g., patient or caregiver report, scales of skills or other characteristics) Non-validated survey Observational (e.g., adminstrative data, review of cost, objective testing of usability, objective testing of access) Biologic outcome Qualitative (e.g., focus group, structured interview) Other	Enlarge Shrink

	re: CHI application) ☐ Knowledge literacy (**Patient 's** lack of skill re: CHI application) ☐ Lack of insurance for services recommended by CHI application ☐ Lack of reimbursement (provider) ☐ Lack of technical infrastructure (home or community) ☐ Language ☐ Patient preferences (define) ☐ Other ☐ Other ☐ Other	re: CHI application) ☐ Knowledge literacy (**Patient 's** lack of skill re: CHI application) ☐ Lack of insurance for services recommended by CHI application ☐ Lack of reimbursement (provider) ☐ Lack of technical infrastructure (home or community) ☐ Language ☐ Patient preferences (define) ☐ Other ☐ Other ☐ Other	☐ Other ☐ Other	

7.

Comment

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4. GENERAL study and population characteristics
5. KQ 1 CHI (categorical variables)
6. KQ 1 CHI (continuous variables)
8. Jadad -- RCT quality

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Refid: 1, Simon, C., Acheson, L., Burant, C., Gerson, N., Schramm, S., Lewis, S., and Wiesner, G., Patient interest in recording family histories of cancer via the Internet, *Genet Med*, 10(12), 2008, p.895-902

State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

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QUALITY FORM
JADAD (quality of controlled trials)

1. Was the study described as randomized (this includes the use of words such as randomly, random, and randomization)? *In other words, was the allocation concealed?*

- Yes (go to question 2)
- No (-1)
- Unspecified (0)

Clear Selection

2. If the answer to question #1 was "yes," then answer the following:

- Was the method used to generate the sequence of randomization described and was it appropriate? (+1)
- Was the method of randomization described but inappropriate? (-1)
- unspecified (0)

Clear Selection

3. Was the study described as double blind? *In other words, were the outcome assessors blind in addition to the patients?*

- Yes (go to question 4)
- No (-1)
- unspecified (0)

Clear Selection

4. If the answer to #3 is "Yes" then answer the following:

- The method of double blinding was described and appropriate (+1)
- the study was described as being blind, but the method of blinding was inapproriate (-1)
- unspecified (0)

Clear Selection

5. Was there a description of withdrawals and dropouts?

- Yes (+1)
- No (-1)

Clear Selection

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Click a link below to review this article at these other levels.

4. GENERAL study and population characteristics
5. KQ 1 CHI (categorical variables)
6. KQ 1 CHI (continuous variables)
7. KQ 2 CHI barriers

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State: Ok, Level: KQ 1 CHI (categorical variables), KQ 1 CHI (continuous variables), Jadad -- RCT quality

Save to finish later | Submit Data

1. **Does this article POTENTIALLY apply to ANY of the key questions?**

Key Question 1: What evidence exists that consumer health informatics impacts: a) health care process outcomes (e.g., receiving appropriate treatment); b) intermediate outcomes (e.g., self-management, health care knowledge), c) relationship-centered outcomes (e.g., shared decision making), d) clinical outcomes (e.g., quality of life), or e) economic outcomes (e.g., cost, or access to care)?

Key question 2: What are the barriers that clinicians, developers, and consumers and their families and caregivers encounter that limit implementation of consumer health informatics applications?

- ○ Yes
- ○ No
- ○ Unclear

Clear Selection

Save to finish later | Submit Data

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Form Last Modified: Dec 22 2008 1:10PM

Appendix F

Appendix F: List of Excluded Articles

A new strategy to empower people in Africa. World Health 97;(6):4-5
No health informatics application

Adler K G. Web portals in primary care: an evaluation of patient readiness and willingness to pay for online services. J Med Internet Res 2006;8(4):e26
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Ahmad F, Hogg-Johnson S, Skinner H A. Assessing patient attitudes to computerized screening in primary care: psychometric properties of the computerized lifestyle assessment scale. J Med Internet Res 2008;10(2):e11
Study of a point of care device

Allenby A, Matthews J, Beresford J et al. The application of computer touch-screen technology in screening for psychosocial distress in an ambulatory oncology setting. Eur J Cancer Care (Engl) 2002;11(4):245-53
No health informatics application;
Study of a point of care device

An J. Correlates and predictors of consumers' health information and services usage behavior on the Internet: A structural equation modeling approach. New York University, 2005. (Doctoral dissertation)
No original data;
Other*

An L C, Schillo B A, Saul J E et al. Utilization of smoking cessation informational, interactive, and online community resources as predictors of abstinence: cohort study. J Med Internet Res 2008;10(5):e55
Not a RCT and not a study addressing barriers

Anderson PF, Wilson B. Rapid development of a craniofacial consumer health Web site: part one, what happens before content and coding.. Journal of Consumer Health on the Internet 2007;11(2):13-31
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Andersson G, Bergstrom J, Hollandare F et al. Internet-based self-help for depression: randomised controlled trial. Br J Psychiatry 2005;187456-61
Study of a point of care device

Andersson G, Lundstrom P, Strom L. Internet-based treatment of headache: does telephone contact add anything?. Headache 2003;43(4):353-61
Study of a point of care device

Anhoj J, Nielsen L. Quantitative and qualitative usage data of an Internet-based asthma monitoring tool. J Med Internet Res 2004;6(3):e23
Study of a point of care device

Apkon M, Mattera J A, Lin Z et al. A randomized outpatient trial of a decision-support information technology tool. Arch Intern Med 2005;165(20):2388-94
Study of a point of care device

Balmford J, Borland R, Benda P. Patterns of use of an automated interactive personalized coaching program for smoking cessation. J Med Internet Res 2008;10(5):e54
Not a RCT, and not a study addressing barriers;
Other*

Bandy M. Health information for patients and consumers.: Health information for patients and consumers.. 2000;325-350
No health informatics application;
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Barnason S, Zimmerman L, Nieveen J et al. Impact of a home communication intervention for coronary artery bypass graft patients with ischemic heart failure on self-efficacy, coronary disease risk factor modification, and functioning. Heart Lung 2003;32(3):147-58
No health informatics application;
Study of a point of care device

Barrera M, Glasgow R E, McKay H G et al. Do Internet-based support interventions change perceptions of social support?: An experimental trial of approaches for supporting diabetes self-management. Am J Community Psychol 2002;30(5):637-54
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Barry K L, Fleming M F. Computerized administration of alcoholism screening tests in a primary care setting. J Am Board Fam Pract 90;3(2):93-8
Other*

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Bechtel-Blackwell D A. Computer-assisted self-interview and nutrition education in pregnant teens. Clin Nurs Res 2002;11(4):450-62
Health informatics application is for general information only AND is not tailored to the individual consumer

Berman R L, Iris M A, Bode R et al. The effectiveness of an online mind-body intervention for older adults with chronic pain. J Pain 2009;10(1):68-79
Other*

Bernhardt J M, Lariscy R A W, Parrott R L et al. Perceived barriers to internet-based health communication on human genetics. 2002;7(4):325-340
Other*

Bexelius C, Honeth L, Ekman A et al. Evaluation of an internet-based hearing test--comparison with established methods for detection of hearing loss. J Med Internet Res 2008;10(4):e32
Not a RCT, and not a study addressing barriers; Other*

Birru M S, Monaco V M, Charles L et al. Internet usage by low-literacy adults seeking health information: an observational analysis. J Med Internet Res 2004;6(3):e25
Health informatics application is for general information only AND is not tailored to the individual consumer

Blas M M, Alva I E, Cabello R et al. Internet as a tool to access high-risk men who have sex with men from a resource-constrained setting: a study from Peru. Sex Transm Infect 2007;83(7):567-70
No health informatics application
Health informatics application does not apply to the consumer

Block G, Sternfeld B, Block C H et al. Development of Alive! (A Lifestyle Intervention Via Email), and its effect on health-related quality of life, presenteeism, and other behavioral outcomes: randomized controlled trial. J Med Internet Res 2008;10(4):e43
Other*

Bonniface L, Green L. Finding a new kind of knowledge on the HeartNET website. Health Information & Libraries Journal 2007-; 2467-76
Health informatics application is for general information only AND is not tailored to the individual consumer;
Not a RCT, and not a study addressing barriers

Borbolla D, Giunta D, Figar S et al. Effectiveness of a chronic disease surveillance systems for blood pressure monitoring. Stud Health Technol Inform 2007;129(Pt 1):223-7
No health informatics application
Health informatics application does not apply to the consumer

Borckardt J J, Younger J, Winkel J et al. The computer-assisted cognitive/imagery system for use in the management of pain. Pain Res Manag 2004;9(3):157-62
Health informatics application does not apply to the consumer

Borland R, Balmford J, Hunt D. The effectiveness of personally tailored computer-generated advice letters for smoking cessation. Addiction 2004;99(3):369-77
No health informatics application

Borland R, Balmford J, Segan C et al. The effectiveness of personalized smoking cessation strategies for callers to a Quitline service. Addiction 2003;98(6):837-46
No health informatics application
Study of a point of care device

Borzekowski D L, Rickert V I, VI. Urban girls, internet use, and accessing health information. J Pediatr Adolesc Gynecol 2000;13(2):94-5
No health informatics application;
Other*

Bosworth K, Gustafson D H. CHESS: Providing Decision Support for Reducing Health Risk Behavior and Improving Access to Health Services. 91;21(3):93-104
Not a RCT, and not a study addressing barriers; Other*

Bouhaddou O, Lambert J G, Miller S. Consumer health informatics: knowledge engineering and evaluation studies of medical HouseCall. Proc AMIA Symp 98;612-6
Not a RCT, and not a study addressing barriers; Other*

Boukhors Y, Rabasa-Lhoret R, Langelier H et al. The use of information technology for the management of intensive insulin therapy in type 1 diabetes mellitus. Diabetes Metab 2003;29(6):619-27
No health informatics application

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Braithwaite S R, Fincham F D. A randomized clinical trial of a computer based preventive intervention: replication and extension of ePREP. J Fam Psychol 2009;23(1):32-8
Other*

Brennan P F. Health informatics and community health: support for patients as collaborators in care. Methods Inf Med 99;38(4-5):274-8
No original data

Brug J. Dutch research into the development and impact of computer-tailored nutrition education. European Journal of Clinical Nutrition 1999;53(SUPPL. 2): S78-82
No original data

Bukachi F, Pakenham-Walsh N. Information technology for health in developing countries. Chest 2007;132(5):1624-30
No health informatics application;
Study of a point of care device

Bull S S, Phibbs S, Watson S et al. What do young adults expect when they go online? Lessons for development of an STD/HIV and pregnancy prevention website. J Med Syst 2007;31(2):149-58
Health informatics application is for general information only AND is not tailored to the individual consumer

Campbell M K, DeVellis B M, Strecher V J et al. Improving dietary behavior: The effectiveness of tailored messages in primary care settings. American Journal of Public Health 1994; 84(5):783-787
No health informatics application

Campbell M K, Tessaro I, DeVellis B et al. Effects of a tailored health promotion program for female blue-collar workers: Health works for women. Preventive Medicine 2002;34(3):313-323
Other*

Campbell R. Older women and the internet. J Women Aging 2004;16(1-2):161-74
No health informatics application

Campbell RJ, Wabby J. The elderly and the Internet: a case study.. Internet Journal of Health 2003;3(1):11p
Not a RCT, and not a study addressing barriers

Campbell SE. Individualised computer generated nutrition information plus interative feedback reduced dietary fat and increased fruit and vegetable intake [commentary on Brug J, Glanz K, Van Assema P, et al. The impact of computer-tailored feedback and iterative feedback on fat, fruit, and vegetable intake. HEALTH EDUC BEHAV 1998 Aug;25:517-31].. Evidence-Based Nursing 99;2(3):83
No original data

Carlbring P, Smit F. Randomized trial of internet-delivered self-help with telephone support for pathological gamblers. J Consult Clin Psychol 2008;76(6):1090-4
Other*

Carlfjord S, Nilsen P, Leijon M et al. Computerized lifestyle intervention in routine primary health care: evaluation of usage on provider and responder levels. Patient Educ Couns 2009;75(2):238-43
Other*

Casper G R, Brennan P F, Burke L J et al. HeartCareII: Patients' Use of a Home Care Web Resource. Stud Health Technol Inform 2009;146139-43
Other*

Chan D S, Callahan C W, Hatch-Pigott V B et al. Internet-based home monitoring and education of children with asthma is comparable to ideal office-based care: results of a 1-year asthma in-home monitoring trial. Pediatrics 2007;119(3):569-78
Study of a point of care device

Chandra A, Rutsohn P, Carlisle MB. Utilization of the Internet by rural West Virginia consumers.. Journal of Consumer Health on the Internet 2004;8(2):45-59
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Chiang M F, Starren J. Evaluation of consumer health website accessibility by users with sensory and physical disabilities. Stud Health Technol Inform 2004;107(Pt 2):1128-32
Health informatics application is for general information only AND is not tailored to the individual consumer

Chinman M, Young A S, Schell T et al. Computer-assisted self-assessment in persons with severe mental illness. J Clin Psychiatry 2004;65(10):1343-51
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Cho J H, Lee H C, Lim D J et al. Mobile communication using a mobile phone with a glucometer for glucose control in Type 2 patients with diabetes: as effective as an Internet-based glucose monitoring system. J Telemed Telecare 2009;15(2):77-82
No health informatics application;
Study of a point of care device

Christensen H, Griffiths K, Groves C et al. Free range users and one hit wonders: Community users of an internet-based cognitive behaviour therapy program. Australian and New Zealand Journal of Psychiatry 2006;40(1):59-62
Not a RCT, and not a study addressing barriers

Cintron A, Phillips R, Hamel M B. The effect of a web-based, patient-directed intervention on knowledge, discussion, and completion of a health care proxy. J Palliat Med 2006;9(6):1320-8
Health informatics application is for general information only AND is not tailored to the individual consumer

Civan A, Skeels M M, Stolyar A et al. Personal health information management: consumers' perspectives. AMIA Annu Symp Proc 2006;156-60
Other*

Clarke G, Eubanks D, Reid E et al. Overcoming Depression on the Internet (ODIN) (2): a randomized trial of a self-help depression skills program with reminders. J Med Internet Res 2005;7(2):e16
Study of a point of care device

Clayton A E, McNutt L A, Homestead H L et al. Public health in managed care: a randomized controlled trial of the effectiveness of postcard reminders. Am J Public Health 99;89(8):1235-7
No health informatics application

Cobb N K, Graham A L, Bock B C et al. Initial evaluation of a real-world internet smoking cessation system. Nicotine Tob Res. 2005;7(2):207-216
Not a RCT, and not a study addressing barriers

Coile R C. E-health: Reinventing healthcare in the information age. Journal of Healthcare Management. 2000;45(3):206-210
No health informatics application

Col N F, Ngo L, Fortin J M et al. Can computerized decision support help patients make complex treatment decisions? A randomized controlled trial of an individualized menopause decision aid. Med Decis Making 2007;27(5):585-98
No health informatics application;
Health informatics application does not apply to the consumer

Cook R F, Billings D W, Hersch R K et al. A field test of a web-based workplace health promotion program to improve dietary practices, reduce stress, and increase physical activity: Randomized controlled trial. Journal of Medical Internet Research 2007;9:e17
Other*

Cox A, Boehm M, Summers R et al. Patient perspective. Using a virtual community to support healthcare. Quality in Primary Care 2003;11(2):143-145
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Cummings E, Turner P. Patient self-management and chronic illness: evaluating outcomes and impacts of information technology. Stud Health Technol Inform 2009;143229-34
No health informatics application;
Study of a point of care device

Cummings E, Turner P. Patient self-management and chronic illness: evaluating outcomes and impacts of information technology. Stud Health Technol Inform 2009;143229-34
Other*

Cunningham J A, Humphreys K, Koski-Jannes A. Providing personalized assessment feedback for problem drinking on the internet: A pilot project. 2000;61(6):794-798
Not a RCT and not a study addressing barriers;
Other*

Cunningham J A, Selby P, van Mierlo T. Integrated online services for smokers and drinkers? Use of the check your drinking assessment screener by participants of the Stop Smoking Center. Nicotine Tob Res 2006;8 Suppl 1S21-5
No health informatics application;
Study of a point of care device

Curioso W H, Kurth A E. Access, use and perceptions regarding Internet, cell phones and PDAs as a means for health promotion for people living with HIV in Peru. BMC Med Inform Decis Mak 2007;724

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Health informatics application is for general information only AND is not tailored to the individual consumer

Curioso W H, Kurth A E. Access, use and perceptions regarding Internet, cell phones and PDAs as a means for health promotion for people living with HIV in Peru. BMC Med Inform Decis Mak 2007;724
Other*

Damster G, Williams J R. The Internet, virtual communities and threats to confidentiality. S Afr Med J 99;89(11):1175-8
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Danaher B G, Boles S M, Akers L et al. Defining participant exposure measures in Web-based health behavior change programs. J Med Internet Res 2006;8(3):e15
No health informatics application;
Other*

Dart J, Gallois C, Yellowlees P. Community health information sources--a survey in three disparate communities. Aust Health Rev 2008;32(1):186-96
Health informatics application is for general information only AND is not tailored to the individual consumer

Dart J. The internet as a source of health information in three disparate communities. Aust Health Rev 2008;32(3):559-69
Health informatics application is for general information only AND is not tailored to the individual consumer

Davison B J, Degner L F. Feasibility of using a computer-assisted intervention to enhance the way women with breast cancer communicate with their physicians. Cancer Nurs 2002;25(6):417-24
Other*

Dawson A J, Konkin D, Riordan D et al. Education about genetic testing for breast cancer susceptibility: Patient preferences for a computer program or genetic counselor. American Journal of Medical Genetics 2001;103(1):24-31
Health informatics application is for general information only AND is not tailored to the individual consumer;
Not a RCT, and not a study addressing barriers

De Bourdeaudhuij I, Stevens V, Vandelanotte C et al. Evaluation of an interactive computer-tailored nutrition intervention in a real-life setting. Annals of Behavioral Medicine 2007;33(1):39-48
Other*

Demiris G, Finkelstein S M, Speedie S M. Considerations for the design of a Web-based clinical monitoring and educational system for elderly patients. Journal of the American Medical Informatics Association 2001;8(5):468-472
No original data

Demiris G, Rantz M, Aud M et al. Older adults' attitudes towards and perceptions of "smart home" technologies: a pilot study. Med Inform Internet Med 2004;29(2):87-94
No health informatics application;
Health informatics application does not apply to the consumer

Detailed report on physician and patient use of the Web. Internet Healthc Strateg 2003;5(5):5-6
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Dilts D, Ridner S H, Franco A et al. Patients with cancer and e-mail: implications for clinical communication. Support Care Cancer 2008;
Health informatics application is for general information only AND is not tailored to the individual consumer

Dimeff L A, McNeely M. Computer-enhanced primary care practitioner advice for high-risk college drinkers in a student primary health-care setting. Cognitive and Behavioral Practice 2000;7(1):82-100
Not a RCT, and not a study addressing barriers;
Other*

Dini E F, Linkins R W, Sigafoos J. The impact of computer-generated messages on childhood immunization coverage. Am J Prev Med 2000;18(2):132-9
Health informatics application does not apply to the consumer;
Study of a point of care device

Dolezal-Wood S, Belar C D, Snibbe J. A Comparison of Computer-Assisted Psychotherapy and Cognitive-Behavioral Therapy in Groups. Journal of Clinical Psychology in Medical Settings 98;5(1):103-115

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Other*

Doumas D M, McKinley L L, Book P. Evaluation of two Web-based alcohol interventions for mandated college students. J Subst Abuse Treat 2009;36(1):65-74
Other*

Draper S, Coffman S. Logging on: what it takes to provide patients with computer access. Biomed Instrum Technol 2004-2005;Suppl17-9
No original data
Dreault RT. Information anxiety. Mississippi RN 2000;62(3):11-14
No health informatics application

Edwards A, Thomas R, Williams R et al. Presenting risk information to people with diabetes: evaluating effects and preferences for different formats by a web-based randomised controlled trial. Patient Educ Couns 2006;63(3):336-49
Health informatics application is for general information only AND is not tailored to the individual consumer

Ellison G L, Weinrich S P, Lou M et al. A randomized trial comparing web-based decision aids on prostate cancer knowledge for African-American men. J Natl Med Assoc 2008;100(10):1139-45
Not a RCT, and not a study addressing barriers

Emmons K M, Wong M, Puleo E et al. Tailored computer-based cancer risk communication: Correcting colorectal cancer risk perception. Journal of Health Communication 2004;9(2):127-141
Other*

Enterprise scheduling may improve patient access. "Transparent" registration is the goal. Patient Focus Care Satisf 98;6(7):83-6
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Ervin N E, Berry M M. Community readiness for a computer-based health information network. J N Y State Nurses Assoc 2006;37(1):5-11
No health informatics application

Escoffery C, McCormick L, Bateman K. Development and process evaluation of a web-based smoking cessation program for college smokers: innovative tool for education. Patient Educ Couns 2004;53(2):217-25
Other*

Etter J F, Perneger T V. Post-intervention effect of a computer tailored smoking cessation programme. J Epidemiol Community Health 2004;58(10):849-51
No health informatics application;
Other*

Eysenbach G. From intermediation to disintermediation and apomediation: new models for consumers to access and assess the credibility of health information in the age of Web2.0. Stud Health Technol Inform 2007;129(Pt 1):162-6
No health informatics application;
Study of a point of care device

Feldstein A C, Smith D H, Perrin N et al. Improved therapeutic monitoring with several interventions: a randomized trial. Arch Intern Med 2006;166(17):1848-54
No health informatics application

Ferrer-Roca O, C+írdenas A, Diaz-Cardama A et al. Mobile phone text messaging in the management of diabetes. Journal of Telemedicine and Telecare 2004;10(5):282-285
Other*

Ferriman A. Patients get access to evidence based, online health information. BMJ 2002;325(7365):618
No original data

Finfgeld-Connett D, Madsen R. Web-based treatment of alcohol problems among rural women. J Psychosoc Nurs Ment Health Serv 2008;46(9):46-53
Health informatics application does not apply to the consumer;
Other*

Fitzgibbon M L, Stolley M R, Schiffer L et al. Two-year follow-up results for Hip-Hop to Health Jr.: A randomized controlled trial for overweight prevention in preschool minority children. Journal of Pediatrics 2005;146(5):618-625
No health informatics application

Ford P. Brief report. Is the Internet changing the relationship between consumers and practitioners? Journal for Healthcare Quality: Promoting Excellence in Healthcare 2000;22(5):41-43
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Franklin V L, Greene A, Waller A et al. Patients' engagement with "Sweet Talk" - a text messaging support system for young people with diabetes. J Med Internet Res 2008;10(2):e20
No health informatics application;
Other*

Friedman D B, Kao E K. A comprehensive assessment of the difficulty level and cultural sensitivity of online cancer prevention resources for older minority men. Prev Chronic Dis 2008;5(1):A07
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Fung V, Ortiz E, Huang J et al. Early experiences with e-health services (1999-2002): promise, reality, and implications. Med Care 2006;44(5):491-6
Study of a point of care device

Garth McKay H, Glasgow R E, Feil E G et al. Internet-based diabetes self-management and support: Initial outcomes from the diabetes network project. Rehabilitation Psychology 2002;47(1):31-48
No health informatics application;
Health informatics application does not apply to the consumer

Gerressu M, French R S. Using the Internet to promote sexual health awareness among young people. J Fam Plann Reprod Health Care 2005;31(4):267, 269-70
No original data

Glasgow R E, Barrera M, Mckay H G et al. Social support, self-management, and quality of life among participants in an Internet-based diabetes support program: A multi-dimensional investigation. Cyberpsychology and Behavior 99;2(4):271-281
Not a RCT, and not a study addressing barriers;
Other*

Goulis D G, Giaglis G D, Boren S A et al. Effectiveness of home-centered care through telemedicine applications for overweight and obese patients: a randomized controlled trial. Int J Obes Relat Metab Disord 2004;28(11):1391-8
Study of a point of care device;
Other*

Graham A L, Bock B C, Cobb N K et al. Characteristics of smokers reached and recruited to an internet smoking cessation trial: a case of denominators. Nicotine Tob Res 2006;8 Suppl 1S43-8
No health informatics application;
Health informatics application does not apply to the consumer

Graham W, Smith P, Kamal A et al. Randomised controlled trial comparing effectiveness of touch screen system with leaflet for providing women with information on prenatal tests. BMJ 2000;320(7228):155-160
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Gruber K, Moran P J, Roth W T et al. Computer-Assisted Cognitive Behavioral Group Therapy for Social Phobia. Behavior Therapy 2001;32(1):155-165
Study of a point of care device;
Not a RCT, and not a study addressing barriers

Gustafson D H, Bosworth K, Chewning B et al. Computer-based health promotion: combining technological advances with problem-solving techniques to effect successful health behavior changes. Annual Review of Public health 87 ;(8)387-415
No original data

Gustafson D H, Hawkins R P, Boberg E W et al. CHESS: ten years of research and development in consumer health informatics for broad populations, including the underserved. Stud Health Technol Inform 2001;84(Pt 2):1459-563
No original data

Gustafson D H, McTavish F M, Boberg E et al. Empowering patients using computer based health support systems. Quality in Health Care 99;8(1):49-56
No original data

Gustafson D H, McTavish F M, Stengle W et al. Reducing the digital divide for low-income women with breast cancer: a feasibility study of a population-based intervention. J Health Commun 2005;10 Suppl 1173-93
Study of a point of care device

Gustafson D H, McTavish F M, Stengle W et al. Use and Impact of eHealth System by Low-income Women With Breast Cancer. J Health Commun 2005;10 Suppl 1195-218
Not a RCT, and not a study addressing barriers

Gustafson D H, Robinson T N, Ansley D et al. Consumers and evaluation of interactive health communication applications. American Journal of Preventive Medicine 99;16(1):23-29

*Please see a list of other reasons at the end of this document

Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Gutteling J J, Busschbach J J, de Man R A et al. Logistic feasibility of health related quality of life measurement in clinical practice: results of a prospective study in a large population of chronic liver patients. Health Qual Life Outcomes 2008;6(1):97
Health informatics application does not apply to the consumer

Haerens L, Deforche B, Maes L et al. Evaluation of a 2-year physical activity and healthy eating intervention in middle school children. Health Education Research 2006;21(6):911-921
No health informatics application

Hanauer D, Dibble E, Fortin J et al. Internet use among community college students: implications in designing healthcare interventions. J Am Coll Health 2004;52(5):197-202
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Hartmann C W, Sciamanna C N, Blanch D C et al. A website to improve asthma care by suggesting patient questions for physicians: qualitative analysis of user experiences. J Med Internet Res 2007;9(1):e3
Other*

Harvey K, Churchill D, Crawford P et al. Health communication and adolescents: what do their emails tell us?. Fam Pract 2008;25(4):304-11
No health informatics application

Harvey-Berino J, Pintauro S, Buzzell P et al. Does using the Internet facilitate the maintenance of weight loss? International Journal of Obesity 2002;26(9):1254-1260
Not a RCT and not a study addressing barriers;
Other*

Harvey-Berino J, Pintauro S, Buzzell P et al. Effect of internet support on the long-term maintenance of weight loss. Obes Res 2004;12(2):320-9
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Hayashi A, Kayama M, Ando K et al. Analysis of subjective evaluations of the functions of tele-coaching intervention in patients with spinocerebellar degeneration. NeuroRehabilitation 2008;23(2):159-69
Health informatics application does not apply to the consumer;
Study of a point of care device

Heidenreich P A, Chacko M, Goldstein M K et al. ACE inhibitor reminders attached to echocardiography reports of patients with reduced left ventricular ejection fraction. Am J Med 2005;118(9):1034-7
No health informatics application

Hibbard J H, Peters E, Dixon A et al. Consumer competencies and the use of comparative quality information: it isn't just about literacy. Med Care Res Rev 2007;64(4):379-94
No health informatics application;
Health informatics application does not apply to the consumer

Hill W, Weinert C, Cudney S. Influence of a computer intervention on the psychological status of chronically ill rural women: preliminary results. Nurs Res 2006;55(1):34-42
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Holmes-Rovner M, Stableford S, Fagerlin A et al. Evidence-based patient choice: a prostate cancer decision aid in plain language. BMC Med Inform Decis Mak 2005;516
No health informatics application

Hopper K D, Zajdel M, Hulse S F et al. Interactive method of informing patients of the risks of intravenous contrast media. Radiology 94;192(1):67-71
Health informatics application does not apply to the consumer;
Other*

Huber J T, Huggins D W. Assessing electronic information access and use in long-term care facilities in north Texas. Bull Med Libr Assoc 2000;88(2):187-9
Health informatics application does not apply to the consumer

Hughes S, Dennison C R. Progress in prevention: how can we help patients seek information on the World Wide

*Please see a list of other reasons at the end of this document

Web?: an opportunity to improve the "net effect". J Cardiovasc Nurs 2008;23(4):324-5
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Hung S H, Hwang S L, Su M J et al. An evaluation of a weight-loss program incorporating E-learning for obese junior high school students. Telemed J E Health 2008;14(8):783-92
Not a RCT, and not a study addressing barriers

Huss K, Salerno M, Huss R W. Computer-assisted reinforcement of instruction: effects on adherence in adult atopic asthmatics. Research in nursing & health 91;14(4):259-267
Health informatics application is for general information only AND is not tailored to the individual consumer

Irvine A B, Ary D V, Grove D A et al. The effectiveness of an interactive multimedia program to influence eating habits. Health Education Research 2004;19(3):290-305
No health informatics application

Izenberg N, Lieberman D A. The Web, communication trends, and children's health. Part 3: The Web and health consumers. Clin Pediatr (Phila) 98;37(5):275-85
No original data

Jackson S J. Access to medical information: essential for better patient care. J Tenn Med Assoc 72;65(10):902-6
Health informatics application is for general information only AND is not tailored to the individual consumer

Jacobs A D, Ammerman A S, Ennett S T et al. Effects of a tailored follow-up intervention on health behaviors, beliefs, and attitudes. Journal of Women's Health 2004;13(5):557-568
Study of a point of care device

Jansa M, Vidal M, Viaplana J et al. Telecare in a structured therapeutic education programme addressed to patients with type 1 diabetes and poor metabolic control. Diabetes Res Clin Pract 2006;74(1):26-32
Study of a point of care device

Jibaja-Weiss M L, Volk R J. Utilizing computerized entertainment education in the development of decision aids for lower literate and naive computer users. J Health Commun 2007;12(7):681-97
No health informatics application;
Other*

Jones J. Patient education and the use of the World Wide Web. Clin Nurse Spec 2003;17(6):281-3
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Jones R B, Atkinson J M, Coia D A et al. Randomised trial of personalised computer based information for patients with schizophrenia. BMJ 2001;322(7290):835-40
Health informatics application does not apply to the consumer

Jones R, Labajo R, Soler-Lopez Alonso et al. "Evaluation of a Scottish touch-screen public-access health information system in rural Spain." In Current Perspectives in Healthcare Computing Conference, Harrogate 20-22 March 2000, 45-54. Guildford, UNITED KINGDOM: British Computer Society Health Informatics Committee, 2000
Health informatics application is for general information only AND is not tailored to the individual consumer

Jones R, Pearson J, Cawsey A et al. Information for patients with cancer. Does personalization make a difference? Pilot study results and randomised trial in progress. Proc AMIA Annu Fall Symp 96;423-7
No original data;
Not a RCT and not a study addressing barriers

Kaldo V, Levin S, Widarsson J et al. Internet versus group cognitive-behavioral treatment of distress associated with tinnitus: a randomized controlled trial. Behav Ther 2008;39(4):348-59
Health informatics application does not apply to the consumer;
Study of a point of care device

Kaphingst K A, Zanfini C J, Emmons K M. Accessibility of web sites containing colorectal cancer information to adults with limited literacy (United States). Cancer Causes Control 2006;17(2):147-51
Health informatics application is for general information only AND is not tailored to the individual consumer

Kaufman DR, Rockoff ML. Increasing access to online information about health: a program for inner-city elders in community-based organizations. Generations 2006;30(2):55-57

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

No original data

Kennedy M G, Kiken L, Shipman J P. Addressing underutilization of consumer health information resource centers: a formative study. J Med Libr Assoc 2008;96(1):42-9
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Kenwright M, Liness S, Marks I. Reducing demands on clinicians by offering computer-aided self-help for phobia/panic. Feasibility study. Br J Psychiatry 2001;179456-9
Study of a point of care device;
Not a RCT, and not a study addressing barriers

Kerr C, Murray E, Stevenson F et al. Interactive health communication applications for chronic disease: patient and carer perspectives. J Telemed Telecare 2005;11 Suppl 132-4
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Khoo K, Bolt P, Babl F E et al. Health information seeking by parents in the Internet age. J Paediatr Child Health 2008;44(7-8):419-23
Health informatics application does not apply to the consumer

Kim E H, Stolyar A, Lober W B et al. Usage patterns of a personal health record by elderly and disabled users. AMIA Annu Symp Proc 2007;409-13
Health informatics application does not apply to the consumer

Kim H S, Yoo Y S, Shim H S. Effects of an Internet-based intervention on plasma glucose levels in patients with type 2 diabetes. J Nurs Care Qual 2005;20(4):335-40
Health informatics application does not apply to the consumer;
Study of a point of care device

Kim J, Trace D, Meyers K et al. An empirical study of the Health Status Questionnaire System for use in patient-computer interaction. Proc AMIA Annu Fall Symp 97;86-90
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Kim S, Chung D S. Characteristics of cancer blog users. J Med Libr Assoc 2007;95(4):445-50
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

King A C, Friedman R, Marcus B et al. Ongoing Physical Activity Advice by Humans Versus Computers: The Community Health Advice by Telephone (CHAT) Trial. Health Psychol. 2007;26(6):718-727
Other*

Kingston J. Web-based support for patients with type 2 diabetes in West Norfolk Primary Care Trust. A district model of diabetes care. Practical Diabetes International 2005;22(8):302
No original data

Kiropoulos L A, Klein B, Austin D W et al. Is internet-based CBT for panic disorder and agoraphobia as effective as face-to-face CBT?. J Anxiety Disord 2008;22(8):1273-84
Study of a point of care device;
Other*

Kiss G R, Walton H J, Farvis K M et al. An adaptive, on-line computer program for the exploration of attitude structures in psychiatric patients. Int J Biomed Comput 74;5(1):39-50
Study of a point of care device

Klein B, Richards J C, Austin D W. Efficacy of internet therapy for panic disorder. J Behav Ther Exp Psychiatry 2006;37(3):213-38
Study of a point of care device

Koivunen M, Hatonen H, Valimaki M. Barriers and facilitators influencing the implementation of an interactive Internet-portal application for patient education in psychiatric hospitals. Patient Educ Couns 2008;70(3):412-9
Health informatics application does not apply to the consumer

Koonce T Y, Giuse D A, Beauregard J M et al. Toward a more informed patient: bridging health care information through an interactive communication portal. J Med Libr Assoc 2007;95(1):77-81

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Kreuter M W, Strecher V J. Do tailored behavior change messages enhance the effectiveness of health risk appraisal? Results from a randomized trial. Health Education Research 96;11(1):97-105
No health informatics application

Krukowski R A, Harvey-Berino J, Ashikaga T et al. Internet-based weight control: the relationship between web features and weight loss. Telemed J E Health 2008;14(8):775-82
Other*

Kypri K, Langley J D, Saunders J B et al. Randomized controlled trial of web-based alcohol screening and brief intervention in primary care. Arch Intern Med 2008;168(5):530-6
Health informatics application does not apply to the consumer

Lai T Y, Larson E L, Rockoff M L et al. User acceptance of HIV TIDES--Tailored Interventions for Management of Depressive Symptoms in persons living with HIV/AIDS. J Am Med Inform Assoc 2008;15(2):217-26
Not a RCT, and not a study addressing barriers

Lange A, van de, Ven J P et al. Interapy, treatment of posttraumatic stress through the Internet: a controlled trial. J Behav Ther Exp Psychiatry 2001;32(2):73-90
Study of a point of care device

Lee C J. Does the internet displace health professionals?. J Health Commun 2008;13(5):450-64
Health informatics application does not apply to the consumer

Lee D M, Fairley C K, Sze J K et al. Access to sexual health advice using an automated, internet-based risk assessment service. Sex Health 2009;6(1):63-6
Other*

Legare F, Dodin S, Stacey D et al. Patient decision aid on natural health products for menopausal symptoms: randomized controlled trial. Menopause Int 2008;14(3):105-10
No health informatics application

Lemire M, Pare G, Sicotte C et al. Determinants of Internet use as a preferred source of information on personal health. Int J Med Inform 2008;77(11):723-34
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Lemire M, Pare G, Sicotte C et al. Determinants of Internet use as a preferred source of information on personal health. Int J Med Inform 2008;77(11):723-34
No original data

Leong T Y, Aronsky D, Shabot M M. Computer-based decision support for critical and emergency care. J Biomed Inform 2008;41(3):409-12
No original data

Leung K Y, Lee C P, Chan H Y et al. Randomised trial comparing an interactive multimedia decision aid with a leaflet and a video to give information about prenatal screening for Down syndrome. Prenat Diagn 2004;24(8):613-8
Health informatics application does not apply to the consumer

Levetan C S, Dawn K R, Robbins D C et al. Impact of computer-generated personalized goals on HbA(1c). Diabetes care 2002;25(1):2-8
Other*

Lewis D, Gunawardena S, El Saadawi G. Caring connection: developing an Internet resource for family caregivers of children with cancer. Comput Inform Nurs 2005;23(5):265-74
Health informatics application is for general information only AND is not tailored to the individual consumer;
No original data

Liaw S T, Radford A J, Maddocks I. The impact of a computer generated patient held health record. Aust Fam Physician 98;27 Suppl 1S39-43
Health informatics application does not apply to the consumer;
Not a RCT, and not a study addressing barriers

Lim J E, Choi O H, Na H S et al. A context-aware fitness guide system for exercise optimization in U-health. IEEE Trans Inf Technol Biomed 2009;13(3):370-9
Health informatics application does not apply to the consumer;
Not a RCT, and not a study addressing barriers

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Lim J E, Choi O H, Na H S et al. A context-aware fitness guide system for exercise optimization in U-health. IEEE Trans Inf Technol Biomed 2009;13(3):370-9
Other*

Lindsay S, Smith S, Bellaby P et al. The health impact of an online heart disease support group: a comparison of moderated versus unmoderated support. Health Educ Res 2009;24(4):646-54
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Linke S, Brown A, Wallace P. Down your drink: A web-based intervention for people with excessive alcohol consumption. Alcohol and Alcoholism 2004;39(1):29-32
Not a RCT, and not a study addressing barriers

Linke S, Murray E, Butler C et al. Internet-based interactive health intervention for the promotion of sensible drinking: Patterns of use and potential impact on members of the general public. Journal of Medical Internet Research 2007;9: e10
Not a RCT, and not a study addressing barriers

Lipkus I M, Rimer B K, Halabi S et al. Can tailored interventions increase mammography use among HMO women?. Am J Prev Med 2000;18(1):1-10
No health informatics application

Lorence D P, Greenberg L. The zeitgeist of online health search. Implications for a consumer-centric health system. J Gen Intern Med 2006;21(2):134-9
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Lorence D, Park H. Group disparities and health information: a study of online access for the underserved. Health Informatics J 2008;14(1):29-38
Health informatics application is for general information only AND is not tailored to the individual consumer

Macdougall J. Community access to health information in Ireland. Health Libr Rev 99;16(2):89-96
No health informatics application;
Health informatics application does not apply to the consumer

Magee J C, Ritterband L M, Thorndike F P et al. Exploring the Relationship between Parental Worry about their Children's Health and Usage of an Internet Intervention for Pediatric Encopresis. J Pediatr Psychol 2008;
Health informatics application does not apply to the consumer;
Other*

Mahabee-Gittens E M, Gordon J S, Krugh M E et al. A smoking cessation intervention plus proactive quitline referral in the pediatric emergency department: a pilot study. Nicotine Tob Res 2008;10(12):1745-51
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Majumdar BB. The effectiveness of a culturally sensitive educational programme of self-perception of health, happiness, self-confidence, and loneliness in Southeast Asian seniors. 1995 (Doctoral Dissertation)
Other*

Malone M, Mathes L, Dooley J et al. Health information seeking and its effect on the doctor-patient digital divide. J Telemed Telecare 2005;11 Suppl 125-8
No health informatics application

Marceau L D, Link C, Jamison R N et al. Electronic diaries as a tool to improve pain management: is there any evidence?. Pain Med 2007;8 Suppl 3S101-9
Health informatics application is for general information only AND is not tailored to the individual consumer

Marcus B H, Lewis B A, Williams D M et al. Step into Motion: a randomized trial examining the relative efficacy of Internet vs. print-based physical activity interventions. Contemp Clin Trials 2007;28(6):737-47
Other*

Masucci M M, Homko C, Santamore W P et al. Cardiovascular disease prevention for underserved patients using the Internet: bridging the digital divide. Telemed J E Health 2006;12(1):58-65
Study of a point of care device

Matano R A, Koopman C, Wanat S F et al. A pilot study of an interactive web site in the workplace for reducing alcohol consumption. J Subst Abuse Treat 2007;32(1):71-80
No health informatics application;

*Please see a list of other reasons at the end of this document

Other*

Mattila E, Parkka J, Hermersdorf M et al. Mobile diary for wellness management--results on usage and usability in two user studies. IEEE Trans Inf Technol Biomed 2008;12(4):501-12
No original data

Mayben J K, Giordano T P. Internet use among low-income persons recently diagnosed with HIV infection. AIDS Care 2007;19(9):1182-7
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

McClure L A, Harrington K F, Graham H et al. Internet-based monitoring of asthma symptoms, peak flow meter readings, and absence data in a school-based clinical trial. Clinical Trials 2008;5(1):31-37
Health informatics application does not apply to the consumer

McCoy M R, Couch D, Duncan N D et al. Evaluating an Internet weight loss program for diabetes prevention. Health Promotion International 2005;20(3):221-228
Not a RCT, and not a study addressing barriers;
Other*

McKee B. Electronic access to consumer health information.. Health Libraries Review 89;6(2):119-121
No original data

McMahon G T, Gomes H E, Hickson Hohne S et al. Web-based care management in patients with poorly controlled diabetes. Diabetes Care 2005;28(7):1624-9
Health informatics application does not apply to the consumer;
Study of a point of care device

McTavish F M, Pingree S, Hawkins R et al. Cultural differences in use of an electronic discussion group. Journal of Health Psychology 2003;8(1):105-117
Other*

Mead N, Varnam R, Rogers A et al. What predicts patients' interest in the Internet as a health resource in primary care in England?. J Health Serv Res Policy 2003;8(1):33-9
Health informatics application is for general information only AND is not tailored to the individual consumer

Meingast M, Roosta T, Sastry S. Security and privacy issues with health care information technology. Conf Proc IEEE Eng Med Biol Soc 2006;15453-8
No health informatics application
Health informatics application does not apply to the consumer

Mennell S, Murcott A, van Otterloo A H. The sociology of food: eating, diet and culture. Sociology Abstracts 1992; Newbury Park, CA: Sage Publications
Other*

Mermelstein R, Turner L. Web-based support as an adjunct to group-based smoking cessation for adolescents. Nicotine Tob Res 2006;8 Suppl 1S69-76
Health informatics application does not apply to the consumer;
Study of a point of care device

Mitchell J E, Myers T, Swan-Kremeier L et al. Psychotherapy for bulimia nervosa delivered via telemedicine. European Eating Disorders Review 2003;11(3):222-230
Study of a point of care device;
Other*

Molenaar S, Sprangers M A, Postma-Schuit F C et al. Feasibility and effects of decision aids. Med Decis Making 2000;20(1):112-27
No original data

Montani S, Bellazzi R, Quaglini S et al. Meta-analysis of the effect of the use of computer-based systems on the metabolic control of patients with diabetes mellitus. Diabetes Technology and Therapeutics 2001;3(3):347-356
No original data

Montelius E, Astrand B, Hovstadius B et al. Individuals appreciate having their medication record on the web: a survey of attitudes to a national pharmacy register. J Med Internet Res 2008;10(4):e35
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Moore T J, Alsabeeh N, Apovian C M et al. Weight, blood pressure, and dietary benefits after 12 months of a Web-based Nutrition Education Program (DASH for health): longitudinal observational study. J Med Internet Res 2008;10(4):e52

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Health informatics application is for general information only AND is not tailored to the individual consumer;
Not a RCT, and not a study addressing barriers

Moore T J, Alsabeeh N, Apovian C M et al. Weight, blood pressure, and dietary benefits after 12 months of a Web-based Nutrition Education Program (DASH for health): longitudinal observational study. J Med Internet Res 2008;10(4):e52
Other*

Moran W P, Nelson K, Wofford J L et al. Computer-generated mailed reminders for influenza immunization: a clinical trial. J Gen Intern Med 92;7(5):535-7
No health informatics application
Study of a point of care device

Mustafa Y. E-health centre: a web-based tool to empower patients to become proactive customers. Health Info Libr J 2004;21(2):129-33
No original data

Newton N C, Andrews G, Teesson M et al. Delivering prevention for alcohol and cannabis using the internet: a cluster randomised controlled trial. Prev Med 2009;48(6):579-84
Health informatics application is for general information only AND is not tailored to the individual consumer

Nguyen H Q, Carrieri-Kohlman V, Rankin S H et al. Is Internet-based support for dyspnea self-management in patients with chronic obstructive pulmonary disease possible? Results of a pilot study. Heart Lung 2005;34(1):51-62
Study of a point of care device

Nix S T, Ibanez C D, Strobino B A et al. Developing a computer-assisted health knowledge quiz for preschool children. Journal of School Health 99;69(1):9-11
Health informatics application does not apply to the consumer

Noell J, Glasgow R E. Interactive technology applications for behavioral counseling: Issues and opportunities for health care settings. American Journal of Preventive Medicine 99;17(4):269-274
No original data

Norman C D, Skinner H A. eHealth Literacy: Essential Skills for Consumer Health in a Networked World. J Med Internet Res 2006;8(2):e9
No original data

Norman C. CATCH-IT Report: Evaluation of an Internet-based smoking cessation program: Lessons learned from a pilot study. Journal of Medical Internet Research 2004;6(4)
No original data

Nwosu CR, Cox BM. The impact of the Internet on the doctor-patient relationship.. Health Informatics Journal 2000;6(3):156-161
No health informatics application

O'Connor A M, Rostom A, Fiset V et al. Decision aids for patients facing health treatment or screening decisions: systematic review. BMJ 99;319(7212):731-4
No original data;
Not a RCT, and not a study addressing barriers

Oenema A, Brug J. Feedback strategies to raise awareness of personal dietary intake: Results of a randomized controlled trial. Preventive Medicine 2003;36(4):429-439
Other*

Olver I N, Whitford H S, Denson L A et al. Improving informed consent to chemotherapy: a randomized controlled trial of written information versus an interactive multimedia CD-ROM. Patient Educ Couns 2009;74(2):197-204
Other*

Ornstein S M, Garr D R, Jenkins R G et al. Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services. J Fam Pract 91;32(1):82-90
Study of a point of care device

Osman L M, Abdalla M I, Beattie J A et al. Reducing hospital admission through computer supported education for asthma patients. Grampian Asthma Study of Integrated Care (GRASSIC). BMJ 94;308(6928):568-71
No health informatics application

Otsuki M. Social connectedness and smoking behaviors among Asian American college students: An electronic diary study. Nicotine Tob Res 2009;11(4):418-26
No health informatics application;
Other*

Papadaki A, Scott J A. Follow-up of a web-based tailored intervention promoting the Mediterranean diet in Scotland. Patient Educ Couns 2008;73(2):256-63
Not a RCT, and not a study addressing barriers;
Other*

*Please see a list of other reasons at the end of this document

Parlove AE, Cowdery JE, Hoerauf SL. Acceptability and appeal of a Web-based smoking prevention intervention for adolescents.. International Electronic Journal of Health Education 2004;71-8
No health informatics application;
Other*

Partin M R, Nelson D, Flood A B et al. Who uses decision aids? Subgroup analyses from a randomized controlled effectiveness trial of two prostate cancer screening decision support interventions. Health Expect 2006;9(3):285-95
No health informatics application

Patrick K, Raab F, Adams M A et al. A text message-based intervention for weight loss: randomized controlled trial. J Med Internet Res 2009;11(1):e1
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Patten C A, Rock E, Meis T M et al. Frequency and type of use of a home-based, Internet intervention for adolescent smoking cessation. J Adolesc Health 2007;41(5):437-43
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Penn DL, Simpson LE, Leggett S et al. The development of a Web site to promote the mental and physical health of sons and daughters of Vietnam veterans of Australia.. Journal of Consumer Health on the Internet 2006;10(4):45-63
Health informatics application is for general information only AND is not tailored to the individual consumer

Pennbridge J, Moya R, Rodrigues L. Questionnaire survey of California consumers' use and rating of sources of health care information including the Internet. West J Med 99;171(5-6):302-5
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Pingree S, Hawkins R P, Gustafson D H et al. Will HIV-positive people use an interactive computer system for information and support? A study of CHESS in two communities. Proc Annu Symp Comput Appl Med Care 93;22-6
Study of a point of care device

Plotnikoff R C, McCargar L J, Wilson P M et al. Efficacy of an e-mail intervention for the promotion of physical activity and nutrition behavior in the workplace context. American Journal of Health Promotion 2005;19(6):422-429
No health informatics application

Polzien K M, Jakicic J M, Tate D F et al. The efficacy of a technology-based system in a short-term behavioral weight loss intervention. Obesity (Silver Spring) 2007;15(4):825-30
No health informatics application;
Study of a point of care device

Port K, Palm K, Viigimaa M. Daily usage and efficiency of remote home monitoring in hypertensive patients over a one-year period. J Telemed Telecare 2005;11 Suppl 134-6
No health informatics application

Porter S C, Silvia M T, Fleisher G R et al. Parents as direct contributors to the medical record: validation of their electronic input. Ann Emerg Med 2000;35(4):346-52
No health informatics application;
Health informatics application does not apply to the consumer

Prochaska J O, Velicer W F, Redding C et al. Stage-based expert systems to guide a population of primary care patients to quit smoking, eat healthier, prevent skin cancer, and receive regular mammograms. Prev Med 2005;41(2):406-16
No health informatics application

Proudfoot J, Swain S, Widmer S et al. The development and beta-test of a computer-therapy program for anxiety and depression: Hurdles and lessons. 2003;19(3):277-289
Not a RCT, and not a study addressing barriers;
Other*

Quinn P, Goka J, Richardson H. Assessment of an electronic daily diary in patients with overactive bladder. BJU Int 2003;91(7):647-52
No health informatics application

Ralston J D, Hirsch I B, Hoath J et al. Web-based collaborative care for type 2 diabetes: a pilot randomized trial. Diabetes Care 2009;32(2):234-9
Study of a point of care device

Ran D, Peretz B. Assessing the pain reaction of children receiving periodontal ligament anesthesia using a

*Please see a list of other reasons at the end of this document

computerized device (Wand). J Clin Pediatr Dent 2003;27(3):247-50
No health informatics application;
Study of a point of care device

Raphael C, Cornwell J L. Influencing support for caregivers. Am J Nurs 2008;108(9 Suppl):78-82; quiz 82
No health informatics application;
No original data

Recabarren M, Nussbaum M, Leiva C. Cultural illiteracy and the Internet. Cyberpsychol Behav 2007;10(6):853-6
No health informatics application

Renahy E, Parizot I, Chauvin P. Health information seeking on the Internet: a double divide? Results from a representative survey in the Paris metropolitan area, France, 2005-2006. BMC Public Health 2008;869
Health informatics application is for general information only AND is not tailored to the individual consumer

Resnik D B. Patient access to medical information in the computer age: ethical concerns and issues. Camb Q Healthc Ethics 2001;10(2):147-54; discussion 154-6
No health informatics application;
No original data

Rigby M, Draper R, Hamilton I. Finding ethical principles and practical guidelines for the controlled flow of patient data. Methods Inf Med 99;38(4-5):345-9
No health informatics application;
No original data

Rizo C A, Lupea D, Baybourdy H et al. What Internet services would patients like from hospitals during an epidemic? Lessons from the SARS outbreak in Toronto. J Med Internet Res 2005;7(4):e46
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Rogers J L, Haring O M, Goetz J P. Changes in patient attitudes following the implementation of a medical information system. QRB Qual Rev Bull 84;10(3):65-74
Health informatics application does not apply to the consumer;
Study of a point of care device

Rosenman S J, Levings C T, Korten A E. Clinical utility and patient acceptance of the computerized Composite International Diagnostic Interview. Psychiatr Serv 97;48(6):815-20
Study of a point of care device

Ross S E, Nowels C T, Haverhals L M et al. Qualitative assessment of Diabetes-STAR: a patient portal with disease management functions. AMIA Annu Symp Proc 2007;1097
No original data;
Other*

Rosser W W, Hutchison B G, McDowell I et al. Use of reminders to increase compliance with tetanus booster vaccination. CMAJ 92;146(6):911-7
No health informatics application;
Study of a point of care device

Rothert K, Strecher V J, Doyle L A et al. Web-based weight management programs in an integrated health care setting: a randomized, controlled trial. Obesity (Silver Spring) 2006;14(2):266-72
Study of a point of care device

Rotondi A J, Sinkule J, Spring M. An interactive Web-based intervention for persons with TBI and their families: use and evaluation by female significant others. J Head Trauma Rehabil 2005;20(2):173-85
Health informatics application is for general information only AND is not tailored to the individual consumer

Rovniak L S, Hovell M F, Wojcik J R et al. Enhancing theoretical fidelity: An e-mail-based walking program demonstration. American Journal of Health Promotion 2005;20(2):85-95
No health informatics application

Rozmovits L, Ziebland S. What do patients with prostate or breast cancer want from an Internet site? A qualitative study of information needs. Patient Educ Couns 2004;53(1):57-64
Health informatics application is for general information only AND is not tailored to the individual consumer

Rybarczyk B, Lopez M, Schelble K et al. Home-based video CBT for comorbid geriatric insomnia: a pilot study using secondary data analyses. Behav Sleep Med 2005;3(3):158-75
No health informatics application

Saitz R, Helmuth E D, Aromaa S E et al. Web-based screening and brief intervention for the spectrum of alcohol problems. Preventive Medicine 2004;39(5):969-975

*Please see a list of other reasons at the end of this document

Not a RCT, and not a study addressing barriers

Schinke S, Di Noia J, Schwinn T et al. Drug abuse risk and protective factors among black urban adolescent girls: a group-randomized trial of computer-delivered mother-daughter intervention. Psychol Addict Behav 2006;20(4):496-500
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Schinke S, Schwinn T. Gender-specific computer-based intervention for preventing drug abuse among girls. Am J Drug Alcohol Abuse 2005;31(4):609-16
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Schmidt R, Norgall T, Morsdorf J et al. Body Area Network BAN--a key infrastructure element for patient-centered medical applications. Biomed Tech (Berl) 2002;47 Suppl 1 Pt 1365-8
No original data;
Other*

Schumann A, John U, Ulbricht S et al. Computer-generated tailored feedback letters for smoking cessation: theoretical and empirical variability of tailoring. Int J Med Inform 2008;77(11):715-22
No original data;
Other*

Scott C, Byng S. Computer assisted remediation of a homophone comprehension disorder in surface dyslexia. Aphasiology 89;3(3):301-320
Health informatics application does not apply to the consumer;
Not a RCT and not a study addressing barriers;
Other*

Secnik K, Pathak D S, Cohen J M. Postcard and telephone reminders for unclaimed prescriptions: a comparative evaluation using survival analysis. J Am Pharm Assoc (Wash) 2000;40(2):243-51; quiz 330-1
No health informatics application;
Health informatics application does not apply to the consumer

Seematter-Bagnoud L, Santos-Eggimann B. Sources and level of information about health issues and preventive services among young-old persons in Switzerland. Int J Public Health 2007;52(5):313-6
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Shachak A, Shuval K, Fine S. Barriers and enablers to the acceptance of bioinformatics tools: a qualitative study. J Med Libr Assoc 2007;95(4):454-8
Health informatics application does not apply to the consumer

Shah A, Kuo A, Zurakowski D et al. Use and satisfaction of the internet in obtaining information on brachial plexus birth palsies and its influence on decision-making. J Pediatr Orthop 2006;26(6):781-4
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

Shaw M J, Beebe T J, Tomshine P A et al. A randomized, controlled trial of interactive, multimedia software for patient colonoscopy education. Journal of Clinical Gastroenterology 2001;32(2):142-147
Health informatics application is for general information only AND is not tailored to the individual consumer

Shepperd S, Charnock D, Gann B. Helping patients access high quality health information. BMJ 99;319(7212):764-6
No original data

Shigaki C L, Smarr K L, Yang Gong et al. Social interactions in an online self-management program for rheumatoid arthritis. Chronic Illn 2008;4(4):239-46
Other*

Silvia K A, Ozanne E M, Sepucha K R. Implementing breast cancer decision aids in community sites: barriers and resources. Health Expect 2008;11(1):46-53
Health informatics application does not apply to the consumer

Simoes A A, Bastos F I, Moreira R I et al. Acceptability of audio computer-assisted self-interview (ACASI) among substance abusers seeking treatment in Rio de Janeiro, Brazil. Drug Alcohol Depend 2006;82 Suppl 1S103-7
Health informatics application does not apply to the consumer

*Please see a list of other reasons at the end of this document

Siva C, Smarr K L, Hanson K D et al. Internet use and e-mail communications between patients and providers: a survey of rheumatology outpatients. J Clin Rheumatol 2008;14(6):318-23
Health informatics application does not apply to the consumer;
Other*

Skinner C S, Strecher V J, Hospers H. Physicians' recommendations for mammography: Do tailored messages make a difference? American Journal of Public Health 94;84(1):43-49
No health informatics application

Skinner H, Morrison M, Bercovitz K et al. Using the Internet to engage youth in health promotion. Promotion & education 1997;4(4):23-25
Health informatics application does not apply to the consumer;
Health informatics application is for general information only AND is not tailored to the individual consumer

Smaglik P, Hawkins R P, Pingree S et al. The quality of interactive computer use among HIV-infected individuals. Journal of Health Communication 1998;3(1):53-68
Not a RCT, and not a study addressing barriers;
Other*

Smith D T, Carr L J, Dorozynski C et al. Internet-delivered lifestyle physical activity intervention: limited inflammation and antioxidant capacity efficacy in overweight adults. J Appl Physiol 2009;106(1):49-56
Other*

Spallek H, Butler B S, Schleyer T K et al. Supporting emerging disciplines with e-communities: needs and benefits. J Med Internet Res 2008;10(2):e19
Health informatics application does not apply to the consumer

Staccini P, Joubert M, Fieschi D et al. Confidentiality issues within a clinical information system: moving from data-driven to event-driven design. Methods Inf Med 99;38(4-5):298-302
No health informatics application;
Health informatics application does not apply to the consumer

Staccini P, Joubert M, Fieschi D et al. Confidentiality issues within a clinical information system: moving from data-driven to event-driven design. Methods Inf Med 99;38(4-5):298-302
No original data

Steele R, Mummery W K, Dwyer T. Using the Internet to promote physical activity: a randomized trial of intervention delivery modes. J Phys Act Health 2007;4(3):245-60
No health informatics application;
Study of a point of care device

Stevens V J, Glasgow R E, Toobert D J et al. One-year results from a brief, computer-assisted intervention to decrease consumption of fat and increase consumption of fruits and vegetables. Prev Med 2003;36(5):594-600
Study of a point of care device

Stock S E, Davies D K, Davies K R et al. Evaluation of an application for making palmtop computers accessible to individuals with intellectual disabilities. J Intellect Dev Disabil 2006;31(1):39-46
No health informatics application

Stoddard J L, Augustson E M, Moser R P. Effect of adding a virtual community (bulletin board) to smokefree.gov: randomized controlled trial. J Med Internet Res 2008;10(5):e53
Health informatics application is for general information only AND is not tailored to the individual consumer

Stoddard J L, Delucchi K L, Munoz R F et al. Smoking cessation research via the internet: A feasibility study. Journal of Health Communication 2005;10(1):27-41
Not a RCT and not a study addressing barriers;
Other*

Strecher V J, Kreuter M, Den Boer et al. The effects of computer-tailored smoking cessation messages in family practice settings. Journal of Family Practice 1994;39(3):262-270
No health informatics application;
Other*

Strom L, Pettersson R, Andersson G. Internet-based treatment for insomnia: a controlled evaluation. J Consult Clin Psychol 2004;72(1):113-20
No health informatics application;
Study of a point of care device

Suggs L S, McIntyre C. Are We There Yet? An Examination of Online Tailored Health Communication. Health Educ Behav 2007;
No health informatics application;

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

Health informatics application is for general information only AND is not tailored to the individual consumer

Svetkey L P, Stevens V J, Brantley P J et al. Comparison of strategies for sustaining weight loss: the weight loss maintenance randomized controlled trial. JAMA 2008;299(10):1139-48
Study of a point of care device

Takahashi Y, Satomura K, Miyagishima K et al. A new smoking cessation programme using the Internet. Tobacco Control 1999;8(1):109-110
Study of a point of care device;
No original data

Tan R L. Medicare beneficiaries" use of computers and Internet: 1998-2005. Health Care Financing Review 2007;28(2):45-51
Health informatics application is for general information only AND is not tailored to the individual consumer

Tate D F, Wing R R, Winett R A. Using Internet technology to deliver a behavioral weight loss program. JAMA 2001;285(9):1172-7
Study of a point of care device

Taub S J. The Internet's role in patient/physician interaction: bringing our understanding in line with online reality. Compr Ophthalmol Update 2006;7(1):25-30
No original data

Taylor D P, Bray B E, Staggers N et al. User-centered development of a Web-based preschool vision screening tool. AMIA Annu Symp Proc 2003;654-8
Other*

Ten Wolde G B, Dijkstra A, van Empelen P et al. Long-term effectiveness of computer-generated tailored patient education on benzodiazepines: a randomized controlled trial. Addiction 2008;103(4):662-70
Study of a point of care device

Tetzlaff L. Consumer informatics in chronic illness. J Am Med Inform Assoc 97;4(4):285-300
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Thobaben M. Technology and informatics. Accessibility, quality, and readability of health information on the internet: implication for home health care professionals.. Home Health Care Management & Practice 2002;14(4):295-296
Health informatics application does not apply to the consumer;
No original data

Thompson D, Baranowski T, Cullen K et al. Food, fun, and fitness internet program for girls: pilot evaluation of an e-Health youth obesity prevention program examining predictors of obesity. Prev Med 2008;47(5):494-7
Health informatics application is for general information only AND is not tailored to the individual consumer

Tiller K, Meiser B, Gaff C et al. A randomized controlled trial of a decision aid for women at increased risk of ovarian cancer. Med Decis Making 2006;26(4):360-72
No health informatics application

Titov N, Andrews G, Choi I et al. Shyness 3: randomized controlled trial of guided versus unguided Internet-based CBT for social phobia. Aust N Z J Psychiatry 2008;42(12):1030-40
Other*

Tjora A, Tran T, Faxvaag A. Privacy vs usability: a qualitative exploration of patients' experiences with secure Internet communication with their general practitioner. J Med Internet Res 2005;7(2):e15
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Torsney K. Advantages and disadvantages of telerehabilitation for persons with neurological disabilities. NeuroRehabilitation 2003;18(2):183-185
No original data

Tsang M W, Mok M, Kam G et al. Improvement in diabetes control with a monitoring system based on a hand-held, touch-screen electronic diary. J Telemed Telecare 2001;7(1):47-50
Not a RCT, and not a study addressing barriers;
Other*

Tugwell P S, Santesso N A, O'Connor A M et al. Knowledge translation for effective consumers. Phys Ther 2007;87(12):1728-38

*Please see a list of other reasons at the end of this document

No health informatics application;
Other*

Tuil W S, Verhaak C M, Braat D D et al. Empowering patients undergoing in vitro fertilization by providing Internet access to medical data. Fertil Steril 2007;88(2):361-8
No health informatics application;
Health informatics application does not apply to the consumer

Underhill C, Mckeown L. Getting a second opinion: health information and the Internet. Health Rep 2008;19(1):65-9
Health informatics application is for general information only AND is not tailored to the individual consumer

van den, Berg M H, Ronday H K et al. Using internet technology to deliver a home-based physical activity intervention for patients with rheumatoid arthritis: A randomized controlled trial. Arthritis Rheum 2006;55(6):935-45
Study of a point of care device

van der, Meer V, van Stel H F et al. Internet-based self-management offers an opportunity to achieve better asthma control in adolescents. Chest 2007;132(1):112-9
Study of a point of care device

Van Voorhees B W, Fogel J, Reinecke M A et al. Randomized clinical trial of an Internet-based depression prevention program for adolescents (Project CATCH-IT) in primary care: 12-week outcomes. J Dev Behav Pediatr 2009;30(1):23-37
Other*

van Wier M F, Ariens G A, Dekkers J C et al. Phone and e-mail counselling are effective for weight management in an overweight working population: a randomized controlled trial. BMC Public Health 2009;96
Other*

van Zutphen M, Milder I E, Bemelmans W J. Integrating an eHealth program for pregnant women in midwifery care: a feasibility study among midwives and program users. J Med Internet Res 2009;11(1):e7
Not a RCT, and not a study addressing barriers

Vandelanotte C, De Bourdeaudhuij I, Brug J. Acceptability and feasibility of an interactive computer-tailored fat intake intervention in Belgium. Health Promotion Internation 2004;19(4):463-470
Not a RCT, and not a study addressing barriers;
Other*

Wade SL, Wolfe CR, Brown TM et al. Can a Web-based family problem-solving intervention work for children with traumatic brain injury?. Rehabilitation Psychology 2005;50(4):337-345
No health informatics application;
Health informatics application does not apply to the consumer

Wagner T H, Greenlick M R. When parents are given greater access to health information, does it affect pediatric utilization?. Med Care 2001;39(8):848-55
No health informatics application;
Not a RCT, and not a study addressing barriers

Walker S N, Pullen C H, Boeckner L et al. Clinical trial of tailored activity and eating newsletters with older rural women. Nurs Res 2009;58(2):74-85
No health informatics application

Wantland D. Content and Functional Assessment of A HIV/AIDS Tailored Web-Based Symptom Self Assessment and Self Management Tool. Stud Health Technol Inform 2009;146820-1
Health informatics application does not apply to the consumer

Wantland D. Content and Functional Assessment of A HIV/AIDS Tailored Web-Based Symptom Self Assessment and Self Management Tool. Stud Health Technol Inform 2009;146820-1
Other*

Warmerdam L, van Straten A, Cuijpers P. Internet-based treatment for adults with depressive symptoms: the protocol of a randomized controlled trial. BMC Psychiatry 2007;772
Study of a point of care device

Weinert C, Cudney S, Hill W. Retention in a computer-based outreach intervention for chronically ill rural women. Appl Nurs Res 2008;21(1):23-9
Health informatics application is for general information only AND is not tailored to the individual consumer;
Study of a point of care device

Weingart S N, Rind D, Tofias Z et al. Who uses the patient internet portal? The PatientSite experience. J Am Med Inform Assoc 2006;13(1):91-5
Health informatics application does not apply to the consumer;

*Please see a list of other reasons at the end of this document

Health informatics application is for general information only AND is not tailored to the individual consumer

What children think about computers. Future Child 2000;10(2):186-91
No health informatics application;
Health informatics application is for general information only AND is not tailored to the individual consumer

White M A, Martin P D, Newton R L et al. Mediators of weight loss in a family-based intervention presented over the internet. Obes Res 2004;12(7):1050-9
Health informatics application is for general information only AND is not tailored to the individual consumer

White M. Enhancing process efficiency through remote access. Wireless implementation and remote access enable medical oncology practice to improve patient and clinician confidence while achieving ROI. Health Manag Technol 2004;25(3):42-3
No original data

Whitten P, Mickus M. Home telecare for COPD/CHF patients: outcomes and perceptions. J Telemed Telecare 2007;13(2):69-73
Study of a point of care device

Williams A. Surfing over sixty. Making Internet access available helps residents stay connected. Provider 99;25(8):69, 71-2
No original data

Williams G C, Lynch M, Glasgow R E. Computer-assisted intervention improves patient-centered diabetes care by increasing autonomy support. Health Psychol 2007;26(6):728-34
Other*

Williams M L, Freeman R C, Bowen A M et al. The acceptability of a computer HIV/AIDS risk assessment to not-in-treatment drug users. AIDS Care 98;10(6):701-11
Study of a point of care device

Williams R B, Boles M, Johnson R E. A patient-initiated system for preventive health care. A randomized trial in community-based primary care practices. Arch Fam Med 98;7(4):338-45
Health informatics application does not apply to the consumer;
Study of a point of care device

Wilson C, Flight I, Hart E et al. Internet access for delivery of health information to South Australians older than 50. Aust N Z J Public Health 2008;32(2):174-6
Health informatics application is for general information only AND is not tailored to the individual consumer;
Other*

Wilson E V, Lankton N K. Modeling patients' acceptance of provider-delivered e-health. J Am Med Inform Assoc 2004;11(4):241-8
Health informatics application is for general information only AND is not tailored to the individual consumer

Wilson P. Searching for the needle in the haystack -- or -- quality criteria for health-related websites.. Health IT Advisory Report 2001;3(1):20-23
Health informatics application is for general information only AND is not tailored to the individual consumer

Wilson-Steele G. Improving healthcare through patient education, patient relationship management. Internet Healthc Strateg 2003;5(3):8
Study of a point of care device;
No original data

Winett R A, Anderson E S, Wojcik J R et al. Guide to health: nutrition and physical activity outcomes of a group-randomized trial of an Internet-based intervention in churches. Ann Behav Med 2007;33(3):251-61
Health informatics application does not apply to the consumer

Wong B M, Yung B M, Wong A et al. Increasing Internet use among cardiovascular patients: new opportunities for heart health promotion. Can J Cardiol 2005;21(4):349-54
Health informatics application is for general information only AND is not tailored to the individual consumer

Woolf S H, Krist A H, Johnson R E et al. A practice-sponsored Web site to help patients pursue healthy behaviors: an ACORN study. Ann Fam Med 2006;4(2):148-52
Other*

Wright J H, Wright A S, Albano A M et al. Computer-assisted cognitive therapy for depression: maintaining efficacy while reducing therapist time. Am J Psychiatry 2005;162(6):1158-64

*Please see a list of other reasons at the end of this document

Appendix F: List of Excluded Articles

No health informatics application;
Study of a point of care device

Zanchetta MS. Understanding functional health literacy in experiences with prostate cancer: older men as consumers of health information.. Online Brazilian Journal of Nursing 2004;3(2):9p

Health informatics application is for general information only AND is not tailored to the individual consumer

List of "other" reasons:

1. Based on data from 2 other trials
2. Book
3. Case study
4. Chess discussion board
5. Cohort study, no control group, no comparison to other methods of testing hearing
6. Commentary--not a study no info
7. Comparing paper based consent form with cd-rom, no tailored info
8. Contact with therapist
9. Contains learning modules only--no tailoring
10. Data not abstractable
11. Description and pilot test
12. Description of the system
13. Development study
14. Development survey
15. Discussion board
16. Doctoral dissertation
17. Electronic diaries only to measure. The study does not examine its impact.
18. Evaluate an internet-based hearing test, no control grp
19. Evaluate the use of a computerized concept for lifestyle
20. Evaluation
21. Focus group--does not address any real barriers
22. Group therapy, no tailored, therapist presence
23. It seems to talk more on lines with group discussion and moderation of group.
24. Descriptive
25. No data comparing experimental and control group; no barriers nor facilitators
26. No data--usage study
27. No health outcomes, just a satisfaction assessment with the system
28. No outcome data available
29. No quantitative data are reported
30. No result
31. No tailored information provided to patients from this application, only to physicians
32. No tailoring required
33. No usable data
34. No usable outcomes, and i really don't think this is a tailored in tailored out study
35. Not about the application but about the parent
36. Not computerized tailored
37. Not tailored and can not isolate the impact of the application from impact of the community chat
38. Not tailored and intervention includes human counseling
39. Not tailored or interactive
40. Not tailored, and there was clinician interaction
41. Only abstract
42. Output is not applied to the patient
43. Overview of a type of full-body sensor
44. Participants had no access to application
45. Patient-centered care
46. Pilot testing of the instrument. Does not look like a study
47. Presence of health care provider -web-based tool to help people to manage their health and improve their communication with their health care provide

*Please see a list of other reasons at the end of this document

48. Qualitative analysis of website usage; does not provide barriers nor facilitators
49. Survey on access to the internet
50. Survey on general use
51. Tailoring not required
52. Tailoring occurs at the level of chat group and therapist
53. Tailoring was accomplished in this study by providing flexibility in the number and timing of receipt of message each day.
54. Telecommunication
55. Telemedicine
56. This is a pilot beta-test
57. This is a study of "use" not any real outcomes
58. Usage study
59. Video informed consent
60. Web based management of diabetes, physician presence
61. Web-based intervention with e-mail counseling
62. Website rating
63. Workplace

*Please see a list of other reasons at the end of this document

Appendix G

Evidence Table 1. Jadad criteria for RCT quality

Author, year	Target	RCT	Approp of rand.	Blinding	Approp of blinding	WD	SCORE
Key Question 1 a (healthcare process outcomes)							
Bartholomew et al.[1]	Asthma	1	0	-1		-1	-1
Guendelman et al.,[2]		1	0	0		1	2
Jan, 2007[3]		1	0	-1		1	1
Krishna, 2003[4]		1		1		1	3
Chewining, 1999[5]	Oral contraception use	1	-1			0	0
Key Question 1 b (intermediate outcomes)							
Gustafson, 2008[6]	Breast cancer	1	1			0	2
Gustafson, 2001[7]		1				0	1
Jones, 1999[8]		1		-1		1	1
Adachi, 2007[9]	Diet, exercise, physical activity (not obesity)	1	-1			0	0
Anderson, 2001[10]		1	-1	0		1	1
Bruge, 1996[11]		1				1	2
Brug, 1998[12]		1	0	0		-1	0
Brug, 1999[13]		1	0	0		1	2
Campbell, 1994[14]		1	0	0		-1	0
Campbell, 1999[15]		1	0	0		1	2
Campbell, 2004[16]		1	1	0		-1	1
Haerens, 2005[17]		1	1	0		-1	1
Haerens, 2007[18]		1	1	-1		-1	0
Haerens, 2009[19]		1	1	0		-1	1
Hurling, 2006[20]		1	1	0		-1	1
Hurling, 2007[21]		1	1			0	2
Jones, 2008[22]		1	0	0	-1	1	1
King, 2006[23]		1	1	0		-1	1
Kristal, 2000[24]		1	1	0		1	3
Low, 2006[25]		1	1			0	2
Lewis, 2008[26]		1	1	0		1	3
Marcus, 2007[27]		1	1			1	3
Mangunkusumo, 2007[28]		1				0	1
Napolitano, 2003[29]		1		-1		0	0
Oenema, 2001[30]		1	1	-1		-1	0
Richardson, 2007[31]		1	0	0		1	2
Silk, 2008[32]		1				-1	0
Smeets, 2007[33]		1	-1			-1	-1
Spittaels, 2007[34]		1		-1		1	1
Spittaels, 2007[35]		1	0	0		1	2
Tate, 2006[36]		1	1	1	1	0	4
Vandelanotte, 2005[37]		1				0	1

Evidence Table1. Jadad criteria for RCT quality (continued)

Author, year	Target	RCT	Approp of rand.	Blinding	Approp of blinding	WD	SCORE
Verheijden, 2004[38]		1	0	-1		0	0
Winzelberg, 2000[39]		1				-1	0
Wylie-Rosett, 2001[40]		1	0	0		-1	0
Cunningham , 2005[41]	Alcohol	1		-1		1	1
Hester , 2005[42]		1	1	-1		1	2
Kypri , 1999[43]		1	1	1	1	0	4
Lieberman, 2006[44]		1		-1		-1	-1
Neighbors , 2004[45]		1				0	1
Riper, 2008[46]		1	1	-1		1	2
Riper, 2008[47]		1	0	0		1	2
An, 2008[48]	Smoking cessation	1	1	-1		1	2
Brendryen, 2008 [49]		1	0	0		1	2
Curry, 1995 [50]		1	0	0		-1	0
Dijkstra, 2005 [51]		1	0	0		-1	0
Hang, 2009 [52]		1	1	0		1	3
Japuntich, 2006[53]		1				1	2
Pattents, 2006[54]		1				0	1
Prochaska, 1993 [55]		1	0	0		1	2
Prokhorov, 2008 [56]		1	0	0		1	2
Schiffmans, 2000[57]		1	1			1	3
Schumann, 2006[58]		1		-1		-1	-1
Schumann, 2008[59]		1	1	-1		1	2
Severson, 2008[60]		1				1	2
Strecher, 1994 [61] Study 1		1	0	0		1	2
Strecher, 2005[62]		1		-1		-1	-1
Strecher, 2005 [63]		1	0	0			1
Strecher, 2006[64]		1		-1		0	0
Strecher, 2008[65]		1	-1	-1		0	-1
Swartz, 2006[66]		1	1	-1		0	1
Booth, 2008[67]	Obesity	1				0	1
Burnett, 1985[68]		-1		-1		-1	-3
Cussler, 2008[69]		1				1	2
Frenn, 2005[70]		1	-1	-1		0	-2
Hunter, 2008[71]		1	1	-1		1	2
Kent, 1985[68]		-1		-1		-1	-3
Kroeze, 2008 [72]		1	1			1	3
McConnon, 2007[73]		1	1	-1		0	1

Evidence Table1. Jadad criteria for RCT quality (continued)

Author, year	Target	RCT	Approp of rand.	Blinding	Approp of blinding	WD	SCORE
Morgan , 2009[74]		1	1		0	1	3
Taylor, 1991[75]		1				-1	0
Williamson, 2006[76]		1	1	-1		1	2
Womble, 2004[77]		1	0			1	2
Glasgow, 2003[78]	Diabetes	1		-1		0	0
Homko, 2007[79]		1		-1		1	1
McKay, 2001[80]		1	1			1	3
Richardson, 2007[31]		1	1	-1		1	2
Wangberg, 2006[81]		1				1	2
Wise, 1986[82]		1	1	0		-1	1
Lorig, 2006[83]	Diabetes, heart disease	1		-1		1	1
Chiauzzi, 2008[84]	Mental health	1	1	-1		-1	0
Christensen, 2004[85]		1	1	-1		1	2
Hasson, 2005[86]		1	1	-1		1	2
Neil, 2009[87]		1	0	0		1	2
Proudfoot, 2004[88]		1	1			1	3
Schneider, 2005[89]		1	-1			1	1
Warmerdam, 2008[90]		1	1	0		1	3
Zetterqvist , 2003[91]		1	0	0		1	2
Jan, 2007[3]	Asthma	1	0	-1		1	1
Joseph, 2007[92]		1	1	-1		1	2
Krishna, 2003[4]		1		1		1	3
Nguyen, 2008[93]	COPD	1	1	-1		1	2
Paperny, 1990[94]	Adolescent risk behavior	1	1		0	1	3
Lorig, 2008[95]	Arthritis	1		-1		1	1
Buhrman, 2004[96]	Back pain	1				1	2
Oenema, 2008[97]	Behavioral risk factors	1	1	0		1	3
Chewning, 1999[5]	Contraception use	1	-1			0	0
Kukafka, 2002[98]	Cardio-vascular disease	1		-1		-1	-1
Jones. 1999[8]	Cancer, general	1	1			1	3
Campbell, 1997[99]		1	-1			-1	-1
Brennan, 1995[100]	Caregiver decision making	1				1	2
Yardley, 2007[101]	Prevention of falls in the elderly	1	1	1	1	1	5
Harari,	Change in health	1	1	-1		0	1

Evidence Table1. Jadad criteria for RCT quality (continued)

Author, year	Target	RCT	Approp of rand.	Blinding	Approp of blinding	WD	SCORE
2008[102]	behavior						
Devineni, 2005[103]	Headache	1				1	2
Flatley-Brennan, 1998[104]	HIV/AIDS	1		-1		0	0
Schapira, 2007[105]	Menopause/HRT	1	1	-1		1	2
Rostom, 2002[106]		1	1	-1		-1	0
Key Question 1 c (relationship-centered outcomes)							
Green, 2005[107]	Breast cancer	1		-1		-1	-1
Gustafson, 2001[7]		1				0	1
Maslin, 1998[108]		1		-1		-1	-1
Gustafson, 2008[6]		1	1			0	2
Brennan, 1995[100]	Caregiver decision making	1				1	2
Flatley-Brennan, 1998[104]	HIV/AIDS	1		-1		0	0
Sciamanna, 2005[109]	Osteoarthritis	1		-1		-1	-1
Montgomery, 2007[110]	Newborn delivery	1	1			1	3
Key Question 1 d (clinical outcomes)							
Gustafson, 2001[7]	Breast cancer	1				0	1
Gustafson, 2008[6]		1	1			0	2
Maslin, 1998[108]		1		-1		-1	-1
Homko, 2007[79]	Diabetes	1		-1		1	1
Tjam, 2006[111]		1	1	-1		0	1
Wise, 1986 [82]		1	1	0		-1	1
Adachi, 2007[9]	Diet, exercise, physical activity (not obesity)	1	-1			0	0
Hunter, 2008[71]		1	1	-1		1	2
McConnon, 2007[73]		1	1	-1		0	1
Tate, 2006[36]		1	1	1	1	0	4
Williamson, 2006[76]		1	1	-1		1	2
Christensen, 2004[85]	Mental health	1	1	-1		1	2
Hasson, 2005[86]		1	1	-1		1	2
Kerr, 2008[112]		1				0	1
March, 2008[113]		1	1	-1		1	2
Orbach, 2007[114]		1	1	-1		0	1
Proudfoot, 2003[115]		1	1			1	3
Spek, 2008[116]		1				1	2

Evidence Table1. Jadad criteria for RCT quality (continued)

Author, year	Target	RCT	Approp of rand.	Blinding	Approp of blinding	WD	SCORE
Tarraga, 2006[117]	Alzheimers	1		-1		0	0
Lorig, 2008[95]	Arthritis	1		-1		1	1
Jan, 2007[3]	Asthma	1	0	-1		1	1
Buhrman, 2004[96]	Back pain	1				1	2
Katz, 1997[118]	Chronic adult aphasia	1		-1		1	1
Nguyen, 2008[93]	COPD	1	1	-1		1	2
Trautman, 2008[119]	Headache	1	1			1	3
Gustafson, 1999[120]	HIV/AIDS	1	1	-1		1	2
Morgan, 2009[74]	Obesity	1	1		0	1	3
Borckardt, 2007[121]	Pain	1				-1	0
Key Question 1 e (economic outcomes)							
Jones, 1999[8]	Cancer	1		-1		1	1
Joseph, 2007[92]	Asthma	1	1	-1		1	2
McConnon, 2007[73]	Obesity	1	1	-1		0	1
Key Question 2 (Barriers)							
Wangberg, 2008[81]	Diabetes	1				1	2
Mangunkusumo, 2007[28]	Diet, exercise	1				0	1

Evidence Table1. Jadad criteria for RCT quality (continued)

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Evidence Table1. Jadad criteria for RCT quality (continued)

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Evidence Table1. Jadad criteria for RCT quality (continued)

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Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
diet/exercise/physical activity NOT obesity										
Adachi, 2007[1]	Body Weight	Control	50	Mean, 65.1 SD, 6.4	1 month mean, -3 SD, 0.9	3 month mean, -1.1 SD, 1.5		7 month: mean, -1.4 SD, 2.4		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Computer tailored program with 6-month weight and targeted behavior's self-monitoring,	36	Mean, 65.3 SD, 6.4	1 month mean, -1.1 SD, 1.2	3 month mean, -2.3 SD, 2		7 month: mean, -2.9 SD, 2.7		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Computer tailored program only,	44	Mean, 64.8 SD, 6.5	1 month mean, -0.9 SD, 1.1	3 month mean, -1.7 SD, 1.9		7 month: mean, -2.2 SD, 3		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Untailored self-help booklet with 7-month self-monitoring of weight and walking	53	Mean, 63.4 SD, 5.5	1 month mean, -0.5 SD, 0.8	3 month mean, -1.3 SD, 1.5		7 month: mean, -1.6 SD, 2.1		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
	BMI	Control	50	Mean, 26.1 SD, 1.6	1 month mean, -0.14 SD, 0.38	3 month mean, -0.44 SD, 0.6		7 month mean, -0.57 SD, 0.93		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Computer tailored program with 6-month weight and targeted behavior's self-monitoring	36	Mean, 26.2 SD, 1.4	1 month mean, -0.47 SD, 0.49	3 month mean, -0.93 SD, 0.85		7 month mean, -1.22 SD, 1.16		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Computer tailored program only	44	Mean, 26.2 SD, 1.5	1 month mean, -0.38 SD, 0.42	3 month mean, -0.69 SD, 0.73		7 month mean, -0.86 SD, 1.15		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Untailored self-help booklet with 7-month self-monitoring of weight and walking,	53	Mean, 26.1 SD, 1.5	1 month mean, -0.2 SD, 0.34	3 month mean, -0.53 SD, 0.64		7 month mean, -0.68 SD, 0.88		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
	% weight loss	Control	50		1 month mean, -0.05 SD, 1.4	3 month mean, -1.6 SD, 2.3		7 month mean, -2.2 SD, 3.5		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Computer tailored program with 6-month weight and targeted behavior's self-	36		1 month mean, -1.8 SD, 1.9	3 month mean, -3.6 SD, 3.3		7 month mean, 4.7 SD, 4.5		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		monitoring,								
		Computer tailored program only	44		1 month mean, -1.5 SD, 1.6	3 month mean, -2.6 SD, 2.8		7 month mean, -3.3 SD, 4.3		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Untailored self-help booklet with 7-month self-monitoring of weight and walking	53		1 month mean, -0.8 SD, 1.3	3 month mean, -2 SD, 2.5		7 month mean, -2.6 SD, 3.4		BL, time point 2, 0.01 time point 3, 0.01 time point 4, final time point, 0.05
Anderson, 2001[2]	Fat (% calories) Composites Scores mean (SD)	Control	137	32.74 (6.85)				33.19 (6.93) n 90	NS	NS
		Intervention	124	33.24 (7.28)				31.00 (6.42) n 72	NS	NS
	Fiber (g/1,000kcals) mean (SD)	Control	NS	9.00(3.32)				9.21(3.26) n 90	NS	NS
		Intervention	NS	8.97 (2.57)				10.61 (3.37) n 72	NS	NS
	Fruit and vegetables (servings/1000 kcals) mean (SD)	Control	136	2.85 (1.34)				2.5 (1.18) n 90	NS	NS
		Intervention	124	2.78 (1.06)				3.35 (1.56) n 72	NS	NS
	Self Efficacy/	Control	139	6.70 (1.79)				6.68 (1.73)		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Low-Fat Meals mean (SD)	Intervention	125	6.89 (1.82)				7.01 (1.67)	NS	P<.10
	Self-Efficacy/ Low-Fat Snacks mean (SD)	Control	139	7.24 (1.67)				7.18 (1.61) n 132	NS	NS
		Intervention	125	7.29 (1.86)				7.38 (1.80) n 98	NS	NS
	Self-Efficacy/Fruit, Vegetables, Fiber mean (SD)	Control	139	7.29 (1.78)				7.38 (1.67) n 132	NS	NS
		Intervention	125	7.50 (1.58)				7.58 (1.73) n 98	NS	NS
	Outcome Expectations/Appetite Satisfaction mean (SD)	Control	139	3.92 (0.90)				3.94 (0.91) n 132	NS	NS
		Intervention	125	3.97 (0.93)				4.13 (0.88) n 98	NS	P<.10
	Outcome Expectations/Budgetary Outcomes mean (SD)	Control	139	3.39 (1.09)				3.40 (1.07) n 132	NS	NS
		Intervention	125	3.40 (1.10)				3.39 (1.14) n 98	NS	NS
	Outcome Expectations/Health Outcomes mean (SD)	Control	139	4.29 (0.66)				4.32 (0.63) n 132	NS	NS
		Intervention	125	4.37 (0.59)				4.40 (0.58) n 98	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
Brug, 1998[3]	Fat (fat points per day)	General Information	220	28.2 (5.2)				27.5 (5.6)	NS	NS
		Tailored + Iterative feedback	215	28.3 (5.4)				25.6 (4.6)	NS	NS
		Tailored Feedback	211	28.0 (5.3)				26.2 (5.2)	NS	Group effect F(2) 17. 1, p < .001
	Fruit (servings per day)	General Information	220	2.09 (1.75)				2.02 (1.59)	NS	NS
		Tailored + Iterative feedback	215	2.13 (1.70)				2.45 (1.69)	NS	NS
		Tailored Feedback	211	2.18 (1.72)				2.18 (1.47)	NS	Group effect F(2) 5.5, p < .01
	Vegetables (servings per day)	General Information	220	1.02 (0.36)				1.08 (0.41)	NS	NS
		Tailored + Iterative feedback	215	1.06 (0.38)				1.20 (0.36)	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Tailored Feedback	211	1.06 (0.41)				1.15 (0.41)	NS	Group effect F(2) 5.2, p < .01.
Brug, 1999[4]	Fat score	Comparison	163	27.4				25.9	NS	NS
		Experimental	152	26.5				26.2	NS	NS
	Servings of vegetables	Comparison	163	1.04				1.13	NS	P<.01 at baseline
		Experimental	152	1.14				1.07	NS	NS
	Servings of fruit	Comparison	163	1.61				1.91	NS	NS
		Experimental	152	1.62				2.02	NS	NS
	Intention to reduce fat (Range: 23 (very surely not) to 13 (very sure).	Comparison	163	.11				.50	NS	NS
		Experimental	152	.26				.37	NS	NS
	Intention to increase vegetables Range: 23 (very surely not) to 13 (very sure).	Comparison	163	-.91				-.47	NS	NS
		Experimental	152	-1.21				-.51	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Intention to increase fruit dRange: 23 (very surely not) to 13 (very sure).	Comparison	163	-0.40				-0.13	NS	NS
		Experimental	152	-0.31				-0.17	NS	NS
Campbell, 1994[5]	Fat (g/day)Mean (SE)	no message	NS	41,1 (2,1)				39,8(1,9)	NS	NS
		tailored message	NS	45,6 (2,6)				35,3(1,7)	NS	33
		Non tailored message	NS	40,4 (2,4)				36,8(1,7)	NS	157
	Saturated Fat (g/day) Mean (SE)	no message	NS	16,3 (,98)				15.8 (,81)	NS	NS
		tailored message	NS	18,7(1,1)				13,9 (.72)	NS	,036
		Non tailored message	NS	16,1 (.93)				14.4 (.72)	NS	,110
	Vegetable/Fruit (servings/day) Mean (SE)	no message	NS	3,6 (.20)				3.3 (.20)	NS	NS
		tailored message	NS	3,6 (.19)				3,3 (,19)	NS	0.817

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Non tailored message	NS	3,6 (.20)				3,3 (.19)	NS	,968
		Computer-tailored intervention	NS	40.7 ± 14.4				31.6 ± 12.4	NS	NS
		Standard intervention	NS	35.6 ± 14.2				33.3 ± 12.9	NS	NS
	Total fat intake (grams/ day) a , b	No intervention	NS	100.3 ± 39.9				97.1 ± 40.3	NS	NS
		Computer-tailored intervention	NS	109.2 ± 40.7				85.0 ± 34.5	NS	NS
		Standard intervention	NS	87.5 ± 35.9				81.8 ± 33.3	NS	NS
Campbell, 1999[6]	Knowledge score of low fat foods	Control	212	4.13 (0.08) N Sig				4.33 (0.08) P<0.001	NS	NS
		Intervention	165	4.29 (0.09) N Sig				5.08 (0.09) P<0.001	NS	NS
	Self-efficacy	Control	212	3.53 (0.08) N Sig				3.83 (0.07) N Sig	NS	NS
		Intervention	165	3.55 (0.09) N Sig				3.94 (0.08) N Sig	NS	NS
	Fat score (g)	Control	212	101.6 (4.2) P<0.001				65.5 (2.8) N Sig	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Intervention	165	83.8 (4.7) P<0.001				64.1 (3.2) N Sig	NS	NS
	Stage of change-Precontemplation *n (*%)	Control	212	31 (14.6)				18 (8.5)	–6.6	*P* <0.01 for baseline difference in stage of change between study groups
		Intervention	165	14 (8.5)				9 (5.4)	–3.1	NS
	Stage of change-Contemplation *n (*%)	Control	212	72 (34.0)				47 (22.1)	–11.9	NS
		Intervention	165	71 (43.0)				26 (15.8)	–37.2	NS
	Stage of change-Preparation *n (*%)	Control	212	30 (14.2)				39 (18.3)	+4.1	NS
		Intervention	165	35 (21.2)				41 (24.8)	+3.6	NS
	Stage of change-Action/maintenance *n (*%)	Control	212	79 (37.3)				109 (51.2)	+13.9	NS
		Intervention	165	45 (27.3)				89 (53.9)	+26.6 *P* 0.01 comparing stage progress, more people	*P* 0.03 for difference between study groups in number of people who were in more advanced stages

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
									in the intervention group advanced in stage compared to the control group.	(preparation, action/ maintenance) at follow-up, intervention . control.
Campbell, 2004[7]	Total Low-fat knowledge score	Control-No Intervention	166	1.86(1.2)				2.63 (0.55)	NS	NS
		Computer based interactive nutrition education	141	1.94(1.2)				2.76 (0.46)	NS	P (.02).
	Total Infant feeding knowledge score	Control-No Intervention	166	2.25 (0.86)				2.40 (0.75)	NS	NS
		Computer based interactive nutrition education	141	2.29 (0.82)				2.62 (0.62)*	NS	(P < .01).

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Total self-efficacy score	Control-No Intervention	166	17.08				18.48	NS	NS
		Computer based interactive nutrition education	141	17.68				18.93 (significant increase at **Immediate** **Follow-up** 19.51, P < .05	NS	NS
Haerens, 2005[8]	Fat intake (g day21)	control condition	(n 655 pupils)	108 ± 46				104 ± 45	NS	NS
		intervention with parental support	(n 1055 pupils)	111 ± 48				105 ± 49	NS	NS
		intervention alone	(n 685 pupils)	130 ± 54				127 ± 56	NS	NS
	Fruit intake (pieces week)	control condition	(n 655 pupils)	6.5 ± 5.0				6.0± 4.9	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		intervention with parental support	(n 1055 pupils)	5.3 ± 5.3				5.4 ± 5.3	NS	NS
		intervention alone	(n 685 pupils)	4.6 ±5.0				4.4 ± 4.7	NS	NS
	Soft drinks (glasses day)	control condition	(n 655 pupils)	2.5 ± 2.2				2.6± 2.4	NS	NS
		intervention with parental support	(n 1055 pupils)	3.1± 2.4				3.1 ±2.5	NS	NS
		intervention alone	(n 685 pupils)	3.5 ± 2.5				3.9 ± 2.8	NS	NS
	Water (glasses day21)	control condition	(n 655 pupils)	3.7 ± 2.6				4.0 ±2.8	NS	NS
		intervention with parental support	(n 1055 pupil	3.4 ± 2.7				3.7 ± 2.8	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
			s)							
		intervention alone	(n 685 pupils)	3.1 ± 2.7				3.5 ± 2.9	NS	NS
	Pre- and post-test intake levels (mean ^ SD) for fat intake in girls	control condition	(n 392 pupils)	99 ± 39				95 ± 40	NS	<0.001
		intervention with parental support	(n 432 pupils)	97 ± 38				85 ± 35	NS	<.0001
		intervention alone	(n 108 pupils)	108 ± 46				98 ± 40	NS	<0.05
	Pre- and post-test intake levels (mean ^ SD) for % energy from fat in girls	control condition	(n 392 pupils)	38.7 ± 15.8				36.1 ± 15.5	NS	<0.001
		intervention with parental support	(n 432 pupils)	37.5 ± 15.0				31.9 ± 13.6	NS	<.0001
		intervention	(n 108	41.1 ± 16.8				36.6 ± 15.2	NS	<0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		alone	pupils)							
Haerens, 2007[9]	Dietary fat intake (self-report) (g/day)	Control	84	Mean, 110 SD, 42.2				3 months after 50 minute intervention: mean, 107.3 SD, 41.5		NR
		Intervention	90	Mean, 120.9 SD, 48.7				3 months after 50 minute intervention: mean, 108.2 SD, 43.9		
		Intervention students who had read the intervention message	65	Mean, 118.4 SD, 50.1				3 months after 50 minute intervention: mean, 102 SD, 43.8		
	Dietary fat intake (technical-vocational)	Control	67	Mean, 118.8 SD, 50.8				3 months after 50 minute intervention mean, 110.5 SD, 47		NR
		Intervention	63	Mean, 109.7 SD, 51.6				3 months after 50 minute intervention mean, 99.6 SD, 51.3		
		Intervention students who had read the intervention message	46	Mean, 97.8 SD, 38.9				3 months after 50 minute intervention mean, 86.2		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								SD, 39.3		
Haerens, 2009[10]	Cycling for transportation	Generic Feedback	543	76 (112)				105 (140)	NS	
		Tailored feedback	511	78 (111)				110 (153)	NS	
	Walking for transportation	Generic Feedback	543	75 (120)				98 (155)	NS	
		Tailored feedback	511	68 (119)				95 (170)	NS	
	Walking in leisure time	Generic Feedback	543	42 (96)				60 (139)	NS	
		Tailored feedback	511	38 (99)				61 (156)	NS	
	Total moderate to vigorous activity	Generic Feedback	543	618 (527)				642 (573)	NS	
		Tailored feedback	511	604 (482)				642 (598)	NS	
Hurling, 2006[11]	Hypothesis 1: %of	Control	22	At 3 weeks 70				At 10 weeks 43	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	participants logging into system after 10 week test period	Intervention	25	At 3 weeks 70				At 10 weeks 75	NS	NS
	Hypothesis 2: change in perception of exercise as boring; Too much effort	Control	22	NS				NS	NS	NS
		Intervention	25	NS				F(2, 57) 3.19; F(2, 57) 2.26,	NS	p < 0.05; p=1.0.
	Hypothesis 3: Change in ratings of Expectation; satisfaction with motivation to exercise;	Control	22	NS				0.6; .38	NS	p < 0.05; p <.01
		Intervention	25	Not clear				3.13; 3.6	NS	p < 0.05; p <.01
	The mean change (from	Control	22	NS				-0.05	NS	(SE 0.37)

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	the beginning of the study period to 7 months after the 10-week intervention) in ratings of the statement ''I am very satisfied with my current level of motivation to do exercise''									
		Intervention	25	NS				+0.64	NS	(SE 0.39)
Hurling, 2007[12]	MET min/week	Control	30					9 weeks: mean, 4.0 SD, 4.1		
		Had access to the internet and mobile phone	47					9 weeks: mean, 12 SD, 3.1		0.12
	Change in weekly hours spent sitting (Met min/week leisure time)	Control	30		3 weeks			9 weeks mean, -5.5 SD, 3.5		
		Had access to internet and mobile phone	47		3 weeks			9 weeks mean, 4.1 SD, 2.6		0.03
King,	Total PA (kcals/kg/hr) M	generic health risk	161	55.5 (31.7)				53.6 (27.6)	NS	.005

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
2006[13]	(SD)	appraisal CD-ROM								
		Interactive CD-ROM	174	58.4 (33.7)				64.6 (39.1)	NS	
	Moderate PA (kcals/kg/hr) M (SD)	generic health risk appraisal CD-ROM	161	15.7 (19.1)				14.9 (17.8)	NS	.001
		Interactive CD-ROM	174	17.2 (20.6)				22.9 (26.4)	NS	
Kristal, 2000[14]	Fat-related diet habit	Control	604	2.30 ± 0.49				-0.00 ± 0.40	NS	NS
		Intervention	601	2.29 ± 0.49				-0.09 ± 0.38	NS	NS
	Fruit and vegetables (svg/day)	Control	604	3.47 ± 1.41				0.14 ± 1.80	NS	NS
		Intervention	601	3.62 ± 1.49				0.47 ± 1.83	NS	NS
Lewis, 2008[15]	median number of logins	Standard Internet	NS	NS				38	NS	<.05
		Motivationally -Tailored Internet	NS	NS				50	NS	
	5-itemWebsite	Standard	NS	NS				11.64	NS	<.001

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Quality Questionnaire	Internet								
		Motivationally -Tailored Internet	NS	NS				16.76	NS	
Low, 2006[16]	Eating Disorder Inventory (EDI) -Drive for Thinness	Control	14	Mean, 4.0 SD, 5.6	Post Intervention: mean,5.0 SD,4.6			8-9 month follow-up: mean, 5.5 SD, 5.7		
		Student bodies with a moderated discussion group	14	Mean, 2.5 SD, 6	Post Intervention: mean,2.0 SD,2.0			8-9 month follow-up: mean, 2.3 SD, 5.6		NR
		Un-moderated discussion group	19	Mean, 2.3 SD, 3.4	Post Intervention: mean,2.3 SD,2.3			8-9 month follow-up: median, 1.2; SD, 1.5		
		Program alone	14	Mean, 4 SD, 5	Post Intervention: mean,3.7 SD,3.6			8-9 month follow-up: mean, 3.7 SD, 4.6		
	EDI- Bulimia	Control	14	Mean, 1.2 SD, 1.6	Post Intervention: mean,1.1 SD, 1.0			8-9 month follow-up mean, 2 SD, 1.9		
		Student bodies with a moderated discussion group	14	Mean, 1.4 SD, 4.2	Post Intervention: mean,1.7 SD, 1.7			8-9 month follow-up mean, 0.46 SD, 1.9		p<0.05 for pair wise comparison
		Un-moderated discussion group	19	Mean, 1.4 SD, 2.2	Post Intervention: mean,0.85 SD, 0.86			8-9 month follow-up mean, 0.42 SD, 0.84		p<0.05 for pair wise comparison
		Program	14	Mean, 1.2	Post			8-9 month		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		alone		SD, 1.5	Intervention: mean,0.47 SD, 0.53			follow-up mean, 1.3 SD, 1.6		
	EDI-Body Dissatisfaction	Control	14	Mean, 9.4 SD, 8	Post Intervention: mean,7.9 SD, 8.2			8-9 month follow-up mean, 9.4 SD, 7.8		p<0.05 for pair wise comparison
		Student bodies with a moderated discussion group	14	Mean, 8.1 SD, 6.8	Post Intervention: mean,7.6 SD, 7.6			8-9 month follow-up mean, 7 SD, 4.9		
		Un-moderated discussion group	19	Mean, 7.9 SD, 6.4	Post Intervention: mean, 5.9 SD, 5.9			8-9 month follow-up mean, 5.2 SD, 4.2		p<0.05 for pair wise comparison
		Program alone	14	Mean, 9 SD, 6.7	Post Intervention: mean,7.1 SD, 7.1			8-9 month follow-up mean, 6.3 SD, 7.8		
	Weight and Shape Concerns	Control	14	Mean, 37 SD, 22.3	Post Intervention: mean,41.8 SD, 22.8			8-9 month follow-up mean, 43.2 SD, 21.1		p<0.05 for pair wise comparison
		Student bodies with a moderated discussion group	14	Mean, 33.8 SD, 22.4	Post Intervention: mean, 32.2 SD, 33.8			8-9 month follow-up mean, 29.9 SD, 23.1		
		Un-moderated discussion group	19	Mean, 29.5 SD, 16.6	Post Intervention: mean, 28.5 SD, 29.3			8-9 month follow-up mean, 27.5 SD, 14.5		p<0.05 for pair wise comparison
		Program alone	14	Mean, 38.3 SD,17.0	Post Intervention: mean, 38.2 SD, 26.7			8-9 month follow-up mean, 34.6 SD, 16.7		
Mangunkus	Evaluation of	Control	465					2-4 months:		0.035

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
umo, 2007[17]	Health Behavior mode (easy to use) (Likert Scale)							mean, 4.1; median, 4; range, 4.0-5.0; SD, 0.7		
		Internet Group	444					2-4 months: mean, 4.2; median, 4.0 ; range, 4.0-5.0; SD, 0.7		0.035
	Evaluation of Fruit Advice (pleasant) (Likert Scale	Control	418					2-4 months mean, 3.7 median, 4 range, 3.0-4.0 SD, 0.7		0.005
		Internet	381					2-4 months mean, 3.8 median, 4 range, 3.0-4.0 SD, 0.7		0.005
	Acceptability (Was fruit advice targeted to you?)	Control	417					2-4 months mean, 3.3 median, 3 range, 3.0-4.0 SD, 1		0.001
		Internet Group	376					2-4 months mean, 3.5 median, 4 range, 3.0-4.0 SD, 0.9		0.001
	Acceptability (Did you enjoy it)	Control	417					2-4 months mean, 3.2 median, 3		0.004

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								range, 3.0-4.0 SD, 1		
		Internet Group	376					2-4 months mean, 3.4 median, 4 range, 3.0-4.0 SD, 0.9		BL, 0.004 time point 2, Liker Scale 1-5
	Quality of Intervention (relevant)	Control	417					2-4 months: mean, 3.3: median, 4: range, 3.0-4.0: SD, 1		0.49
		Internet Group	376					2-4 months: mean, 3.5: median, 4: range, 3.0-4.0: SD, 1		0.49
	Quality of Intervention (credible)	Control	417					2-4 months mean, 3.8 median, 4 range, 4.0-4.0 SD, 0.8		0.003
		Internet Group	376					2-4 months mean, 3.6 median, 4 range, 3.0-4.0 SD, 0.9		0.003
	Quality of Intervention (useful)	Control	417					2-4 months mean, 3.7 median, 4 range, 3.0-4.0		0.048

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								SD, 0.9		
		Internet	376					2-4 months mean, 3.6 median, 4 range, 3.0-4.0 SD, 0.9		0.048
Marcus, 2007[18]	Physical activity per week	Tailored print	86	Minutes of physical activity per week (using PAR interview)	6 months mean, 112.5			12 months: mean, 90		Time point 2, 0.15 final time point, 0.74
		Tailored internet	81	Minutes of physical activity per week (using PAR interview)	6 months mean, 120			12 months: mean, 90		Time point 2, 0.15 final time point, 0.74
		Standard internet	82	Minutes of physical activity per week (using PAR interview)	6 months mean, 90			12 months mean, 80		Time point 2, 0.15 final time point, 0.74
	Improvement in functional capacity (estimated v02 at 85% of predicted maximum heart rate) (ml/kg per minute)	Tailored print	86		6 months mean, 25.8 SD, 6.8			12 months mean, 26.2 SD, 6.9		Time point 2, >.99 final time point, 0.31
		Tailored internet	81		6 months mean, 26.5			12 months mean, 26.1		Time point 2, >.99

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
					SD, 6.6			SD, 6.9		final time point, 0.31
		Standard internet	82		6 months mean, 25.4 SD, 6.6			12 months mean, 25.7 SD, 6		Time point 2, >.99 final time point, 0.31
	150 minutes of physical activity per week (150 minutes)	Tailored print	86		6 months, (37.2)			12months, (32.6)		Time point 2, 0.52 final time point, 0.45
		Tailored internet	81		6 months, (44.4)			12months, (39.5)		Time point 2, 0.52 final time point, 0.45
		Standard internet	82		6 month, (36.6)			12 months, (30.5)		Time point 2, 0.52 Final time point, 0.45
Napolitano, 2003[19]	Minutes moderate physical activity	Control	31	Mean, 80.86 SD, 77.8	1 month mean, 96.82 SD, 93.7			3 month: mean, 82 SD, 87.3		
		Internet intervention	21	Mean, 68.79 SD, 58.1	1 month mean, 98.33 SD, 53.9			3 month: mean, 112 SD, 75.7		P<0.05 at one month, NS at 3 months
	Minutes, walking	Control	31	Mean, 87.57 SD, 177.4	1 month mean, 83.79 SD, 121.1			3 month mean, 68.39 SD, 85.2		
		Internet intervention	21	Mean, 57.24 SD, 56.9	1 month mean, 87.29 SD, 46			3 month mean, 99.75 SD, 68.3		p<0.001 at one month and p<0.05 at three months

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Stage of change, progression	Control	31		1 month			3 month		
		Internet intervention	21		1 month			3 month		p<0.05) at one month and p<0.01 at three months
Oenema, 2001[20]	Intention to eat less fat	Control	102					Post-intervention: mean, 0.29 SD, 1.26		Diff between intervention and control at post test, p<0.01
		Web based tailored nutrition education	96					Post-intervention: mean, 0.72 SD, 1.21		Diff between intervention and control at post test, p<0.01
	Self-rated fat intake compared to others	Control	102	Mean, -0.44 SD, 0.77				Post-intervention mean, -0.33 SD, 0.74		Diff between intervention and control at post test, p<0.01
		Web based tailored nutrition education	96	Mean, -0.31 SD, 0.7				Post-intervention mean, -0.05 SD, 0.8		Diff between intervention and control at post test, p<0.01
	Self-rated fruit intake	Control	102	Mean, -0.51 SD, 0.98				Post-intervention mean, -0.49 SD, 0.97		Diff between intervention and control at post test, p<0.01
		Web based tailored nutrition education	96	Mean, -0.49 SD, 0.91				Post-intervention mean, -0.27 SD, 0.93		Diff between intervention and control at post test, p<0.01
	Self rated fat	Control	102					Post-		Diff between

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	intake			Mean, -0.23 SD, 0.77				intervention mean, 0.01 SD, 0.81		intervention and control at post test, p<0.05
		Tailored	96	Mean, 0.03 SD, 0.73				Post-intervention mean, 0.17 SD, 0.68		Diff between intervention and control at post test, p<0.05
	Self rated fruit intake compared to others	Control	102	Mean, -0.34 SD, 1.01				Post-intervention: mean, -0.34 SD, 0.96		Diff between intervention and control at post test, p<0.05
		Tailored	96	Mean, -0.31 SD, 0.93				Post-intervention: mean, -0.16 SD, 0.89		Diff between intervention and control at post test, p<0.05
	Self-rated vegetable intake	Control	102	Mean, 0.37 SD, 0.73				Post-intervention mean, 0.3 SD, 0.76		NS
		Tailored	96	Mean, 0.2 SD, 0.71				Post-intervention mean, 0.08 SD, 0.74		NS
	Self-rated vegetable intake compared to other	Control	102	Mean, 0.3 SD, 0.78				Post-intervention mean, 0.27 SD, 0.72		NS
		Tailored	96	Mean, 0.18 SD, 0.74				Post-intervention mean, 0.08 SD, 0.82		NS
Oenema, 2005[21]	Fat intake	Control	232	Mean, 20.3 SD, 6.2				3 weeks after sending intervention		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								materials: mean, 19.9 SD, 6.2		
		General information	196	Mean, 20.0SD, 5.9				3 weeks after sending intervention materials: mean, 19.2 SD, 6.0		
		Tailored Information	188	Mean, 19.8 SD, 6.1				3 weeks after sending intervention materials: mean, 19.2 SD, 6.2		
	Vegetable intake	Control	232	Mean, 1.9 SD, 1.0				3 weeks after sending intervention materials mean, 1.8 SD, 0.9		
		General information	196	Mean, 1.8 SD, 0.8				3 weeks after sending intervention materials Mean,1.7 SD,0.8		
		Tailored Information	188	Mean, 1.8 SD, 0.8				3 weeks after sending intervention materials mean, 1.9 SD, 0.9		
	Fruit intake	Control	232	Mean, 2.1 SD, 1.4				3 weeks after sending intervention materials mean,		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								median, 2.0 range, SD, 1.6		
		General information	196	Mean, 2.1 SD, 1.4				3 weeks after sending intervention materials mean, 2.0 SD, 1.2		
		Tailored intervention	188	Mean, 2.2 SD, 1.6				3 weeks after sending intervention materials mean, 2.3 SD, 1.6		
	Fat self-rated intake	Control	232	Mean, -0.11 SD, 0.81				3 weeks after sending intervention materials mean, -0.18 SD, 0.73		
		General	196	Mean, -.16 SD, 0.70				3 weeks after sending intervention materials mean, -0.22 SD, 0.71		
		Tailored	188	Mean, -0.25 SD,0.68				3 weeks after sending intervention materials mean, -0.12 SD, 0.76		
	Vegetable self-rated intake	Control	232	Mean, 0.42 SD, 0.71				3 weeks after sending intervention materials: mean, 0.37		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								SD, 0.70		
		General information	196	Mean, 0.44 SD, 0.68				3 weeks after sending intervention materials: mean, 0.37 SD, 0.71		
		Tailored	188	Mean, 0..35 SD, 0.67				3 weeks after sending intervention materials: mean, 0.16 SD, 0.69		
	Fruit self-rated intake	Control	232	Mean, -0.22 SD, 0.99				3 weeks after sending intervention materials mean, -0.26 SD, 0.91		
		General information	196	Mean, -0.26 SD, 0.95				3 weeks after sending intervention materials mean, -0.16 SD, 0.89		
		Tailored intervention	188	Mean, -0.19 SD, 1.09				3 weeks after sending intervention materials mean, -0.19 SD, 1.05		
	Fat Intention to Change	Control	232	Mean, -0.21 SD, 1.01				3 weeks after sending intervention materials mean, -0.24 SD, 1.00		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		General	196	Mean, -0.13 SD, 0.95				3 weeks after sending intervention materials mean, -0.13 SD, 0.99		
		Tailored	188	Mean, -0.23SD, 0.92				3 weeks after sending intervention materials mean, 0.01 SD, 0.97		
	Vegetable Intention to Change	Control	232	Mean, 0.85 SD, -0.31				3 weeks after sending intervention materials: mean, -0.26 SD, 0.89		
		General	196	Mean, -0.32 SD, 0.83				3 weeks after sending intervention materials: mean, -0.25 SD, 0.81		
		Tailored	188	Mean, -0.38 SD, 0.78				3 weeks after sending intervention materials: mean, -0.04 SD, 0.93		
	Fruit Intention to Change	Control	232	Mean,-0.08 SD,0.93				3 weeks after sending intervention materials: mean, -0.13 SD, 0.85		
		General	196	Mean,0.02 SD,0.90				3 weeks after sending		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								intervention materials: mean, -0.04 SD,0.92		
		Tailored	188	Mean,-0.10 SD,0.88				3 weeks after sending intervention materials: mean, -0.01 SD,1.01		
Richardson, 2007[22]	Total Steps	LG	17	4,157 ± 1,737				6,279 ± 3,306		0.0142
		SG	13	5,171 ± 1,769				6,868 ± 3,751		0.1117
	Bout Steps	LG	17	286 ± 599				2,070 ± 2,814		0.0164*
		SG	13	516 ± 801				2,616 ± 2,706		0.0196*
	Change	LG	17					2,122 ± 3,179		
		SG	13					1,783 ± 2,741		
Smeets, 2007[23]	Fat consumption (gm)	Control	1410	Mean, 18.7 SD, 6.2				Post test at 3 month: mean, -1 SD, 0.05		0.01
		Intervention group, receiving one tailored letter	1417	Mean, 18.7 SD, 6.2				Post test at 3 month: mean, -2.5 SD, -0.05		0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Fruit consumption (pieces/day)	Control	1410	Mean, 2.7 SD, 1.7				Post test at 3 month mean, -0.2 SD, 0.06		0.01
		Intervention group, receiving one tailored letter	1417	Mean, 2.7 SD, 1.7				Post test at 3 month mean, 0.04 SD, 0.06		0.01
	Vegetable consumption (gm/day)	Control	1410	Mean, 139 SD, 140				Post test at 3 month mean, -10.4		NR
		Intervention group, receiving one tailored letter	1417	Mean, 139 SD 140				Post test at 3 month mean, -0.48		
	Physical activity (action moments/wk)	Control	1410	Mean, 5 SD, 3.6				Post test at 3 month mean, -1.1		
		Intervention group, receiving one tailored letter	1417	Mean, 5 SD, 3.6				Post test at 3 month mean, -0.7		BL, time point 2, Baseline mean and SD are for control and treatment groups together. The final time point mean and SD reflect the change in action moments per day per day (post-test

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
										minus baseline).
Spittaels, 2007[24]	Total MVPA scores=Moderate- to vigorous-intensity physical activity for completers	No Intervention	104	201 (254)				233 (273)	+32	NS
		Website with computer tailored feedback	103	292 (285)				420 (337)	+128	NS
		Website without computer tailored feedback	78	290 (319)				352 (357)	+62	NS
Spittaels, 2007[25]	Increase in total physical activity	Control	141	Mean, 622 SD, 462				6 month: mean, 708 SD, 514		
		On-line tailored PA advice+ stage based reinforcement emails	116	Mean, 696 SD, 510				6 month: mean, 776 SD, 540		0.001
		On-line tailored physical activity advice	122	Mean, 640 SD, 422				6 month: mean, 682 SD, 452		
	Increase in moderate to vigorous physical activity	Control	141	Mean, 376 SD, 325				6 month mean, 428 SD, 374		
		On-line tailored PA advice+	116	Mean, 438 SD, 373				6 month mean, 479 SD, 376		0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		stage based reinforcement emails								
		On-line tailored physical activity advice only	122	Mean, 362 SD, 292				6 month mean, 397 SD, 310		
	Increase in physical activity in leisure time	Control	141	Mean, 151 SD, 152				6 month mean, 185 SD, 161		
		On-line tailored PA advice+ stage based reinforcement emails	116	Mean, 174 SD, 191				6 month mean, 211 SD, 220		.001
		On-line tailored physical activity advice only	122	Mean, 154 SD, 150				6 month mean, 190 SD, 188		
Tate, 2006[26]	Dietary intake (kcal/day)	Control	54	Mean, 1869.7 SD, 778.9	3 month: mean, 1544.2 SD,651.7			6 month: mean, 1603.5 SD, 793.7		
		Tailored Computer-Automated Feedback	40	Mean, 1911 SD, 770.9	3 month: mean,1381.7 SD,448.2			6 month: mean, 1488.7 SD, 580.2		p<0.21 at 3 months and p<0.28 at 6 months
		Human Email Counseling (HC)	52	Mean, 2042.6 SD, 875.6	3 month: mean,1468.2 SD,449.1			6 month: mean, 1484.3 SD, 574.3		p<0.21 at 3 months and p<0.28 at 6 months
	Fat intake (% day)	Control	54	Mean, 38.4, SD, 7.1	3 month: mean,36.0 SD,7.0			6 month mean, 37.3 SD, 6.6		
		Tailored	40	Mean, 37.5	3 month:			6 month		p<0.04 at 3

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Computer-Automated Feedback		SD, 6.1	mean,33.5 SD,4.9			mean, 34 SD, 6.5		months and p<0.004 at 6 months
		Human Email Counseling (HC)	52	Mean,38.8 SD, 6.2	3 month: mean, 32.8 SD,5.0			6 month mean, 33.1 SD,4.9		p<0.04 at 3 months and p<0.004 at 6 months
	Physical activity (kcal/week)	Control	54	Mean, 1188.7 SD, 1286.8	3 month: mean, 1335.8 SD,1540			6 month mean, 1064.4 SD, 1139.5		
		Tailored Computer-Automated Feedback	40	Mean, 1210.9 SD, 1234.9	3 month: mean,1525.1 SD,1368.9			6 month mean, 1335.1 SD, 1410.1		p<0.08 at 3 months and p<0.52 at 6 months
		Human Email Counseling (HC)	52	Mean, 1283.9 SD, 1969.3	3 month: mean, 1537.2 SD,1113			6 month mean, 1377.1 SD, 1163.8		p<0.08 at 3 months and p<0.52 at 6 months
Vandelanotte, 2005[27]	Increase Physical activity	Control	204	Minutes of pa/week mean, 720 SD, 485				6 months: mean, 734 SD, 516		
		Sequential interactive computer tailored intervention	180	Minutes of pa/week mean, 514 SD, 367				6 months: mean, 727 SD, 492		
		Simultaneous interactive computer tailored intervention	189	Minutes of pa/week mean, 532 SD, 519				6 months: mean, 705 SD, 519		
	Decrease fat intake	Control	195	Grams/week: mean, 101 SD, 39				6 months mean, 94 SD, 33		
		Sequential interactive	194	Gram/week: mean, 110				6 months mean, 85		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		computer tailored intervention		SD, 39				SD, 30		
		Simultaneous interactive computer tailored intervention	176	Grams/week: mean, 118 SD, 43				6 months mean, 85 SD, 28		
Verheijden, 2004[28]	Perceived support	Control	73	Mean score, range, 1-7, higher score, better outcome mean, 5.7 SD, 1.2	Change after 4 month mean, -0.08			Change after 8 month: mean, -0.07 SD,		BL, 0.87 time point 2, 0.29 final time point, 0.60
		Web-Based Targeted Nutrition Counseling and Social Support	24	Mean score, range,1-7, higher score, better outcome mean, 5.7 SD, 1.3	Change after 4 month mean, 0.11			Change after 8 month: mean, -0.17 SD,		BL, 0.87 time point 2, 0.29 final time point, 0.60
	Social network	Control	73	Mean score, range,1-7, higher score, better outcome: mean, 3.5 SD, 0.5	Change after 4 month mean, 0.04 SD,			Change after 8 month mean, 0.07 SD,		BL, 0.35 time point 2, 0.21 final time point, 0.49
		Web-Based Targeted Nutrition Counseling and Social Support	24	Mean score, range,1-7, higher score, better outcome: mean, 3.5 SD, 0.5	Change after 4 month mean, -.0.06 SD,			Change after 8 month mean, 0.01 SD,		BL, 0.35 time point 2, 0.21 final time point, 0.49
	BMI (kg/m2)	Control	73	BMI, kg/m2 mean, 29.2	Change after 4 month			Change after 8 month		BL, 0.73 time point 2,

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				SD, 4.5	mean, -0.21 SD,			mean, -0.01 SD,		0.07 final time point, 0.12
		Web-Based Targeted Nutrition Counseling and Social Support	24	BMI, kg/m2 mean, 29.5 SD, 5.2	Change after 4 month mean, 0.08 SD,			Change after 8 month mean, -0.02 SD,		BL, 0.73 time point 2, 0.07 final time point, 0.12
	Systolic blood pressure	Control	73	Systolic blood pressure mean, 136 SD, 18	Change after 4 month mean, -2.1 SD,			Change after 8 month mean, -5.2 SD,		BL, 0.42 time point 2, 0.46, final time point, 0.16
		Web-Based Targeted Nutrition Counseling and Social Support	24	Systolic blood pressure mean, 134 SD, 14	Change after 4 month mean, -0.4			Change after 8 month mean, -1.9 SD,	Time point 2, 0.42 time point 3, 0.46	BL, 0.42 time point 2, 0.46 final time point, 0.16
	Diastolic blood pressure	Control	73	Diastolic blood pressure: mean, 80 SD, 11	Change after 4 month: mean, -1.4 SD,			Change after 8 month: mean, -3.2 SD,		BL, 0.61 time point 2, 0.44 final time point, 0.6
		Web-Based Targeted Nutrition Counseling and Social Support	24	Diastolic blood pressure: mean, 81 SD, 9	Change after 4 month: mean, -0.2 SD,			Change after 8 month: mean, -2.5 SD,		BL, 0.61 time point 2, 0.44 final time point, 0.6
	Total cholesterol	Control	73	Total cholesterol mean, 5.4 SD, 1.2	Change after 4 month mean, -0.06 SD,			Change after 8 month mean, -0.11 SD,		BL, 0.56 time point 2, 0.41 final time

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
										point, 0.79
		Web-Based Targeted Nutrition Counseling and Social Support	24	Total cholesterol mean, 5.5 SD, 0.9	Change after 4 month mean, 0.03 SD,			Change after 8 month mean, -0.08 SD,		BL, 0.56 time point 2, 0.41 final time point, 0.79
Wylie-Rosett, J, 2001[29]	Dietary Intake (Kcal/d)	Work book only	97	NS				-397.9±55.3	NS	NS
		Computer tailored feedback	183	NS				-283±41.8	NS	NS
		Computer tailored feedback plus staff consultation	194	NS				-323.6±43.1	NS	NS
	Exercise (Blocks walked daily)	Work book only	97	NS				5.9±1.10	NS	NS
		Computer tailored feedback	183	NS				5.1±0.79	NS	NS
		Computer tailored feedback plus staff consultation	194	NS				3.9±0.79	NS	NS
	Exercise (min walked	Work book	97	NS				5.10±1.10	NS	NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	continuously)	only								
		Computer tailored feedback	183	NS				5.11±1.13	NS	NS
		Computer tailored feedback plus staff consultation	194	NS				4.96±1.09	NS	NS
	Weight (lb)	Work book only	97	NS				-2.2±1.26	NS	.003
		Computer tailored feedback	183	NS				-4.7±1.02	NS	.003
		computer tailored feedback plus staff consultation	194	NS				-7.4±1.15	NS	.003
	BMI	Work book only	97	NS				-0.4±0.21	NS	.003
		Computer tailored feedback	183	NS				-0.8±0.17	NS	.003
		computer tailored	194	NS				-1.2±0.19	NS	.003

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		feedback plus staff consultation								
Eating disorder										
Winzelberg, 2000[30]	Body shape measure	Control	20	Mean, 104 SD, 36	Post Intervention mean, 107 SD, 39			3months: mean, 101 SD, 44		
		Intervention group	24	Mean, 118 SD, 34	Post Intervention mean, 104 SD, 33			3months: mean, 93 SD, 25		p<0.01
	EDI-drive for thinness	Control	20	Mean, 24 SD, 8	Post Intervention mean, 26 SD, 9.4			3months mean, 24.8 SD, 9.9		
		Intervention	24	Mean, 27.6 SD, 9.7	Post Intervention mean, 25.1 SD, 8.8			3months mean, 23.3 SD, 9.1		p<.05
	EDI-Bulimia	Control	20	Mean, 14 SD, 4.9	Post Intervention mean, 14.8 SD, 6			3months mean, 13.8 SD, 6.7		
		Intervention	24	Mean, 15.9 SD, 8.4	Post Intervention mean, 14.1 SD, 7			3months mean, 12.6 SD, 5.7		NS
	EDE-Q Weight Concerns	Control	20	Mean, 2.5 SD, 1.3	Post Intervention mean, 2.7 SD, 1.6			3months mean, 2.5 SD, 1.6		
		Intervention	24	Mean, 2.8 SD, 1.4	Post Intervention mean,2.5 SD,1.3			3months mean, median, 2.3 range, SD, 1.2		NS

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	EDE-Q Shape Concern	Control	20	Mean, 2.7 SD, 1.5	Post Intervention: mean, 3 SD, 1.6			3months: mean, 2.6 SD, 1.7		
		Intervention	24	Mean, 3.3 SD, 1.4	Post Intervention: mean, 2.8 SD, 1.3			3months: mean, 2.5 SD, 1.3		NS
Nutrition intervention										
Bruge, 1996[31]	Fat (points per day)	Control	169	Fat points/ day mean, 28 SD, 5.3				3 weeks after receiving nutrition letter: mean, 27.2 SD, 5.5		p<0.05 for diff between baseline and post test
		Tailored feedback	178	Fat points/ day mean, 29 SD, 5				3 weeks after receiving nutrition letter: mean, 26.9 SD, 4.9		p<.01 between baseline and post-test; p<.01 for diff between tailored and control group
	Vegetables (servings per day)	Control	169	Servings/day: mean, 1 SD, 0.31				3 weeks after receiving nutrition letter mean, 1.06 SD, 0.37		p<0.05 for diff between baseline and post test
		Tailored feedback	178	Mean, 1.03 SD, 0.36				3 weeks after receiving nutrition letter mean, 1.07 SD, 0.36		NS
	Fruit (servings per day)	Control	169	Servings/ day mean, 1.61 SD, 1.14				3 weeks after receiving nutrition letter mean, 1.57 SD, 1.19		None

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
			178	Servings/ day mean, 1.49 SD, 1				3 weeks after receiving nutrition letter mean, 1.57 SD, 0.96		None
	Positive attitude to increasing vegetables and fruits	Control	169					3 weeks after receiving dietary information , .11		
		Tailored feedback	178					3 weeks after receiving dietary information, .39		p<.01 for diff between tailored and control group
Silk, 2008[32]	Likeability of learning materials (hypothesis 1) [authors identify 3 subscales -- attention, understanding, intention]	Pamphlet	57	Likeability was measured using 9 items on a 5-point Likert-type scale. mean, no measure SD,				10-12days: mean, 3.99 SD, 0.66		p<0.05
		Website	51	Likeability was measured using 9 items on a 5-point Likert-type scale.				10-12days: mean, 4.29 SD, 0.45		p<0.05
		Video game	47	Likeability was measured using 9 items				10-12days: mean, 4.06 SD, 0.66		p<0.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				on a 5-point Likert-type scale.						
	Nutrition literacy scores (hypothesis 2) [authors identify 6 subscales: My Pyramid, Food groups, Food servings, Serving size, Food safety, Food cost]	Pamphlet	57	Knowledge questions were based on the EFNEP Evaluation and Reporting System developed by USDA for EFNEP at the federal level (33 items)				10-12days mean, 24.75 SD, 4.76		p<.05
		Website	51	Knowledge questions were based on the EFNEP Evaluation and Reporting System developed by USDA for EFNEP at the federal level (33 items)				10-12days mean, 25.59 SD, 3.56		p<.05
		Video game	47	Knowledge questions were based on the EFNEP				10-12days mean, 23.17 SD, 4.95		p<.05

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				Evaluation and Reporting System developed by USDA for EFNEP at the federal level (33 (Items)						
Overweight and binge eating										
Jones, 2008[33]	BMI (kg/m^2)	Control	43	Mean, 30.64 SD, 5.97	Post Treatment mean, 29.99 SD, 5.92			16weeks: mean, 31.17 SD, 6.33		
		SB2-BED	44	Mean, 30.58 SD, 4.9	Post Treatment mean, 28.76 SD, 4.72			16weeks: mean, 29.76 SD, 5.34		p<.001
	BMIzScore	Control	43	Mean, 1.79 SD, 0.51	Post Treatment mean, 1.68 SD, 0.54			16weeks mean, 1.76 SD, 0.57		
		SB2-BED	44	Mean, 1.81 SD, 0.47	Post Treatment mean, 1.56 SD, 0.59			16weeks mean, 1.6 SD, 0.62		p<.001
	Binge eating (OBEs and SBEs)	Control	43	No. of episodes mean, 8.42 SD, 18.74	Post Treatment mean, 6.98 SD, 17.55			16weeks mean, 2.74 SD, 8.6		
		SB2-BED	44	No. of episodes mean, 15.16 SD, 20.78	Post Treatment mean, 0.95 SD, 3.88			16weeks mean, 2.29 SD, 7.67		p<.05
	Binge eating (OOEs)	Control	43	No. of episodes mean, 7.53	Post Treatment mean, 2.34			16weeks mean, 1.07 SD, 2.80		

Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				SD, 14.28	SD, 5.25					
		SB2-BED	44	No. of episodes mean, 7.89 SD, 14.28	Post Treatment mean, 2.05 SD, 6.98			16weeks mean, 2.16 SD, 9.33		NS
	Weight and shape concerns	Control	43	Score mean, 1.35 SD, 0.92	Post Treatment mean, 1.27 SD, 0.78			16weeks mean, 1.14 SD, 0.72		
		SB2-BED	44	Score: mean, 1.3 SD, 0.80	Post Treatment mean,1.05 SD, 0.64			16weeks mean, 0.81 SD, 0.67		p<0.05
	Dietary fat intake	Control	43	Score: mean, 22.06 SD, 10.73	Post Treatment: mean, 20.05 SD, 7.49			16weeks: mean, 17.33 SD, 7.57		
		SB2-BED	44	Score: mean, 24.54 SD, 8.63	Post Treatment: mean, 18.88 SD, 6.56			16weeks: mean, 18.25 SD, 6.95		NS
	Depressed mood	Control	43	Score: mean, 15.63 SD, 10.33	Post Treatment mean, 12.57 SD, 10.10			16weeks mean, 10.49 SD, 11.21		
		SB2-BED	44	Score: mean, 14.26 SD, 9.43	Post Treatment mean, 9.63 SD, 8.30			16weeks mean, 12.42 SD, 11.59		NS

NS = Not Significant, BL = baseline, SD =Standard Deviation, BMI= Body Mass Index

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Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

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Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

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Evidence Table 10. All outcomes KQ1b, impact of CHI application on intermediate outcomes (continued)

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Evidence table 11. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Alcohol Abuse									
Cunningham, 2005[1]	Individuals interested in their own health care	Interactive consumer website,	Home/ residence	2 yr			After intervention, did not receive additional self-help information by postal mail	After intervention, received additional self-help materials by postal mail	**1.5**
Hester, 2005[2]	Individuals interested in their own health care	Personalized health risk assessment tool	Home/ residence	NS	≤21 yr old, Minimum score of 8 on Alcohol Use Disorders Inventory Test, At least 8th grade reading level, Available and willing significant other to corroborate self-report of drinking	Current alcohol treatment, Severe uncontrolled thought disorder, Presence of a medical condition for which alcohol use would be contraindicated	Delayed treatment		**2**
Kypri , 1999[3]	Individuals interested in their own health care	Personalized health risk assessment tool	Home/ residence	2002/ NS	17-26 yr old, Score of 8 or more on the Alcohol Use Disorders Identification Test, Consuming more than 4/6 standard drinks (F/M) on one more occasions in the preceding 4 weeks		Leaflet on health effects of alcohol	Web-based assessment and personalized feedback on their drinking	**4**
Lieberman, 2006[4]	Individuals interested in their own health care	Interactive consumer website	NS	18 months			Text website	Multimedia website	**-0.5**
Neighbors,	Individuals interested	Interactive consumer	Remote location:	NS	At least one heavy drinking episode at		No intervention	Personalized normative	**1**

Evidence table 11. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
2004[5]	in their own health care	website	"Controlled setting on campus"		one sitting in the previous month			feedback	
Riper, 2008[6]	Adult alcohol drinkers	Web-based self help intervention	Data from other RCT	NS	Men who were drinking more than 21 standard units per week, women who were drinking over 14 units per week, age 18-65, access to the internet, no previous professional help for problem drinking	Insufficient alcohol use, above age 65, alcohol-related medication, professional help, in other alcohol study; incomplete data, non-response, in same household	Control condition (an online psycho educational brochure on alcohol use that could be read in 10 minutes)	The experimental condition participants access to web-based self help intervention without therapist	
Riper, 2008[7]	Individuals interested in their own health care	Interactive consumer website	NS	Yr 2003	18–65 yr, Men were selected who were drinking either more than 21 units per week (excessive drinking) or 6 or more units at least 1 day per week for the past 3 months (hazardous drinking). Women were included if they drank over 14 units a week or 4 or more units at least 1 day a week for the past 3months. Access to the internet. Not receiving professional help for problem drinking at		Control condition	Experimental condition	**2**

Evidence table 11. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					the start of the study.				

Yr = year, NS= Not Specified

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Evidence Table 12. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in alcohol abuse

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n (%)	SES	Gender, n (%)	Marital Status	Other characteristics
alcohol abuse									
Cunningham , 2005[1]	After intervention, did not receive additional self-help information by postal mail	Baseline characteristics not reported							
	Internet plus book								
Hester , 2005[2]	Delayed treatment	Baseline characteristics not reported							
	DCU/ Immediate treatment group								
Kypri , 1999[3]	Leaflet on health effects of alcohol	Mean, 20.4 SD, 1.8	NS	NS	NS	NR			AUDIT score, mean, 16.6 SD, 6
	Web-based assessment and personalized feedback on their drinking	Mean, 19.9 SD, 1.4	NS	NS	NS	NR			AUDIT score, mean, 16.6 SD, 6
Lieberman, 2006[4]	Text website	Mean, 37.2 SD, 11.8	White non Hispanic, (87) Black non-Hispanic, (1.7) Latino/Hispanic, (7) API, (2.3) AIAN , (2.3) Other, 6.5	NS	NS	NR	F, (37.2)		Age of first drink, mean, 16.4 SD, 3.9 Drinks per week, mean, 34.3 SD, 31.6 AUDIT score, mean, 17 SD, 8.8
	Multimedia website	Mean, 36 SD, 12.1	White non-Hispanic, (86.8) Black non-	NS	NS	NR	F, (31)		Age of first drink, mean, 17.4 SD, 5.5

Evidence Table 12. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in alcohol abuse (continued)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n (%)	SES	Gender, n (%)	Marital Status	Other characteristics
			Hispanic, (1.6) Latino/Hispanic, (4.1) API, (4.1) AIAN, (2.5) No response, (5.0)						Drinks per week, mean, 32.4 SD, 50.8 AUDIT score, mean, 15.7 SD, 8.4
Neighbors , 2004[5]	No intervention	NS	NS	NS	NS	NR	M, 54 F, 72		
	Intervention (personalized normative feedback)	NS	NS	NS	NS	NR	M, 50 F, 76		
Riper, 2008[6]	Control: alcohol information brochure	Control: mean 46.2 SD,9.2	NS	Paid employment control: 96 (73.3)	Control low 38 (29.0) High 93 (71.0)	NS	F 64(48.9)		High Internet competence100 (76.3) High treatment expectancy 66 (49.6) Weekly alcohol intake 43.5 (22.3) Moderate problem drinking74 (56.5) Sever problem drinking 57 (43.5) Prior professional help for problem drinking 15 (11.5) Contemplation stage 115 (87.8) Alcohol moderation as goal 123 (93.9) Living with a partner 71 (54.2)
	Intervention:	Experiment	NS	Paid	Low 41 (31.5)	NS	F 64(49.2)		High Internet

Evidence Table 12. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in alcohol abuse (continued)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n (%)	SES	Gender, n (%)	Marital Status	Other characteristics
	drinking less (free-access, Web-based self-help intervention without therapist guidance.	al : mean 45.9 SD,8.9		employ ment control: 96 (73.3)	High 89 (68.5)				competence 104 (80.0) High treatment expectancy 61 (46.9) Weekly alcohol intake 43.7 (21.0) Moderate problem drinking 74 (56.9) Sever problem drinking 56 (43.1) Prior professional help for problem drinking18 (13.8) Contemplation stage 116 (89.2) Alcohol moderation as goal 120 (92.3) Living with a partner 71 (54.2) 75 (57.7)
Riper, 2008[7]	Control condition (PBA)	Mean, 46.2 SD, 9.2	NS	NS	Unskilled, 38 (29.0) Vocational, 55 (42.0) Academic, 38 (29.0)	NR	F, 64 (48.9)		Problem drinking, 131 (100) Excessive drinking, 128 (97.7)
	Experimental condition (DL)	Mean, 45.9 SD, 8.9	NS	NS	Unskilled, 41 (31.5) Vocational, 52 (40.0) Academic, 37 (28.5)	NR	F, 64 (49.2)		Problem drinking, 130 (100) Excessive drinking, 125 (96.2)

NR= Not Reported, NS= Not specified, SD= Standard Deviation, SES= Socioeconomic Status, AIAN= American Indian/Alaska Native, API = Asian/Pacific Islander
F = female, M = Male

Evidence Table 12. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in alcohol abuse (continued)

Reference List

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2 Hester RK, Squires DD, Delaney HD. The Drinker's Check-up: 12-month outcomes of a controlled clinical trial of a stand-alone software program for problem drinkers. J Subst Abuse Treat 2005; 28(2):159-69.

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Evidence table 13. All outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at final time point	Ratios at time points	Significance
Alcohol Abuse									
Cunningham, 2005[1]	Mean drinks per typical week	Internet alone	29	Mean, 21 SD, 16.6			3 months mean, 17.4 SD, 17.7		
		Internet plus self help book	19	Mean, 29.1 SD, 23.2			3 months mean, 18.4 SD, 25.8		p<0.05
	Mean AUDIT test score	Internet alone	29	Mean, 15.6 SD, 8.9			3 months mean, 12.6 SD, 7.8		
		Internet plus book	19	Mean, 19.8 SD, 10.3			3 months mean, 11.9 SD, 9.9		p<0.05
	Mean # of alcohol consequences	Internet alone	29	Mean, 2.4 SD, 1.9			3 months Mean, 1.9 SD, 1.6		
		Internet plus book	19	Mean, 2.9 SD, 1.8			3 months mean, 1.5 SD, 1.6		p<0.05
Hester , 2005[2]	Average drinks per day	DCU/4 week Delayed treatment group	21	Mean, 5.64 SD, 4.66	4 weeks mean, 4.13 SD, 2.61	8 weeks mean, 3.56 SD, 2.8	12 months median, 2.5 SD, 2.58		P 0.008
		DCU/ Immediate treatment group	29	Mean, 5.69 SD, 5.44	4 weeks mean, 2.71 SD, 2.84	8 weeks mean, 2.31 SD, 2.23	12 months mean, 2.07 SD, 2.19		P 0.002
	Drinks per drinking day	DCU/4 week Delayed treatment group	21	Mean, 5.57 SD, 2.55	4 weeks mean, 5.66 SD, 2.6	8 weeks mean, 4.86 SD, 2.4	12 months mean, 4.14 SD, 2.72		NR
		DCU/Immediate treatment group	29	Mean, 8.84 SD, 6.36	4 weeks mean, 5.64 SD, 4.09	8 weeks mean, 6.66 SD, 6.12	12 months mean, 5.5 SD, 4.63		NR
	Average peak BAC	DCU/4 week Delayed treatment group	21	Mean, 0.161 SD, 0.132	4 weeks mean, 0.149 SD, 0.106	8 weeks mean, 0.1 SD, 0.079	12 months mean, 0.073 SD, 0.063		P 0.003
		DCU/	29	Mean, 0.174	4 weeks	8 weeks	12 months		P 0.001

Evidence table 13. All outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at final time point	Ratios at time points	Significance
		Immediate treatment group		SD, 0.107	mean, 0.096 SD, 0.087	mean, 0.118 SD, 0.126	mean, 0.078 SD, 0.058		
Kypri , 1999[3]	Drinking frequency	Control	47	N of drinking days in last 2 weeks	6 weeks median, 4 range, 0-13		6 months: median, 4 range, 0-14		
		Computerized assessment and behavioral intervention	47	N of drinking days in last 2 weeks	6 weeks median, 3 range, 0-9		6 months median, 3 range, 0-8		NR
Lieberman, 2006[4]	Number of modules completed	Control	NS	Number of modules (1-4)			After completing each of 4 modules mean, 3.69		
		Multimedia	NS				After completing each of 4 modules mean, 3.9		0.01
	Perceived helpfulness of the modules	Control		Helpfulness scores (rating the 4 modules)			After completing each of 4 modules mean, 12.1		
		Multimedia		Helpfulness scores (rating the 4 modules)			After completing each of 4 modules mean, 12.2		0.74
Neighbors , 2004[5]	Effect size in perceived norms	Control	126	Effect Size	3 months mean, .17		6 months mean, .2		
		Computerized normative feedback	126	Effect size	3 months mean, .46		6 months mean, .48		NR
	Effect size in reduction in alcohol	Control	126	Effect Size	3 months mean, .05		6 months mean, .03		
		Computerized	126	Effect Size	3 months		6 months		p<0.01

Evidence table 13. All outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at final time point	Ratios at time points	Significance
	consumption	normative feedback			mean, .24		mean, .22		
	Effect size in reduction in alcohol consumption	Control	126	Effect Size	3 months		6 months		
		Computerized normative feedback	126	Effect Size	3 months		6 months		
Riper, 2008[6]	Mean alcohol consumption difference between baseline and 6months and 12month follow up period.	Control: alcohol information brochure	131	Follow up at 6 month n 81 (61.8)			Follow up at 12 month n 92(70.2)	NS	
				Loss to follow-up at 6 month n 50 (38.2)			Loss to follow up at 12 month n 39(29.8)		
		Intervention: drinking less(free-access, Web-based self-help intervention without therapist	130	Follow up at 6 month n 70 (53.8)			Follow up at 12 month n 71(54.6)	NS	Females displayed modest predictive power at 6 month P .05

Evidence table 13. All outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at final time point	Ratios at time points	Significance
		guidance.		Loss to follow-up at 6 month n 60 (46.2)			Loss to follow up at 12 month n 59(45.4)		at 12 month P .045 With higher levels of education modest predictive power P .01
Riper, 2008[7]	Weekly alcohol consumption (second outcomes)	Control	81	Weekly alcohol intake in std units mean, 43.5 SD, 22.3			6months mean, 39.2	Difference in means,10.6 (95) (CI,4.33-16.94)	P 0.001
		Intervention condition DL	70	Weekly alcohol intake in std units mean, 43.7 SD, 21			6months mean, 28.7		

SD = Standard deviation, BL = baseline, CI = confidence interval, DCU = Drinker's Check-up, NR = Not reported

Evidence table 13. All outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

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Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Smoking									
An, 2008[1]	Individuals interested in their own health care	Interactive consumer website	University of Minnesota internet health screening	2004	≥18 yr, Smoked cigarettes in the past 30 days, indicated that they intended to be in school for the next two semesters		Control group	RealU intervention group	**2**
Brendryen, 2008 [2]	Smokers in Norway	Internet and cell phone	Online	2006 / February 2006 to March, 2007	18 years or older, Willing to quit on March 6, 2006, currently smoking five cigarettes or more a day, willing to quit without using NRT, owning a mobile phone, owning a Norwegian-registered phone number and postal address, and having daily access to the Internet and email.	NR	Self-help booklet	Happy Ending program (HE)	
Curry, 1995 [3]	Random sample of group health cooperative enrollees	Computer generated tailored feedback	Residence	NS / 21 months	Self-identified smoker		No treatment	Booklet (self-help booklet) Feedback (self-help booklet + personalized feedback) Phone (Booklet + Feedback + Counselor phone call)	
Dijkstra, 2005 [4]	Students who are smokers	Information	Laboratory at university	NR / One session	Student who is a smoker	NR	Standard information	Personalization	

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
								Adaptation Feedback	
Hang, 2009 [5]	Daily smoker	SMS messaging	University	2007 / August to December	Daily smoker, use SMS (text messaging) at least weekly	NR	No intervention	1 SMS per week 3 SMS per week	
Japuntich, 2006[6]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Recruitment took place from October 2001 to July 2002.	≥18 yr, Smoke at least 10 cigarettes per day, Have a traditional telephone line, Literate in English	Current depression, current use of psychiatric medication, medical conditions contraindicating bupropion SR (e.g., history of seizure disorder), current use of a smoking cessation product or treatment, Being pregnant or likely to become pregnant during the treatment phase of the study	bupropion plus counseling alone	CHESS intervention with bupropion	**2**
Pattens, 2006[7]	Individuals interested in their own health care, adolescent smokers	Interactive consumer website	Clinician office	March 2000 to November 2003	11-18 yr , gave written consent or received consent from parent/guardian, 18 yr, Smoked 10 or more cigarettes in last 30 days, Cigarettes were primary tobacco product used, Willing and able to	Homeless, Alcohol or drug abuse in the last 3 months	Brief office intervention	Stomp Out Smokes	**1**

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					complete treatment assessment visits				
Prochaska, 1993[8]	Volunteer smokers in Rhode Island	Tailored manuals and computer reports	Residence	NS / 18 months	Smokers who responded to advertisement		ALA + (standard self-help manual)	TTT (individualized manual) ITT (interactive computer reports) PITT (personalized counselor calls + ITT TTT)	
Prokhorov, 2008[9]	Students in culturally diverse high schools	Interactive CD-ROM	High school	NS / 4 years	10th grade Speaks, reads and writes English		Clearing the Air self-help booklet	ASPIRE Interactive CD-ROM	
Schiffman, 2000[10]	Individuals interested in their own health care	Computer tailored mailings via computer assisted automated telephone interviews	Home/ residence	1996/ NS	≥18 yr, Current cigarette smoker, Purchased 2 or 4 mg nicotine prolacrilex gum, Were attempting to quit smoking cigarettes, Target quit date was within 7 days of enrollment, Agreed to be contacted at follow up at 6 and 12 weeks		User Guide only	Committed Quitter Program	**2.5**
Schumann, 2006[11]	Smokers drawn from representative population	Computer generated tailored feedback	Residence	2002 – 2004 / 24 months	Provided written informed consent and said yes to a question about currently smoking		No intervention	Feedback letters	

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	of 20-79 year olds living in Western Pomeania, GERMANY								
Schumann, 2008[12]	Individuals interested in their own health care	Letters entered into a system with PHI and generating tailored information for the consumer	NS	Started in April 2002	20-79 yr, Currently smoke cigarettes, Currently smoke cigars or cigarillos, Currently a pipe smoker		Assessment-only control group	Computer-tailored TTM-based intervention group	**2.5**
Severson, 2008[13]	Individuals interested in their own health care	Interactive consumer website	Online	NS	At least 18 yr old, Male, A resident of the US or Canada, E-mail address checked at least weekly, any ST user (defined as having used ST for at least 1 year and used at least at in a week), and willing to provide his or her name, mailing address, and phone number		Text-based website (Basic Condition)	Tailored web-based intervention (Enhanced Condition)	**2**
Strecher, 1994 [14] Study 1	Adult cigarette smokers in North Carolina	Computer generated tailored feedback	Residence	Study 1: 1990 / 4 months	40-65 years old, seen by family physician in last 6 months, telephone available and working, not sharing household with other		Standardized generic letter	Tailored letter from individual's physician	

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					subject, mentally and physically capable of being interviewed.				
Strecher, 2005 [15]	Callers to NCI CIS call centers				18 yrs or older, English as a primary language, smoked at least five cigarettes per day, interested in quitting, not currently in another cessation program, not currently undergoing or planning cancer treatment				
Strecher, 2005[16]	Individuals interested in their own health care	Interactive consumer website	NS		≥18 yr, Target quit date within 7 days, Valid email address, Internet access, Smoke more than 10 cig/day Purchased NiQuitin CQ 21 mg, Agreed to contact for FU email and questionnaire at 6 and 12 weeks				**-1**
Strecher, 2006[17]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	≥ 18 yr, Smokers in the United Kingdom and Republic of Ireland who purchased NiQuitin CQ 21-mg patch and connected to a Web site to enroll for free behavioral support		Non-tailored Web-based cessation material	Tailored web-based smoking cessation (CQ PLAN)	**0.5**

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					materials, Had a target quit date that was within seven days from the enrollment date, Provided a valid e-mail address and had Internet access for the duration of the study, Were attempting to quit smoking cigarettes (i.e., not smokeless tobacco), Had been smoking more than 10 cigarettes per day, had purchased NiQuitin CQ 21 mg (21 mg of nicotine; indicated for those who smoke at least 10 cigarettes per day), Agreed to be contacted for follow-up e-mail and Web-based questionnaires at 6 and 12 weeks				
Strecher, 2008[18]	Individuals interested in their own health care	Interactive consumer website	NS	September 2004	21–70 yr, had smoked at least 100 cigarettes in his or her lifetime, Currently smoked at least 10 cigarettes/ day, and had smoked in the past 7 days, was seriously	Medical contraindications for NRT, Not currently enrolled in the HMO, Lack of adequate Internet/e-mail access, Already enrolled in	Low-tailored	High-tailored	**0**

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					considering quitting in the next 30 days, was a member of either Group Health or HFHS, had home or work access to the Internet and an e-mail account that he or she used at least twice weekly, was not currently enrolled in another formal smoking-cessation program or was not currently using pharmacotherapy for smoking cessation, had no medical contraindications for NRT	another smoking-cessation program, Medical contraindications for NRT, Currently using pharmacotherapy to quit smoking			
Swartz, 2006[19]	Individuals interested in their own health care	Interactive consumer website	Home/ residence Remote: work site	NS	>18 yr, Daily smoker, Wish to quit in the next 30 days, Ability to access website	<18 yr	90 day wait period for access to website	Access to website	**1**

NS = not specified, yr = year, NRT = nicotine replacement therapy, CHESS = Comprehensive Health Enhancement Support System

Evidence Table 14. Description of RCTs addressing impact of CHI applications on intermediate outcomes in smoking (KQ1b) (continued)

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Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
Smoking									
An, 2008[1]	Control group	Mean, 19.8 SD, 1.6	Black non-Hispanic, 24(9.2)	NS	Yr in school: Freshman, 80 (30.8) Sophomore, 64 (24.6) Junior, 67 (25.8) Senior, 49(18.9)	NR	F,196 (75.4)		Employment: Not working, 84 (32.3) Part-time, 159 (61.2) Full-time, 17 (6.5) Internet use: 1–5 days/week, 26 (10.0) 6–7 days/week, 233 (90.0)
	RealU intervention group	Mean, 20.1 SD, 1.6	Black non-Hispanic, 20(7.8)	NS	Yr in school: Freshman,67 (26.1) Sophomore, 63 (24.5) Junior, 68 (26.5) Senior, 59 (23.0)	NR	F,181 (70.4)		Employment: Not working, 81 (31.6) Part-time, 161 (62.9) Full-time, 14 (5.5) Internet use: 1–5 days/week, 32 (12.5) 6–7 days/week, 225 (87.6)
Brendryen, 2008 [2]	Self-help booklet	Mean, 39.5 SD, 11.0			Has college degree, 70(49)		F, 72(50)		Cigarettes smoked per day Mean 16.6 SD 7.2 Self-efficacy Mean 5.1 SD 1.4
	Happy Ending program (HE)	Mean, 39.7 SD, 10.8			Has college degree, 76(52)		F, 73(50)		Cigarettes smoked per day

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
									Mean 17.6 SD 7.0 Self-efficacy Mean 5.1 SD 1.3
Curry, 1995 [3]	Control	Mean, 41.2 SD, 11.9	White, 285(87)	> $25,000, 230(70)	Finished high school, 302(92)		F, 157(48)		No. cigarettes / day Mean, 17.1, SD 10.3 Stage of readiness to quit smoking Precontemplation, 121(37) Contemplation, 134(41) Preparation, 72(22)
	Booklet	Mean, 41.3 SD, 11.5	White, 294(89)	> $25,000, 251(76)	Finished high school, 300(91)		F, 175(53)		No. cigarettes / day Mean, 17.2, SD 10.5 Stage of readiness to quit smoking Precontemplation, 125(38) Contemplation, 132(40) Preparation, 69(21)

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
	Feedback	Mean, 40.9 SD, 11.1	White, 283(86)	> $25,000, 240(73)	Finished high school, 303(92)		F, 174(53)		No. cigarettes / day Mean, 17.7, SD 11.1 Stage of readiness to quit smoking Precontemplation, 132(40) Contemplation, 135(41) Preparation, 63(19)
	Phone	Mean, 40.8 SD, 11.9	White, 129(86)	> $25,000, 112(75)	Finished high school, 134(89)		F, 88(59)		No. cigarettes / day Mean, 17.1, SD 10.1 Stage of readiness to quit smoking Precontemplation, 65(43) Contemplation, 65(43) Preparation, 22(15)
Dijkstra, 2005 [4]	Standard information	NR	NR	NR	NR	NR	NR		NR
	Personalization								
	Adaptation								
	Feedback								
Hang, 2009 [5]	No Intervention	Mean, 25.4 SD, 4.9	NR	NR	> 10 years, 63(98)	NR	F, 40(63)		Living in a stable partnership, 37(58) Self-efficacy (1-5)

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
									Mean 2.7 SD 0.7
	1 SMS per week	Mean, 25.2 SD, 4.8			> 10 years, 46(92)		F, 28(56)		Living in a stable partnership, 26(52) Self-efficacy (1-5) Mean 2.7 SD 0.6
	3 SMS per week	Mean, 24.3 SD, 3.8			> 10 years, 54(90)		F, 31(52)		Living in a stable partnership, 25(42) Self-efficacy (1-5) Mean 2.8 SD 0.7
Japuntich, 2006[6]	Bupropion plus Counseling alone	Mean, 41 SD, 11.8	White non-Hispanic, (82.6)	NS	<high school4 (2.8), High school/GED, 40 (27.8) Some college/tech school, 68 (47.2) College/graduate school, 31(21.5)	NR	F, (54.9)		Cigarettes per day: mean, 22.1 SD, 10.2 FTND Test for Nicotine Dependence: mean, 5.5 SD, 4.4 CES-D for Depression: mean, 5.5 SD, 4.4
	With CHESS SCRP	Mean, 40.6 SD, 12.4	White non-Hispanic, (75.4)	NS	<High school, 5 (3.6) High school/GED, 41 (29.5) Some college/tech school, 72 (51.8) College/graduate	NR	F, (55.0)		Cigarettes per day: mean, 21.1 SD, 9.5 FTND Test for nicotine dependence: mean, 5.4 SD, 2.1

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
					school, 21 (15.1)				CES-D for depression: mean, 5.2, SD, 4.7
Pattens, 2006[7]	BOI	Mean, 15.8 SD, 1.4	White non-Hispanic, (86)	NS	6th-8th grade, (9) 9th-11th grade, (79) >12th grade, (13)	NR	F, (49)		Literacy--"easy to read English": (81) Use of internet: little to no use (12) some use (41) a lot of use (48) Computer : at home (77) internet access (79)
	SOS	Mean, 15.7 SD, 1.3	White non-Hispanic, (90)	NS	6th-8th grade, (16) 9th-11th grade, (71) >12th grade, (13)	NR	F, (50)		Literacy--easy to read English: (86) Use of internet: little to no use (14) some use (33) a lot of use (53) Computer: in home (70) internet access (78)
Prochaska, 1993 [8]	Characteristics not reported by subgroup	NR	NR	NR	NR	NR	NR		
Prokhorov, 2008 [9]	Clearing the Air self-help booklet	NR	NR	NR	NR	NR	NR		Among nonsmokers, NonHispanic 291(58.1)
	ASPIRE CD-ROM								Among nonsmokers, NonHispanic 244(42.6)
Schiffman, 2000[10]	User Guide only	Mean, 41.7 SD, 13	NS	Gross House Hold Income. USD mean, 38,000	Mean, 13.5 yr SD, 2.1	NR	F, (54.9)		Previous cessation and nicotine replacement therapy experience : Previous quit attempt, (91.6) Prior nicotine patch

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
				SD, 22,300					use, (38.7) Prior nicotine gum use, (20.0) Smoking history (mean/SD): Cigarettes per day: 26.9/12.2 Yr of smoking: 23.1/12.6 Time of first cigarette (minutes): 14.6/31.7 No. of lifetime cessation attempts: 4.5/7.3 Initial motivation and confidence (mean/SD) (range, 1-5): Level of motivation: 4.3/0.7 Confidence of success: 3.9/1.0
	CQP	Mean, 41 SD, 12.7	NS	Gross House Hold Income, USD mean, 39800 SD, 22300	Mean, 13.6 SD, 2.2	NR	F, (53.4)		Previous cessation and nicotine replacement therapy experience : Previous quit attempt, (91.8) Prior nicotine patch use, (34.9) Prior nicotine gum use,(20.0) Smoking history (mean/SD): Cigarettes per day: 26.1/12.1 Yr of smoking: 22.3/12.4 Time of first cigarette (minutes): 16.8/27.1 No. of lifetime

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
									cessation attempts: 5.5/17.7 Initial motivation and confidence (mean/SD) (range, 1-5): Level of motivation: 4.3/0.8 Confidence of success: 4.0/1.0
	Committed Quitter Program + Call	Mean, 41.7 SD, 12.9	NS	Gross House Hold Income, USD mean, 39,100 SD, 22,200	Mean, 13.6 SD, 2.1	NR	F, (54.3)		replacement therapy experience: Previous quit attempt, (90.9) Prior nicotine patch use, (35.1) Prior nicotine gum use, (20.2) Smoking history (mean/SD): Cigarettes per day: 26.0/12.1 Yr of smoking: 22.7/12.5 Time of first cigarette (minutes): 14.1/22.8 No. of lifetime cessation attempts: 5.8/18.7 Initial motivation and confidence (mean/SD) (range, 1-5): Level of motivation: 4.3/0.8 Confidence of success: 4.0/1.0
Schumann, 2006 [11]	Characteristics not reported by subgroup								

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
Schumann, 2008[12]	Assessment-only control group	Mean, 44.2 SD, 13.2	NS	NS	<10 yr, 81 (26.2) 10 yr, 154 (49.8) >10 yr, 62 (20.1)	NR			Self-reported health status, score 0–100: mean, 74.2 SD, 17.2 Daily cigarette smoking: 245 (79.3) Cigarettes per day: mean, 15.4 SD, 8.9 Intention to quit within the next 6 months: 79 (32.2)
	Computer-tailored TTM-based intervention group	Mean, 44.8 SD, 14.6	NS	NS	<10 yr, 77 (25.5) 10 yr, 156 (51.7) >10 yr, 54 (17.9)	NR			Self-reported health status, score 0–100: mean, 75.7 SD, 15.4 Daily cigarette smoking: 240 (79.5) Cigarettes per day: mean, 15 SD, 7.2 Intention to quit within the next 6 months: 48 (20.0)
Severson, 2008[13]	Text-based website (Basic Condition)	Mean, 36.9 SD, 9.6	White non-Hispanic, 1234(97.7) Black non-Hispanic, 15(1.2) Latino/Hispanic, 14(1.1) API, 4(0.3) AIAN, 17(1.3)	NS	<High school, 38(3.0) High school, 199(15.8) College, 548(43.4) >College 478(37.8)	NR			Self-efficacy: mean, 2.4 SD, 1 Readiness to quit: mean, 8.1 SD, 1.8 Currently smoking: 67 (5.3) Rural: 459 (36.6)
Strecher,	Characteristics not reported by								

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
1994 [14] Study 1	subgroup								
Strecher, 2005 [15]	Characteristics not reported by subgroup								
Strecher, 2005[16]	Control	Baseline characteristics not reported							
	Tailored intervention								
Strecher, 2006[17]	Non-tailored web-based cessation material	Baseline characteristics not reported							
Strecher, 2008[18]	Low-tailored	Baseline characteristics not reported							
	High tailored								
	Tailored Web-based intervention (Enhanced Condition)	Mean, 36.7 SD, 9.7	White non-Hispanic, 1228(97.5) Black non-Hispanic, 12(1) Latino/Hispanic, 17(1.3) API, 5(0.4) AIAN, 24(1.9)	NS	<High school, 28(2.2) High school, 208(16.5) College, 542(43.0) >College, 482(38.3)	NR			Self-efficacy: mean, 2.4 SD, 1 Readiness to quit: mean, 8.2 SD, 1.9 Currently smoking: 43 (3.4) Rural: 447 (35.7)
	CQPLAN								
Swartz, 2006[19]	90 day wait period for access to website	Range, 18 to >70	White non-Hispanic, 152(84.4) Black non-Hispanic, 9(5) Latino/Hispanic, 7(3.9) AIAN, 5(2.8) Other, (1.7)	NS	NS	NR	M, 88 (48.9) F, 92 (50.6)		Cig/day: <16: 69 (38.6) 16-20: 56 (28.1) 21-30: 43 (24) 31+: 17 (9.4)

Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other characteristics
	Video-based internet site	Range, 18 to >70	White non-Hispanic, 136(79.5) Black non-Hispanic, 14(8.2) Latino/Hispanic, 8(4.7) AIAN, 2(1.2) Other, 9 (5.3)	NS	NS	NR	M, 80 (46.8) F, 91 (53.2)		Cig/day: <16: 55 (31.9) 16-20: 63(36.8) 21-30: 34 (20.2) 30+: 19 (11)

NR= Not Reported, NS= Not Significant, SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, API = Asian Pacific Islander, AIAN = American Indian/Alaska Native, M= male, F = female, CQP = Committed Quitters Program, USD = United States Dollar

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Evidence Table 15. Description of consumer characteristics in addressing impact of CHI applications on intermediate outcomes in smoking (continued)

9 Prokhorov AV, Kelder SH, Shegog R *et al*. Impact of A Smoking Prevention Interactive Experience (ASPIRE), an interactive, multimedia smoking prevention and cessation curriculum for culturally diverse high-school students. Nicotine Tob Res 2008; 10(9):1477-85.

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Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
Smoking										
An, 2008[1]	%abstinent for 30 days	Control	260		8 wks (%): 16.2	20 wks (%) 19.6		30 weeks (%) 23.1		p<0.001
		RealU intervention	257		8 wks (%): 16 95 % CI: 0.64-1.66	20 wks (%) 24.1 95% CI: 0.88-2.04		30 weeks (%) 40.5 95% CI:1.58-3.40		
Brendryen, 2008 [2]	Repeated Points of Abstinence (1 + 3 + 6 + 12 months)	Self-help booklet	146					10(7)		OR 3.43, P .002
		Happy Ending program (HE)	144					29(20)		
Curry, 1995 [3]	7-day abstinence at 21 months	Control	324 (119, 133, 72)					Precontemplation group (13), for contemplation group (11), for preparation group (18)		.07. .95, .86
		Booklet	327 (125, 131, 71)					Precontemplation group (10), for contemplation group (10), for preparation group (15)		
		Feedback	323 (128, 132,					Precontemplation group (5), for contemplation group (12), for preparation group		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
			63)					(16)		
		Phone	150 (64, 64, 22)					Precontemplation group (16), for contemplation group (11), for preparation group (23)		
	Abstinent at 3, 12 and 21 months	Control	324 (119, 133, 72)					Precontemplation group (1), for contemplation group (1), for preparation group (6)		.03, .80, .56
		Booklet	327 (125, 131, 71)					Precontemplation group (0), for contemplation group (0.5), for preparation group (3)		
		Feedback	323 (128, 132, 63)					Precontemplation group (1), for contemplation group (2), for preparation group (3)		
		Phone	150 (64, 64,					Precontemplation group (5), for contemplation group (2), for		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
			22)					preparation group (9)		
Dijkstra, 2005 [4]	Affective attitude	Standard	51	NR				At time of intervention Mean, 5.61		P 0.048
		Personalization	50	NR				At time of intervention Mean, 5.13		
		Adaptation	51	NR				At time of intervention Mean, 5.48		
		Feedback	50	NR				At time of intervention Mean, 5.55		
	Cognitive attitude	Standard	51	NR				At time of intervention Mean, 2.62		P 0.028
		Personalization	50	NR				At time of intervention Mean, 2.52		
		Adaptation	51	NR				At time of		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
								intervention Mean, 2.53		
		Feedback	50	NR				At time of intervention Mean, 2.79		
	Quitting attempts	Standard	NR	NR				4 months, (22.9)		P 0.042
		Personalization	NR	NR				4 months, (44.7)		
		Adaptation	NR	NR				4 months, (28.6)		
		Feedback	NR	NR				4 months, (48.5)		
Hang, 2009 [5]	Number of cigarettes smoked per day	No intervention	64	Mean 11.7 SD 7.5				3 months, Mean 9.5, SD 5.5		
		SMS 1 per week	50	Mean 12.4 SD 7.3				3 months, Mean 10.2, SD 6.5		
		SMS 3 per week	60	Mean 11.2 SD 6.3				3 months, Mean 9.7, SD 6.4		P .91
	24 hour quit attempt	No intervention	64					3 months, N 26, (41)		P .47
		SMS 1 per	50					3 months, N 20,		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
		week						(42)		
		SMS 3 per week	60					3 months, N 30, (50)		
Japuntich, 2006[6]	Abstinent	Control	144		3 months (%): (20.8)			6mos (%):15		NR
		CHESS SCRP	140		3 months (%): (22.9) OR:1.13 (.64-1.98)			6mos (%):11.8 OR:1.48 (.66-2.62)		
Pattens, 2006[7]	Smoking abstinence	Control	69		8 wks	12 wks		24 wks (%): 12 95% CI:5-22		0.217
		Internet based intervention	70		8 wks	12 wks		24 wks (%): 6 95% CI:2-14		0.217
Prochaska, 1993 [8]	Point Prevalence Abstinence, Precontemplation stage	ALA+ (self-help manual)		0						
		TTT (individualized manual)		0						
		ITT (interactive computer report)		0						
		PITT (personalized counselor +TTT+ITT)		0						
	Point	ALA+		0				(11.1)		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
	Prevalence Abstinence, Contemplation stage	TTT		0				(5.0)		
		ITT		0				(17.6)		
		PITT		0				(5.3)		
	Point Prevalence Abstinence, Preparation stage	ALA+		0				(10.8)		
		TTT		0				(15.4)		
		ITT		0				(25.0)		
		PITT		0				(15.6)		
	Point Prevalence Abstinence, Preparation stage	ALA+		0				(11.6)		
		TTT		0				(29.4)		
		ITT		0				28.0)		
		PITT		0				(27.9)		
Prokhorov, 2008 [9]	Smoking initiation rates at 18 months (nonsmokers at BL)	Control (Clearing the Air self-help booklet)	516					(5.8)		OR 2.9 Confidence interval 95% (1.1 7.8)
		ASPIRE CD-ROM	582					(1.9)		
	Smoking cessation rates at 18 months	Control (Clearing the Air self-help	34					(61.8)		OR 1.0 Confidence interval 95%

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
	(smokers at BL)	booklet)								(0.3 2.7)
Schiffman, 2000[10]	Abstinence rates	Control	1203		28-day abstinence at 6 weeks (%): 28.6 95% CI:1.780 (1.342-2.360)			10-wks abstinence at 12 weeks:18.9 95% CI:2.044 (1.489-2.807)		p≤0.001
		Computer tailored smoking cessation materials (CQP)	1217		28- day abstinence at 6 wks:41.6, 95% CI:1.780 (1.342-2.360)			10-wks abstinence at 12 wks:32.3 95% CI:2.044 (1.489-2.807)		
Schumann, 2006 [11]	Average probability of progression (precontemplation and contemplation)	Control (no intervention)	245					0.038		
		Tailored letters	240					0.032		
	Average probability of regression (precontemplation and contemplation)	Control (no intervention)	245					0.084		
		Tailored letters	240					0.034		
Schumann, 2008[12]	Point-prevalence abstinence	Control	309		6 mos: 46	12 mos: 55	18 mos:55	24 mos: 69		NS
		Computer-tailored smoking cessation intervention	302		6 mos:46	12 mos :56	18 mos:55	24 mos:63		
	Prolonged abstinence	Control	309			12 mos:38	18 ms:46	24 mos:46		
		Computer-tailored	302			12 mos:35	18 mos:45	24 mos:46		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
		smoking cessation intervention								
Severson, 2008[13]	Tobacco abstinence (complete case)	Control	100		3 mos:26.9	6 mos:31		3 and 6 mos:21.2		Time point 2, 0.001 Time point 3, 0.001 Final Time point, 0.001
		Interactive, tailored web-based intervention	159		3 mos:44.2	6 mos:46.2		3 and 6 mos:40.6		
	Tobacco abstinence (intent-to-treat)	Control	100		3 mos:13.9	6 mos:14.7		3 and 6 mos:7.9		Time point 2, 0.001 Time point 3, 0.001 Final time point, 0.001
		Interactive, tailored web-based intervention	159		3 mos:19.5	6 mos:19.3		3 and 6 mos:12.6		
	Smokeless tobacco use abstinence (complete case)	Control	128		3 mos:32.4	6 mos:35.3		3 and 6 mos:27.2		Time point 2, 0.001 Time point 3, 0.001 Final time point, 0.001
		Interactive, tailored web-based intervention	189		3 mos:49.6	6 mos:51.3		3 and 6 mos:48.2		
	Smokeless tobacco use abstinence (intent-to-treat)	Control	128		3 mos:16.8	6 mos:16.8		3 and 6 mos:10.1		Time point 2, 0.001 Time point 3, 0.01 Final time point, 0.001
		Interactive, tailored web-based intervention	189		3 mos:21.9	6 mos:21.4		3 and 6 mos:15.0		
Strecher, 1994 [14] Study 1	7-day abstinence	Control (generic letter)						(7.4)		P <.10
		Tailored letter						(20.8)		
	7-day abstinence	Control (generic letter) / light smoker						(7.1)		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
		Control (generic letter) / heavy smoker						(7.7)		
		Tailored letter / light smoker						(30. 7)		
		Tailored letter / heavy smoker						(7.1)		
Strecher, 1994 [14] Study 1	7-day abstinence	Control (no letter) / light smoker						(7.3)		P < .05
		Control (no letter) / heavy smoker						(9.8)		
		Tailored letter / light smoker						(19.1)		
		Tailored letter / heavy smoker						(3.9)		
Strecher, 2005 [15]	7-day abstinence at 12 months (intent to treat analysis)	SU (single untailored booklet)						(8.1)		Difference between groups 3+4 and groups 1+2 (Wald X^2 4.7, p <.05; OR 1.41, 1.04 – 1.99)

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
		ST (single tailored booklet)						(7.2)		
		MT (multiple tailored materials)						(10.3)		
		MRT (multiple retailored materials)						(10.5)		
	7-day abstinence at 12 months of subjects who were abstinent at 5 months (intent to treat analysis)	SU (single untailored booklet)						(41.9)		Difference between groups 3+4 and groups 1+2 (Wald X^2 1.4, p .2; OR 1.44, 0.78 – 2.68)
		ST (single tailored booklet)						(37.4)		
		MT (multiple tailored materials)						(41.7)		
		MRT (multiple retailored materials)						(53.6)		
	7-day abstinence at 12 months of	SU (single untailored						(57.1)		Difference between groups 3+4

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
	subjects who were abstinent at 5 months (per protocol analysis)	booklet)								and groups 1+2 (Wald X^2 4.1, $p < .05$; OR 2.16, 1.03 – 4.65)
		ST (single tailored booklet)						(51.4)		
		MT (multiple tailored materials)						(63.3)		
		MRT (multiple retailored materials)						(75.8)		
Strecher, 2005[16]	28 day abstinence rate	Control	588		6 wks (%): 46.8			12 wks		.008
		CQ plan	640		6 wks (%): 54.4 OR:1.36 95% CI: 1.08-1.70			12 wks		
	10 week continuous rates	Control	418		6 wks			12 wks (%): 43.3		.0004
		CQ Plan	446		6 wks			12 wks (%): 55.4 OR: 1.63 95% CI:1.24-2.13		
Strecher , 2006[17]	Tobacco related illness	CQ-PLAN	1491		6 wks			12 wks:55.6 95% CI:		p<0.001
		CONTROL	1491		6 wks			12 weeks:38.2		
	Non-smoking children in household	CQ PLAN	1491		6 wks			12 wks:57.7		p<0.001
		CONTROL	1491		6 wks			12 wks:38.5		
	Frequency of alcohol	CQ-PLAN	1491		6 wks			12 wks:55.4		p<0.001
		CONTROL	1491		6 wks			12 wks:36.5		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
	consumption									
Strecher, 2008[18]	Depth of efficacy expectation of smoking cessation intervention	High depth efficacy expectation	466					6 mos follow up:32.4		0.213
		Low depth efficacy expectation	478					6 mos follow up:28.5		
	Depth of outcome expectation of smoking cessation intervention	High depth outcome expectation	494					6 mos follow up:32.2		Final time point, 0.242
		Low depth outcome expectation	450					6 mos follow up:28.7		
	Depth of success stories of smoking cessation intervention	High depth success story	488					6 mos follow up:34.3		Final time point, 0.018
		Low depth success story	456					6 mos follow up:26.8		
	Personalization of message source	High personalization of message source	481					6 mos follow up:33.6		Final time point, 0.039
		Low personalization of message source	463					6 mos follow up:27.4		
	Timing of message exposure	Multiple message exposure	487					6 mos follow up:29.6		Final time point 0.567
		Ingle message exposure	457					6 mos follow up:31.3		
Swartz, 2006[19]	Automated behavioral intervention for cessation of smoking at 90 day follow-up	Control	9					90 day (%):8.2		0.002
		Those who received immediate access to the web site for automated	21					90 day:24.1 OR:3.57 95% CI:1.54-8.27		

Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at Time point 2	Measure at Time point 3	Measure at Time point 4	Measure at Final Time point	Ratios at Time points	Significance
		behavioral intervention for smoking								
		Control (intent to treat model)	9					90 day:5		0.015
		behavioral intervention for smoking (intent to treat model)	21					90 day:12.3, OR:2.66 95% CI:1.18-5.99		

CI = confidence interval, NR = not reported, NS = not specified, OR = odd ratio, wks = weeks, mos = months

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Evidence table 16. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in alcohol abuse (KQ1b) (continued)

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Evidence Table 17. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Obesity									
Booth, 2008[1]	Individuals interested in their own health care	Personal monitoring device	NS	NS	BMI was between 24.5 and 37 kg/ m2, Internet access	<18 yr, Pregnant or lactating or were currently receiving medications for Type 1 or Type 2 diabetes		ED group EX group	
Burnett, 1985 [2] Obesity	Overweight females	An interactive lap sized computer	Home / Res	Ns	Consenting 30 – 50 yr old females to the newspaper advertisement	Ns	Paper and pencil method of providing feedback	Computer Assisted method of providing feedback	
Cussler, 2008[3]	Individuals interested in their own health care	Interactive consumer website	NS	NS	40 - 55 yr, Women, have a BMI between 25.0 and 38.0 kg/m2, Nonsmoker and be free from major illnesses, Internet access		Self directed group	Internet group	**2**
Frenn, 2005 [4] Obesity	Students of 7th grade	Computer based interactive web	Computer labs in school	NR	7th grade student who could read in English / Spanish and completed the consent form	ns	Regular Classroom assignments	8 sessions Internet based interactive model based on HP/TM	
Hunter, 2008[5]	Individuals interested in their own health care	Interactive consumer website	NS	2006	18 - 65 yr, Weight within 5 pounds or above their maximum allowable weight for the USAF, Personal computer with Internet access, plans to remain in the local area for 1 year	Lost more than 10 pounds in the previous 3 months, Used prescription or over-the-counter weight-loss medications in the previous 6 months, had any physical	Usual care	Behavioral Internet treatment	**2.5**

Evidence Table 17. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
						activity restrictions, had a history of myocardial infarction, stroke, or cancer in the last 5 years, reported diabetes, angina, or thyroid difficulties; or had orthopedic or joint problems, Women were excluded if they were currently pregnant or breast-feeding, or had plans to become pregnant in the next year			
Kroeze, 2008[6]	Individuals interested in their own health care	Interactive consumer website	Worksites and 2 neighborhoods in the urban area of Rotterdam	2003-2004	18-65 yr, Sufficient understanding of the Dutch language, No diet prescribed by a dietitian or physician, and no treatment for hypercholesterolemia		Generic condition	Interactive-tailored condition Print-tailored condition	**3**
McConnon, 2007[7]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	2003/ NS	18 - 65 yr, BMI 30 or more, able to access internet at least 1 time a week, able to read and write		Usual care	Internet group	**1**

Evidence Table 17. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					English				
Taylor, 1991 [9]	Overweight women	Pocket Computer Device	Home / Res	NS	Overweight women BMi b/w 25 and 35 kg/m^3	Bulemia, Depression, alcohol and drug dependence, psychosis, DSM III R	Computer Assisted Therapy (CAT)	1200 calorie diet followed by CAT	
Williamson, 2006[10]	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS	11 - 15 yr, African-American, Female, BMI above the 85th percentile for age and gender based on 1999 National Health and Nutrition Examination Study normative data, at least one obese biological parent, as defined by BMI > 30, one designated parent who was overweight (BMI > 27), adolescent's family was willing to pay $300 out-of pocket expenses toward the purchase of the computer worth >$1000, the family home had electricity and at least one functional telephone line		Control and intervention adolescents	Control and intervention parents	**2**
Womble , 2004[11]	Individuals interested in their own	Interactive consumer website	NS	2001/ NS	18-65 yr, BMI: 27-40 kg/m2, Daily access to the	Type 1 or 2 diabetes, Uncontrolled			**0.5**

Evidence Table 17. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	health care				internet	HTN (BP>140/90), History of cerebrovascular, cardiovascular, kidney or liver disease, Use of medications known to affect body weight, pregnancy or lactation weight loss>=5% of initial weight, Use of anorectic agents in the previous 6 months, bulimia, major depression, or other psychiatric illness significantly disrupted daily functioning			

NS = not specified, yr = year, BMI = body mass index, kg/m2 = Kilograms per square meter, BP = blood pressure, HTN = hypertension

Reference List

1 Booth AO, Nowson CA, Matters H. Evaluation of an interactive, Internet-based weight loss program: a pilot study. Health Educ Res 2008; 23(3):371-81.

2 Burnett KF, Taylor CB, Agras WS. Ambulatory computer-assisted therapy for obesity: A new frontier for behavior therapy. 1985; 53(5):698-703.

3 Cussler EC, Teixeira PJ, Going SB *et al*. Maintenance of weight loss in overweight middle-aged women through the Internet. Obesity (Silver Spring) 2008; 16(5):1052-60.

Evidence Table 17. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

4 Frenn M, Malin S, Brown RL *et al*. Changing the tide: An Internet/video exercise and low-fat diet intervention with middle-school students. 2005; 18(1):13-21.

5 Hunter CM, Peterson AL, Alvarez LM *et al*. Weight management using the internet a randomized controlled trial. Am J Prev Med 2008; 34(2):119-26.

6 Kroeze W, Oenema A, Campbell M, Brug J. The efficacy of Web-based and print-delivered computer-tailored interventions to reduce fat intake: results of a randomized, controlled trial. J Nutr Educ Behav 2008; 40(4):226-36.

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9 Taylor CB, Agras WS, Losch M, Plante TG, Burnett K. Improving the effectiveness of computer-assisted weight loss. 1991; 22(2):229-36.

10 Williamson DA, Walden HM, White MA *et al*. Two-year internet-based randomized controlled trial for weight loss in African-American girls. Obesity (Silver Spring) 2006; 14(7):1231-43.

11 Womble LG, Wadden TA, McGuckin BG, Sargent SL, Rothman RA, Krauthamer-Ewing ES. A randomized controlled trial of a commercial internet weight loss program. Obes Res 2004; 12(6):1011-8.

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
Obesity									
Booth, 2008[1]	Comparison	NS	NS	NS	NS	NR	NS	NS	BMI: mean, 29 SD, 2.3 Weight (kg): mean, 80.5 SD, 8.6
	Online Diet advice and exercise program	Mean, 46.4 SD, 12.5	NS	NS	NS	NR	NS	NS	BMI: mean, 29.9 SD, 2.7 Weight (kg): mean, 84.3 SD, 11.3
	Online exercise program only	Mean, 46.2 SD, 9.2	NS	NS	NS	NR	NS	NS	BMI: mean, 30.1 SD, 3.4 Weight (kg) mean, 82 SD, 10.8
Burnett, 1985 [2] Obesity	Paper and Pencil method of providing feedback	39.8 SD 5.5	Ns	Ns	Ns	Ns	All F		
	A lap sized computer	43.2 SD 8.8					All F		
Cussler, 2008[3]	Self directed group	Mean, 48.2 SD, 4.2	NS	NS	NS	NR	NR	NR	Weight (kg): mean, 82 SD, 10.8 BMI: mean, 30.1 SD, 3.4
	Internet group	Mean, 48.3 SD, 4.4							Weight(kg): mean, 84.4 SD, 12.6 BMI: mean, 30.6 SD, 3.9
Frenn, 2005 [4]	Regular Classroom	12—14yrs	Diet : Asians 2	Diet: Free	Seventh grade Students	NR	Diet: M 22 (44.9) F 27		

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
Obesity	Assignments		(4.1); Blacks 15 (30.6); Hispanics 17 (34.7); Native Americans 4 (8.2); Whites 4 (8.2); Others 7 (14.3) Activity: Asians 3 (5); Blacks 16 (26.7); Hispanics 24 (40); Native Americans 4 (6.5); Whites 4 (8.9); Others 9 (15)	lunch 35(71.4); Reduced 6(12.2); No reduction 8(16.0) Activity: Free lunch 42(70.0); Reduced 8(13.3); No reduction 10(16.7)			(55.1); Activity: M 30 (50) F 30 (50)		
	8 sessions Internet based interactive model based on HP/TM		Diet: Asians 0 (0); Blacks 8 (20); Hispanics 22 (55); Native Americans 1 (2.5); Whites 5	Diet: Free lunch 30(75.0); Reduced 5(12.5); No reduction			Diet group: M 12(30); F 28(70) Activity: M 14 (26.3) F 29 (73.7)		

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
			(12.5); Others 4 (10) Activity: Asians 0 (0); Blacks 9 (20.9); Hispanics 23 (53.3); Native Americans 0 (0); Whites 4 (9.3); Others 7 (16.3)	5(12.5) Activity: Free lunch 31 (72.1); Reduced 6(14); No reduction 6 (14)					
Hunter, 2008[5]	Usual care	Mean, 34.4 SD, 7.2	C, 222 C, 53.2	NS	12-16 years, 222(61.7)	NR	F, 222(50.5)	NR	
	Behavioral Internet treatment	Mean, 33.5 SD, 7.4	C, 224 C, 58.0	NS	12-16 years, 224(63.9)	NR	F, 224(50.0)		
Kroeze, 2008 [6]	Generic condition	Mean, 44.1 SD, 9.7	NS	NS	Elementary,3(2) Lower secondary, 28(18.4) Higher secondary, 56(37.4) Tertiary, 63(42.2)	NR	F,150(56.0)	NR	BMI (kg/m2): mean, 25.3 SD, 3.8
	Interactive-tailored condition	Mean, 44 SD, 10.56			Elementary,4(2.6) Lower secondary,29(19.2) Higher secondary,51(33.8) Tertiary, 67(44.4)		F,151(53.6)		BMI (kg/m2): mean, 25.5 SD, 3.8
	Print-tailored condition	Mean, 43.4 SD, 10.1			Elementary,15(3.6) Lower secondary,26(18.6) Higher secondary,49(35.0) Tertiary,61(42.9)		F,141(55.3)		BMI (kg/m2): mean, 25.5 SD, 4.3
McConnon, 2007[7]	Usual care	Mean, 47.4	NS	NS	NS	NR	NR	NR	Weight (kg): mean, 94.9 BMI: mean, 34.4

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
									Quality of Life (Euro QoL): mean, 61.5 Physical Activity (Baecke): mean, 6.7
	Internet group	Mean, 48.1							Weight (kg): mean, 97.5 BMI: mean, 34.35 Quality of Life (EuroQoL): mean, 70 Physical Activity (Baecke): mean, 6.8
Morgan, 2009 [8] Obesity	One information session + Program booklet	34 SD 11.6	NS	NS	Student: 14 Non Acad Staff: 13 Acad Staff: 4	Measured by SEIFA score 1,2-0 3,4-5 5,6-9 7,8:11 9,10:3	All M		
	SHED IT internet program w/ information session and program booklet (the program facilitates self monitoring and daily diary to which the researchers	37.5 SD 10.4	NS	NS	Student: 14 Non Acad Staff: 14 Acad Staff: 6	1,2-1 3,4-7 5,6-3 7,8:11 9,10:2	All M		

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
	respond)								
Taylor, 1991 [9] Obesity	Computer Assisted Therapy	43.7. SD 11.1	NS	NS	NS	NS	All F		
	1200 calorie diet (Frozen Food) followed by CAT								
Williamson, 2006[10]	Control and intervention adolescents	Mean, 13.2 SD, 1.4	NS	NS	NS	NR	NR	NR	Height (cm): mean, 160.0 SD, 8.1 Weight (kg): mean, 93.3 SD, 22.5 BMI: percentile 98.3 (2.5) mean, 36.4 SD, 7.9 body fat DXA: mean, 45.9 SD, 7.5
	Control and intervention parents	Mean, 43.2 SD, 6.2							Height (cm): mean, 162.3 SD, 6.9 Weight (kg): mean, 101.2 SD, 18.4 BMI: percentile not reported mean, 38.4 SD, 7.2 Body fat DXA: mean, 48.4 SD, 6.3
Womble, 2004[11]	Control	Mean, 43.3 SD, 11.1	NS	NS	NS	NR	NR	NR	Height (cm): mean, 162.8 SD, 6.3

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other outcomes
									Weight (kg): mean, 87.9 SD, 10.8 BP(systolic): mean,112.1 SD, 13.8 BP (diastolic): mean, 66 SD, 9.6 Glucose: mean, 81.5 SD, 21.3
	ediets.com	Mean, 44.2 SD, 9.3							Height (cm): mean, 165.5 SD, 6.5 Weight (kg): mean, 93.4 SD, 12.6 BP (systolic): mean, 121.7 SD, 16.7 BP (diastolic): mean, 74.4 SD, 10.1 Glucose: mean, 90.2 SD, 11.7

C = Caucasian, NS = not specified, NR = not reported, F = female, kg = kilograms, BMI = body mass index, cm = centimeter, BP = blood pressure, kg/m2 = kilograms per square meter, SD = standard deviation, SES = Socio economic status

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2. Burnett KF, Taylor CB, Agras WS. Ambulatory computer-assisted therapy for obesity: A new frontier for behavior therapy. 1985; 53(5):698-703.

3. Cussler EC, Teixeira PJ, Going SB *et al*. Maintenance of weight loss in overweight middle-aged women through the Internet. Obesity (Silver Spring) 2008; 16(5):1052-60.

Evidence Table 18. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in obesity (KQ1b) (continued)

4. Frenn M, Malin S, Brown RL *et al*. Changing the tide: An Internet/video exercise and low-fat diet intervention with middle-school students. 2005; 18(1):13-21.

5. Hunter CM, Peterson AL, Alvarez LM *et al*. Weight management using the internet a randomized controlled trial. Am J Prev Med 2008; 34(2):119-26.

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9. Taylor CB, Agras WS, Losch M, Plante TG, Burnett K. Improving the effectiveness of computer-assisted weight loss. 1991; 22(2):229-36.

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11. Womble LG, Wadden TA, McGuckin BG, Sargent SL, Rothman RA, Krauthamer-Ewing ES. A randomized controlled trial of a commercial internet weight loss program. Obes Res 2004; 12(6):1011-8.

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
Obesity										
Booth, 2008[1]	Weight change (%)	EX	26					12weeks: mean, 2.1 range, -2.9-14.2 SD, 3.4		
		ED	27					12weeks: mean, 0.9 range, 3.0-8.6 SD, 2.5		
	Waist circumference change (cm)	EX	26					12weeks mean, -4.5 range, -12.5-4.7 SD, 4.5		
		ED	27					12weeks mean, -3.2 range, -8.7-2.2 SD, 2.9		
	Physical activity (daily steps)	EX	26	Mean, 9151.5 range, 3559,16623 SD, 3289.9				12weeks mean, 12299.6 range, 6214,19246 SD, 3514.7		
		ED	27	Mean, 8673.3 range, 2784,15202 SD, 3567.3				12weeks mean, 12198.8 range, 6650,22572 SD, 4121.8		
	Energy intake	EX	26					12weeks mean, 131.1 SD, 759.9		BL, time point 2, difference between group p 0.066

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		ED	27					12weeks mean, -1812.6 SD, 729.9		
Burnett, 1985 [2] **Obesity**	Short term weight change: Baseline 2 wk period	Paper and pencil method of providing feedback	6	Gain of weight: 0.67lbs SD 2.66lbs						The initial 2 week period had only self monitoring and instruction to lose wt given
		Computer Assisted method of providing feedback	6	Gain of weight: 0.17lbs SD 0.41lbs						
	Short term weight change: Post- baseline 8 wk period	Paper and pencil method of providing feedback	6	Loss of weight: 3.3 lbs SD 3.2 lbs						The Rx→Withdraw→Rx phase 2 + 2 + 4 wk format.
		Computer Assisted method of providing feedback	6	Loss of weight: 8.1 lbs SD 2.7 lbs						
	Long term weight changes (24 wks)	Paper and pencil method of providing feedback	6	Loss of Weight: 4.17 lbs SD 4.83 lbs						No treatment offered during this time

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		Computer Assisted method of providing feedback	6	Loss of Weight: 15.67lbs SD 10.46 lbs						
	Long term weight changes (40 wks)	Paper and pencil method of providing feedback	6	Loss of Weight: 2.34 lbs SD 7.31						
		Computer Assisted method of providing feedback	6	Loss of Weight: 17.67 lbs SD 13.82 lbs						
	Self-reported Caloric intake	Paper and pencil method of providing feedback	6	2076 cal SD 165 cal				1462 cal SD 324 cal		
		Computer Assisted method of providing feedback	6	1942 cal SD 334 cal				1142 cal SD 323 cal		
	Self-reported physical	Paper and pencil method of	6	77 PA units SD 128				206 PA units SD 108		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	activity	providing feedback								
		Computer Assisted method of providing feedback	6	172 PA units SD 188				372 PA units SD 158		
	How beneficial will this treatment be in promoting weight loss for you?	Paper and pencil method of providing feedback	6					2.72 SD 0.58		
		Computer Assisted method of providing feedback	6					2.79 SD 0.94		
	How beneficial will this treatment be in promoting weight loss for overwt indi.?	Paper and pencil method of providing feedback	6					2.84 SD 0.54		
		Computer Assisted method of providing	6					2.74 SD 0.84		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		feedback								
Cussler, 2008[3]	Weight change (kg)	Control	59	Mean, -5.2 SD, 3.8				4-16months: mean, 1 SD, 4.6		
		Internet group	52	Mean, -5.3 SD, 3.6				4-16months: mean, 0.7 SD, 5.4		
	BMI	Control	59	Mean, -1.9 SD, 1.4	BL-4 months			4-16months mean, 1.9 SD, 1.5		
		Internet	52	Mean, -1.9 SD, 1.4	BL-4 months			4-16months mean, -2.1 SD, 1.4		
	Exercise energy expenditure (kcal/day)	Control	59	mean, 144 SD, 151	BL-4 months			4-16months mean, 164 SD, 268		
		Internet	52	Mean, 151 SD, 196	BL-4 months			4-16months mean, 123 SD, 265		
	Energy intake (kcal/day)	Control	59	Mean, -370 SD, 471	BL-4 months			4-16months mean, 91 SD, 330		
		Internet	52		BL-4months			4-16months mean, 74 SD, 371		BL, time point 2, change in energy intake
Frenn, 2005 [4] **Obesity**	Physical Activity	Regular Classroom assignments	60	Reduction in moderate/vigorous PA by 46 min measured by the log						
		8 sessions Internet based	43	Increase in the PA by 22 min for those completing						

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		interactive model based on HP/TM		2/3 modules and 33 min for those completing all 3 modules (p=0,05)						
	Diet	Regular Classroom assignments	49	Fat intake went from 31.5 → 31.6% (Not significant)						
		8 sessions Internet based interactive model based on HP/TM	40	Reduced fat intake from 30.7 to 29.9% (p=0,008)						
Hunter, 2008[5]	Body weight (kg)	Control	222	Mean, 86.6 SD, 14.7				6months: mean, 87.4 SD, 14.7		
		BIT	224	Mean, 87.4 SD, 15.6				6months: mean, 85.5 SD, 15.8		
	BMI (kg/m2)	Control	222	Mean, 29.3 SD, 3				6months mean, 29.4 SD, 3		
		BIT	224	mean, 29.4 SD, 3				6months mean, 28.8 SD, 3.3		
	Waist circumference (cm)	Control	222	Mean, 94.2 SD, 10.9				6months mean, 93.4 SD, 12.8		
		BIT	224	Mean, 94.5 SD, 11				6months mean, 92.2 SD, 11.6		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	Body fat percentage (%)	Control	222	Mean, 34.2 SD, 6.9				6months mean, 34.7 SD, 7		
		BIT	224					6months mean, 33.9 SD, 7.3		
Kroeze, 2008 [6]	Total fat intake	Control	133	g	1month mean, 88.4 SD, 39.9			6months: mean, 83.0 SD, 34.2		
		Interactive-tailored condition	126	g	1 month mean, 77.4 SD, 30.9			6months: mean, 77.9 SD, 30.4		
		Print-tailored condition	124	g	1 month mean, 80.5 SD, 25.7			6months: mean, 76.1 SD, 26.9		
	Saturated fat intake	Control	133	g	1 month mean, 31.4 SD, 15			6months mean, 29.5 SD, 13.7		
		Interactive Condition	126	g	1 month mean, 28.3 SD, 12.9			6months mean, 28.5 SD, 10		
		Print condition	124	g	1 month mean, 28.9 SD, 9.8			6months mean, 27.0 SD, 10		
	Energy intake	Control	133	mega joules	1 month mean, 9.4 SD, 3.1			6months mean, 8.9 SD, 3		
		Interactive Condition	126	mega joules	1 month mean, 8.6 SD, 2.5			6months mean, 8.4 SD, 2.5		
		Print	124	mega joules	1 month			6months		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		condition			mean, 8.3 SD, 2.7			mean, 8.2 SD, 2.4		
McConnon, 2007[7]	BMI change at 12 months (kg/m2)	Control	77	kg / m2				12 months after baseline: range, -8.1 to +3.5;		
		Internet group	54	kg / m2				12 months after baseline: range, -5.9 to 3.8;		
	Loss of 5% or more body weight (12 months)	Control	77			6 months		12 months (%):(18)		
		Internet group	54			6 months		12 months (%): (22)		
	Using website at 6 months, at 12 months	Internet group	54		mean, 53	6 months		12 months (%): (29)		
	Never used website	Internet group	54			6 months		12 months (%): (47)		
	Of those who used website, found it easy / very easy	Internet group	54		mean, 63	6 months		12 months (%): (85)		
	Of those who us website, found it clear / very clear	Internet group	54		mean, 78	6 months		12 months (%): (76)		
Morgan, 2009 [8] **Obesity**	Change in body wt. 3m	Prog info + Booklet gp	31	Loss of Weight: −3.0 (−4.5, −1.4) KG						All differences statistically significant
		SHED IT group	34	Loss of Weight: −4.8 (−6.4, −3.3) KG						

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	Change in body wt. 6m	Prog info + Booklet gp	31	Loss of Weight: −3.5 (−5.5, −1.4)						
		SHED IT group	34	Loss of Weight: −5.3 (−7.3, −3.3)						
	Waist circumference (cm) 3m	Prog info + Booklet gp	31	LOSS: −4.4 (−6.3, −2.5) CM						
		SHED IT group	34	LOSS: −5.2 (−7.1, −3.4) CM						
	Waist circumference (cm) 6m	Prog info + Booklet gp	31	−5.6 (−7.7, −3.5) CM						
		SHED IT group	34	−7.0 (−9.1, −4.9) CM						
	BMI (kg/m2) 3m	Prog info + Booklet gp	31	−0.9 (−1.4, −0.5) KG/M^2						
		SHED IT group	34	−1.5 (−2.0, −1.0) KG/M^2						
	BMI (kg/m2) 6m	Prog info + Booklet gp	31	−1.1 (1.7, −0.5)						
		SHED IT group	34	−1.6 (−2.2, −1.0)						
	Systolic blood pressure 3m	Prog info + Booklet gp	31	−8 (−12, −3) MM HG						

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		SHED IT group	34	−6 (−10, −1) MM HG						
	Systolic blood pressure 6m	Prog info + Booklet gp	31	−10 (−14, −6)						
		SHED IT group	34	−10 (−14, −7)						
	Diastolic blood pressure 3m	Prog info + Booklet gp	31	−6 (−10, −2) MM HG						
		SHED IT group	34	−4 (−8, −1) MM HG						
	Diastolic blood pressure 6m	Prog info + Booklet gp	31	−5 (−10, −2)						
		SHED IT group	34	−6 (−11, −1)						
	Resting heart rate 3m	Prog info + Booklet gp	31	−7 (−11, −3) BPM						
		SHED IT group	34	−9 (−12, −5) BPM						
	Resting heart rate 6m	Prog info + Booklet gp	31	−7 (−12, −3) BPM						
		SHED IT group	34	−6 (−11, −2) BPM						

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	Physical activity (mean steps/day) 3m	Prog info + Booklet gp	31	Went Up by: 976 (−12, 1,965) STEPS/DAY						
		SHED IT group	34	Went Up by: 1,184 (234, 2,133) STEP/DAY						
	Physical activity (mean steps/day) 6m	Prog info + Booklet gp	31	Went Up by: 1,302 (241, 2,363)						
		SHED IT group	34	Went Up by: 938 (−90, 1,966)						
	Energy intake (kJ/day) 3m	Prog info + Booklet gp	31	Went down by: −2,068 (−3,089, −1,047) KJ/DAY						
		SHED IT group	34	Went down by: −3,195 (−4,159, −2,230) KJ/DAY						
	Energy intake (kJ/day) 6m	Prog info + Booklet gp	31	Went down by: −1,881 (−3,087, −676) KJ/DAY						
		SHED IT group	34	Went down by: −3,642 (−4,764, −2,521) KJ/DAY						
Taylor, 1991 [9] **Obesity**	Weight Loss (Post-treatment 12w – Pre-	Computer Assisted Therapy (fu 12 wks)	28	M 3.1 SD 2.2 (Loss to fu 4, therefore 24 subjects analyzed)						

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	treatment)	1200 calorie diet (Frozen Food) followed by CAT (fu 12 wks)	27	M = 5.3 SD 2.2 (Loss to fu 1, therefore 27 subject analyzed)						
	Weight Loss (F/u @ 6m – Pre-treatment)	Computer Assisted Therapy	21	M 0.9 SD 3.6						
		1200 calorie diet (Frozen Food) followed by CAT	25	M 3.8 SD 2.7						
Williamson, 2006[10]	Body weight (kg)	Control	50					24 month: mean A: 6.3 P: 0.06 SD A: 1.6 P: 0.89		
		Interactive nutrition education program and Internet counseling behavioral therapy for the intervention group	47	Mean, A:93.3 P:101 SD, A: 22.5 P: 18.4				24 month: mean, A: 4.4 P: 1.1 SD, A: 1.7 P: 0.91		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	Body composition	Control	50	BMI	6 month	12 month	18 month	24 month mean, A: 1.2 P: 0.04 SD A: .65 P: .34		
		Interactive bNutrition education program and internet counseling behavioral therapy for the intervention group	47	Mean, A:36.4 P:38.4 SD, A: 7.9 P:7.2	6 month	12 month	18 month	24 month mean, A: 0.73 P: 0.55 SD, A: .66, P: 0.34		
	Weight loss behavior (body fat %)	Control	50		6 month	12 month	18 month	24 month mean, A:0.84 P:0.51 SD, A:0.72 P:0.46		
		Interactive bNutrition education program and internet counseling behavioral therapy for the intervention group	47	Mean, A: 45.9 P: 48.4 SD, A: 7.5 P: 6.3	6 month	12 month	18 month	24 month mean, A:-0.08 P:0.36 SD, A:0.71 P:0.46		
	BMI (BMI	Control	50		6 month	12 month	18 month	24 month		

Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	percentile)							mean, A: -0.001 SD, A: 0.003		
		Interactive bNutrition education program and internet counseling behavioral therapy for the intervention group	47		6 month	12 month	18 month mean, A: -0.004 SD, A: 0.003	24 month		
Womble, 2004[11]	Weight change percent (%)	Control	16		16weeks mean, 3.6 SD, 4			52 weeks: mean, 4 SD, 5.1		
		ediets.com	15		16weeks mean, 0.9 SD, 3.2			52 weeks: mean, 1.1 SD, 4		
	Weight change (kg)	Control	16		16weeks mean, 3 SD, 3.1			52 weeks mean, 3.3 SD, 4.1		
		ediets.com	15		16weeks mean, 0.7 SD, 2.7			52 weeks mean, 0.8 SD, 3.6		

BMI = body mass index, BL = baseline, g = gram, kg = kilogram, SD = standard deviation, cm = centimeter, kg/m2 = Kilograms per square meter, kcal/day = kilocalories per day, A = Adolescents, P = parents

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Evidence table 19. Outcomes in studies addressing the impact of CHI application intermediate outcomes in obesity (KQ1b) (continued)

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Evidence Table 2. Description of RCTs addressing the impact of CHI applications on health care processes (KQ1a)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Asthma									
Bartholomew, 2000 [1]	Inner-city elementary and middle school–age 6-17 children with moderate to severe asthma	Watch, Discover, Think and Act (An Interactive multimedia application on CD-ROM)	Physician office	4 to 15.6	Age 6–17 years, Moderate-to-severe asthma, English speaking parents, No chronic disease other than asthma	Not speaking English, co-existing disease, inadequate reading level, parent inability to understand the study	Participant assigned to usual-care	Participant assigned to Watch, Discover, Think and Act	
Guendelman, 2002 [2]	Inner-city children as having asthma by a physician.	Personal and interactive communication device (Health Buddy	Home and in an outpatient hospital clinic.	April 8, 1999, and July 5, 2000	Children age 8- 16 years, had an English-speaking caregiver, had a telephone at home, and were diagnosed as having persistent asthma, Patient with 2 or more emergency department (ED) visits and/or at least 1 inpatient admission during the year before the study	Patients involved in other asthma or drug efficacy studies, Involved in research that required behavior modification, Mental or physical challenges that made difficult to use Health Buddy. Children with co-morbid conditions that could affect their quality of life.	Participants using asthma diary	Participants using Health Buddy	
Jan, 2007[3]	Individuals interested in their own health care Caregiver, childhood asthma	Personal monitoring device	Home/ residence	2004/ January to December	6 - 12 yr, Caregivers have Internet access, persistent asthma diagnosis (GINA clinical practice guidelines)	Diagnosed with Bronchopulmonary dysplasia, Diagnosed with other chronic co morbid conditions that could affect quality of life	Verbal information and booklet for asthma education with written asthma diary.	Blue Angel for Asthma Kids An Internet-based diary record for peak expiratory flow rate (PEFR) Symptomatic support	**1**

Evidence Table 2. Description of RCTs addressing the impact of CHI applications on health care processes (KQ1a) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
								information, and an action plan suggestion, and telecommunication technologies for uploading and retrieving the storage data	
Krishna, 2003[4]	Individuals interested in their own health Parents/ caregivers	Personal monitoring device	Home/ residence	1999/ NS	< 18 yr, Confirmed asthma	Cystic fibrosis, Bronchopulmonary dysplasia, Other chronic lung disease	Traditional care	Internet-enabled interactive multimedia asthma education program	**3**
Use of Contraception									
Chewining, 1999[5]	Individuals interested in their own health care	Computer-Based Decision Aid	Clinician office	NS	≤ 20 yr, Female, ability to read and understand English, Expressed interest in getting a contraceptive		Standard information	Computer-Based Interactive Decision Aid	**0**

Yr = Year, NS = not specified, PEFR = Peak expiratory flow rate

Evidence Table 2. Description of RCTs addressing the impact of CHI applications on health care processes (KQ1a) (continued)

Reference List

1 Bartholomew LK, Gold RS, Parcel GS *et al*. Watch, Discover, Think, and Act: Evaluation of computer-assisted instruction to improve asthma self-management in inner-city children. 2000; 39(2-3):269-80.

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Evidence Table 20. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Diabetes mellitus									
Glasgow, 2003[1]	Individuals interested in their own health care	Personal monitoring device	NS	NS	Type 2 diabetes for more than 1 year, Planning to stay in area for one year, Meet Wellborn criteria for type 2 diabetes		Basic information	Tailored self-management, Peer support	**0.5**
Homko, 2007[2]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Duration, Sep 2004 to May 2006	18-45 yr, documented GDM on 3-h oral glucose tolerance test, using the criteria of Carpenter and Coustan, 33 weeks gestation or less	Prior history of glucose intolerance outside of pregnancy, multiple gestations	Usual care, paper logbooks	Telemedicine (website to document glucose levels and to communicate with health-care team)	**1.5**
McKay, 2001[3]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	≥ 40 or > 39 yr, Type 2 diabetes, physical activity level below the current minimum recommendation	Contraindication to moderate physical activity as assessed by the Physical Activity Readiness Questionnaire	Internet information only	Internet Active Lives Intervention	**2.5**
Richardson, 2007 [4] Diabetes	Type 2 diabetics	Pedometer hooked onto Interactive computer based feedback mechanism	Home/res	NS	18 y/o Type 2 DM, email users w/ Window XP/2000 and self reported moderate PA less than 150 min/week. English speaking. Interested in starting a walking program (cleared by a physician)	Pregnant women and folks who have used pedometer in last 30 days	Employing lifestyle goals for overall steps recorded from the pedometer	Employing structured goals that emphasize PA using computerized feedback mechanisms	
Wangberg, 2006[5]	Individuals interested in their own health care	Interactive consumer website	NS	NS	17-67 yr, Type I or II diabetes, Access to the internet		Low self-efficacy		**2**

Evidence Table 20. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Wise, 1986 [6] Diabetes	Diabetic individuals both NIDDM and IDDM	Interactive computerized machine	Home / Res	Ns	Diabetics attending Charing Cross hospitaland having DM > 2 yrs	None specified	3 controls Used: a. No intervention (used for Glucose control assessment) No KAP b. Just the assessment of the KAP c. Take-away corrective feedback	Interactive computerized machine	
Diabetes, heart disease or chronic lung disease									
Lorig, 2006[7]	Individuals interested in their own health care	Interactive consumer website	NS	NS	>18 yr, Heart disease or chronic lung disease or Type 2 diabetes, Access to a computer with Internet and email capabilities, Agreed to 1–2 h/week of log on time spread over at least 3 sessions/wk for 6 wk, Able to complete the online questionnaire	No cancer treatment in past year, Participated in the small-group Chronic Disease Self-Management Program	Usual care	Treatment	**1.5**

h = hours, NS = not specified, yr = year, GDM = Gestational Diabetes Mellitus, wk = week

Evidence Table 20. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b) (continued)

Reference List

1 Glasgow RE, Boles SM, McKay HG, Feil EG, Barrera M Jr. The D-Net diabetes self-management program: long-term implementation, outcomes, and generalization results. Prev Med 2003; 36(4):410-9.

2 Homko CJ, Santamore WP, Whiteman V *et al*. Use of an internet-based telemedicine system to manage underserved women with gestational diabetes mellitus. Diabetes Technol Ther 2007; 9(3):297-306.

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4 Richardson CR, Mehari KS, McIntyre LG *et al*. A randomized trial comparing structured and lifestyle goals in an internet-mediated walking program for people with type 2 diabetes. Int J Behav Nutr Phys Act 2007; 4:59.

5 Wangberg SC. An Internet-based diabetes self-care intervention tailored to self-efficacy. Health Educ Res 2008; 23(1):170-9.

6 Wise PH, Dowlatshahi DC, Farrant S. Effect of computer-based learning on diabetes knowledge and control. 1986; 9(5):504-8.

7 Lorig KR, Ritter PL, Laurent DD, Plant K. Internet-based chronic disease self-management: a randomized trial. Med Care 2006; 44(11):964-71.

Evidence Table 21. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n(%)	SES	Gender n (%)	Marital Status	Other outcomes
Diabetes mellitus									
Glasgow, 2003[1]	Basic information	Baseline characteristics not reported							
	Tailored self-management intervention								
Homko, 2007[2]	Usual care, Paper logbooks	Mean, 29.2 SD, 6.7	White non-Hispanic, 6(24) Black non-Hispanic, 12(48) Latino/Hispanic, 4(16) API, 3(12)	USD <15,000, 10(40) 15,000-$34,999, 3(12) 35,000-$54,999, 3(12) >55,000, 3(12) missing, 6(24)	< 8 yr, 2(8) 8-12 yr, 12(48) 12-16 yr, 10(40)	NR			BMI: mean, 32.5 SD, 7.1 Gravidity: mean, 2.9 SD, 2.3 Glucose challenge (mg/dl): mean, 179.1 SD, 45.2 GA at diagnosis (weeks): mean, 27.7 SD, 3.8
	Telemedicine (website to document glucose levels and to communicate with health-care team)	Mean, 29.8 SD, 6.6	White non-Hispanic, 8(25) Black non-Hispanic, 14(44) Latino/Hispanic, 7(22) API, 3(9)	USD <15,000, 8(25) 15,000-$34,999, 8(25) 35,000-$54,999, 3(9) >55,000, 6(19) missing, 7(22)	< 8 yr, 4(12.5), 8-12 yr, 12(37.5) 12-16 yr,15(47)	NR			BMI : mean, 33.4 SD, 8.6 gravidity: mean, 3 SD, 1.8 glucose challenge (mg/dl): mean, 159.5 SD, 46.3 GA at diagnosis (weeks): mean, 27.5 SD, 4.2
McKay, 2001[3]	Internet information only	Mean, 52.3	White non-Hispanic, (82)	NS	12-16 yr, (50)	NR			Treatment: Taking Insulin: (22) Diagnosed with diabetes for over one or more co morbid chronic

Evidence Table 21. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n(%)	SES	Gender n (%)	Marital Status	Other outcomes
									disease: (75)
	Internet-based physical activity intervention	NS	NS	NS	NS	NR			NS
Richardson, 2007 [4] Diabetes	Employing lifestyle goals for overall steps recorded from the pedometer	52 +- 12	W (76) B (18) O (6)	<30K-18 30-70K-18 >70K-65 (percent)	HS DIP/GED: 6 Some Coll:47 Coll Degree: 18 Grad Degree: 29	NS	M (29)		
	Employing structured goals that emphasize PA using computerized feedback mechanisms	53 +-9	W (77) B (8) O (15)	<30K-8 30-70K-31 >70K-62 (percent)	HS DIP/GED: 8 Some Coll:15 Coll Degree:46 Grad Degree:31	NS	M (38)		
Wangberg, 2006[5]	Low self-efficacy	Mean, 37.3 range, 33.2–41.4	NS	NS	8-12 yr, (11)	NR	F, (63)		Type I Diabetes: (72) Insulin use: (78) HbA1C: (7.7)
	High self-efficacy	Mean, 42.9 range, 38.0–47.9	NS	NS	8-12 yr, (8)	NR	F, (50)		Type I Diabetes: (50) Insulin use: (71) HbA1C: (7.2)
Wise, 1986 [6] Diabetes	IDDM	42 +/- 16	NS	NS	NS		Sex ratio varied from 0.42 to 0.60. The study does not specify any other detail		
	Control Group (AGE +/- SE)								
	Assessment on	44 +/- 17							

Evidence Table 21. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n(%)	SES	Gender n (%)	Marital Status	Other outcomes
	KAP								
	KAP – Feedback – KAP	45 +/- 16							
	KAP – Interactive computer –KAP	41 +/- 18							
	NIDDM	55 +/- 21	NS	NS	NS		Sex ratio varied from 0.42 to 0.60. The study does not specify any other detail		
	Control Group (AGE +/- SE)								
	Assessment on KAP	57 +/- 23							
	KAP – Feedback – KAP	58 +/- 17							
	KAP – Interactive computer –KAP	56 +/- 16							
Diabetes, heart disease or chronic lung disease									
Lorig , 2006[7]	Usual care	Mean, 57.6 SD, 11.3	White non-Hispanic, (88.7)	NS	NS	NR	F, (71.6)		
	Online intervention	Mean, 57.4 SD, 10.5	White non-Hispanic, (87.3)	NS	NS	NR	F, (71.2)		

F = female, M = male, NS = Not specified, NR = Not reported, SES = Socio economic status, API = Asian/Pacific Islander, mg/dl = milligrams/deciliter, HbA1c = hemoglobin A1c, yr = year, USD = united states dollar

Evidence Table 21. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (KQ1b) (continued)

Reference List

1 Glasgow RE, Boles SM, McKay HG, Feil EG, Barrera M Jr. The D-Net diabetes self-management program: long-term implementation, outcomes, and generalization results. Prev Med 2003; 36(4):410-9.

2 Homko CJ, Santamore WP, Whiteman V *et al*. Use of an internet-based telemedicine system to manage underserved women with gestational diabetes mellitus. Diabetes Technol Ther 2007; 9(3):297-306.

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4 Richardson CR, Mehari KS, McIntyre LG *et al*. A randomized trial comparing structured and lifestyle goals in an internet-mediated walking program for people with type 2 diabetes. Int J Behav Nutr Phys Act 2007; 4:59.

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7 Lorig KR, Ritter PL, Laurent DD, Plant K. Internet-based chronic disease self-management: a randomized trial. Med Care 2006; 44(11):964-71.

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
Diabetes mellitus							
Glasgow, 2003[1]	Kristal total (Dietary behavior)	Control		Mean, 2.22 SD, 0.45	10 months: mean, 2.03 SD, 0.38		
		Tailored self-management intervention		Mean, 2.19 SD, 0.46	10 months: mean, 1.93 SD, 0.38		
	Estimated grams of daily fat (grams)	Control		Mean, 44.4 SD, 33.8	10 months mean, 29.8 SD, 14.3		
		Tailored self-management		Mean, 40.8 SD, 23.8	10 months mean, 27.9 SD, 14.3		
	Minutes activity per day (minutes/day)	Control		Mean, 26.8 SD, 20.4	10 months mean, 32.1 SD, 22.9		
		Tailored self-management		Mean, 33.4 SD, 25.4	10 months mean, 30.9 SD, 23		
	Minutes activity per day	Control		Mean, 66.68 SD, 20.66	10 months mean, 79.97 SD, 14.81		
		Tailored self-management		Mean, 63.32 SD, 19.69	10 months mean, 78.4 SD, 14.81		
	Guidelines met (% guidelines met)	Control		Mean, 7.43 SD, 1.71	10 months mean, 7.67 SD, 1.1		
		Tailored self-management		mean, 1.53	10 months mean, 7.42 SD, 1.1		
	Hemoglobin A1C	Control		Mean, 5.18 SD, 1.44	10 months: mean, 5.02 SD, 1.17		
		Tailored self-management		Mean, 5.7 SD, 1.89	10 months: mean, 5.13 SD, 1.16		
	Lipid ratio	Control		Mean, 17.9 SD, 10.56	10 months mean, 12.93		

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
					SD, 9.11		
		Tailored self-management		Mean, 18 SD, 10.02	10 months mean, 13.72 SD, 9.12		
	CES-D total	Control		Mean, 4.14 SD, 1.32	10 months mean, 4.96 SD, 1.12		
		Tailored self-management		Mean, 4.14 SD, 1.2	10 months mean, 4.97 SD, 1.12		
Homko, 2007[2]	Self-efficacy (DES)	Control	25	Score on DES	37 weeks gestation: mean, 4 SD, 0.5		NS
		Telemedicine	32	Score on DES	37 weeks gestation: mean, 4.4 SD, 0.5		
	System use (# of sets of information sent on telemedicine system)	Control	25	Frequency of monitoring (sets of data reported)	37 weeks gestation mean, 73.7 SD, 56.7		NS
		Telemedicine	28		37 weeks gestation mean, 94.8 SD, 60		
	FBS	Control	25	FBS (mg/dl)	37 weeks gestation mean, 88.6 SD, 9.5		NS
		Telemedicine	32		37 weeks gestation mean, 90.8 SD, 11.8		
	A1c at time of delivery	Control	25	A1c at delivery (%)	37 weeks gestation mean, 6.2 SD, 2.2		NS
		Telemedicine	32		37 weeks gestation mean, 6.1 SD, 0.8		
McKay, 2001[3]	Moderate-to-vigorous exercise Unadjusted (minutes/day)	Control	33	Mean, 7.3 SD, 6.2	8 weeks mean, 18 SD, 17.3		
		Internet-based physical	35	Mean, 5.6 SD, 6.2	8 weeks mean, 17.6		

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
		activity intervention			SD, 15.3		
	Walking Unadjusted (minutes/day)	Control	33	Mean, 8.4 SD, 8.4	8 weeks mean, 16.8 SD, 22.8		
		Internet-based physical activity intervention	35	Mean, 6.4 SD, 6.2	8 weeks mean, 12.5 SD, 9.5		
	Depressive symptoms	Control	33	Mean, 17.6 SD, 10.4	8 weeks mean, 19.9 SD, 14.2		
		Internet-based physical activity intervention	35	Mean, 16.9 SD, 11.6	8 weeks mean, 14.9 SD, 12.5		
Richardson, 2007 [4] **Diabetes**	Total Step	Employing lifestyle goals for overall steps recorded from the pedometer	17	4,157 ± 1,737 stps	6,279 ± 3,306	Diff: 2,122 ± 3,179	Ns
		Employing structured goals that emphasize PA using computerized feedback mechanisms	13	5,171 ± 1,769	6,868 ± 3,751	Diff: 1,697 ± 3,564	NS
	Bout Steps	Employing lifestyle goals for overall steps	17	286 ± 599	2,070 ± 2,814	1,783 ± 2,741	S

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
		recorded from the pedometer					
		Employing lifestyle goals for overall steps recorded from the pedometer	13	516 ± 801 (NS from above)	2,616 ± 2,706 (NS diff from above)	2,101 ± 2,815 (NS Diff from above)	S
	Satisfaction	Employing lifestyle goals for overall steps recorded from the pedometer	17			100%	
		Employing lifestyle goals for overall steps recorded from the pedometer	13			62%	P =0.006
	Usefulness	Employing lifestyle goals for overall steps recorded from the pedometer	17			71%	
		Employing lifestyle goals for overall steps	13			31%	P = 0.03

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
		recorded from the pedometer					
	Adherence (Likelihood of wearing a pedometer)	Employing lifestyle goals for overall steps recorded from the pedometer	17			(3)	
		Employing lifestyle goals for overall steps recorded from the pedometer	13			(15)	P < 0.001
	Adherence (Mean hours of wearing a pedometer)	Employing lifestyle goals for overall steps recorded from the pedometer	17		16.5h		
		Employing lifestyle goals for overall steps recorded from the pedometer	13		14.5h		P = 0.038
Wangberg, 2006[5]	Summary of Diabetes Self Care Activities	Low self-efficacy	15	Mean, 29.47 SD, 9.49	1 month - analyzed: mean, 30.60 SD, 8.92		
		High self-	14	Mean, 27.64	1 month - analyzed:		

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
		efficacy		SD, 8.55	mean, 32.07 SD, 7.5		
	Perceived competence scale	Low self-efficacy	15	Mean, 52.20 SD, 13.19	1 month - analyzed mean, 49.73 SD, 14.18		
		High low self-efficacy	14	Mean, 52.07 SD, 10.66	1 month - analyzed mean, 49.93 SD, 10.83		
Wise, 1986 [6] **Diabetes**	IDDM Patients						
	Knowledge Index (KAP Questionnaire) 4—6mo	Assessment of KAP only	24	Knowledge Score: 79 SE 2	82 SE 2		Ns
		Assessment + Feedback	22	78 SE 2	83 SE 3		significant
		Assessment + Interactive computer	20	77 SE 2	83 SE 2		Significant
	NIDDM Patients						
	Knowledge Index (KAP Questionnaire) 4—6mo	Assessment of KAP only	22	Knowledge UNS	UNS		Ns
		Assessment + Feedback	24	64 SE 2	73 SE 2		significant
		Assessment + Interactive computer	21	60 SE 3	70 SE 2		Significant
	IDDM Patients						

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
	Knowledge Index (KAP Questionnaire) 4—6mo	Control	20	HBA1c: 8.9%	8.8%		NS
		Assessment of KAP only	24	9.1 SE 0.2	8.4 SE 0.1		Significant
		Assessment + Feedback	22	9.3 SE 0.5	8.1 SE 0.4		significant
		Assessment + Interactive computer	20	9.3 SE 0.2	8.6 SE 0.3		Significant
	NIDDM Patients						
	Knowledge Index (KAP Questionnaire) 4—6mo	Control	21	HBA1c: 8.7%	8.5%		NS
		Assessment of KAP only	22	9.6 SE 0.4	8.8 SE 0.3		Significant
		Assessment + Feedback	24	9.2 SE 0.4	7.9 SE 0.4		significant
		Assessment + Interactive computer	21	8.7 SE 0.7	7.9 SE 0.6		Significant
Diabetes, heart disease or chronic lung disease							
Lorig, 2006[7]	Change in health distress (0-5)	Control	426	CHANGE in score on Health Distress Scale	12 months: mean, -0.193 SD, 1.07		0.-13 (ANCOVA) 0.025 (repeated measures)
		Online intervention	354	CHANGE in score on Health Distress Scale	12 months: mean, -0.377		

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
					SD, 1.11		
	Change in self reported global health(0-5)	Control	426	0-5 scale	12 months mean, -0.068 SD, 0.645		0.340 (logistic) 0.514 (repeated measures)
		Online intervention	354		12 months mean, -0.102 SD, 0.768		
	Change in illness intrusiveness	Control	426	1-7scale	12 months mean, -0.064 SD, 0.926		0.704 (ANCOVA), 0.061 (repeated measures)
		Online intervention	354		12 months mean, -0.150 SD, 1.023		
	Change in disability	Control	426	0-3 Scale	12 months mean, -0.142 SD, 0.32		BL, 0.051 (ANCOVA) 0.335 repeated measures
		Online intervention	354		12 months mean, -0.166 SD, 0.345		
	Change in fatigue	Control	426	0-10scale	12 months: mean, -0.358 SD, 2.09		
		Online intervention	354		12 months: mean, -0.720 SD, 2.14		
	Change in pain	Control	426	0-10 scale	12 months mean, -0.047 SD, 2.46		
		Online intervention	354		12 months mean, -0.367 SD, 2.72		
	Change in shortness of breath	Control	426	0-10 scale	12 months mean, -0.216 SD, 2.4		
		Online intervention	354		12 months mean, -0.537 SD, 2.41		
	Change in self-efficacy	Control	426	1-10 Scale	12 months: mean, 0.200		

Evidence table 22. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in diabetes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
					SD, 1.82		
		Online intervention	354	1-10 Scale	12 months: mean, 0.406 SD, 1.98		

FBS = fasting blood sugar, DES = Diabetes Empowerment Scale, BL = baseline, NS = not significant, mg/dl = milligrams/deciliter

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Evidence table 23. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in mental health

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Depression/anxiety									
Christensen, 2004[1]	Individual interested in their own health care	Interactive consumer website	NS	NS	≥18 yr, Internet access, 22 or higher on the Kessler psychological distress scale	>52 yr, receiving clinical care from either a psychologist or psychiatrist	Control	Mood GYM, Blue Pages	**2**
Neil, 2009[2]	Depressed/ Anxious youth	Interactive consumer website	School – classroom / community	2006-07	Adolescents 13 – 17 yrs completing the YouthMood project	NS	Use of website (open access) in community	Use of website (open access) in classroom	
Proudfoot, 2004[3]	Individual interested in their own health care	Computerized cognitive behavioral therapy	Clinician office	NS	18-75 yr, Depression, Anxiety and depression, Anxiety, Not currently receiving any form of psychological treatment or counseling, Score of 4 or more on the 12 item general health questionnaire, 12 or more on the computer version of the Clinical Interview Schedule-Revised	Active suicidal ideas, Diagnosis of psychosis or organic mental disorder, alcohol and/or drug dependence, Medication for anxiety and/or depression continuously for 6 months or more immediately prior to entry, Unable to attend 8 sessions at the surgery, Unable to read or write English	Treatment as usual	Computerized therapy	**3**
Warmerdam, 2008[4]	Depressed / Anxious	Interactive Consumer website	Home / res	08-09/06 – 01-02/07	>18 yrs, Score of >=16 on CES-D, knew Dutch, internet and email access	CES-D scores greater than 32	Wait-listed controls	Interactive computer tool based on Cog. Beh. Theory and Prob. Sol. Theory	
Phobia									

Evidence table 23. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Schneider, 2005[5]	Individual interested in their own health care	Web based tailored self help information	Home/ residence, Remote location: preferred site of patient	NS	Fulfill ICD-10 criteria for agoraphobia with/without panic disorder, social phobia or specific phobia, 4≥ for global phobia, Main goal negotiated and set with clinician, phobia for more than one year, Men: alcohol <21 units/week, Women: alcohol <14 units/week, No reading disorder hindering net use	Current psychotic illness, suicide plans, no severe depression, disabling cardiac or respiratory disease, On benzodiazepine or diazepam equivalent dose of >5 mg/day, began or changed dose or type of antidepressant within the last 4 weeks, Substance abuse, Failed past exposure therapy of >4 sessions		Managing Anxiety application, Fear Fighter application	**1**
Stress									
Chiauzzi, 2008[6]		Interactive consumer website,	University	2005	≥18 and ≤24 yr, college students, scoring above 14 on the		A control website (CW)	MyStudentBody–Stress website, No treatment control (NTX)	**0**
Hasson, 2005[7]	Individual interested in their own health care	Personal monitoring device	NS	NS	Employment at a company insured by Alecta (occupational pension plan company)	those who quit employment prior to completion of study, "communication related problem"	Access to web-based tool	Web-based tool with control group components plus self-help with stress management exercises and chat	**2**
Stress Management									
Zetterqvist,	For stress	Interactive	Home / res	04/2000 –	No specified inclusion or exclusion criteria		Control	Interactive	

Evidence table 23. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
2003 [8]	management for gen population	consumer web		06-07/2000	unless the participant expressed a condition that would prevent him / her from completing the study			self help stress management program	

NS = not specified, Yr = year

Reference List

1. Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: randomised controlled trial. BMJ 2004; 328(7434):265.

2. Neil AL, Batterham P, Christensen H, Bennett K, Griffiths KM. Predictors of adherence by adolescents to a cognitive behavior therapy website in school and community-based settings. J Med Internet Res 2009; 11(1):e6.

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Evidence Table 24. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in mental health

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
Depression/anxiety									
Proudfoot, 2004[1]	Usual care	Mean, 43.4 SD, 13.7	Bangladeshi, 1(1) Black Caribbean, 4(4) Indian, 3(3) Pakistani, 1(1) White,100(87)		0-10 yr, 17(14) 11-12 yr, 28(23) 13-15 yr, 30(25) >15 yr, 46(38)		M, 32(25) F, 96(75)	Single, 33(26) Married, 54(43) Cohabiting, 11(9) Separated, 7(6) Divorced,15(12) Widowed, 5(4)	Previous computer use No, 23(18) Yes, 103(82)
	Internet therapy	Mean, 43.6 SD, 14.3	Black African, 1(1) Black Caribbean, 2(2) Black other, 3(2) White, 120(90)		<5 yr, 1(1) 11-12 yr, 34(24) 13-15 yr, 31(22) >15 yr, 58(41)		M, 40(27) F,106(73)	Single, 35(25) Married, 60(43) Cohabiting, 16(11) Separated, 4(3) Divorced,18(13) Widowed, 8(6)	
Christensen, 2004[2]	Control	Mean, 36.29 SD, 9.3			Mean, 14.4 SD, 2.3		F,124(70) M, 54(30)	Married Cohabiting, 100(56) Divorced/ separated, 24(14) Never married, 53(36)	Kessler psychological distress scale, mean, 18 SD, 5.7 Center for Epidemiologic studies depression score, mean, 21.6 SD, 11.1
	Mood gym	Mean, 35.85 SD, 9.5			Mean, 14.6 SD, 2.4		F,136(75) M, 46(25)	Married/ cohabiting, 98(54) Divorced/ separated, 26(14) Never married, 57(31)	Kessler psychological distress scale, mean, 17.9 SD, 5 Center for Epidemiologic Studies depression scale, mean, 21.8 SD, 10.5
	Blue Pages	Mean, 37.25 SD, 9.4			Mean, 15 SD, 2.4		F,115(69) M, 50(31)	Married/ cohabiting, 100(61) Divorced/ separated, 24(15) Never Married,	Kessler psychological distress scale, mean, 17.5 SD, 4.9 Center for Epidemiologic Studies

Evidence Table 24. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
								53(30)	depression scale, mean, 21.1 SD, 10.4
Neil, 2009 [3]	Use of website (open access) in community	13 – 17 yrs	NS				5223/7207 F 72%		(19) rural area (N 1396) (66) depressed (N 4734)
	Use of website (open access) in classroom						597/1000 F (59.7)		(19) from rural area (N 193) (29) depressed (N 287)
Warmerdam, 2008 [4]	Wait-listed controls (87)	44.1	NS	Paid Jobs w/: 49 (58.3)	Lower: 9 (10.3) Middle: 28 (32.2) Higher: 50 (57.5)	NR	69 (79.3)		
	Interactive computer tool based on Cog. Beh. Theory (88)	45.7		43 (52.4)	Lower: 9 (10.2) Middle: 26 (29.5) Higher: 53 (60.2)		61 (69.3)		
	Interactive computer tool based on Prob. Sol. Theory (88)	45.1		43 (50.6)	Lower: 5 (5.7) Middle: 18 (20.5) Higher: 65 (73.9)		57 (64.8)		
Phobia									
Schneider, 2005[5]	Control	NS	NS	NS	NS	NR			NS
	Computer aided cognitive behavior therapy with self-help exposure	NS	NS	NS	NS	NR			NS
Stress									
Chiauzzi, 2008[6]	A control website(CW),	Range, 18-24	White non-Hispanic, 48 black non-Hispanic, 12	NS	Yr in School(n), First, 29 Second, 18 Third, 19	NR	M, 40 F, 43		

Evidence Table 24. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other	
			Latino/Hispanic, 9 API,(16) Other 7		Fourth,17					
	MyStudent Body–Stress website	Range, 18-24	White non-Hispanic, 44 Black non-Hispanic, 13 Latino/Hispanic, 5 API, 14 Other, 7	NS	Yr in School(n), First, 30 Second, 16 Third, 19 Fourth, 13	NR	M, 34 F, 44			
	NTX	Range, 18-24	White non-Hispanic, 50 Black non-Hispanic, 7 Latino/Hispanic, 8 API, 13 Other, 8	NS	Yr in school (n), First, 23 Second, 19 Third, 12 Fourth, 24	NR	M, 42 F, 36			
Hasson, 2005[7]	Access to web-based tool including monitoring tool for stress and health; diary connected to monitoring tool, and scientific info on stress and health	NS	NS	USD <25,000, 39(22) 25,000-40,000, 106(61) >40,000, 27(16)	8-12 yr, 89(51) 12-16yr, 83(48)	NR	M, 112(64) F, 62(36)	Married, 134(77) Single, 38(22)		
		NS	NS	USD <25,000, 24(18) 25,000-40,000, 76(59) >40,000, 27(21)	8-12yr, 54(42) 12-16yr,73(57)	NR	M, 75(58) F, 54(42)	Married, 102(79) Single, 25(19)		
Stress Management										
Zetterqvist,	Control Group	38.7 (26—	NS	Work	Student: 5 (12)	NS	M: 14/40		Civil	No. of

Evidence Table 24. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other	
2003 [8]		60)		hours per week: 36.3 (0—60)	Work: 33 (83) Unemployed: 2 (5)		(35%)		Standing: Single: 14 (35) Living with partner: 9 (23) Married: 17 (43)	children: Mean: 0.98 (0—4)
	Self Help for stress management via internet	40.0 (24—56)		Mean: 29.6 (0—60)	Student: 5 (22) Work: 15 (65) Unemployed:3 (13)		M: 10/23 (43%)		Single: 8 (35) Living with partner: 6 (26) Married: 9 (39)	

NR = Not reported, M = male, F = female, AIAN = American Indian/Alaska Native, API = American/Pacific Islander, SD = standard deviation, SES= Socioeconomic Status, USD = United States Dollar

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Evidence Table 24. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

6. Chiauzzi E, Brevard J, Thurn C, Decembrele S, Lord S. MyStudentBody-Stress: an online stress management intervention for college students. J Health Commun 2008; 13(6):555-72.

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Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
Depression/anxiety										
Proudfoot, 2004[1]	Depression (BDI)	Control	109	BDI				6 Month: mean,16.2 SD, 10.1		0.0006
		Computerized Therapy	112	BDI				6 Month: mean, 11.6 SD, 9.6		0.0006
	Anxiety (BAI)	Control	110	BAI				6 Month mean, 12.8 SD, 9.1		0.06
		Computerized Therapy	115	BAI				6 Month mean, 10.6 SD, 8.4		0.06
	Work and Social Adjustment scale	Control	110					6 Month mean, 13.4 SD, 8.6		
		computerized therapy	115					6 Month mean, 10 SD, 7.8		
	ASQ,CoNeg	Control	106					6 Month mean, 84.1 SD, 13.6		
		Computerized therapy	106					6 Month mean, 73.7 SD, 15.3		
	ASQ,CoPos	Control	106					6 Month: mean, 82.8 SD, 12.5		
		Computerized therapy	108					6 Month: mean, 87.6 SD, 13.5		
Neil, 2009 [2]	Depression score (Pre-test)	Use of website (open access) in community	7207	5.46 SD 2.42						
		Use of website (open	1000	2.62 SD 2.42						

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		access) in classroom								
	Anxiety (Pre-test)	Use of website (open access) in community	7207	5.50 SD 2.59						
		Use of website (open access) in classroom	1000	2.51 SD 2.44						
	Warpy thoughts score	Use of website (open access) in community	7207	3.16 SD 0.71						
		Use of website (open access) in classroom	1000	2.58 SD 0.65						
	No. of exercises completed (0—28)	Use of website (open access) in community	7207	3.10 SD 3.85						P < 0.001
		Use of website (open access) in classroom	1000	9.38 SD 6.84						
Warmerda,	Depression	Wait-listed	87	32.1 (9.3)	25.6 (9.9)	25.2 (9.9)		25.8 (10.4)		Significant improvement

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
2008 [3]	(CES – D)	controls (87)								with time. Yellow indicates significant difference
		Interactive computer tool based on Cog. Beh. Theory (88)	88	31.2 (9.3)	22.9 (10.6)	19.4 (11.3)		17.9 (11.7)		
		Interactive computer tool based on Prob. Sol. Theory (88)	88	31.9 (9.3)	20.6 (11.2)	20.6 (11.3)		18.4 (12.1)		
	Anxiety using HADS	Wait-listed controls (87)	87	11.3 (3.6)	8.9 (3.9)	9.0 (3.8)		8.9 (4.0)		Significant improvement with time. Yellow indicates significant difference
		Interactive computer tool based on Cog. Beh. Theory (88)	88	10.6 (3.6)	7.8 (4.1)	6.7 (4.4)		6.6 (4.5)		
		Interactive computer tool based on Prob. Sol. Theory (88)	88	10.2 (3.6)	7.1 (4.3)	6.9 (4.4)		6.6 (4.7)		
	QoL using EQ5D	Wait-listed controls (87)	87	0.59 (0.18)	0.69 (0.27)	0.65 (0.27)		0.66 (0.27)		Significant improvement with time. Yellow indicates significant
		Interactive computer tool based on	88	0.64 (0.18)	0.68 (0.27)	0.73 (0.27)		0.76 (0.27)		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		Cog. Beh. Theory (88)								difference
		Interactive computer tool based on Prob. Sol. Theory (88)	88	0.59 (0.18)	0.73 (0.27)	0.73 (0.27)		0.76 (0.27)		
	Depression (CES – D) Proportion reaching clinically significant change	Wait-listed controls (87)	87		E: 0 (0.0) O: 10 (14.1)	E:0 (0.0) O: 15 (21.1)		E: 0 (0.0) O: 9 (14.3)		Brackets is %
		Interactive computer tool based on Cog. Beh. Theory (88)	88		E: 0 (0.0) O: 11 (18.0)	E: 26 (29.5) O: 21 (41.2)		E: 34 (38.6) O: 18 (39.1)		
		Interactive computer tool based on Prob. Sol. Theory (88)	88		E: 18 (20.5) O: 19 (36.5)	E: 18 (20.5) O: 20 (39.2)		E: 30 (34.1) O: 17 (40.5)		
Christensen, 2004[4]	Center for Epidemiologic depression scale	Control	159	Mean score point improvement over baseline mean, 21.6 SD, 11.1				6 weeks: mean, 1.1 SD, 8.4		
		Blue Pages: Computer based psycho education	136	Mean score point improvement over baseline				6 weeks: mean, 3.9 SD, 9.1		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		website offering information about depression		mean, 21.1 SD, 10.4						
		Mood GYM: Computer based Cognitive Behavior therapy	136	Mean score point improvement over baseline mean, 21.8 SD, 10.5				6 weeks: mean, 4.2 SD, 9.1		
	Automatic thoughts	Control	159	Mean score point improvement over baseline				6 weeks mean, 3.1 SD, 15.8		
		Blue Pages: Computer based psycho education website offering information about depression	136	Mean score point improvement over baseline				6 weeks mean, 6.4 SD, 18.1		
		Mood GYM: Computer based Cognitive Behavior therapy	136	Mean score point improvement over baseline				6 weeks mean, 9.3 SD, 16.9		
	Medical literacy	Control	159	Mean score point improvement over baseline				6 weeks mean, -0.1 SD, 0.5		
		Blue Pages: Computer based psycho education website	136	Mean score point improvement over baseline				6 weeks mean, -0.6 SD, 0.7		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		Offering information about depression								
		Mood GYM: Computer based cognitive behavior therapy	136	Mean score point improvement over baseline				6 weeks mean, -0.1 SD, 0.5		
	Psychological literacy	Control	159	Mean score point improvement over baseline				6 weeks mean, -0 SD, 0.9		
		Blue Pages: Computer based psycho education website offering information about depression	136					6 weeks mean, -0.7 SD, 1.1		
		Mood GYM: Computer based cognitive behavior therapy	136					6 weeks mean, -0.5 SD, 1		
	Lifestyle literacy	Control	159	Mean score point improvement over baseline				6 weeks: mean, 0.1 SD, 1.6		
		Blue Pages: Computer based psycho education website offering	136	Mean score point improvement over baseline				6 weeks: mean, -1.1 SD, 2		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		information about Depression								
		Mood GYM: Computer based cognitive behavior therapy	136	Mean score point improvement over baseline				6 weeks: mean, -0 SD, 0.5		
	Cognitive behavior therapy literacy	Control	159	Mean score point improvement over baseline				6 weeks mean, 0.1 SD, 1.6		
		Blue Pages: Computer based psycho education website offering information about depression	136	Mean score point improvement over baseline				6 weeks mean, -1.1 SD, 2		
		Mood GYM: Computer based cognitive behavior therapy	136	Mean score point improvement over baseline				6 weeks mean, -2 SD, 2.4		
Phobia										
Schneider, 2005[5]	Main problem(self-rating)	Control	13	Mean, 7.2 SD, 1.4	Week 10 mean, 4.9 SD, 2			Week 14: mean, 4.9 SD, 1.7		
		Computer aided cognitive behavior therapy with self-help exposure	31	Mean, 7 SD, 1.2	Week 10 mean, 4.7 SD, 2			Week 14: mean, 4.1 SD, 2.1		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
	Main goal(self-rating)	Control	13	Mean, 7.3 SD, 1.6	Week 10 mean, 4.8 SD, 2			Week 14 mean, 5 SD, 1.9		
		Computer aided cognitive behavior therapy with self-help exposure	31	Mean, 7 SD, 1.2	Week 10 Mean, 4.5 SD, 2.4			Week 14 mean, 4.2 SD, 2.2		
Stress										
Chiauzzi, 2008[6]	Perceived Stress Scale	Control	78					7 months		0.77
		MyStudent Body–Stress website	77					7 months		
		No treatment control (NTX)	80					7 months		
Hasson, 2005[7]	Self rated stress management	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up: mean, SD,		Time*group effect= .001
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up: mean, SD,		Time*group effect= .001
	Self rated sleep quality	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect=.04
		Web-based stress management system	121	Changes in self rated measures and biological markers				6 month follow-up		Time*group effect=.04

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
				covariate for baseline scores						
	Self rated mental energy	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect= .002
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .002
	Self rated concentration ability	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .038
		Web-based stress management system	121					6 month follow-up		BL, Time*group effect: .038
	Self rated social support	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .049
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .049
	Biological marker: dehydroeoiand	Control	156	Changes in self rated measures and biological				6 month follow-up		Time*group effect: .04

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
	osterone sulphate			markers covariate for baseline scores						
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .04
	Nero peptide	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .002
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect= .002
	Chromogranin	Control	156	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .001
		Web-based stress management system	121	Changes in self rated measures and biological markers covariate for baseline scores				6 month follow-up		Time*group effect: .001
Stress										
Zetterqvist, 2003 [8]	Perceived Stress Scale	Control	40	M 33.17 SD 3.76				M 28.88 SD 7.02		Significant difference
		Interactive	23	32.91 SD 6.08				24.48 SD		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
		self help stress management program						7.17		
	Hospital Anxiety and Depression Scale HADS	Control	40	23.23 SD 5.85				18.70 SD7.64		
		Interactive self help stress management program	23	23.61 SD 5.96				14.13 SD 7.09		
	Anxiety	Control	40	13.85 SD 4.12				11.10 SD 5.05		
		Interactive self help stress management program	23	13.43 SD 4.00				8.39 SD 4.50		
	Depression	Control	40	9.38 SD 3.07				7.60 SD 3.13		
		Interactive self help stress management program	23	10.17 SD 2.90				5.74 SD 3.14		

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significances
	LE (Life Events) (Holmes and Rahes Scale)	Control	40	1.55 SD 1.22				1.60 SD 1.28		
		Interactive self help stress management program	23	1.52 SD 1.38				1.48 SD 1.38		
	Perceived Social Support PS-family	Control	40	9.80 SD 3.45				9.62 SD 3.62		
		Interactive self help stress management program	23	8.48 SD 3.46				8.61 SD 3.63		
	Perceived Social Support PS-friends	Control	40	9.40 SD 3.26				9.82 SD 3.99		
		Interactive self help stress management program	23	9.78 SD 3.66				10.09 SD 4.01		

BL = baseline, SD = standard deviation, BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, ASQ C0Neg/CoPos = Attribution Style Questionnaire, composite index for negative/positive situations

Evidence Table 25. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in mental health (continued)

Reference List

1. Proudfoot J, Ryden C, Everitt B *et al*. Clinical efficacy of computerised cognitive-behavioural therapy for anxiety and depression in primary care: randomised controlled trial. Br J Psychiatry 2004; 185:46-54.

2. Neil AL, Batterham P, Christensen H, Bennett K, Griffiths KM. Predictors of adherence by adolescents to a cognitive behavior therapy website in school and community-based settings. J Med Internet Res 2009; 11(1):e6.

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4. Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: randomised controlled trial. BMJ 2004; 328(7434):265.

5. Schneider AJ, Mataix-Cols D, Marks IM, Bachofen M. Internet-guided self-help with or without exposure therapy for phobic and panic disorders. Psychother Psychosom 2005; 74(3):154-64.

6. Chiauzzi E, Brevard J, Thurn C, Decembrele S, Lord S. MyStudentBody-Stress: an online stress management intervention for college students. J Health Commun 2008; 13(6):555-72.

7. Hasson D, Anderberg UM, Theorell T, Arnetz BB. Psychophysiological effects of a web-based stress management system: a prospective, randomized controlled intervention study of IT and media workers. BMC Public Health 2005; 5:78.

8. Zetterqvist K, Maanmies J, Str+¦m L, Andersson G. Randomized controlled trial of internet-based stress management. 2003; 32(3):151-60.

Evidence Table 26. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in asthma and COPD (KQ1b)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Asthma									
Jan , 2007[1]	Individuals interested in their own health care Caregiver, childhood asthma	Personal monitoring device	Home/ residence	2004/ January to December	6 - 12 yr, Caregivers have Internet access, Persistent asthma diagnosis (GINA clinical practice guidelines)	Diagnosed with bronchopulmonary dysplasia, Diagnosed with other chronic co morbid conditions that could affect quality of life	Verbal information and booklet for asthma education with written asthma diary.	Blue Angel for Asthma Kids An Internet-based diary record for peak expiratory flow rate Symptomatic support information, and an action plan suggestion, and telecommunication technologies for uploading and retrieving the storage data	**1.5**
Joseph, 2007[2]	Individuals interested in their own health care	Interactive consumer website	Remote location: school	NS	9-11 grade, Current asthma		Generic asthma website	Tailored website	**2.5**
Krishna, 2003[3]	Individuals interested in their own health Caregiver: Parents/ caregivers	Personal monitoring device	Home/ residence	1999/ NS	<18 yr, Confirmed asthma	Cystic fibrosis, Bronchopulmonary dysplasia, Other chronic lung disease	Traditional care	Internet-enabled interactive multimedia asthma education program	**1**
COPD									
Nguyen, 2008[4]	Individuals interested in their own health care	Interactive consumer website	Academic medical centers	2005	Diagnosis of COPD and being clinically stable for at least 1 month, Spirometry results showing at least mild obstructive	Any active symptomatic illness, Participated in a pulmonary rehabilitation program in the last 12 months,	Face-to-face (fDSMP)	Internet-based (eDSMP)	**2.5**

Evidence Table 26. Description of RCTs addressing the impact of CHI applications on intermediate outcomes in asthma and COPD (KQ1b) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					disease, ADL limited by dyspnea, Use of the Internet and/or checking email at least once per week with a windows operating system, Oxygen saturation > 85% on room air or ¡Ü 6 L/min of nasal oxygen at the end of a 6-minute walk test	Were currently participating in > 2 days of supervised maintenance exercise			

NS = not specified, yr = year, PEFR = Peak expiratory flow rate, COPD = Chronic obstructive pulmonary disease, ADL = Activities of daily living, eDSMP = Internet based dyspnea self-management programs, fDSMP = face-to-face dyspnea self-management programs, min = minutes

Reference List

1. Jan RL, Wang JY, Huang MC, Tseng SM, Su HJ, Liu LF. An internet-based interactive telemonitoring system for improving childhood asthma outcomes in Taiwan. Telemed J E Health 2007; 13(3):257-68.

2. Joseph CL, Peterson E, Havstad S *et al*. A web-based, tailored asthma management program for urban African-American high school students. Am J Respir Crit Care Med 2007; 175(9):888-95.
   Notes: CORPORATE NAME: Asthma in Adolescents Research Team

3. Krishna S, Francisco BD, Balas EA, Konig P, Graff GR, Madsen RW. Internet-enabled interactive multimedia asthma education program: a randomized trial. Pediatrics 2003; 111(3):503-10.
   Notes: CORPORATE NAME: Randomized trial

4. Nguyen HQ, Donesky-Cuenco D, Wolpin S *et al*. Randomized controlled trial of an internet-based versus face-to-face dyspnea self-management program for patients with chronic obstructive pulmonary disease: pilot study. J Med Internet Res 2008; 10(2):e9.

Evidence Table 27. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in asthma and COPD (KQ1b)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n (%)	SES	Gender, n (%)	Other characteristics
Asthma								
Jan, 2007[1]	Verbal information and booklet for asthma education with written asthma diary	Mean, 9.9 SD, 3.2	NS	NS	Education of primary caregiver: HS diploma or below, 43 (56.6) College or above, 33 (43.4)	NR	M, 28(36.8) F, 48(63.2)	History of asthma (yr): mean, 2.1 SD, 1.2 Asthma severity: mild, 33(43.4) moderate, 35(46.1) severe, 8(10.5)
	Participants received asthma education and with interactive asthma monitoring system	Mean, 10.9 SD, 2.5			Education of primary caregiver: HS diploma or below, 58(66.0) College or above, 30 (34.0)		M, 35(39.7) F, 53(60.2)	History of asthma (yr): mean, 2.4 SD, 1.9 Asthma severity: mild, 33(37.5) moderate, 43(48.9) severe, 12(13.6)
Joseph, 2007*[2]	Generic asthma website	Mean, 15.3 SD, 1	NS	USD mean, 12,049 SD, 2,442	NS	NR	F, 199 (63.4)	
	Tailored website							
Krishna, 2003†[3]	Traditional care	Range, 0-17 yr	White non-Hispanic, 102(84.3) Black non-Hispanic, 9(7.4) AIAN, 7(5.8) Other, 3	NS	Preschool/none: 58 (47.9) Kindergarten: 6(5) Elementary: 27(22.3) Jr High 24 (19.8) High School 6 (5)	NR	M, 76 (62.8) F, 45 (37.2)	
	Internet-enabled interactive multimedia asthma education program	Range, 0-17 yr	White non-Hispanic, 93(86.9) Black non-Hispanic, 10(9.3) AIAN, 2(1.9) Other, 2(1.9)		Preschool/none: 48 (44.9) Kindergarten: 12(11.2) Elementary: 23 (21.5) Jr High 19 (17.6) High school 5 (4.1)		M, 72 (67.3) F, 35 (32.7)	
COPD								
Nguyen, 2008[4]	Face-to-face (fDSMP),	Mean, 70.9 SD, 8.6	White non-Hispanic, 20(100)	NS	12-16 yr, 8(40) >16yr, 12(60)	Not currently employed or currently disabled or	F, 9 (45)	Currently smoking: 1 (5)

Evidence Table 27. Description of consumer characteristics in studies addressing the impact of CHI applications on intermediate outcomes in asthma and COPD (KQ1b) (continued)

Author, year	Control Interventions	Age	Race, n (%)	Income	Education, n (%)	SES	Gender, n (%)	Other characteristics
						retired: 15 (75)		
	eDSMP	Mean, 68 SD, 8.3	White non-Hispanic, 18 (95)		12-16 yr, 10(50) >16yr, 9(50)	Not currently employed or currently disabled or retired: 13 (72)	F, 8(39)	Currently smoking: 2 (11)

* Consumer characteristics were not stratified by intervention
† Education of caregiver was not reported

NS = not specified, SES = Socioeconomic Status, F = female, M = male, AIAN = American Indian/Alaska Native, Yr = year, SD = standard deviation, NR= Not Reported
USD = United States dollar, eDSMP = Internet-based dyspnea self-management programs, fDSMP = face to face dyspnea self management programs

Reference List

1. Jan RL, Wang JY, Huang MC, Tseng SM, Su HJ, Liu LF. An internet-based interactive telemonitoring system for improving childhood asthma outcomes in Taiwan. Telemed J E Health 2007; 13(3):257-68.

2. Joseph CL, Peterson E, Havstad S *et al*. A web-based, tailored asthma management program for urban African-American high school students. Am J Respir Crit Care Med 2007; 175(9):888-95.

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4. Nguyen HQ, Donesky-Cuenco D, Wolpin S *et al*. Randomized controlled trial of an internet-based versus face-to-face dyspnea self-management program for patients with chronic obstructive pulmonary disease: pilot study. J Med Internet Res 2008; 10(2):e9.

Evidence Table 28. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes of asthma and COPD (KQ1b)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at final time point	ratios at time points	Significance
Asthma								
Jan , 2007[1]	Monitoring adherence (peak flow meter technique score (%))	Control	71	85.6	NA	12 week, 93.5	NA	
		Education and interactive asthma monitoring system	82	83.5		12 week, 99.7		
	Monitoring adherence (asthma diary entries per month)	Control	71	Mean, 21 SD, 4.5		12 weeks, mean, 15 SD, 5.3		Significantly different from BL value
		Education and interactive asthma monitoring system	82	Mean, 27 SD, 3.2		12 weeks, mean, 23 SD, 4.3		
	Monitoring adherence (adherence to asthma diary (%))	Control	71	93.2		12 weeks, 53.4		
		Education and interactive asthma monitoring system	82	96.0		12 weeks, 82.5		
	Therapeutic adherence (DPI or MDI plus spacer technique score (%))	Control	71	80.3		12 week, 93.1		
		Education and interactive asthma monitoring system	82	82.1		12 week, 96.5		
	Therapeutic adherence (adherence to inhaled corticosteroid, (%))	Control	71	82.3		12 week, 42.1		
		Education and interactive asthma monitoring system	82	83.5		12 week, 63.2		
Joseph , 2007[2]	Controller medication adherence: positive behavior change	Control	143	NR	NA	12 months, n(%) 18 (12.6)	NA	0.09
		Puff City internet intervention	152			12 months, n(%) 31 (20.4)		
	Controller medication adherence: no change in negative behavior	Control	143			12 months, n(%) 91 (63.6)		0.09
		Puff City internet intervention	152			12 months, n(%) 95 (62.5)		
	Controller medication adherence: negative change in behavior	Control	143			12 months, n(%) 34 (23.8)		0.09
		Puff City internet intervention	152			12 months, n(%) 26 (17.1)		
	Rescue inhaler availability: positive behavior change	Control	143			12 months, n(%) 46 (32.2)		0.01
		Puff City internet intervention	152			12 months, n(%) 59 (38.8)		
	Rescue inhaler availability:	Control	143			12 months, n (%) 62 (43.3)		0.01

Evidence Table 28. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes of asthma and COPD (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at final time point	ratios at time points	Significance
	no change in negative behavior	Puff City internet intervention	152			12 months, n (%) 74 (48.7)		
	Rescue inhaler availability: negative change in behavior	Control	143			12 months, n (%) 35 (24.5)		0.01
		Puff City internet intervention	152			12 months, n (%) 19 (12.5)		
Krishna, 2003[3]	Asthma Knowledge score (caregivers of children 0-6yr)	Control	23	Mean, 48.41 SD, 6.64	NA	12 months mean, 52.3 SD, 5.55	NA	<0.01
		Interactive asthma education	24	Mean, 47.94 SD, 5.24		12 months mean, 55.68 SD, 4.28		
	Asthma knowledge score (caregivers of children 7-17yr)	Control	28	Mean, 49.57 SD, 4.75		12 months mean, 55.38 SD, 4.16		<0.01
		Interactive asthma education	26	Mean, 49.95 SD, 5.59		12 months mean, 55.68 SD, 4.28		
	Asthma knowledge score (children 7-17yr)	Control	28	Mean, 43.44 SD, 4.75		12 months mean, 47.51 SD, 5.95		<0.001
		Interactive asthma education	25	Mean, 49.95 SD, 6.10		12 months mean, 53.12 SD, 5.56		
	Change in knowledge(caregivers of children 0-6yr)	Control	23			mean, 2.52 SD, 6.71 median, 5 95% CI, -0.38 to 5.42		0.0293
		Interactive asthma education	24			mean, 7.97 SD, 4.57 median, 7 95% CI, 5 to 11		<0.0001
	Change in knowledge (caregivers of children 7-17yr)	Control	28			mean, 2.38 SD, 4.38 median, 2.55 95% CI, 0 to 4		0.0079
		Interactive asthma education	26			mean, 4.62 SD, 4.48 median, 3 95% CI, 2 to 7		<0.0001

Evidence Table 28. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes of asthma and COPD (KQ1b) (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at final time point	ratios at time points	Significance
	Change in knowledge (children 7-17yr)	Control	27			mean, 4.44 SD, 5.49 median, 4 95% CI, 2 to 7		0.0001
		Interactive asthma education	25			mean, 10 SD, 6.99 median, 8 95% CI, 7 to 11		<0.0001
COPD								
Nguyen, 2008[4]	Dyspnea knowledge score (range 0-15)	Face-to-face dyspnea self-management program	20	Mean, 12.5 SD, 2.3	3 months mean,13.3 SD, 1.6	6 months mean,13.8 SD, 1.5	NA	Group P: 0.49 time *P* value: <0.001 group X time P value: 0.68
		Internet-based dyspnea self-management program	19	Mean, 12.6 SD, 1.8	3 months mean, 13.8 SD,1.0	6 months mean, 14.1 SD, 1.0		
	Self-efficacy score for managing dyspnea (range 0-10)	Face-to-face dyspnea self-management program	20	Mean, 4.6 SD, 2.4	3 months mean, 5.5 SD,3.3	6 months mean, 5.0 SD, 3.6		Group P: 0.18 time P value: 0.2 group X time P value: 0.34
		Internet-based dyspnea self-management program	19	Mean, 4.7 SD, 2.3	3 months mean, 6.8 SD,2.3	6 months mean, 6.7 SD, 2.6		

NS = not specified, NA = not applicable, yr = year, SD = standard deviation, BL = baseline, NR = not reported

Reference List

1. Jan RL, Wang JY, Huang MC, Tseng SM, Su HJ, Liu LF. An internet-based interactive telemonitoring system for improving childhood asthma outcomes in Taiwan. Telemed J E Health 2007; 13(3):257-68.

2. Joseph CL, Peterson E, Havstad S *et al*. A web-based, tailored asthma management program for urban African-American high school students. Am J Respir Crit Care Med 2007; 175(9):888-95.

3. Krishna S, Francisco BD, Balas EA, Konig P, Graff GR, Madsen RW. Internet-enabled interactive multimedia asthma education program: a randomized trial. Pediatrics 2003; 111(3):503-10.

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Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
CVD									
Kukafka, 2002[1]	Individuals interested in their own health care	Interactive consumer website	NS	NS	Unspecified AMI risk criteria			Tailored Web-based, Non-tailored Web-based Non-tailored paper based.	**-1**
Simkins, 1986[2]	Individuals interested in their own health care	Electronic medication reminder	Primary care or specialty clinics at an university health care	Duration, 3 months	64-67yr		Group1	Group 2, Group 3	**3**
Arthritis									
Lorig, 2008[3]	Individuals interested in their own health care	Interactive consumer website	NS	2004/NS	18 and older, a diagnosis of OA, rheumatoid arthritis (RA), or fibromyalgia, could have other chronic conditions Internet and email access agreed to 1–2 hours per week of log-on time spread over at least 3 sessions/week for 6 weeks	Active treatment for cancer for 1 year, participated in the small-group ASMP or the Chronic Disease Self-Management Program	Usual care	Online intervention	**1**
Back pain									
Buhrman, 2004[4]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	18-65 years old, Internet access, been in contact with a physician, have back pain, have chronic pain (>3 months)	Suffer of pain that can increase as a consequence of activity, wheelchair bound, have planned any surgical treatment, suffer from heart	Wait-list	Internet-based pain management program	**2**

Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
						and vascular disease			
Behavioral risk factors									
Oenema, 2008[5]	Individuals interested in their own health care	Personalized health risk assessment tool	NS	2004/ NS	30 years or older, Dutch adults, Internet skills, sufficient understanding of the Dutch language	Insufficient understanding of the Dutch language, poor Internet skills	Control group	Internet group	**3**
Breast cervical prostate and laryngeal cancer									
Jones, 1999[6]	Individuals interested in their own health care	Interactive consumer website	Clinician office	1996/ NS	Breast, laryngeal, prostate, cervical cancer patients receiving care at oncology center,	Receiving palliative treatment, no knowledge of diagnosis, visual or mental handicap, severe pain	Booklet information	Personalized computer information General computer information	**1**
Cervical cancer									
Campbell, 1997[7]	Individuals interested in their own health care	Personalized health risk assessment tool	Clinician office	1995/ NS	Between 18 and 70 years, can speak and read English well enough to use computer		Survey without computer generated printed feed back	Survey with computer generated printed feed back	**-1**
Cancer, Prostate									
Forsch, 2008[8]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	2005	>50 yr, Men		Control	Traditional decision aid Chronic disease trajectory model combined	**2**
Caregiver decision making									
Brennan, 1995[9]	Caregivers of persons with Alzheimer's Disease	Interactive consumer website	Home/ residence	NS	Primary responsibility as a family caregiver for a person with Alzheimer's disease living at home, has a local		Comparison group	Computer link program	**2**

Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					telephone exchange, the ability to read and write English				
Change in health behavior									
Harari, 2008[10]	Individuals interested in their own health care	Personalized health risk assessment tool	NS	2001/ NS	65 and older	Nursing home resident, needing help in basic activities of daily living, dementia, terminal disease, non-English speaking	Usual care control group	HRA-O intervention group	**1**
Paperny, 1990[11]	Adolescent with high risk behavior	Personalized health risk assessment tool	Clinician office	Duration 3 years	Voluntary participation, both male and female, Teen agers	Participants unwillingness	Group Q: 251 participants those who has given a written questionnaire before physical exam and printout shared with the clinician	Group (1): 265 participants those who was given computer questionnaire after the physical exam and printout remain private Group (2): 294 participants those who was given computer questionnaire before the physical exam and printout shared with clinician	
Headache									
Devineni, 2005[12]	Individuals interested in their own health care	Personal monitoring device	Home/ residence		Chronic tension or migraine HA for at least one year	New headache onset within the past year, head injury or major illness in temporal proximity	Delayed	Treatment	**2**

Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
						to headache onset, Secondary headache diagnosis, Concurrent chronic pain disorder other than primary migraine or tension headache			
HIV/AIDS									
Flatley-Brennan, 1998[13]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	HIV infected, ability to read and type English, home telephone line		Received brochure	Received computer intervention	
Menopause HRT									
Rostom, 2002[14]	Individuals interested in their own health care	Computerized decision aid	Home/ residence	NS	40-70, women, pre and post menopausal, fully fluent in spoken and written English, no evidence of cognitive impairment or psychiatric illness		Audio booklet	Interactive computerized DA	**0**
Schapira, 2007[15]	Individuals interested in their own health care	Personalized health risk assessment tool	Clinician office	May 2002-Oct 2003	45-74 yr, female, post menopausal, VA clinic patient	Non English speaking, MMSE < 23	Printed pamphlet	Computer-based decision aid	**2**
Preventing falls in the elderly									
Yardley, 2007[16]	Individuals interested in their own health care	Interactive consumer website,	NS	July-Dec 2005		<65 yr, used site more than once			**5**
Use of contraception									
Chewning, 199[17]	Individuals interested in their own	Computer based decision Aid	Clinician office	NS	≤ 20 years, Female, ability to read and		Standard information	Computer based interactive	**0**

Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	health care				understand English, expressed interest in getting a contraceptive			decision aid	

NS = Not specified, OA = Osteoarthritis, RA = rheumatoid arthritis, CHESS = Comprehensive Health Enhancement Support System, Yr = year

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Evidence table 29. Description of RCTs addressing the impact of CHI applications on intermediate outcomes on miscellaneous topic (continued)

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Evidence Table 3. Description of consumer characteristics in RCTs addressing the impact of CHI applications on health care processes (KQ1a)

Author, Year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Other characteristics
Asthma								
Bartholomew, 2000 [1]	Control n=63 usual care	Range, 6-17	Hispanic,28(44.1) African American,32(50.8) White ,3(4.8) Other,	NS	Parent education: None, 2(3.2) Elementary, 15(23.8) High school, 28(44.4) College, 18(27.0)	NS	Male, 44(69.8) Female, 19(30.2)	Insurance (private) ,5(8.5) Medicare, 5(8.5) Medicate, 27(45.8) Self pay, 3(5.1) None, 19(32.2) Asthma: Mild, 13(24.6) Moderate, 25(47.2) Severe, 15(28.3) Parent's marital status: Single, 15(23.8) Married, 39(61.9) Widowed, 2(3.2) Divorced, 3(4.8) Separated, 4(6.3) Parent in home: One, 24(38.1) Two, 39(61.9) Parents employment : Fulltime , 30(48.4) Part-time, 8(12.9) Not, 24(38.7) Parents education: None,2(3.2) 15(23.8) High school, 28(44.4) College, 18(27.0)
	Intervention n,70 computer intervention (watch, discover, think and act)	Range,6-17	Hispanic,33(47.1) African American,34(48.6) White ,2(2.9) Other,1(1.4)	NS	None,3(4.3) Elementary, 20(29.0) High school, 34(49.3) College, 12(17.3)	NS	Male, 42(60.0) Female, 28(40.0)	Insurance (private), 3(5.1) Medicare, 3(5.1) Medicate, 30(50.8) Self pay, 5(8.5) None, 18(30.5) Asthma:

Evidence Table 3. Description of consumer characteristics in RCTs addressing the impact of CHI applications on health care processes (KQ1a) (continued)

Author, Year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Other characteristics
								Mild, 22(40.8) Moderate, 14(25.9) Severe, 18(33.3) Parent's marital status: Single, 15(21.7) Married, 39(56.5) Widowed, 1(1.4) Divorced, 4(5.8) Separated, 10(14.5) Parent in home: One, 30(44.1) Two, 38(55.9) Parents employment : Fulltime , 18(27.3) Part-time, 12(18.2) Not, 36(54.5) Parents education: None, 3(4.3) Elementary, 20(29.0) High school, 34(49.3) College, 12(17.3)
Guendelman, 2002[2]	Control, 68 participants used an asthma diary.	12.2 (2.9)	Black, 50 (74) White,8 (12) Others,10 (15)	NS	NS	NS	Male, 37 (54	Public health insurance,63(93) Private health insurance,4(6) Parent is the care-giver ,55(81) Primary caregiver education - high school,35(51) College,33(49) Passive smoking in the household,36(53) Mild asthma,20(29) Moderate asthma,40(59) Severe asthma ,8(12) Daily puffs of quick-relief medication,15(0.7)

Evidence Table 3. Description of consumer characteristics in RCTs addressing the impact of CHI applications on health care processes (KQ1a) (continued)

Author, Year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Other characteristics
								ER visit,2.40(2.33) Nights in the hospital,0.66(1.23)
	Intervention,66 Health Buddy(is a personal and interactive communication device)	12.0 (2.3	Black, 52 (79) White,5 (8) Others,9 (14)	NS	NS	NS	Male, 40 (61)	Public health insurance,61(92) Private health insurance,5(8) Parent is the care-giver ,47(71) Primary caregiver education high school,26(39) College,40(61) Passive smoking in the household,35(53) Mild asthma,15(23) Moderate asthma,43(66) Severe asthma ,7(11) Daily puffs of quick-relief medication,1.6(0.7) ER visit ,2.10(2.09) Nights in the hospital,0.56(1.04)
Jan, 2007[3]	Verbal information and booklet for asthma education with written asthma diary	Mean, 9.9 SD, 3.2	NR	NR	Education of primary caregiver HS diploma or below, 43(56.6) College or above, 33(43.4)	NR	M, 28(36.8) F, 48(63.2)	History of asthma (yr), mean, 2.1 SD, 1.2 Asthma severity: mild, 33(43.4) moderate, 35(46.1) severe, 8(10.5)
	Intervention	Mean, 10.9 SD, 2.5			Education of primary caregiver HS diploma or below, 58(66.0) College or above, 30(34.0)		M, 35(39.7) F, 53(60.2)	History of asthma (yr), mean, 2.4 SD, 1.9 Asthma severity: mild, 33(37.5)

Evidence Table 3. Description of consumer characteristics in RCTs addressing the impact of CHI applications on health care processes (KQ1a) (continued)

Author, Year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Other characteristics
								moderate, 43(48.9) severe, 12(13.6)
Krishna, 2003[4]	Traditional care	Range, 0-17	White non-Hispanic, 102(84.3) Black non-Hispanic, 9(7.4) AIAN, 7(5.8) Not specified, 3	NR	Preschool/none, 58(47.9) Kindergarten, 6(5) Elementary, 27(22.3) Jr High, 24(19.8) High School, 6(5)	NR	M, 76(62.8) F, 45(37.2)	
	Internet-enabled interactive Multimedia asthma education program	Range, 0-17	White non-Hispanic, 93(86.9) Black non-Hispanic, 10(9.3) AIAN, 2(1.9) Not specified, 2(1.9)	NR	Preschool/none, 48(44.9) Kindergarten, 12(11.2) Elementary, 23(21.5) Jr High, 19(17.6) High school, 5(4.1)	NR	M, 72(67.3) F, 35(32.7)	
Use of contraception								
Chewning, 1999[5]	Standard information	NR	NR	NR	NR	NR	F(100)	NR
	Computerized decision aid						F(100)	

NR= Not Reported, SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, CBT= Cognitive Behavioral Therapy, WL= Wait List, AIAN= American Indian/Alaska Native, M = Male, F = Female

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Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
CVD									
Kukafka, 2002[1]	Control	NS	NS	NS	NS	NR			NS
	tailored Web-based	NS	NS	NS	NS	NR			NS
	Non-tailored Web-based	NS	NS	NS	NS	NR			NS
Simkins, 1986[2]	Group1	Mean, 64	NS	NS	NS	NR			Chronic medication/patient: mean, 2.95
	Group 2	Mean, 66	NS	NS	NS	NR			Chronic medication/ patient: mean, 3.09
	Group 3	Mean, 67	NS	NS	NS	NR			Chronic medication/patient: mean, 2.78
Arthritis									
Lorig, 2008[3]	Usual care	Mean, 52.5 range, 22–89 SD, 12.2	White non-Hispanic, 425(93.7)	NS	Mean, 15.7 SD, 3.11	NR	F, 425(90.5)	Married: 425(71.1)	Health-related Web site visits last 6 months: mean, 2.85 SD, 11.68
	Online intervention	Mean, 52.2 SD, 10.9	White non-Hispanic, 441(90.9)	NS	Mean, 15.6 SD, 3.09	NR	F, 441(89.8)	Married: 441(65.5)	Health-related Web site visits last 6 months: mean, 2.87 SD, 11.2
Back pain									
Buhrman, 2004[4]	Wait-list	Mean, 45 SD, 10.7	NS	NS	<8 yr, 7(24.1) 8-12 yr, 6(21) 12-14 yr, 2 (6.9) 14-16 yr, 14 (48.3)	NR	M, 11 (37.9) F, 18 (62.1)		Sick leave: Yes:12 (41.4) No:17 (58.6) Pain location: Back, 12 (41.4) Back plus other area,17(58.6) Previous treatment: PT:11(37.9) Chiropractor:12 (41.4) Naprapathy:3 (10.3) Psychologist:6 (20.7)

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									Pain Clinic:2 (6.9)
	Internet-based pain management program	Mean, 43.5 SD, 10.3	NS	NS	<8 yr, 2 (9.1) 8-12 yr, 6 (27) 12-14 yr, 3 (13.6) 14-16 yr, 11 (50)	NR	M, 8 (36.4) F, 14 (63.6)		Sick leave: Yes: 5 (22.7) No: 17 (77.3) Pain location: Back, 7 (31.8) Back plus other area, 15 (68.2) Previous treatment: PT: 10 (45.5) Chiropractor: 8 (36.4) Nephropathy: 4 (18.2) Psychologist: 3 (13.6) Pain Clinic: 1 (4.5)
Behavioral risk factors									
Oenema, 2008[5]	Control group	Mean, 44.1 SD, 10.4	NS	NS	Educational level: High 453 (42) Medium 324 (30) Low 302 (28)	NR	M, 507 (47) F, 572 (53)		
	Internet group	Mean, 43.1 SD, 10.4	NS	NS	Educational level: High 432 (40) Medium 3 67 (34) Low 281 (26)	NR	M, 497 (46) F, 583 (54)		
Breast cervical prostate and laryngeal cancer									
Jones, 1999[6]	Booklet information	NS	NS	NS	NS	NS	NS	NS	NS
		NS	NS	NS	NS	NS	NS	NS	NS
Cervical cancer									

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
Campbell, 1997[7]	Survey without computer generated printed feed back	< 50 yr, (78)	Australian born, (94)	NS	8-12 yr,(55)	NR		Married or living with partner, (71)	Full/part time work, (44) NS
	intervention	NS	NS	NS	NS	NR			NS
Cancer, Prostate									
Forsch, 2008[8]	Control	Mean, 59 SD, 5.1	White non-Hispanic, 133(880) Black non-Hispanic , 4(2.6) Latino/Hispanic, 6(4) API, 6(4) Not specified, 2 (1.3)	NS	High school or less 6(4) Some college44(29.1) College 42(27.8) Some graduate school 10(6.6)	NR	NS	Married 123(81.5) Other 28(18.5)	Internet access, n, (%): home 127(84.1) work 24(15.9)
	Traditional decision aid	Mean, 58.5 SD, 5.5	White non-Hispanic, 133(85.8) Black non-Hispanic, 6(3.9) Latino/ Hispanic, 7(4.5) API, 4(2.6) Not specified, 5 (3.2),	NS	High school or less 8(5.2) Some college 39(25.2) College44(28.4) Some graduate school13(8.4)	NR	NS	Married 119(76.8) Other 36(23.2)	Internet access, n. (%): home 136(87.7) work 19(12.3)
	Chronic disease trajectory model	Mean, 58.4 median, range, SD, 5.6	White non-Hispanic, 127(83) Black non-Hispanic, 2(1.3) Latino/	NS	High school or less 6(3.9) Some college40(26.1) College 35(22.9) Some graduate	NR	NS	Married 114(74.5) Other 39(25.5)	Internet access, n, (%): home 130(85) work 12(15)

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
			Hispanic, 15(9.8) API, 7(4.6)		school 12(7.8)				
Caregiver decision making									
Brennan, 1995[9]	Comparison group	Mean, 64	White non-Hispanic, (72)	NS	12-16 yr, (86)	NR	F,(67)		
	Experimental	NS	NS	NS	NS	NR			NS
Change in Health behavior									
Harari, 2008[10]	Usual care control group	Mean, 74.2 SD, 6	NS	NS	NS	NR	F, 564(52.9)		Fair or poor general-health perception: 271 (25.4) Ischemic heart disease: 175 (16.4) diabetes:73(6.9
	HRA-O intervention group	Mean, 74.7 SD, 6.3	NS	NS	NS	NR	F, 526(56.0)		Fair or poor general-health perception: 207 (22.0) Ischemic heart disease: 170 (18.1) diabetes: 70(7.5)
Paperny, 1990[11]	Control: Group Q: 251 participants those who has given a written questionnaire before physical exam and printout shared with the clinician	mean,15.1 SD, 1.46	White,(33) Hawaiian, (12) Oriental, (32) Pacific/mixture, (12) Other (11)	Financial assistance (10)	NR	NR	M, 131(52)		NS
	Intervention Group (1): 265 participants those who was given computer	mean,14.9 SD, 1.44	White (33) Hawaiian (13) Oriental (30) Pacific/mixture (13) Other (11)	(10)	NR		M, 154(58)		

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	questionnaire after the physical exam and printout remain private								
	Group (2): 294 participants those who was given computer questionnaire before the physical exam and printout shared with clinician	mean, 15.0 SD, 1.37	White (34) Hawaiian (14) Oriental (32) Pacific/mixture, (11) Other, (9)	(11)	NR	NR	M, 176 (60)		NS
Headache									
Devineni, 2005[12]	Delayed	Mean, 43.6 SD, 11.8	NS	NS	NS	NR	M,10 (21) F, 37 (79)		Headache Index score: Mean, 35.5 SD, 15.5 Medication Index: Mean, 0.85 SD 1.04 Yr computing: Mean, 5.8 SD, 3.6
	Treatment	Mean, 43.6 SD, 12	NS	NS	NS	NR	M,5 (12) F,34 (88)		HA Index: Mean 31.8 SD 17 Medication Index: Mean 0.93 SD 0.99 Yrs computing: Mean: 3.8 SD 2.4
HIV/AIDS									
Flatley-Brennan, 1998[13]	Received brochure	Mean, 34 SD, 10.8	White non-Hispanic, (58)	NS	Mean, 14 SD, 2.7	NR		Living Alone: mean, 27	

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	Received computer intervention	Mean, 33 SD, 7.3	White non-Hispanic, (64)	NS	Mean, 13 SD, 2.6	NR		Living Alone: mean, 29	
Gustafson, 1994[14]	Control	NR	NR	NR	NR	NR	NR		HIV-infected people
	CHESS	NR	NR	NR	NR	NR	NR		HIV-infected people
Menopause HRT									
Rostom, 2002[15]	Audio booklet	Mean, 53.8 SD, 8.13	NS	NS	8-12 yr,7 (26.9) 12-16y r, 19(73.1)	NR			Currently not using HRT: 13, (50.0) Menses: 7, (26.9) Contemplating the decision: 6, 2(3.1) Strongly leaning: 18, (69.2)
	Interactive computerized DA	Mean, 50.6 SD, 7.67	NS	NS	8-12yr, 6 (24) 12-16 yr, 19 (76)	NR			Currently not using HRT: 19 (76.0) Menses: 16 (64) Contemplating the decision: 8, (32) Strongly leaning: 16 (64.0)
Schapira, 2007[16]	Printed pamphlet	Mean, 57.8 SD, 7.5	White non-Hispanic, 64 (73) Black non-Hispanic, 22(25) AIAN,2 (2)	USD <19,999, 25 (28) 20,000-34,999, 32 (36) 35,000-49999, 17 (19) 50,000-74,999,	NS	NR			NS

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
				11 (13) 75,000+, 3 (3)					
	Computer-based decision aid	Mean, 57.8 SD, 7.2	White non-Hispanic, 64 (72) Black non-Hispanic, 24 (27) AIAN, 1(1)	USD <19,999, 31 (35) 20,000-34,999, 22 (25) 35,000-49999, 19 (21) 50,000-74,999, 11 (12) 75,000+, 6 (7)	NS	NR			NS
Preventing falls in the elderly									
Yardley, 2007[17]	Control	NS	NS	NS	NS	NR	M, 42 (31) F, 94 (69)		Self-rated balance: good 13 (9.5) quite good 32 (23.5) have some problems 91 (67) health condition (co morbidity): unsteadiness 97(71) poor vision 34 (25) take >=4 meds 60 (44) take <4 meds38 (28)
	Tailored	NS	NS	NS	NS	NR	M, 54 (37) F, 90 (63)		Self-rated balance: good ,11 (8) quite good 38 (26) have some problems 95 (66) health condition (co morbidity): unsteadiness 106(74) poor vision 43(30) take >=4 meds 51 (35) take <4 meds52 (36)

Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
Use of contraception									
Chewning, 199[18]	Standard information	NS	NS	NS	NS	NR			NS
	Computerized decision	NS	NS	NS	NS	NR			NS

NR= Not Reported, NS= Not Significant SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, API = Asian, Pacific Islander, AIAN = American Indian / Alaska Native, CVD = Cardiovascular Disease, F = female, M = Male

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Evidence Table 30. Description of consumer characteristics studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions (continued)

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Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
CVD										
Kukafka, 2002[1]	Symptoms	Control	17	Self-efficacy scores						BL, time point 2, <.05 Final time point,
		Non-Tailored	13	Self-efficacy scores						
		Tailored	17	Self-efficacy scores						BL, time point 3, <.001
	Action	Control	32	Self-efficacy scores	1 month	3 month				BL, time point 2, <.05 final time point,
		Non-tailored	31	self-efficacy scores	1 month	3 month				
		Tailored	31	self-efficacy scores	1 month	3 month				BL, time point 2, <.05 time point 3, <.05
	Cognitive	Control		Self-efficacy scores	1 month	3 month				
		Non-Tailored		Self-efficacy scores	1 month	3 month				
		Tailored		Self-efficacy scores	1 month	3 month				BL, time point 2, <.05 time point 3, <.001 time point 4, final time point,
Simkins, 1986[2]	Medication refill compliance	Control	104	Compliant months				Month 3: mean, 0.58 SD, 0.5		
		Group 2 received	101	Compliant months				Month 3: mean, 0.65		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		reminder by postcard						SD, 0.52		
		Group 3 received reminder by calling	69	Compliant months				Month 3 mean, 0.64 SD, 0.46		
	Medication refill non-compliance	Control	104	non-compliant months	Month 1			Month 3 mean, 0.43 SD, 0.5		
		Group 2 received reminder by postcard	101	Non-compliant months	Month 1			Month 3 mean, 0.35 SD, 0.52		
		Group 3 received reminder by calling	69	Non-compliant months	Month 1			Month 3 mean, 0.36 SD, 0.46		
Arthritis										
Lorig, 2008[3]	Health distress	Control	344	Mean, 2.37 SD, 1.19	6months			1year: mean, 2.25 SD, 1.19		
		Online intervention	307	Mean, 2.41 SD, 1.2	6months			1year: mean, 2 SD, 1.18		
	Activity limitation	Control	344	Mean, 3.22 SD, 0.903	6months			1year mean, 3.29 SD, 0.885		
		Online intervention	307	Mean, 3.17 SD, 0.973	6months			1year mean, 3.09 SD, 0.962		
	Self reported global health	Control	344	Mean, 0.569 SD, 0.446	6months			1year mean, 0.573 SD, 0.457		
		Online intervention	307	Mean, 0.547 SD, 0.401	6months			1year mean, 0.514 SD, 0.445		
	Pain	Control	344	Mean, 6.37 SD, 2.22	6months			1year mean, 6.1 SD, 2.35		
		Online	307		6months			1year		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		intervention						mean, 5.77 SD, 2.53		
	Self efficacy	Control	344	Mean, 4.96 SD, 1.98	6months			1year: mean, 5.34 SD, 2.06		
		Online intervention	307	Mean, 5.08 SD, 2.13	6months			1year: mean, 5.89 SD, 2.09		
Back pain										
Buhrman, 2004[4]	CSQ-Diverting attention	Control	29	Mean, 12.3 SD, 7.4				2 months: mean, 11.9 SD, 6.9		
		Cognitive behavior intervention	22	Mean, 11.6 SD, 5.7				2 months: mean, 12.3 SD, 5.2		
	CSQ-Reinterpret pain sensations	Control	29	Mean, 5.4 SD, 6.5				2 months mean, 4.6 SD, 5.9		
		Cognitive behavior intervention	22	Mean, 3.6 SD, 3.5				2 months mean, 4.4 SD, 3.6		
	CSQ-Coping self-statement	Control		Mean, 18.3 SD, 6.6				2 months mean, 17.3 SD, 6.7		
		Cognitive behavior intervention		Mean, 18.4 SD, 6.5				2 months mean, 19.1 SD, 5.8		
	CSQ-Ignore pain sensations	Control	29	Mean, 13.5 SD, 6.6				2 months mean, 12.9 SD, 6.5		
		Cognitive behavior intervention	22					2 months mean, 13.7 SD, 7		
	CSQ-Praying or hoping	Control	29	Mean, 10.4 SD, 6.7				2 months: mean, 8.5 SD, 6		
		Cognitive behavior intervention	22	Mean, 12 SD, 6.9				2 months: mean, 9.8 SD, 5.1		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	CSQ-Catastrophizing	Control	29	Mean, 13.7 SD, 6.9				2 months mean, 12.3 SD, 7.2		
		Cognitive behavior intervention	22	Mean, 13.6 SD, 7.7				2 months mean, 8.6 SD, 5.2		
	CSQ-Increase activity level	Control	22	Mean, 17.3 SD, 6.1				2 months mean, 16.9 SD, 6.3		
		Cognitive behavior intervention	22	Mean, 14.4 SD, 5				2 months mean, 14.8 SD, 5.6		
	CSQ-Control over pain	Control	29	Mean, 2.9 SD, 1.1				2 months: mean, 2.9 SD, 1		
		Cognitive behavior intervention	22	Mean, 2.8 SD, 1				2 months: mean, 3.9 SD, 0.7		
Behavioral risk factors										
Oenema, 2008[5]	Self-rated saturated fat intake	Control	930	Mean, -0.16 SD, 0.82				one month: mean, -0.19 SD, 0.82		
		Internet group	887	Mean, -0.19 SD, 0.78				One month: mean, -0.18 SD, 0.79		
	Self rated PA level	Control	890	Mean, -0.29 SD, 0.92				One month mean, -0.3 SD, 0.93		
		Internet group	827	Mean, -0.31 SD, 0.91				One month mean, -0.29 SD, 0.85		
Breast cervical prostate and laryngeal cancer										
Jones, 1999[6]	Satisfaction Score >2 (n (%))	Booklet (control)	150					58(40)		
		Personal computer information	156					68(46)		
	Satisfaction Score	Booklet (control)	150					32 to 48		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	>2(95% CI of percentage	Personal computer information	156					38 to 54		
	Prefer computer to 10 minute consultation with professional	Booklet (control)	150					12/122(10)		
		Personal computer information	156					38/131(29)		
Cervical cancer										
Campbell, 1997[7]	Pap smear within 6 months in women who were under screened by Path report 18-49 years	Control	32					6 months (24.6), 95% CI		
		Experimental	56					6 months (37.8), 95% CI		NS
	Pap smear within 6 months in women who were under screened by Self report 18-49 years	Control	44					6 months		
		Intervention	52					6 months		NS
	Pap smear within 6 months in women who were under screened by Path report 50-70 years	Control	41					6 months		
		Intervention	38					6 months		NS (0.09)
	Pap smear within 6	Control	21					6 months		
		Intervention	22					6 months		0.026

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	months in women who were under screened by Self report 50-70 years									
Cancer, Prostate										
Forsch, 2008[8]	Total knowledge scores(completer cases only), mean (SE)	Traditional decision aid	155					Posttest: mean, 8.65 SD, 0.18		
		Chronic disease trajectory model	153					Posttest: mean, 8.03 SD, 0.18		
		Combined	152					Posttest: mean, 8.03 SD, 0.18		
Caregiver decision making										
Brennan, 1995[9]	Decision confidence	Control	49	Likert scale, 14 items, 5 choices mean, 54.65 SD, 7.3				12 months: mean, 54.7 SD, 6.1		
		Experimental	47	Likert scale 14 items, 5 choices mean, 51.9 SD, 6				12 months: mean, 56.8 SD, 7		<.01
	Improved decision making skill	Control	49	Number of alternatives caregiver considers to solve a problem: mean, 2.51 SD, 0.91				12 months mean, 2.37 SD, 78		
		Experimental	47	Number of alternatives				12 months mean, 2.4		0.2

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				caregiver considers to solve a problem: mean, 2.53 SD, 0.78				SD, 0.61		
	Isolation	Control	49	Score on Instrumental and Expressive Support Scale (IESS) mean, 62.7 SD, 15.5				12 months mean, 62.6 SD, 16		
		Experimental	47	Mean, 63.4 SD, 16.6				12 months mean, 65 SD, 17.4		0.51
Change in health behavior										
Harari, 2008[10]	Self-reported health behavior	Control	1066					12 months:(84)		
		HRA-O intervention group	940					12 months (76)		
	Preventative care uptake	Control	1066					12 months (84)		
		HRA-O intervention group	940					12 months (76)		
Paperny, 1990[11]	High cigarette use	Control	10							
		Intervention group 1	25							P=<0.01
		Intervention group 2	25							P=<0.03

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Frequent marijuana use (weekly)	Control	8							
		Intervention group 1	19							P=<0.04
		Intervention group 2	22							P=<0.03
	High alcohol use (weekly)	Control	13							
		Intervention group 1	28							P=<0.02
		Intervention group 2	28							NS
	Problems at home with parents ,family	Control	24							
		Intervention group 1	70							P=<0.001
		Intervention group 2	72							P=<0,001
	Often sad, upset or unhappy	Control	34							
		Intervention group 1	69							P=<0.001
		Intervention group 2	66							P=<0,007

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Feeling sad or down lately	Control	45							
		Intervention group 1	67							P=<0.04
		Intervention group 2	63							NS
	Would like contraceptive information	Control	27							
		Intervention group 1	74							P=<0.001
		Intervention group 2	66							P=<0.001
	Has a lover now	Control	56							
		Intervention group 1	82							P=<0.03
		Intervention group 2	82							NS
	Had sexual intercourse	Control	56							
		Intervention group 1	75							NS
		Intervention group 2	75							NS

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Taking medications	Control	50							
		Intervention group 1	61							NS
		Intervention group 2	62							NS
Headache										
Devineni, 2005[12]	Headache symptom questionnaire	Control	47	Mean, 35.5 SD, 20.9				2 months mean, 31.7 SD, 22.4		
		Intervention	39	Mean, 33.8 SD, 19.3				2 months mean, 20.3 SD, 15.9		
	Headache disability inventory	Control	39	Mean, 54.2 SD, 20.5				2 months mean, 49.6 SD, 23.1		
		Intervention	39	Mean, 52.9 SD, 18.8				2 months mean, 38 SD, 19.5		
	CES-D (depression scale)		47	Mean, 13.9 SD, 9.5				2 months mean, 14.3 SD, 12.1		
	Trait-anxiety scale	Control	39	Mean, 25.6 SD, 15.9				2 months mean, 20.8 SD, 17.2		
		Intervention	39					2 months mean, 18.4 SD, 15.7		
HIV/AIDS										
Flatley-Brennan, 1998[13]	Improved decision making confidence	Control	26	Mean score mean, 52.8 SD, 6				Post-intervention: mean, 56.47 SD, 4.2		BL, 0.05 time point 2, final time point, 0.05
		Computer link	31	Mean score mean, 54.35 SD, 5.9				Post-intervention: mean, 51.45 SD, 6.9		BL, 0.05 time point 2, final time point, 0.05

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Improved decision making skill	Control	26	Mean score: mean, 4.73 SD, 1.4				Post-intervention mean, 5.47 SD, 1.3		BL, 0.05 time point 2, final time point, 0.05
		Computer link	31	Mean Score: mean, 4.58 SD, 5.4				Post-intervention mean, 5.4 SD, 1.5		BL, 0.05 time point 2, final time point, 0.05
	Reduced social isolation	Control	26	Mean score mean, 67.05 SD, 17				Post-intervention mean, 68 SD, 16.8		BL, 0.05 time point 2, final time point, 0.05
		Computer Link	31	Mean score mean, 63.5 SD, 14.4				Post-intervention mean, 66.08 SD, 13.68		BL, 0.05 time point 2, final time point, 0.05
	Differential decline in health status	Control	26	Mean score mean, 13.8 SD, 4.93				Post-intervention mean, 13.65 SD, 1.3		BL, 0.05 final time point, 0.05
		Computer link	31					Post-intervention mean, 13 SD, 1.7	RR or OR time point 2, 0.05	BL, 0.05 time point 2, No improvement over control
Gustafson, 1994 [14]	Average Quality of life (%)	Control	28					(65)		
		CHESS	30					(68)		
	Hospital cost ($/person/Month)	Control	97					Cost went up $457		
		CHESS	107					Cost went down $148		
Menopause HRT										
Rostom,	Realistic expectations	Control	26	Final score: difference in				Difference in posttest		p=0.015, t=2.530, mean

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
2002[15]				Mean scores; baseline and point 4 score: mean score mean, 37.2 SD, 25.5				score-baseline score: mean, 52.7 SD, 37.5		deviation =0.25. p=0.023, Mann-Whitney U = 205, Z = -2.282
		Computerized decision aid	25	Final score: difference in Mean scores; baseline and point 4 score: mean score mean, 32 SD, 30.4				Difference in posttest score-baseline score: mean, 52.7 SD, 37.5		p=0.015, t=2.530, mean deviation =0.25. p=0.023, Mann-Whitney U = 205, Z = -2.282
	Knowledge	Control	26	Final score: difference in Mean scores; baseline and point 4 score: mean score: mean, 78.7 SD, 16.7			Post-intervention questionnaire mean, 87.1 SD, 11.8	Difference in posttest score-baseline score mean, 8.4 SD, 13.3		p= 0.019, t = 2.423, mean deviation = 0.0906. p=0.017, Mann-Whitney U = 201, Z= -2.397
		Computerized decision aid	25	Final score: difference in Mean scores; baseline and point 4 score: mean score: mean, 76.4 SD, 14.9			Post-intervention questionnaire mean, 93.8 SD, 9	Difference in posttest score-baseline score mean, 17.5 SD, 13.4		p= 0.019, t = 2.423, mean deviation = 0.0906. p=0.017, Mann-Whitney U = 201, Z= -2.397
Schapira, 2007[16]	Menopause-related knowledge and health-risk expectations	Control	86					3 months mean, 15.5 ; median, ; range, 14.9, 16.0;		
		Computer-based decision aid	85					3 months mean, 15.1 ; median, ; range, 14.5, 15.7;,		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Satisfaction with decision	Control	85		3 months prior decision			3 months mean, 4.37 median, range, 4.26, 4.48		
		Computer-based decision aid	85		3 months prior decision			3 months mean, 4.37 median, range, 4.26, 4.47		
	Decisional conflict	Control	85		3 months prior decision			3 months mean, 1.78 median, range, 1.67, 1.90		
		computer-based decision aid	85		3 months prior decision			3 months mean, 1.74 median, range, 1.62, 1.85		
	Decisional conflict Decisional uncertainty subscale	Control	85		3 months prior decision			3 months mean, 1.9 median, range, 1.75, 2.05		
		Computer-based decision aid	85		3 months prior decision			3 months mean, 1.88 range, 1.73, 2.03		
	Decisional conflict Factors of uncertainty subscale	Control	85		3 months prior decision			3 months: mean, 1.78 : range, 1.66, 1.91:		
		Computer-based decision aid	85		3 months prior decision			3 months: mean, 1.73 SD, 1.61, 1.86		
	Decisional conflict		85		3 months prior			3 months mean, 1.70		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Effective decision-making subscale				decision			median, range, 1.58, 1.82 SD,		
	Decision to use hormone therapy	Control	86		3 months - prior decision			3 months		
	Decision to use hormone therapy	Computer-based decision aid	85		3 months - prior decision			3 months		0.85
preventing falls in the elderly										
Yardley, 2007[17]	Intention to carry out the recommended activities	Control	136	6 point scale				Adter reviewing the intervention or control web site: mean, 4.65 SD, 0.79		
		Tailored	144	6 point scale				Adter reviewing the intervention or control web site: mean, 4.86 SD, 0.61		
	Personal relevance	Control	136					Adter reviewing the intervention or control web site mean, 4.6 SD, 0.77		
		Tailored	144					Adter reviewing the intervention or control		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								web site mean, 4.83 SD, 0.65		
	Interest	Control	136					Adter reviewing the intervention or control web site mean, 5.08 SD, 0.64		
		Tailored	144					Adter reviewing the intervention or control web site mean, 5.03 SD, 0.61		
	Suitability of the activities	Control	136					Adter reviewing the intervention or control web site mean, 4.8 SD, 0.79		
		Tailored	144					Adter reviewing the intervention or control web site mean, 4.95 SD, 0.6		BL, time point 2, CI -0.055, 0.009 NS
	Self-efficacy	Control	136					Adter reviewing the intervention or control		

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								web site: mean, 4.35 SD, 0.95		
		Tailored	144					Adter reviewing the intervention or control web site: mean, 4.61 SD, 0.7		
	Outcome expectancy	Control	136					Adter reviewing the intervention or control web site mean, 4.79 SD, 0.74		
		Tailored	144					Adter reviewing the intervention or control web site mean, 4.78 SD, 0.67		
use of contraception										
Chewning, 1999[18]	OC knowledge Chicago	Control	NA	Mean, 1.95 SD, 1.13	Initial visit mean, 2.29 SD, 1.03			1 year: mean, 3.05 SD, 1.24		BL, 0.709 time point 2, 0 final time point, NS
		Computerized decision aid	NA	Mean, 1.89 SD, 1.07	Initial visit mean, 3.28 SD, 1.17			1 year: mean, 3.23 SD, 1.27		BL, 0.709 time point 2, 0 final time point, NS
	OC knowledge Madison	Control	NA	Mean, 2.48 SD, 1.21	Initial visit mean, 3.58 SD, 1.06			1 year mean, 3.76 SD, 1.02		BL, 0.813 time point 2, 0 final time point, 0.031

Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Computerized decision aid	NA	Mean, 2.46 SD, 1.3	Initial visit mean, 4.49 SD, 0.78			1 year mean, 3.95 SD, 0.91		BL, 0.813 time point 2, 0 final time point, 0.031
	OC efficacy Chicago	Control	NA		Initial visit mean, 11.26 SD, 15.93			1 year mean, 6.38 SD, 13.45		BL, time point 2, 0 final time point, NS
		Computerized decision aid	NA		Initial visit mean, 4.59 SD, 9.2			1 year mean, 5.66 SD, 8.45		BL, time point 2, 0 final time point, NS
	OC efficacy Madison	Control	NA		Initial visit mean, 4.8 SD, 5.58			1 year mean, 4.83 SD, 9.15		BL, time point 2, 0
		Computerized decision aid	NA	Mean, 2.09 SD, 2.2	Initial visit			1 year mean, 4 SD, 8.26		BL, NS time point 2,

BL = baseline, SD = standard deviation, CI = confidence interval, OC = oral contraceptive, CES-D = Center for Epidemiologic Studies Depression Scale

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Evidence Table 31. Outcomes in studies addressing the impact of CHI applications on intermediate outcomes in miscellaneous conditions of interest (continued)

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Evidence table 32. Description of RCTs addressing the impact of CHI applications on relationship-centered outcomes

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Breast cancer									
Green, 2005[1]	Individuals interested in their own health care	Personalized health risk assessment tool	Clinician office	Between May 2000 and September 2002	≥18 yr, Female, Read, write and speak English, Scheduled a genetic counseling appt to evaluate personal and/or family history of breast cancer, Able to give informed consent	Previously underwent genetic counseling, Testing for inherited breast cancer susceptibility	Counseling without computer intervention	Counseling with computer intervention	**-1**
Gustafson, 2008[2]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Between April 1995 and May 1997	<60 yr, Breast cancer patients, Within 6 months of diagnosis, Not homeless, Not active illegal drug users		Allocated standard intervention	Received CHESS intervention	**2**
Gustafson, 2001[3]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Between April 1995 and May 1997	<60 yr, Breast cancer patients, Within 6 months of diagnosis, Not homeless, Not active illegal drug users		Allocated standard intervention	Received CHESS intervention	**1**
Maslin, 1998[4]	Individuals interested in their own health care	Interactive computerized video system	Clinician office	NS	Non metastatic breast cancer	Advanced breast cancer, Metastatic disease, Sensory impairment, do not understand English	Standard care	Interactive computerized video system	**-1**
Caregiver decision making									
Brennan, 1995[5]	Caregivers of persons	Interactive consumer	Home/ residence	NS	Primary responsibility as a		Comparison group	Computer link program	**2**

Evidence table 32. Description of RCTs addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	with Alzheimer's Disease	website			family caregiver for a person with Alzheimer's disease living at home, Has a local telephone exchange, The ability to read and write English				
HIV/AIDS									
Flatley-Brennan, 1998[6]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	HIV infected, Ability to read and type English, Home telephone line		Received brochure	Received computer intervention	**0**
Arthritis									
Sciamanna, 2005[7]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	Had knee joint symptoms for at least the past three months, Saw a doctor for knee symptoms, Has the diagnosis of osteoarthritis	Patient did not report having knee joint symptoms for at least the past three months, Patient did not report having been seen by a doctor for the knee symptoms, Does not have the diagnosis of osteoarthritis	Completed questionnaire before intervention	Completed questionnaire after intervention	**-1**
Vaginal or c-section delivery									
Montgomery, 2007[8]	Individuals interested in their own health care	Decision analysis tool re caesarean delivery after having had a caesarean delivery	Home/ residence Clinician office	2004 (may) to 2006 (august)	Pregnant, one previous lower segment caesarean section, no current obstetric problems, delivery expected at >= 37 weeks	Limited ability to speak or understand English	Usual care	Information program and website Decision-Analysis Program	**3**

NS = Not specified, Yr = year, CHESS = Comprehensive Health Enhancement Support System

Evidence table 32. Description of RCTs addressing the impact of CHI applications on relationship-centered outcomes (continued)

Reference List

1. Green MJ, Peterson SK, Baker MW *et al*. Use of an educational computer program before genetic counseling for breast cancer susceptibility: effects on duration and content of counseling sessions. Genet Med 2005; 7(4):221-9.

2. Gustafson DH, Hawkins R, Mctavish F *et al*. Internet-based interactive support for cancer patients: Are integrated systems better? 2008; 58(2):238-57.

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Evidence Table 33. Description of consumer characteristics in RCTs addressing KQ 1c (impact of CHI applications on relationship-centered outcomes)

Author, year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other
Breast cancer									
Green, 2005[1]	Counseling without computer intervention	Mean, 44 range, 24-71	White non-Hispanic, 100(95)	NS	College grad, 53 (50)	NR			Religion Catholic, 27 (26) Protestant , 52 (50) Jewish, 7 (7) Computer use at work Often or sometimes, 71 (72) Computer use, personal affairs Often or sometimes, 63 (61) Very Confident computer skills. 39 (37)
	Counseling & Interactive computer program	Mean, 45 range, 23-77	White non-Hispanic, 100(95)	NS	College grad, 65 (62)	NR			Religion Catholic, 38 (37) Protestant, 45 (44) Jewish, 7 (7) Computer use, work Often or sometimes, 83 (82) Computer use, personal Often or sometimes, 68 (65) Very Confident computer skills, 44 (42)
Gustafson, 2008[2]	Usual Care with books		NS	NS	NS	NR			NS
	CHESS		NS	NS	NS	NR			NS
Gustafson, 2001[3]	Allocated standard intervention	Mean, 44.4 SD, 7.1	White non-Hispanic, (72)	USD >40,000, (50.8)	Bachelor's degree, (40.2)	NR		Living with Partner, (72.6)	Insurance Private Insurance, (84.7)
	Received CHESS intervention, a home based computer	Mean, 44.3 SD, 6.6	White non-Hispanic, (76)	USD 40,000, (58.1)	Bachelor's degree, (45.8)	NR		Living with Partner, (71.9)	Insurance Private Insurance, (86)

Evidence Table 33. Description of consumer characteristics in RCTs addressing KQ 1c (impact of CHI applications on relationship-centered outcomes) (continued)

Author, year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other
	system								
Maslin, 1998[4]	Standard care	Mean, 52.1	NS	NS	NS	NR			NS
	Interactive Video Disk for shared decision making		NS	NS	NS	NR			NS
Caregiver decision making									
Brennan, 1995[5]	Comparison group	Mean, 64	White non-Hispanic, (72)	NS	(86)	NR	F, (67)		
	Computer Link		NS	NS	NS	NR			NS
HIV/AIDS									
Flatley-Brennan, 1998[6]	Received brochure	Mean, 34 SD, 10.8	White non-Hispanic, (58)	NS	mean, 14 SD, 2.7	NR		Living Alone	
	Received Computer Link	mean, 33 SD, 7.3	White non-Hispanic, (64)	NS	mean, 13 SD, 2.6	NR		Living Alone	
Arthritis									
Sciamanna, 2005[7]	Completed questionnaire before intervention	Mean, 49.3	White non-Hispanic, 50 (87.7) black non-Hispanic, 4 (7) Latino/ Hispanic, 1 (1.8) API, 0, (0) AIAN, 1, (1.8)	NS	14 (24.6)	NR	F, 41 (71.9) M, 16 (28.9)		
	Patient satisfaction survey administered after participating in the web-based intervention	Mean, 46.6	White non-Hispanic, 55, (85.9) Black non-Hispanic, 4 (6.3) Latino/Hispanic, 3 (4.7) AIAN, 2 (3.1)	NS	17 (26.6)	NR	F, 52 (81.3) M, 12 (18.7)		
Vaginal or c-section delivery									
Montgomery, 2007[8]	Usual Care	Mean, 32.4 SD, 4.6	NS	Pound <20, 42	Highest Educational	NR			Previous caesarean section

Evidence Table 33. Description of consumer characteristics in RCTs addressing KQ 1c (impact of CHI applications on relationship-centered outcomes) (continued)

Author, year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status	Other
				(18) 20-30, 53 (23) 30-40, 51 (22) 40-50, 43 (18) >50, 46 (20)	Qualification None, 12 (5) GCSE, 99 (40) A level, 42 (17) Degree,92 (38)				Elective, 62(25) Emergency, 184(75) Decisional conflict scale (total) SD, 17.1 Preferred mode of delivery Vaginal, 111(45) Elective caesarean, 53(21) Unsure, 83(34)
	Computerized Educational Information	Mean, 32.8 SD, 4.7	NS	Pounds <20, 44 (19) 20-30, 57 (24) 30-40, 46 (19) 40-50, 37 (16) >50, 52 (22)	Highest Educational Qualification None, 10(4) GCSE, 92(37) A level, 47(19) Degree, 97(39)	NR			Previous caesarean section elective, 55(22) emergency, 192(78) Decisional conflict scale (total) mean, 40.2 SD, 16.6 Preferred mode of delivery Vaginal, 112(45) Elective caesarean, 52(21) Unsure, 86(34)
	Decision analysis program	Mean, 32.5 SD, 4.8	NS	Pounds <20, 48 (20) 20-30, 49 (21) 30-40, 44 (19) 40-50, 46 (19) >50, 50 (21)	Highest Educational Qualification None, 7(3) GCSE, 97(40) A level (36(15) Degree, 103(42)	NR			Previous caesarean section Elective, 49(20) Emergency, 193(80) Decisional conflict scale (total) mean, 37.8 SD, 17.2 Preferred mode of delivery Vaginal, 111(45) Elective caesarean, 50(20) Unsure, 84(34)

NR= Not Reported, NS= Not Significant, SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, AIAN = American Indian/Alaska Native, API = Asian/Pacific Islander, GCSE= General Certificate of Secondary Education

Reference List

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2. Gustafson DH, Hawkins R, Mctavish F *et al*. Internet-based interactive support for cancer patients: Are integrated systems better? 2008; 58(2):238-57.

3. Gustafson DH, Hawkins R, Pingree S *et al*. Effect of computer support on younger women with breast cancer. J Gen Intern Med 2001; 16(7):435-45.

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8. Montgomery AA, Emmett CL, Fahey T *et al*. Two decision aids for mode of delivery among women with previous caesarean section: randomised controlled trial. BMJ 2007; 334(7607):1305.

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
Breast Cancer										
Green, 2005[1]	Alter content of discussions	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer program	106					After counseling session with genetic counselor:100		0.03
	Change the way they used their time	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer program	106					After counseling session with genetic counselor:100		
	Used time more efficiently	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer program	106					After counseling session with genetic counselor:100		
	Skip material typically present	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer	106					After counseling session with		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		program						genetic counselor:100		
	Effectiveness of counseling session	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer program	106					After counseling session with genetic counselor:100		Final time point, 0.81 (patients) and 0.45 (counselors)
	Shorter counseling sessions	Control	105					After counseling session with genetic counselor		
		Counseling & Interactive computer program	106					After counseling session with genetic counselor		Final time point, 0.03
Gustafson, 2008[2]	Social support	Control	80	Quality of life mean, 0.18 SD, 0.53				9 month: mean, 0.11 SD, 0.45		BL, .058 .039 .126 Time point 2, .24 .004 .32 Final time point, .018 .021 .028
		Internet	75	Quality of life mean, -0.02 SD, 0.56				9 month: mean, 0.07 SD, 0.45		BL, .84 .39 .69 Time point 2,

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
										.44 .77 .53 Final time point, .33 .57 .48
		CHESS	80	Quality of life mean, 0.02 SD, 0.54				9 month: mean, 0.18 SD, 0.54		BL, .029 .003 .007 Time point 2, 0.47 .027 .15 Final time point, .14 .14 .16
	Quality of life	Control	80	Social support: mean, 0.23 SD, 0.49	4 month			9 month mean, 0.13 SD, 0.54		
		Internet	75	social support: mean, -0.08 SD, 0.56	4 month			9 month mean, 0.06 SD, 0.58		
		CHESS	80	Social support: mean, 0.16 SD, 0.49	4 month			9 month mean, 0.21 SD, 0.55		
	Health competence	Control	80	Health and information competence mean, 0.17 SD, 0.39	4 month			9 month mean, 0.12 SD, 0.37		
		Internet	75	Health and information competence mean, -0.03 SD, 0.48	4 month			9 month mean, 0.06 SD, 0.49		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		CHESS	80	Health and information competence mean, 0.12 SD, 0.47	4 month			9 month mean, 0.18 SD, 0.48		
Gustafson, 2001[3]	Information competence	Control	125		2 month mean, 65.6			5 month: mean, 65.8		Time point 2, 0.01
		Chess	121		2 month mean, 70.4			5 month: mean, 69.3		Time point 2, 0.01
	Participation	Control	125		2 month mean, 74.3			5 month		time point 2, 0.01
		CHESS	121		2 month mean, 80.7			5 month		Time point 2, 0.01
		Control	125		2 month mean, 74.3			5 month		Time point 2, 0.01
		CHESS	121		2 month mean, 80.7			5 month		Time point 2, 0.01
	Confidence in doctors	Control	125		2 month mean, 77.3			5 month		Time point 2, 0.05
		CHESS	121	mean, 83	2 month	RR or OR time point 3, 0.05		5 month		
Maslin, 1998[4]	Anxiety and depression	Interactive Video Disk for shared decision making	51	Score on HAD				9 months later		
			51					9 months later		
	Satisfaction with treatment decision	Control	51					9 months after diagnosis		
		Interactive Video Disk for shared	51					9 months after diagnosis		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		decision making								
Caregiver decision making										
Brennan, 1995[5]	Decision confidence	Control	49	Likert scale, 14 items, 5 choices mean, 54.65 SD, 7.3				12 months: mean, 54.7 SD, 6.1		
		ComputerLink	47	Likert scale 14 items, 5 choices mean, 51.9 SD, 6				12 months: mean, 56.8 SD, 7		<.01
	Improved decision making skill	Control	49	Number of alternatives caregiver considers to solve a problem: mean, 2.51 SD, 0.91				12 months mean, 2.37 SD, 78		
		ComputerLink	47	Number of alternatives caregiver considers to solve a problem: mean, 2.53 SD, 0.78				12 months mean, 2.4 SD, 0.61		0.2
	Isolation	Control	49	Score on Instrumental and Expressive Support Scale (IESS) mean, 62.7 SD, 15.5				12 months mean, 62.6 SD, 16		
		ComputerLink	47	mean, 63.4 SD, 16.6				12 months mean, 65		0.51

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
								SD, 17.4		
HIV/AIDS										
Flatley-Brennan, 1998[6]	Improved decision making confidence	Control	26	Mean score mean, 52.8 SD, 6				Post-intervention: mean, 56.47 SD, 4.2		BL, 0.05 time point 2, final time point, 0.05
		Computer Link	31	Mean score mean, 54.35 SD, 5.9				Post-intervention: mean, 51.45 SD, 6.9		BL, 0.05 time point 2, final time point, 0.05
	Improved decision making skill Reduced social isolation	Control	26	Mean score: mean, 4.73 SD, 1.4				Post-intervention mean, 5.47 SD, 1.3		BL, 0.05 time point 2, final time point, 0.05
		Computer Link	31	Mean Score: mean, 4.58 SD, 5.4				Post-intervention mean, 5.4 SD, 1.5		BL, 0.05 time point 2, final time point, 0.05
		Control	26	Mean score mean, 67.05 SD, 17				Post-intervention mean, 68 SD, 16.8		BL, 0.05 time point 2, final time point, 0.05
		Computer Link	31	Mean score mean, 63.5 SD, 14.4				Post-intervention mean, 66.08 SD, 13.68		BL, 0.05 time point 2, final time point, 0.05
	Differential decline in health status		26	Mean score mean, 13.8 SD, 4.93				Post-intervention mean, 13.65 SD, 1.3		BL, 0.05 final time point, 0.05
		Computer Link	31		RR or OR time point 2, 0.05			Post-intervention mean, 13 SD, 1.7		BL, 0.05 time point 2, No improvement over control
Arthritis										
Sciamanna, 2005[7]	Patient overall satisfaction	Control	57					One measurement only, survey		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	score with the osteoarthritis care they are receiving							before or after viewing the web-based module		
		www.myexpertdoctor.com tailored feedback on quality of received care	64					One measurement only, survey before or after viewing the web-based module:		BL, No diff between control & intervention group time point 2, final time point
Vaginal or c-section delivery										
Montgomery, 2007[8]	mean (SD) on DCS at follow up	Usual Care	201	Total score on DCS				37 weeks gestation (DCS): mean, 27.8 SD, 14.6		
		Computerized Educational Information	201	Total score on DCS				37 weeks gestation (DCS): mean, 22.5 SD, 13.2		
		Decision analysis program	198	Total score on DCS				37 weeks gestation (DCS): mean, 23.6 SD, 15.1		
	Difference between groups in total score on DCS (decision v usual care)	Usual Care	201	Difference between groups on total score on DCS(adjusted figure	2 weeks post delivery (satisfaction with decision)		time point 4, OR:1.42(0.94 to 2.14)	37 weeks gestation (DCS) mean, -4 range, -6.5 to -1.5		0.22
	Odds ratio for caesarean (elective and emergency)	Computerized Educational Information	201	Odds ratio for vaginal v c section (elective and emergency)	2 weeks post delivery (satisfaction with decision)			37 weeks gestation (DCS)		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
	v vaginal, decision v usual care			decision analysis v usual care						
		Decision analysis program			2 weeks post delivery (satisfaction with decision)			37 weeks gestation (DCS)		
		Usual Care			2 weeks post delivery (satisfaction with decision)			37 weeks gestation (DCS)		
		Computerized Educational Information			2 weeks post delivery (satisfaction with decision)			37 weeks gestation (DCS)		
	Satisfaction with decision (decision analysis v usual care)	Decision analysis program	201	Satisfaction with decision as odds ratio (decision analysis v usual care)	2 weeks post delivery (satisfaction with decision)			37 weeks gestation (DCS) mean, 0.14 range, 0.02 to 0.27		0.063
	Mode of delivery - elective caesarean	Usual Care	201		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:50		
		Computerized Educational Information	201		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:49		
		Decision analysis program	198		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:41		
	Delivery - emergency caesarean	Usual Care	238		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:20		
		Computerized Educational Information	240		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:22		
		Decision	235		6 weeks		questionnaire	Hospital		

Evidence Table 34. Outcomes in studies addressing the impact of CHI applications on relationship-centered outcomes (continued)

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	ratios at time points	Significance
		analysis program			post delivery		at 36 weeks gestation	records: type of delivery:21		
	Delivery - vaginal birth	Usual Care	238		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:30		
		Computerized Educational Information	240		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:29		
		Decision analysis program	235		6 weeks post delivery		questionnaire at 36 weeks gestation	Hospital records: type of delivery:37		

BL = baseline, SD = standard deviation, OR = odd ratio, RR = relative ratio, DCS = decisional conflict scale

Reference List

1. Green MJ, Peterson SK, Baker MW *et al*. Use of an educational computer program before genetic counseling for breast cancer susceptibility: effects on duration and content of counseling sessions. Genet Med 2005; 7(4):221-9.

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Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Alzheimer's									
Tarraga, 2006[1]	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS	> 65 yr, treated with CHEI x 1 yr, > 3 yrs education, MMSE 18-24, a Global Deterioration Scale (GDS) score of 3 or 4, absence of uncontrolled disruptive behaviors, absence of major depression, absence of structural lesions in the computed tomogram, absence of history of alcohol or the substance abuse	Uncontrolled disruptive behaviors (e.g., aggression, delusions, hallucinations and agitation) that could interfere with program administration and/or neuropsychological assessments, major depression, current or partial remission, structural lesions in the computed tomogram or magnetic resonance image, history of alcohol or other substance abuse, severe auditory, visual or motor deficits that may interfere with cognitive testing	ChEI control	Integrated psycho stimulation program, Interactive Multimedia Internet-based System (IMIS)	**0**
Arthritis									
Lorig, 2008[2]	Individuals interested in their own health care	Interactive consumer website	NS	2004/ NS	18 and older, a diagnosis of OA, rheumatoid arthritis (RA), or fibromyalgia, could have other chronic conditions Internet and email access	Active treatment for cancer for 1 yr, participated in the small-group ASMP or the Chronic Disease Self-Management Program	Usual care	Online intervention	**1**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					agreed to 1–2 hours per week of log-on time spread over at least 3 sessions/week for 6 weeks				
Asthma									
Jan, 2007[3]	Individuals interested in their own health care Caregiver, childhood asthma	Personal monitoring device	Home/ residence	2004/ January to December	6 - 12 yr, caregivers have Internet access, persistent asthma diagnosis (GINA clinical practice guidelines)	Diagnosed with bronchopulmonary dysplasia, diagnosed with other chronic co morbid conditions that could affect quality of life	Verbal information and booklet for asthma education with written asthma diary.	Blue Angel for Asthma Kids, An internet-based diary record for peak expiratory flow rate (PEFR) symptomatic support information, and an action plan suggestion, and telecommunication technologies for uploading and retrieving the storage data	**1**
Back pain									
Buhrman, 2004[4]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS,	18-65 yr, Internet access, Been in contact with a physician, Have back pain, Have chronic pain (>3 months),	Suffer of pain that can increase as a consequence of activity, wheelchair bound, have planned any surgical treatment, suffer from heart	Wait-list	Internet-based pain management program	**2**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
						and vascular disease			
Breast cancer									
Gustafson, 2001[5]	Individuals interested in their own health care	Interactive consumer website,	Home/ residence	Duration, Between April 1995 and May 1997	<60 years, Breast cancer patients, Within 6 months of diagnosis, not homeless, not active illegal drug users,		Allocated standard intervention	Received CHESS intervention	**1**
Gustafson, 2008[6]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Between April 1995 and May 1997	<60 years, Breast cancer patients, Within 6 months of diagnosis, not homeless, not active illegal drug users		Allocated standard intervention	Received CHESS intervention	**2**
Maslin, 1998[7]	Individuals interested in their own health care	Interactive computerized video system	Clinician office	NS	Non metastatic breast cancer,	Advanced breast cancer, metastatic disease, sensory impairment, do not understand English,	Standard care	Interactive computerized video system	**-1**
Chronic adult aphasia									
Katz, 1997[8]	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS	<85 years, aphasia subsequent to a single left hemisphere, thromboembolic infarct, completed at least 8th grade, pre-morbidly literate in English, living in non-	Visual acuity better than 20/100 corrected in the better eye, auditory acuity better than 40 dB speech reception threshold, language treatment in the three months prior	No treatment	Computer stimulation, Computer reading treatment	**1**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					institutionalized environment, at least one year post-onset of aphasia, performs between 15th and 90th overall percentile on the Porch Index of communicative Ability, Pre-morbidly right-handed	to entry into the study			
COPD									
Nguyen, 2008[9]	Individuals interested in their own health care	Interactive consumer website,	Academic medical centers	2005/ NS	Diagnosis of COPD and being clinically stable for at least 1 month, spirometry results showing at least mild obstructive disease, ADL limited by dyspnea, use of the Internet and/or checking email at least once per week with a windows operating system, oxygen saturation > 85% on room air or ¡Ü 6 L/min of nasal oxygen at the end of a 6-minute walk test,	Any active symptomatic illness, participated in a pulmonary rehabilitation program in the last 12 months, were currently participating in > 2 days of supervised maintenance exercise	Face-to-face (fDSMP)	Internet-based (eDSMP)	**2**
Headache									
Trautman, 2008[10]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	10-18 yr, At least two headache attacks per month		EDU (First training session of CBT on	CBT (6 self-help sessions and 6 weekly chat sessions	**3**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	Parents/caregivers						headache information plus chat communication)	with trainer)	
Mental health/Depression									
Christensen, 2004[11]	Individuals interested in their own health care	Interactive consumer website	NS	NS	≥18 years, internet access, 22 or higher on the Kessler psychological distress scale	≥ 52 years, receiving clinical care from either a psychologist or psychiatrist	Control	Mood GYM Blue Pages	**2**
Hasson, 2005[12]	Individuals interested in their own health care	Personal monitoring device	NS	NS	Employment at a company insured by Alecta (occupational pension plan company)	Those who quit employment prior to completion of study, "communication related problem"	Access to web-based tool including monitoring tool for stress and health; diary connected to monitoring tool, and scientific info on stress and health	Web-based tool with control group components plus self-help with stress management exercises and chat	**2**
Kerr, 2008[13]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	18 - 25 years, BMI 25-39		Enhanced standard care	PACEi	**1**
March, 2008[14]	Individuals interested in their own health care: children parents		NS	NS	7 - 12 yr, primary diagnosis of an anxiety disorder with severity level of 4 or more on 8 point scale (I-e moderate severity), a minimum reading level of 8 years access to internet at	Developmental disorders, learning disability, depressive disorder, other psychological treatment, primary behavioral disorder,	Wait list (WL)		**2**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					home	failure to complete screening assessment			
Orbach, 2007[15]		Interactive consumer website,	Remote location: university campus	NS	Both, students in Kings College London, London University, access to a computer connected to the Internet	Receiving treatment for anxiety,	Control	CBT	**1**
Proudfoot, 2003[16]	Individuals interested in their own health care	Personal monitoring device	Clinician office	NS	18-75 years old, depression, anxiety and depression, Anxiety, >=4 on General Health Questionnaire-12, >=12 on Clinical Interview Schedule-Revised	Psychological treatment or counseling, current Suicidal ideation, psychotic disorder organic mental disorder, alcohol and/or drug dependence, on medication for anxiety and/or depression for >=6 months immediately prior to entry, unable to read or write, unable to attend 8 session at surgery	Usual treatment	Beating the Blues intervention	**3**
Spek, 2008[17]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Duration, 12months	Age between 50 and 75 years, an Edinburgh Depression Scale (EDS) score of 12 or more, no DSM-IV diagnosis of depression, access to the internet and the	Suffering from any other psychiatric disorder in immediate need of treatment and suicidal ideation	Waiting list control	Group CBT, Internet-based intervention	**2**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					ability to use the internet				
Diabetes									
Homko, 2007[18]	Individuals interested in their own health care	Interactive consumer website,	Home/ residence	Duration, Sep 2004 to May 2006	18-45 years, documented GDM on 3-h oral glucose tolerance test, using the criteria of Carpenter and Coustan, 33 weeks gestation or less	Prior history of glucose intolerance outside of pregnancy, multiple gestations	Usual care, paper logbooks	telemedicine (website to document glucose levels and to communicate with health-care team)	**1**
Tjam, 2006[19]	Individuals interested in their own health care	Interactive consumer website	Clinician office	2years duration	65 yr, Both male and female, Internet proficient have access, have access to internet	Below40 and above65 years, blindness, little or no dexterity, education level below grade 5, ESRD , gestational diabetes	Individuals with Diabetes Education Centers program n, 20	Individuals with interactive internet program	**1**
Wise, 1986 [20] Diabetes	Diabetic individuals both NIDDM and IDDM	Interactive computerized machine	Home / Res	Ns	Diabetics attending Charing Cross hospitaland having DM > 2 yrs	None specified	3 controls Used: a. No intervention (used for Glucose control assessment) No KAP b. Just the assessment of the KAP c. Take-away corrective feedback	Interactive computerized machine	
Diet/exercise/physical activity NOT Obesity									
Adachi,	Individuals	Tailored	Home/	2002/	20-65 yr,		Untailored	behavioral	**0**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
2007[21]	interested in their own health care	advice based on answers to a questionnaire	residence	January to September	BMI ≥24, BMI r≥ 23 with mild hypertension Hyperlipidemia, or DM		self-help booklet with 7-month self monitoring	weight control program with 6	
Hunter, 2008[22]	Individuals interested in their own health care	Interactive consumer website,	NS	Year, 2006	18 - 65 yr, weight within 5 pounds or above their maximum allowable weight (MAW) for the USAF, personal computer with internet access, plans to remain in the local area for 1 year,	Lost more than 10 pounds in the previous 3 months, used prescription or over-the-counter weight-loss medications in the previous 6 months, had any physical activity restrictions, had a history of myocardial infarction, stroke, or cancer in the last 5 years, reported diabetes, angina, or thyroid difficulties; or had orthopedic or joint problems, women were excluded if they were currently pregnant or breast-feeding, or had plans to become pregnant in the next year	Usual care	behavioral Internet treatment	**2**
McConnon, 2007[23]	Individuals interested	Interactive consumer	Home/ residence	2003/ NS	18 - 65 yr, BMI 30 or more,		Usual care	Internet group	**1**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	in their own health care	website,			able to access internet at least 1 time a week, able to read and write English				
Tate, 2006[24]	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS,	20 to 65, body mass index of 27 to 40, willingness to use meal replacements as part of the dietary regimen, availability of a computer with internet access	Heart attack, stroke, or cancer in the past 5 years, diabetes, angina or orthopedic or joint problems that would prohibit exercise, major psychiatric disorder involving hospitalization during the past year, current, planned, or previous (within 6 months) pregnancy	No counseling	human email counseling, automated feedback	**4**
Williamson, 2006[25]	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS	11 - 15 yr, African-American, female, BMI above the 85th percentile for age and gender based on 1999 National Health and Nutrition Examination Study normative data, at least one obese biological parent, as defined by BMI > 30, one designated		Control and intervention adolescents	control and intervention parents	**2**

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					parent who was overweight (BMI > 27), adolescent's family was willing to pay $300 out-of pocket expenses toward the purchase of the computer worth >$1000, the family home had electricity and at least one functional telephone line				
HIV AIDS									
Gustafson, 1999[26]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS		Dementia, Control subject with room mate in experimental group	No intervention	Received access to CHESS	**2**
Pain Tolerance									
Borckardt, 2007[27]	Individuals interested in their own health care	Computer assisted imagery system	Remote; Sound proof lab at the university	NS			Distraction group	Computerized Pain Management	**0**
Obesity									
Morgan, 2009 [28] Obesity	Overweight and obese males	Interactive website	Home / Res	Sept to Dec 2007	Consenting Male individuals from U of Newcastle responding to adv who were obese / overwt (BMI 25—37), 18—60 y/o.	H/o major medical problem like heart disease in past 5 years, DM, orthopedics or joint problem that would be a barrier to PA, recent weight loss of 4.5 kg or consuming meds affecting body wt.	One information session + Program booklet	SHED IT internet program w/ information session and program booklet (the program facilitates self monitoring and daily diary to which the researchers	

Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
								respond)	

NS = not specified, yr = year, CHESS = Comprehensive Health Enhancement Support System, CBT = computer based training, eDSMP = Internet based dyspnea self-management programs, fDSMP = face-to-face dyspnea self-management programs, BMI = body mass index

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Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

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Evidence Table 35. Description of RCTs addressing KQ1d (impact of CHI applications on clinical outcomes) (continued)

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Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
Alzheimer's									
Tarraga, 2006[1]	ChEI control	Mean, 76.9 SD, 4.5	NS	NS	NS	NR	F,12		
	Integrated psycho stimulation program (PPI)	Mean, 77.4 SD, 4.7	NS	NS	NS	NR	F,14		
	Interactive multimedia internet-based system (IMIS)	Mean, 75.8 SD, 5.9	NS	NS	NS	NR	F,13		
Arthritis									
Lorig, 2008[2]	Usual care	Mean, 52.5 range 22–89 SD, 12.2	White non-Hispanic, 425(93.7)	NS	Mean, 15.7 SD, 3.11	NR	F, 425(90.5)	Married, 425(71.1)	Health-related web site visits last 6 months: mean, 2.85 SD, 11.68
	Online intervention	Mean, 52.2 SD, 10.9	White non-Hispanic, 441(90.9)	NS	Mean, 15.6 SD, 3.09	NR	F, 441(89.8)	Married, 441(65.5)	Health-related web site visits last 6 months mean, 2.87 SD, 11.2
Asthma									
Jan, 2007[3]	Verbal information and booklet for asthma education with written asthma diary.	Mean, 9.9 SD, 3.2	NS	NS	NS	NR	M,28(36.8) F, 48(63.2)		History of asthma (yr): mean, 2.1 SD, 1.2 Asthma severity: mild, 33(43.4) moderate, 35(46.1) severe, 8(10.5) Education of primary caregiver: HS diploma or below, 43 (56.6) College or above,

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									33 (43.4)
	Participant received asthma education and with interactive asthma monitoring system	Mean, 10.9 SD, 2.5	NS	NS	NS	NR	M,35(39.7) F, 53(60.2)		History of asthma (yr): mean, 2.4 SD, 1.9 Asthma severity: mild, 33(37.5) moderate, 43(48.9) severe, 12(13.6) Education of primary caregiver: HS diploma or below, 58(66.0) College or above, 30 (34.0)
Back pain									
Buhrman, 2004[4]	Wait-list	Mean, 45 SD, 10.7	NS	NS	<8 yr, 7(24.1) 8-12 yr, 6(21) 12-14 yr, 2 (6.9) 14-16 yr, 14 (48.3)	NR	M,11(37.9) F, 18(62.1)		Sick leave: Yes, 12 (41.4) No, 17 (58.6) Pain location: back, 12 (41.4) back plus other area, 17 (58.6) Previous treatment: PT,11(37.9) chiropractor, 12 (41.4) nephropathy, 3 (10.3)

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									Psychologist, 6 (20.7) Pain Clinic, 2 (6.9)
	Internet-based pain management program	Mean, 43.5 SD, 10.3	NS	NS	<8 yr, 2 (9.1) 8-12 yr, 6 (27) 12-14 yr, 3 (13.6) 14-16 yr, 11 (50)	NR	M, 8 (36.4) F,14 (63.6)		Sick leave: Yes, 5 (22.7) No, 17 (77.3) Pain location: back, 7 (31.8) back plus other area, 15 (68.2) Previous treatment: PT, 10 (45.5) chiropractor, 8 (36.4) naprapathy, 4 (18.2) Psychologist, 3 (13.6) Pain Clinic, 1 (4.5)
Breast cancer									
Gustafson, 2001[5]	Allocated standard intervention	Mean, 44.4 median, range, SD, 7.1	White non-Hispanic, 72	USD >40,000, 50.8%	12-16 yr (40.2)	NR		Living Status: Living with Partner, (72.6)	Insurance: private Insurance, (84.7)
	Received CHESS intervention, a home based computer system	Mean, 44.3 median, range, SD, 6.6	White non-Hispanic, 76	USD >40,000, (58.1)	12-16 yr (45.8)	NR		Living Status: Living with Partner, (71.9)	Insurance: private Insurance, (86)
Gustafson, 2008[6]	Usual Care with books	NS	NS	NS	NS	NR			NS
	Internet	NS	NS	NS	NS	NR			NS
Maslin, 1998[7]	Standard care	Mean, 52.1	NS	NS	NS	NR			NS
	IVD shared	NS	NS	NS	NS	NR			NS

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	decision program								
Chronic adult aphasia									
Katz, 1997[8]	No treatment	Mean, 62.8 range, 53-70 SD, 5.1	NS	NS	Mean, 13.6 yr SD, 2.2	NR			NS
	Computer stimulation	Mean, 66.4 range, 53-76 SD, 6	NS	NS	mean, 15 SD, 2.8	NR			NS
	Computer reading treatment	Mean, 61.6 range, 48-83 SD, 10	NS	NS	Mean, 14.4 SD, 3.3	NR			NS
COPD									
Nguyen, 2008[9]	Face-to-face (fDSMP),	Mean, 70.9 SD, 8.6	White non-Hispanic, 20(100)	NS	12-16 yr, 8(40) >16 yr, 12(60)	NR	F, 9 (45)		Not currently employed or currently disabled or retired, 15 (75) currently smoking, 1 (5)
	eDSMP	Mean, 68 SD, 8.3	White non-Hispanic, 18 (95)	NS	12-16 yr, 10(50) >16 yr, 9(50)	NR	F, 8(39)		Not currently employed or currently disabled or retired: 13 (72) currently smoking: 2 (11)
Headache									
Trautman, 2008[10]	EDU (First training session of CBT on headache information plus chat communication)	NS	NS	NS	NS	NR	NS	NS	NS
		Mean, 13.4 range, 10-18 SD, 2.6	NS	NS	NS	NR	NS	NS	NS

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
		Mean, 13.4 range, 10-18 SD, 2.6	NS	NS	NS	NR	NS	NS	NS
Mental health/ Depression									
Christensen, 2004[11]	Control	Mean, 36.29 SD, 9.3	NS	NS	Mean, 14.4 SD, 2.3	NR	F, 124 (70) M, 54 (30)	Married cohabiting: 100 (56) Divorced/separated: 24 (14) Never married: 53 (36)	Kessler Psychological Distress Scale: mean, 18 SD, 5.7
	Mood gym	Mean, 35.85 SD, 9.5	NS	NS	Mean, 14.6 SD, 2.4	NR	F, 136 (75) M, 46 (25)	Married/ cohabiting: 98 (54) Divorced/separated: 26 (14) Never married: 57 (31)	Kessler Psychological Distress Scale: mean, 17.9 SD, 5
	Blue Pages	Mean, 37.25 SD, 9.4	NS	NS	Mean, 15 SD, 2.4	NR	F, 115 (69) M, 50 (31)	Married/cohabiting: 100 (61%) Divorced/separated: 24(15) Never Married: 53 (30)	Kessler Psychological Distress Scale: mean, 17.5 median, SD, 4.9
Hasson, 2005[12]	Access to web-based tool including monitoring tool for stress and health; diary connected to monitoring tool, and scientific info on stress and	NS	NS	US D <25,000, 39 (22) 25,000-40,000, 106 (61) >40,000, 27 (16)	8-12 yr, 89 (51) 12-16 yr, 83 (48)	NR	M, 112 (64) F, 62 (36%)	Marital status: Married, 134 (77) Single: 38 (22	

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	health								
		NS	NS	USD <25,000, 24 (18) 25,000-40,000, 76 (59) >40,000, 27 (21)	8-12 yr, 54 (42), 12-16 yr, 73 (57)	NR	M, 75 (58) F, 54 (42)	Marital status: Married: 102 (79) Single: 25 (19)	
Kerr, 2008[13]	Enhanced standard care. Standard care participants received usual advice from their provider concerning overweight; to change their physical activity and eating habits. They also received a standard set of materials summarizing recommendations for diet and exercise.	Mean, 41.6(8.9)	NS	NS	81(14.3)	NR		Married or living with partner: yes, 128(65.3)	Full-time employed: yes, 140(71.4) Percent with CESD score 10 or greater: yes 59(30.1) Physical activity: mean baseline total minutes moderate & vigorous activity per day: mean, 23.15
	PACEi	Mean, 40.8 SD, 8.4	NS	NS	105(51.2)	NR		Married or living with partner: yes, 140(68.5)	Full-time employed: 152 (74.0) percent with CESD score 10 or greater: 50(24.4) Physical activity: mean baseline total minutes moderate &

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									vigorous activity per day: mean, 21.05
March, 2008[14]	Wait list (WL)	Mean, 9.09 SD, 1.44	NS	Australian dollar <40,000, 33(12.5) 41,000–60,000, 33(34.4) 61,000–80,000, 33(15.5) 81,000–100,000, 33(6.3) >100,000, 33(31.3)	NS	NR	F, 33(57.6) M, 33(42.		
	Internet-based CBT (NET)	Mean, 9.75 SD, 1.24	NS	Australian dollar <40,000 40(21.1) 41,000–60,000 40(26.2) 61,000–80,000, 40(15.8) 81,000–100,000,40(15.8) >100,000, 40(21.1)	NS	NR	F, 40(52.5) M,40(47.5)		
Orbach, 2007[15]	Control	Mean, 22.54 range, 20.07–24.97 SD, 5.71	NS	NS	Yr at university: mean, 3.02 median, SD, 2.81	NR	F, 24 (86)		Years test anxiety: mean, 6.12 SD, 6.39 Failed exams: 14(50)

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	CBT	Mean, 24.72 range, 22.36–27.09 SD, 6.89	NS	NS	NS	NR	F, 18 (60)		Year at university: mean, 3.18 SD, 2.53 Years test anxiety: mean, 7.59 SD, 6.67 Failed exams: 15 (50)
Proudfoot, 2003[16]	Usual treatment	Mean, 45.7 SD, 14.1	Black Caribbean 2 (3) Indian 3 (5) Pakistani 1 (2) White 57 (88)	NS	<5 yr, 1(1) 5-10yr, 10 (14) 11-12 yr, 17(24) 13-15yr, 15 (21) >15, 28(39)	NR	F, 57 (73.1) M, 21(26.9)	Single, 20 (27) Married, 34 (45) Cohabiting, 7 (9) Separated, 2 (3) Divorced, 8 (11) Widowed, 4 (5)	
	Beating the Blues intervention	Mean, 43.7 SD, 14.7	Black African: 1(1) Black Caribbean 2(3) Black other 2 (3) White 68 (88)	NS	<5yr, 0 5-10yr, 8 (10) 11-12 yr, 22 (26) 13-15yr, 15 (18) >15yr, 39 (46)	NR	F, 66 (74.2) M, 23 (25.8)	Single, 25 (29) Married, 32 (37) Cohabiting, 9 (11) Separated, 2(2) Divorced. 13 (15) Widowed, 5 (6)	
Spek, 2008[17]	Waiting list control	Mean, 55 SD, 4.6	NS	NS	NS	NR	M, 110 F, 191		
		NS	NS	NS	NS	NR			NS
Diabetes									
Homko, 2007[18]	Usual care, paper logbooks	Mean, 29.2 SD, 6.7	White non-Hispanic, 6(24)	USD <15,000,	< 8 yr, 2(8) 8-12 yr, 12(48)	NR			BMI: mean, 32.5

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
			Black non-Hispanic, 12(48) Latino/Hispanic, 4(16) API, 3(12)	10(40) 15,000-34,999, 3(12) 35,000-54,999, 3(12) >55,000, 3(12) missing, 6(24)	12-16 yr, 10(40)				SD, 7.1 Gravidity: mean, 2.9, SD, 2.3 Glucose challenge (mg/dl): mean, 179.1 SD, 45.2 GA at diagnosis (weeks): mean, 27.7 SD, 3.8
	Telemedicine (website to document glucose levels and to communicate with health-care team)	Mean, 29.8 SD, 6.6	White non-Hispanic, 8(25) Black non-Hispanic, 14(44) Latino/Hispanic, 7(22) API, 3(9)	USD <$15,000, 8(25) $15,000-$34,999, 8(25) $35,000-$54,999, 3(9) >$55,000, 6(19) missing, 7(22)	<8 yr, 4(12.5) 8-12 yr, 12(37.5) 12-16 yr, 15(47)	NR			BMI : mean, 33.4 SD, 8.6 Gravidity: mean, 3 SD, 1.8 Glucose challenge (mg/dl): mean, 159.5 SD, 46.3 GA at diagnosis (weeks): mean, 27.5 SD, 4.2
Tjam, 2006[19]	Individual with Diabetes Education Centers (DEC) program n,20	Range, 65	NS	NS	<8 yr, 8 (40) 8-12 yr, 3 (15) 12-16 yr, 9 (45)	NR	NS	NS	NS
	Individual with interactive internet program	Range, 65	NS	NS	<8 yr, 8 (21.6) 8-12 yr, 5 (13.5)	NR	NS	NS	NS

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
					12-16 yr, 24 (64.9)				
Wise, 1986 [20] Diabetes	IDDM	42 +/- 16	NS	NS	NS		Sex ratio varied from 0.42 to 0.60. The study does not specify any other detail		
	Control Group (AGE +/- SE)								
	Assessment on KAP	44 +/- 17							
	KAP –Feedback – KAP	45 +/- 16							
	KAP –Interactive computer –KAP	41 +/- 18							
	NIDDM	55 +/- 21	NS	NS	NS		Sex ratio varied from 0.42 to 0.60. The study does not specify any other detail		
	Control Group (AGE +/- SE)								

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
	Assessment on KAP	57 +/- 23							
	KAP –Feedback – KAP	58 +/- 17							
	KAP –Interactive computer –KAP	56 +/- 16							
Diet/exercise/physical activity not obesity									
Adachi, 2007[21]	Control	Mean, 46.3 SD, 8.6	NS	NS	NS	NR			Height (cm): mean, 157.6 SD, (5.9) Body weight (kg): mean, 65.1 SD, 6.4 BMI (kg/m2): mean, 26.1 SD, 1.6
	Behavioral weight control program with 6-month weight and targeted	Mean, 46.6 SD, 10.1	NS	NS	NS	NR			Height: mean, 157.5 SD, 6.1 Body weight (kg): mean, 65.3 SD, 6.4 BMI (kg/m2): mean, 26.2 SD, 1.4
	Untailored self-help booklet with 7-month self monitoring	Mean, 46.6 SD, 9	NS	NS	NS	NR			Height: mean, 155.7 SD, 5.2 Body weight (kg): mean, 63.4 SD, 5.5 BMI (kg/m2): mean, 26.1

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									SD, 1.5
Hunter, 2008[22]	Usual care	Mean, 34.4 SD, 7.2	White non-Hispanic, 222 (53.2)	NS	12-16 yr, 222(61.7)	NR	F, 222(50.5)		
	Behavioral Internet treatment	Mean, 33.5 SD, 7.4	White non-Hispanic, 224 (58.0)	NS	12-16 yr, 224(63.9),	NR	F, 224(50.0)		
McConnon, 2007[23]	"usual care". Participants randomized to the usual care group were advised to continue with their usual approach to weight loss and were given a small amount of printed information at baseline, reflecting the type of information available within primary care.	Mean, 47.4	NS	NS	NS	NR			Weight (kg): mean, 94.9 kg BMI: mean, 34.4 Quality of Life (Euro QoL): mean, 61.5 Physical Activity (Baecke): mean, 6.7
	Internet group	Mean, 48.1	NS	NS	NS	NR			Weight (kg): mean, 97.5 kg BMI: mean, 34.35 Quality of Life (EuroQoL): mean, 70 Physical Activity (Baecke): mean, 6.8
Tate, 2006[24]	No counseling	Mean, 49.9 SD, 8.3	Minority, 6 (9)	NS	>16 yr, (49)	NR	F, 55 (82)		Weight: mean, 88.3 (13.9) body mass index: 32.3 (3.7)

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									internet experiences: 4.7 (2.9)
	Human email counseling	Mean, 49.7 SD, 11.4	Minority, 8(13)	NS	>16 yr, (56)	NR	F, (53, 87)		Weight: mean, 89.0 (13.0) body mass index: 32.8 (3.4) Internet experiences: 4.1 (2.3)
	Automated feedback	Mean, 47.9 SD, 9.8	Minority, 6(10)	NS	>16 yr, (59)	NR	F, 54 (84)		Weight: mean, 89.0 (13.2) body mass index 32.7 (3.5) Internet experiences: 4.4 (2.2)
Williamson, 2006[25]	Control and intervention adolescents	Mean, 13.2 SD, 1.4	NS	NS	NS	NR			Height: mean, 160.0 cm SD, 8.1 weight: mean, 93.3 kg SD, 22.5 BMI: percentile 98.3 (2.5) mean, 36.4 SD, 7.9 body fat DXA: mean, 45.9 SD, 7.5
	Control and intervention parents	Mean, 43.2 SD, 6.2	NS	NS	NS	NR			Height: mean, 162.3 cm SD, 6.9

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
									weight: mean, 101.2 kg SD, 18.4 BMI: percentile not reported mean, 38.4 SD, 7.2 body fat DXA: mean, 48.4 SD, 6.3
HIV									
Gustafson, 1999[26]	Control	Mean, 34.5	White, non-Hispanic, (86.7)		Mean, 14.7yr			Living alone mean, (31.9)	Health insured, (80.5)
	CHESS	Mean 34.8	White, non-Hispanic, (81.2)		Mean, 14.3 yr			Living alone mean, (24)	Health insured, (75.8)
Pain									
Borckardt, 2007[27]	Distraction group	Mean, 20.29 SD, 2.38	NS	NS	NS	NR	M, 26 F, 38	NS	
	Computerized Pain Management	Mean, 20.52 SD, 2.86	NS	NS	NS	NR	M, 26 F, 30	NS	
Obesity									
Morgan, 2009 [28] Obesity	One information session + Program booklet	34 SD 11.6	NS	NS	Student: 14 Non Acad Staff: 13 Acad Staff: 4	Measured by SEIFA score 1,2-0 3,4-5 5,6-9	All M		

Evidence Table 36. Description of consumer characteristics in RCTs addressing KQ 1d (impact of CHI applications on clinical outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital Status, n(%)	Other
						7,8:11 9,10:3			
	SHED IT internet program w/ information session and program booklet (the program facilitates self monitoring and daily diary to which the researchers respond)	37.5 SD 10.4	NS	NS	Student: 14 Non Acad Staff: 14 Acad Staff: 6	1,2-1 3,4-7 5,6-3 7,8:11 9,10:2	All M		

NR= Not Reported, NS= Not Significant, SD= Standard Deviation, SES= Socioeconomic Status, Yr = year, M = male, F = female, API = Asian/Pacific Islander, CBT = computer-based training, kg = kilogram, BMI= Body Mass Index, QOL= Quality of Life, CHESS = Comprehensive Health Enhancement Support System

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Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
Alzheimer's										
Tarraga, 2006[1]	Alzheimer's Disease Assessment Scale-Cognitive	Control	12	Mean, 20 SD, 4.35				24wks: mean, 21.83 SD, 4.48		
		IMIS,IPP, ChEIs	15	Mean, 22.4 SD, 5.7				24wks: mean, 21.33 SD, 5.74		
		IPP, ChEIs	16	Mean, 21.19 SD, 5.73				24wks: mean, 22.31 SD, 6.81		
Arthritis										
Lorig, 2008[2]	Health distress	Control	344	Mean, 2.37 SD, 1.19	6mos			1yr: mean, 2.25 SD, 1.19		p<0.001
		Online intervention	307	Mean, 2.41 SD, 1.2	6mos			1yr: mean, 2 SD, 1.18		
	Activity limitation	Control	344	Mean, 3.22 SD, 0.903	6mos			1yr mean, 3.29 SD, 0.885		p<0.001
		Online intervention	307	Mean, 3.17 SD, 0.973	6mos			1yr mean, 3.09 SD, 0.962		
	Self reported global health	Control	344	Mean, 0.569 SD, 0.446	6mos			1yr mean, 0.573 SD, 0.457		P< 0.004
		Online intervention	307	Mean, 0.547 SD, 0.401	6mos			1yr mean, 0.514 SD, 0.445		
	Pain	Control	344	Mean, 6.37 SD, 2.22	6mos			1yr mean, 6.1 SD, 2.35		p<0.001
		Online intervention	307		6mos			1yr mean, 5.77 SD, 2.53		
	Self efficacy	Control	344	Mean, 4.96 SD, 1.98	6mos			1yr: mean, 5.34 SD, 2.06		
		Online intervention	307	Mean, 5.08 SD, 2.13	6mos			1yr: mean, 5.89		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								SD, 2.09		
Asthma										
Jan, 2007[3]	Symptom score at nighttime	Control	71	Mean, 0.05 median, 0 SD, 0.13				Week 12: mean, 0.05; median, 0; SD, 0.19		
		Participants received asthma education and with interactive asthma monitoring system	82	Mean, 0.11 median, 0 range, 0.00-0.58 SD, 0.28				Week 12 mean, 0.04 median, 0 range, 0.00-1027 SD, 0.17		
	Symptom score at daytime	Control	71	Mean, 0.03 median, 0 range, 0.00-0.58 SD, 0.11				Week 12 mean, 0.05 median, 0 range, 0.00-0.91 SD, 0.07		
		Participants received asthma education and with interactive asthma monitoring system	82	Mean, 0.14 median, 0 range, 0.00-1.17 SD, 0.32				Week 12		
	Morning PEF	Control	71	Mean, 219.2 median, 212.7 range, 125.0-361.9 SD, 58.0				Week12: mean, 230.0 median, 229.6 range, 147.5-374.2 SD, 57.9		p<0.072
		Participants received asthma education and with interactive asthma monitoring system	82	Mean,223.1 median, 214.6 range, 128.2-385.0 SD, 55.5				Week, 12 mean, 241.9 median 220.0 range, 126.7-594.3 SD, 81.4		p <0.017

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Night PEF	Control	71	Mean, 224.7 median, 213.8 range, 107.5-356.6 SD, 57.6				Week, 12 mean, 235.9 median, 232.1 range, 142.5-428.4 SD, 61.6		p<0.070
		Participants received asthma education and with interactive asthma monitoring system	82	Mean, 232.5 median 223.3 range, 141.4-389.4 SD, 55.3				Week, 12 mean, 255.6 median, 244.1 range, 123.3-655.5 SD, 86.7		p<0.010
Back pain										
Buhrman, 2004[4]	CSQ-Catastrophizing	Control	29	Mean, 13.7 SD, 6.9				2 mos mean, 12.3 SD, 7.2		p<0.01
		Cognitive Behavior Intervention	22	Mean, 13.6 SD, 7.7				2 mos mean, 8.6 SD, 5.2		
	CSQ-Ability to decrease pain	Control	29	Mean, 2.6 SD, 1.0				2 mos mean, 2.9 SD, .1.0		p<0.05
		Cognitive Behavior Intervention	22	Mean, 3.0 SD, 0.8				2 mos mean, 3.9 SD, 0.9		
	CSQ-Control over pain	Control	29	Mean, 2.9 SD, 1.1				2 mos: mean, 2.9 SD, 1		p<0.05
		Cognitive Behavior Intervention	22	Mean, 2.8 SD, 1				2 mos: mean, 3.9 SD, 0.7		
Breast cancer										
Gustafson, 2001[5]	Social/family well being (quality of life)	Control	125		2 mos mean, 78.2			5 mos: mean, 74.7		
		Chess	121		2 mos mean, 79.3			5 mos: mean, 75.8		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Emotional well-being (quality of life)	Control	125		2 mos mean, 72.8 SD,			5 mos mean, 75.3		
		CHESS	121		2 mos mean, 73.9			5 mos mean, 76.3		
	Functional well-being (quality of life)	Control	125		2 mos mean, 63.0			5 mos mean, 69.9		
		CHESS	121		2 mos mean, 62.2			5 mos mean, 70.4		
	Breast cancer concerns (quality of life)	Control	125		2 mos mean, 63.3			5 mos mean, 64.7		
		CHESS	121		2 mos mean, 65.1			5 mos mean, 67.6		
Gustafson, 2008[6]	Quality of life	Control	80	Mean, 0.18 SD, 0.53				9 mos: mean, 0.11 SD, 0.45		BL, .058 .039 .126 Time point 2, .24 .004 .32 Final time point, .018 .021 .028
		Internet	75	Mean, -0.02 SD, 0.56				9 mos: mean, 0.07 SD, 0.45		BL, .84 .39 .69 Time point 2, 44 .77 .53 Final time point, .33

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
										.57 .48
		CHESS	80	Mean, 0.02 SD, 0.54				9 mos: mean, 0.18 SD, 0.54		BL, .029 .003 .007 Time point 2, 0.47 .027 .15 Final time point, .14 .14 .16
Maslin, 1998[7]	Anxiety and depression	Control	48	Score on HAD				9 mos later		p<0.001
		IVD shared decision program	51					9 mos later		
Chronic adult aphasia										
Katz, 1997[8]	Porch Index of Communicative Ability (percentiles) Overall	Control	15	Mean, 59.5 SD, 16.2				Week, 26 mean, 61.3 SD, 17.4		
		Computer reading treatment	21	Mean, 57.3 SD, 17.9				Mean, 66.4 SD, 19.4		p<.01
		Computer stimulation	19	Mean, 51.9 SD, 20.3				Mean, 56.3 SD, 20.9		p<.01
	Porch Index of Communicative Ability (percentiles) Verbal	Control	15	Mean, 55.6 SD, 16.0				Week, 26 mean, 58.1 SD, 19.1		
		Computer reading treatment	21	Mean, 54.4 SD,17.8				Mean, 62.3 SD, 22.3		p<.01
		Computer stimulation	19	Mean, 49.3 SD, 24.6				Mean, 50.6 SD, 24.5		
	Western Aphasia Battery Aphasia "Quotient"	Control	15	Mean, 72.2 SD, 24.8				Week, 26 mean, 72.2 SD, 23.7		
		Computer	21	Mean, 68.9				Mean, 73.6		p<.01

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		reading treatment		SD, 24.3				SD, 22.6		
		Computer stimulation	19	Mean, 61.9 SD, 29.5				Mean, 63.4 SD, 28.5		
	Western Aphasia Battery Aphasia "Repetition"	Control	15	Mean, 7.0 SD, 3.2				Week, 26 mean, 6.7 SD, 3.4		
		Computer reading treatment	21	Mean, 6.7 SD, 3.0				Mean, 7.3 SD, 2.9		p<.01
		Computer stimulation	19	Mean, 6.0 SD, 3.5				Mean, 6.1 SD, 3.4		
COPD										
Nguyen, 2008[9]	Score on CRQ subscale for dyspnea with ADLs	Control	20	Score o n CRQ dyspnea subscale (score range from 5-35) rating 5 activities ion a Likert scale of 1-7 points. mean, 15.9 SD, 5.4	3 mos mean, 19.2 SD, 5.8			6 mos: mean, 19.9 SD, 6.2		BL, time point 2, improvement over time is statistically significant p<0.001 final time point, improvement over time is statistically significant p<0.001
		Electronic dyspnea self management program	19	Mean, 18.8 SD, 6.2	3 mos mean, 22.3 SD, 4.6			6 mos: mean, 21.3 SD, 6		BL, time point 2, significant change from baseline. No significant difference between intervention & control groups. final time point,

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
										significant change from baseline. NO difference between control & intervention groups. p,0.14
Headache										
Trautman, 2008[10]	Frequency	Control	8	Number of headaches mean, 13.8 SD, 10.1	Post-treatment mean, 12.3 SD, 8.6			6 mos follow-up		
		CBT	8	Number of headaches mean, 15.2 SD, 10.9	Post-treatment mean, 8.1 SD, 8			6 mos follow-up: mean, 8 SD, 7.8		<0.05
	Duration	Control	8	Duration of headaches: mean, 6 SD, 5-24	post-treatment mean, 5.1 SD, 2-23			6 mos follow-up		
		CBT	8	Duration of headaches: mean, 3.8 SD, 2-24	Post-treatment mean, 3.5 SD, 2.24			6 mos follow-up mean, 3.3 SD, 1.23		>0.05
	Intensity		8	Intensity of Headaches mean, 5.8 SD, 1.5	Post-treatment mean, 5 SD, 1.3			6 mos follow-up		
		CBT	8	Intensity of Headaches mean, 4.7 SD, 0.8	Post-treatment mean, 4.7 SD, 1.3			6 mos follow-up mean, 4.2 SD, 1.9		>0.05
	Pain catastrophizing		8	PCS-C mean, 36.4 SD, 9.7	Post-treatment mean, 37.3 SD, 7.9			6 mos follow-up		
		CBT	8	Mean, 30 SD, 5.9	Post-treatment			6 mos follow-up		<0.05

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								mean, 28.3 SD, 5.8		
Mental Health (Depression/Anxiety)										
Christensen, 2004[11]	Center for Epidemiologic depression scale		159	Mean score point improvement over baseline mean, 21.6 SD, 11.1				6 wks: mean, 1.1 SD, 8.4		
		Blue Pages: Computer based psycho education website offering information about depression	136	Mean score point improvement over baseline mean, 21.1 SD, 10.4				6 wks mean, 3.9 SD, 9.1		
		Mood GYM: Computer based Cognitive Behavior therapy	136	Mean score point improvement over baseline mean, 21.8 SD, 10.5				6 wks mean, 4.2 SD, 9.1		
Hasson, 2005[12]	Biological marker: dehydroeoiandosterone sulphate	Control	156	Changes in self rated measures and biological markers covariated for baseline scores				6 mos follow up		Time*group effect, .04
		Web-based stress Management system	121	Changes in self rated measures and biological markers covariated				6 mos follow-up		Time*group effect, .04

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				for baseline scores						
	Nero peptide	Control	156	Changes in self rated measures and biological markers covariated for baseline scores				6 mos Follow- up		Time*group effect, .002
		Web-based stress management system	121	Changes in self rated measures and biological markers covariated for baseline scores				6 mos follow up		Time*group effect, .002
	Chromogranin	Control	156	Changes in self rated measures and biological markers covariated for baseline scores				6 mos follow up		Time*group effect, .001
		Web-based stress management system	121	Changes in self rated measures and biological markers covariated for baseline scores				6 mos follow up		Time*group effect, .001
Kerr, 2008[13]	CES-D score	Control	146	CES-D score (10 or	6 mos			12 mos		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				greater probable depression) mean, 7.5 SD, 4.43						
		PACEi	146	CESD score (10 or greater probable depression) mean, 7.38 SD, 4.96	6 mos			12 mos		BL, time point 2, non significant final time point, non significant
March, 2008[14]	Clinical severity rating	Control		Mean, 5.83 SD, 0.6	Post treatment at 10 wks mean, 5.14 SD, 1.43	at 6 mos				
		Web based intervention		Mean, 6.07 SD, 0.58	Post treatment at 10 wks mean, 4.3 SD, 1.58	at 6 mos mean, 2.32 SD, 1.78				BL, time point 2, significant difference of intervention vs. control time point 3, significant diff of post treatment (point 2) vs. Follow up (point 3)
	Children global assessment score	Control		Mean, 51.72 SD, 5.24	Post treatment at 10 wks mean, 54.93 SD, 8.91	at 6 mos				
		Web based intervention		Mean, 50.87 SD, 3.95	Post treatment at 10 wks	at 6 mos mean, 73.67				BL, time point 2, significant

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
					mean, 61.73 SD, 8.71	SD, 9.14				intervention vs. control time point 3, sig. post treatment vs. follow up)
	Does not meet criteria for any anxiety disorder	Control	1		10 wks: 3.4	6 mos				Time point 2, 0.09 (intervention vs. control)
		Web based intervention	17		10 wks: 16.7	6 mos: 60.7				
Orbach, 2007[15]	Test Anxiety Inventory	Control	28	Mean, 59.18 SD, 12.20				Post treatment: mean, 54.25 SD, 11.31		
		Cognitive Behavior Therapy group (CBT)	30	Mean, 58.14 SD, 8.43				Post treatment: mean, 47.31 SD, 9.49		
	Anxiety Hierarchy Questionnaire	Control	28	Mean, 12.73 SD, 1.66				Post treatment mean, 12.62 SD, 2.04		
		Cognitive Behavior Therapy group (CBT)	30	Mean, 12.64 SD, 1.67				Post treatment mean, 10.38 SD, 3.45		
	AH tests (perceptual and numerical)	Control	28	AH test mean, 48.74 SD, 8.18				Post treatment mean, 51.58 SD, 9.82		
		Cognitive Behavior Therapy group (CBT)	30	Mean, 44.55 SD, 13.32				Post treatment mean, 46.6 SD, 13.3		
	General Self-Efficacy Scale	Control	28	Mean, 53.46 SD, 13.09				Post treatment: mean, 44.69		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
								SD, 7.67		
		Cognitive Behavior Therapy group (CBT)	30	Mean, 57.97 SD, 7.84				Post treatment: mean, 60.24 SD, 7.67		
Proudfoot, 2003[16]	BDI(beck depression inventory)	Control	42	Mean, 24.08 SD, 9.78				6mos mean, 16.07 SD, 13.06		
		beating the blues	44	Mean, 25.38 SD, 11.05				6mos mean, 9.61 SD, 10.06		
	BAI (beck anxiety inventory)	Control	38	Mean, 19.39 SD, 9.72				6mos mean, 11.32 SD, 9.61		
		beating the blues	40	Mean, 18.33 SD, 9.61				6mos mean, 8.73 SD, 7.66		
	WSA (work and social adjustment scale)	Control	42	Mean, 18.46 SD, 8.25				6mos mean, 12.1 SD, 10.11		
		Beating the blues	45	Mean, 19.89 SD, 9.29				6mos mean, 9.11 SD, 8.97		
Spek, 2008[17]	Treatment response after 1 yr treatment	Control	58	Mean, 18.31 SD, 7.88				12mos: mean, 12.88 SD, 10.1		
		Group CBT	66	Mean, 17.99 SD, 9.39				12mos: mean, 12.14 SD, 8.76		
		Internet based intervention	58	Mean, 19.07 SD, 7.04				12mos: mean, 10.45 SD, 8.05		
Diabetes										
Homko, 2007[18]	Insulin therapy	Control	25				4(n,1)			
		Telemedicine	28				31 (n,10)			
	FBS	Control	25	FBS mg/dl				37 wks gestation mean, 88.6 SD, 9.5		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Telemedicine	32					37 wks gestation mean, 90.8 SD, 11.8		Non significant
	A1c at time of delivery	Control	25	A1c at delivery (%)				37 wks gestation mean, 6.2 SD, 2.2		
		Telemedicine	32					37 wks gestation mean, 6.1 SD, 0.8		Non significant
Tjam, 2006[19]	A1C (%)	Control	19	Mean, 6.8 SD, 1.0	3 mos mean, 6.8 SD, 1			12 mos: mean, SD,		
		Individuals with interactive internet program	34	Mean, 6.7 SD, 1	3 mos mean, 6.5 SD, 1			12 mos: mean, SD,		
	FBG (MMOL/L)	Control	8	Mean, 7.98 SD, 2.07	3 mos	6 mos		12 mos mean, 7.71 SD, 2.14		
		Individuals with interactive internet program	17	Mean, 8.51 SD, 2.46	3 mos	6 mos		12 mos mean, 8.02 SD, 2.17		
	TC (MMOL/L	Control	9	mean, 5.38 SD, 1.13	3 mos	6 mos		12 mos mean, 4.6 SD, 0.9		
		Individuals with interactive internet program	16	Mean, 4.98 SD, 1.11	3 mos	6 mos		12 mos mean, 5.15 SD, 1.42		
	TG (MMOL/L)	Control	14	Mean, -0.09 SD, 0.12	3 mos	6 mos mean, 2.1 SD, 0.76		12 mos		
		Individuals with interactive internet program	24		3 mos mean, 1.9 SD, 1.1	6 mos		12 mos		
Wise, 1986 [20] **Diabetes**	IDDM Patients									
	Knowledge Index (KAP Questionnaire)	Assessment of KAP only	24	Knowledge Score: 79 SE 2				82 SE 2		Ns

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	4—6mo	Assessment + Feedback	22	78 SE 2				83 SE 3		significant
		Assessment + Interactive computer	20	77 SE 2				83 SE 2		Significant
	NIDDM Patients									NIDDM Patients
	Knowledge Index (KAP Questionnaire) 4—6mo	Assessment of KAP only	22	Knowledge UNS				UNS		Ns
		Assessment + Feedback	24	64 SE 2				73 SE 2		significant
		Assessment + Interactive computer	21	60 SE 3				70 SE 2		Significant
	IDDM Patients									IDDM Patients
	Knowledge Index (KAP Questionnaire) 4—6mo	Control	20	HBA1c: 8.9%				8.8%		NS
		Assessment of KAP only	24	9.1 SE 0.2				8.4 SE 0.1		Significant
		Assessment + Feedback	22	9.3 SE 0.5				8.1 SE 0.4		significant
		Assessment + Interactive computer	20	9.3 SE 0.2				8.6 SE 0.3		Significant
	NIDDM Patients									NIDDM Patients
	Knowledge Index (KAP Questionnaire) 4—6mo	Control	21	HBA1c: 8.7%				8.5%		NS
		Assessment of KAP only	22	9.6 SE 0.4				8.8 SE 0.3		Significant
		Assessment + Feedback	24	9.2 SE 0.4				7.9 SE 0.4		significant
		Assessment + Interactive computer	21	8.7 SE 0.7				7.9 SE 0.6		Significant
Diet/exercise/physical activity not obesity										
Adachi, 2007[21]	% weight loss	Control (Group B)	50		1 mos mean, -0.05 SD, 1.4	3 mos mean, -1.6 SD, 2.3		7 mos mean, -2.2 SD, 3.5		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Computer tailored program with 6-mos weight and targeted behavior's self-monitoring, (Group KM)	36		1 mos mean, -1.8 SD, 1.9	3 mos mean, -3.6 SD, 3.3		7 mos mean, 4.7 SD, 4.5		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.05
		Computer tailored program only, (Group K)	44		1 mos mean, -1.5 SD, 1.6	3 mos mean, -2.6 SD, 2.8		7 mos mean, -3.3 SD, 4.3		BL, time point 2, 0.01 time point 3, 0.01 final time point, 0.01
		untailored self-help booklet with 7-mos self-monitoring of weight and walking, (Group BM)	53		1 mos mean, -0.08 SD, 1.3	3 mos mean, -2 SD, 2.5		7 mos mean, -2.6 SD, 3.4		BL, time point 2, 0.01 time point 3, 0.01 time point 4, final time point, 0.05
Hunter, 2008[22]	Body weight (kg)	Control	222	Mean, 86.6 SD, 14.7				6mos: mean, 87.4 SD, 14.7		
		BIT	224	Mean, 87.4 SD, 15.6				6mos: mean, 85.5 SD, 15.8		
McConnon, 2007[23]	Loss of 5% or more body weight (12 mos)	Control	77			6 mos		12 mos: 18		
		internet group	54			6 mos		12 mos: 22		
Tate, 2006[24]	Weight loss	Control	59		3mos mean, -2.8 SD, 3.5			6 mos mean, -2.6 SD, 5.7		
		Tailored Computer-	44		3mos mean, -5.3			6mos mean, -4.9		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
		Automated Feedback			SD, 4.2			SD, 5.9		
		Human Email Counseling (HC)	52		3mos mean, -6.1 SD, 3.9			6mos mean, -7.3 SD, 6.2		
Williamson, 2006[25]	Body weight (kg)	Control	50					24 mos: mean A,6.3 P,-0.06 SD, A,1.6 P,0.89		
		Interactive Nutrition education program and internet counseling behavioral therapy for the intervention group	47					24 mos: mean A: 4.4 P: -1.1 SD A: 1.7 P: 0.91		
	BMI	Control	50		6 mos	12 mos	18 mos	24 mos mean A:1.2, P:0.04 SD A:.65, P;.34		
		Interactive Nutrition education program and internet counseling behavioral therapy for the intervention group	47	Mean, A:36.4, P;38.4 SD A:7.9, P:7.2	6 mos	12 mos	18 mos	24 mos mean A:0.73, P:-0.55 SD A:.66, P:0.34		
	Weight loss	Control	50		6 mos	12 mos	18 mos	24 mos		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	behavior (body fat %)							mean A:0.84, P:0.51 SD, A:0.72, P:0.46		
		Interactive Nutrition education program and internet counseling behavioral therapy for the intervention group	47	Mean A:45.9, P:48.4 SD A:7.5 P:6.3	6 mos	12 mos	18 mos	24 mos mean, A:-.08, P:0.36 SD A:0.71, P:0.46		
	BMI (percentile)	Control	50	BMI	6 mos	12 mos	18 mos	24 mos mean, A:-0.001 SD, A:0.003		
		Interactive Nutrition education program and internet counseling behavioral therapy for the intervention group	47		6 mos	12 mos	18 mos mean A:-0.004 SD A:0.003	24 mos		
HIV										
Gustafson, 1999[26]	Active life	Control	97					1.37(22)		p<0.034
		CHESS	107					1.66(27)		
	Social support	Control	97					4.24(24)		p<0.017
		CHESS	107					4.47(27)		
	Participation in health care	Control	97					3.64(23)		p<0.020
		CHESS	107					4.15(24)		
Pain										
Borckardt,	Cold Pressor	Control	64	Seconds				Immediate		

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
2007[27]	Tolerance							post: mean, 73.25		
		CACIS	56	Seconds				Immediate post: mean, 86.25		
Obesity										
Morgan, 2009 [28] **Obesity**	Change in body wt. 3m	Prog info + Booklet gp	31	Loss of Weight: −3.0 (−4.5, −1.4) KG						All differences statistically significant
		SHED IT group	34	Loss of Weight: −4.8 (−6.4, −3.3) KG						
	Change in body wt. 6m	Prog info + Booklet gp	31	Loss of Weight: −3.5 (−5.5, −1.4)						
		SHED IT group	34	Loss of Weight: −5.3 (−7.3, −3.3)						
	Waist circumference (cm) 3m	Prog info + Booklet gp	31	LOSS: −4.4 (−6.3, −2.5) CM						
		SHED IT group	34	LOSS: −5.2 (−7.1, −3.4) CM						
	Waist circumference (cm) 6m	Prog info + Booklet gp	31	−5.6 (−7.7, −3.5) CM						
		SHED IT group	34	−7.0 (−9.1, −4.9) CM						
	BMI (kg/m$_2$) 3m	Prog info + Booklet gp	31	−0.9 (−1.4, −0.5) KG/M^2						
		SHED IT group	34	−1.5 (−2.0, −1.0) KG/M^2						
	BMI (kg/m$_2$) 6m	Prog info + Booklet gp	31	−1.1 (1.7, −0.5)						
		SHED IT group	34	−1.6 (−2.2, −1.0)						
	Systolic blood pressure 3m	Prog info + Booklet gp	31	−8 (−12, −3) MM HG						
		SHED IT group	34	−6 (−10, −1)						

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
				MM HG						
	Systolic blood pressure 6m	Prog info + Booklet gp	31	−10 (−14, −6)						
		SHED IT group	34	−10 (−14, −7)						
	Diastolic blood pressure 3m	Prog info + Booklet gp	31	−6 (−10, −2) MM HG						
		SHED IT group	34	−4 (−8, −1) MM HG						
	Diastolic blood pressure 6m	Prog info + Booklet gp	31	−5 (−10, −2)						
		SHED IT group	34	−6 (−11, −1)						
	Resting heart rate 3m	Prog info + Booklet gp	31	−7 (−11, −3) BPM						
		SHED IT group	34	−9 (−12, −5) BPM						
	Resting heart rate 6m	Prog info + Booklet gp	31	−7 (−12, −3) BPM						
		SHED IT group	34	−6 (−11, −2) BPM						
	Physical activity (mean steps/day) 3m	Prog info + Booklet gp	31	Went Up by: 976 (−12, 1,965) STEPS/DAY						
		SHED IT group	34	Went Up by: 1,184 (234, 2,133) STEP/DAY						
	Physical activity (mean steps/day) 6m	Prog info + Booklet gp	31	Went Up by: 1,302 (241, 2,363)						
		SHED IT group	34	Went Up by: 938 (−90, 1,966)						
	Energy intake (kJ/day) 3m	Prog info + Booklet gp	31	Went down by: −2,068 (−3,089, −1,047) KJ/DAY						
		SHED IT group	34	Went down by: −3,195 (−4,159, −2,230) KJ/DAY						

Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at time point 3	Measure at time point 4	Measure at final time point	Ratios at time points	Significance
	Energy intake (kJ/day) 6m	Prog info + Booklet gp	31	Went down by: −1,881 (−3,087, −676) KJ/DAY						
		SHED IT group	34	Went down by: −3,642 (−4,764, −2,521) KJ/DAY						

BL = baseline, SD = standard deviation, , mos = months, wks = weeks, CHESS = Comprehensive Health Enhancement Support System, CES-D = Center for Epidemiologic Studies Depression Scale, CBT = cognitive behavior therapy, CACIS = Computer-Assisted Cognitive/Imagery System, FBG = Fasting blood glucose, TC = total cholesterol, TG = triglycerides, A1c = glycosylat ed hemoglobin

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Evidence Table 37. All outcomes KQ 1d, impact of CHI applications on clinical outcomes (continued)

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Evidence table 38. Description of RCTs addressing the impact of CHI applications on economic outcomes (KQ1e)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Asthma									
Joseph, 2007[1]	Individual interested in their own health	Interactive consumer website	Remote location: school	NS	9-11 grade, Current asthma	NS	Generic asthma website	Tailored website	**2.5**
Breast cervical prostate and laryngeal cancer									
Jones, 1999[2]	Individual interested in their own health care	Interactive consumer website	Clinician office	December 1996-December 1997/NS	Breast, laryngeal, prostate, Cervical cancer patients receiving care at oncology center	Receiving palliative treatment, no knowledge of diagnosis, visual or mental handicap , severe pain	Booklet information	General computer information Personalized computer information	**1.5**
Obesity									
McConnon, 2007[3]	Individual interested in their own health care	Interactive consumer website	Home/ residence	NS	18 - 65 yr, BMI 30 or more, able to access internet at least 1 time a week, able to read and write English	NS	Usual care	Internet group	**1**

NS = Not specified, BMI = Body mass index, Yr = year

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Evidence table 39. Description of consumer characteristics in studies addressing the impact of CHI applications on economic outcomes (KQ1e)

Author, year	Control Intervention	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Other characteristics
Asthma								
Joseph, 2007[1]	Generic asthma website	Mean, 15.3 SD, 1	NS	NA	High school students	NS	F, 199 (63.4)	Smoking status: ≥ 2 per day, 15 (5.2)
	Tailored website							
Cancer: breast, lung, prostate and esophageal								
Jones, 1999[2]	Booklet information	No baseline participant characteristics were provided						
	General computer information							
	Personal computer information							
Obesity								
McConnon, 2007[3]	"usual care". Participants randomized to the usual care group were advised to continue with their usual approach to weight loss and were given a small amount of printed information at baseline, reflecting the type of information available within primary care.	Mean, 47.4	NS	NS	NS	NS	NS	Weight (kg): mean, 94.9 kg BMI: mean, 34.4 Quality of Life (Euro QoL): mean, 61.5 Physical Activity (Baecke): mean, 6.7
	Internet group	Mean, 48.1						Weight (kg): mean, 97.5 kg BMI: mean, 34.35 Quality of Life (EuroQoL): mean, 70 Physical Activity (Baecke): mean, 6.8

* Only "all participants" data was provided in this paper with a notation that there were no differences between the treatment and control groups
NS = not specified, SD = standard deviation, BMI = body mass index, kg = kilogram, SES= Socioeconomic Status, NA = Not Applicable, QoL = quality of Life

Reference List

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Evidence table 4. Outcomes in studies addressing Key Question 1a, impact of CHI applications on health care processes

Author, Year	Outcome	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
Asthma							
Bartholomew, 2000[1]		Control: Usual care	63				
		Intervention Watch, Discover, Think and Act (An Interactive multimedia application on CD-ROM)	70				
Guendelman, 2002[2]	Health and quality of life and process evaluation	Control: participants used an asthma diary	66	Limitation in activity No:19 (28) Yes: 49 (72) Peak flow measurement ever: No 12 (18) Yes 20 (29) Missing data: 36 (53) Coughing No7(10) Yes 61(90) Trouble sleeping No Yes	Limitation in activity No:32 (53) Yes: 28(47) Peak flow measurement No 27(40) Yes 26 (38) Missing data 36 (53) Coughing No21(35) Yes39(65) Trouble sleeping No Yes		.03
		Intervention: Health Buddy(is a personal and interactive communication device)	68	Limitation in activity No: 22 (33) Yes:44 (67) Peak flow measurement ever No 14 (21) Yes 22(33) Missing data 30 (45) Coughing No10(15) Yes56(85) Trouble sleeping No Yes	Limitation in activity No: 42 (68) Yes:20(32) Peak flow measurement ever No 38 (58) Yes 19(29) Missing data 09 (14) Coughing No23(37) Yes39(63) Trouble sleeping No Yes	0.52	.03
Jan, 2007[3]	Monitoring adherence	Control	71	Mean, 85.6	12 week mean, 93.5		

Evidence table 4. Outcomes in studies addressing Key Question 1a, impact of CHI applications on health care processes (continued)

Author, Year	Outcome	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
		Asthma education and an interactive asthma monitoring system	82	Mean, 83.5	12 week mean, 99.7		
	Therapeutic adherence	Control	15				
		Asthma education and an interactive asthma monitoring system	23				
	Adherence to daily diary entry	Control	71	Mean, 93.2	12 week mean, 53.4		
		Asthma education and an interactive asthma monitoring system	82	Mean, 96	12 week mean, 82.5		
	Therapeutic adherence: DPI or MDI plus spacer technique score	Control	71	Mean, 80.3	12 week mean, 93.4		
		Asthma education and an interactive asthma monitoring system	82	Mean, 82.1	12 week mean, 96.5		
	Peak flow meter technique score	Control	97	Mean, 82.3	12 week mean, 42.1		
		Asthma education and an interactive asthma monitoring system	99	Mean, 83.5	12 week mean, 63.2		
Krishna, 2003[4]	Days of quick relief medicine	Control	44	Mean, 90.7 SD, 114.8	12 months mean, 41 SD, 82		
		Internet-enabled asthma education program	42		12 months mean, 26.3 SD, 56.6		
	Urgent physician visit	Control	44	Mean, 6.4 SD, 10.5	12 months mean, 1.3 SD, 2.2		
		Internet-enabled asthma education program	42	Mean, 6.6 SD, 10.5	12 months mean, 0.8 SD, 1.5		

Evidence table 4. Outcomes in studies addressing Key Question 1a, impact of CHI applications on health care processes (continued)

Author, Year	Outcome	Control Intervention	n	Measure at BL	Measure at final time point	ratios at time points	Significance
	Emergency room visit	Control	44	Mean, 1.2 SD, 2.8	12 months mean, 0.6 SD, 1.1		
		Internet-enabled asthma education program	42	Mean, 2 SD, 4.2	12 months mean, 0.1 SD, 0.4		
	Daily dose of inhaled corticosteroids	Control	44	Mean, 350.53 SD, 649.61	12 months mean, 753.88 SD, 706.94		
		Internet-enabled asthma education program	42	Mean, 353.09 SD, 615.83	12 months mean, 433.51 SD, 569.13		
Use of contraception							
Chewning, 1999[5]	Oral contraceptive efficacy Chicago	Control	NA	Initial visit mean, 11.26 SD, 15.93	1 yr mean, 6.38 SD, 13.45		NS
		Computerized decision aid	NA	Initial visit mean, 4.59 SD, 9.2	1 yr mean, 5.66 SD, 8.45		
	Oral contraceptive efficacy Madison	Control	NA	Initial visit mean, 4.8 SD, 5.58	1 yr mean, 4.83 SD, 9.15		NS
		Computerized decision aid	NA	Initial visit mean, 2.09 SD, 2.2	1 yr mean, 4 SD, 8.26		

NA= Not applicable, NS= Not Significant, Yr = year, BL = baseline, SD = standard deviation

Evidence table 4. Outcomes in studies addressing Key Question 1a, impact of CHI applications on health care processes (continued)

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Evidence table 40. All outcomes in studies addressing the impact of CHI applications on economic outcomes (KQ1e)

Author, year	Outcome	Control Intervention	n	Measure at BL	Measure at final time point, define
Asthma					
Joseph, 2007[1]	Cost of program delivery	Control	152	No baseline measure of cost	12 months: no cost estimate for control group
		Treatment	162		12 months: cost of referral coordinator, $6.66/per treatment student
Cancer: breast cervical prostate and laryngeal cancer					
Jones, 1999[2]	Cost of the computer information system—Manual extraction of Patient data	Control: books alone	162	No baseline measure of cost	
		General computer information	143		
		Tailored computer information	162		9x the cost of a general information system
	Cost of the computer information system—use of electronic patient record	Control: books alone	162		
		General computer information	143		
		Tailored computer information	162		No difference in cost between general and tailored systems
	Materials cost	Control: books alone	162		£7/patient
		General computer information	143		£2.8/patient
		Tailored computer information	162		NS
Obesity					
McConnon, 2007[3]	Total costs	Control	110	No baseline costs reported	£276.12
		Website (internet group)	111		£992.40*
	Incremental cost-effectiveness	Control	110		NS
		Website (internet group)	111		£39,248/QALY

*Difference in cost is due to the cost of developing the website; when this fixed cost was removes; total costs were lower in the intervention group (actual results not presented).
BL = baseline, NS = not specified, QALY = quality-adjusted life year, $ = United States Dollars

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Evidence Table 41. Description of all study designs addressing barriers KQ 2

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
Simon, 2008[1]	Survey/ interview	User level	Breast cancer	Individuals interested in their own health care , women getting mammogram	Interactive electronic tool	Clinician office	2007/ NS	Female scheduled to get a mammogram	No control group/ Survey respondents
Cimino, 2001[2]	Survey (cross-sectional)	System level User level	Usage study of general med group	Individuals interested in their own health care	Access to patient records with tailored feedback	NS	1999/ NS		No control group
Keselman, 2007[3]	Survey	System level User level	Multiple condition	Individuals interested in their own health care	Interactive consumer website	NS	2006	Who viewed their paper or electronic health records within the past year	No control group
Shaw, 2008[4]	Applicability of a C-SHIP model to discern why people with cancer seek online information to cope with disease	User level	Breast cancer	Individuals interested in their own health care	Interactive consumer website	NS	May2001	Women participants were at or below 250% of the federal poverty level resided within one of 56 rural Wisconsin counties (as defined by the Office of Management and Budget criteria) within one year of diagnosis of breast cancer or had metastatic breast cancer not homeless able to read and understand an informed consent letter	No control group/ CHESS users
Nijland, 2008[5]		System level User Level	Design of the Internet-based	Individuals interested in their own health care, non-medical	Interactive consumer website	Home/ residence workplace	NS	At least 18 yr old Dutch speaking had experience with using one of	No control group

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
			applications for self-care	caregiver				the Internet based applications	
Morak, 2008[6]	Pilot	User level	Obesity	Individuals interested in their own health care	Interactive consumer website	Clinician office	NS		No control group
Steele, 2007[7]	RCT	System level	Diet/exercise/ physical activity NOT obesity	Individuals interested in their own health care	Interactive consumer website	Local community of Rock Hampton, Queensland	12 weeks	More than 18 years old Both male and female Functionally mobile more than 10 min Inactive Access to internet Singed informed consent. Less than 18 years Functionally immobile more than 10 min Active No access to internet Did not signed informed consent	No control group/ Face to face n:52, Both face to face and internet n:51, Internet only:56
Wangberg, 2008[8]	RCT	User level	Diabetes	Individuals interested in their own health care	Interactive consumer website	NS	NS	17-67 yr Type I or II diabetes access to the internet	Low self-efficacy
Lober, 2006[9]	Survey	User level	Computer literacy Computer anxiety Cognitive impairment Health literacy	Individuals interested in their own health care	Patient kiosk	Home/ residence Remote location, common computer area	8 months	Resident at publicly subsidized housing project	No control group

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
			Physical impairment						
Stock, 2006[10]	Within-subject design	System level	Usability	Individuals interested in their own health care	Palmtop computer	NS	NS	18-54 yr both male and female intellectual disabilities vision, hearing and motor skills to interact with palmtop	No control group/ all subjects
Mangunkusumo, 2007[11]	RCT	System level	Diet/exercise/ physical activity NOT obesity	Individuals interested in their own health care, student--with parental consent	Internet site	Remote location, at a secondary school	NS		
Ferney, 2006[12]	Qualitative; semi-structured interview	System level	Diet/exercise/ physical activity NOT obesity	Individuals interested in their own health care	Interactive consumer website,	Unspecified location of a study group	NS		No control group
Temesgen, 2006[13]	Survey	System level User level	HIV/AIDS	Individuals interested in their own health care	Interactive consumer website,	Home/ residence	6 months	HIV positive	No control/ Use of CHESS intervention
Owen, 2004[14]	Survey	User level	Breast cancer	Individuals interested in their own health care	Interactive consumer website,	Clinician office	1999/ NS	Appointment at Dept of Hematology/Oncology at the University of Alabama at Birmingham Comprehensive Cancer Center Histologicaly confirmed breast cancer	No control group

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
Lahdenpera, 2000[15]	Interviewed before use of IT application	User level	Hypertension	Individuals interested in their own health care	Personal monitoring device	Clinician office	Between summer 1997 and Autumn 1998	16-64 yr, Hypertension for one year or less Hypertension medication for one year or less or none Three successive blood pressure readings exceeded 140/90 mm Hg	No control group/ Study group
Weber, 1998[16]		User level	DSM-III-R psychiatric disorders	Individuals interested in their own health care	Interactive self assessment	NS	NS	Mixed DSM-III-R psychiatric disorders and healthy volunteers hospitalized for psych disorders	Healthy group/ Patients
Jenkinson, 1998[17]	Qualitative study	User level	Prostate cancer	Individuals interested in their own health care	Interactive consumer website,	Clinician office	NS	Newly diagnosed (1-12 months) English speaking localized prostate cancer	
Paperny, 1997[18]	Survey after use	User level	HIV/AIDS and substance abuse	Individuals interested in their own health care, Youth at risk	Interactive consumer website,	Clinician office Public Health Fairs, school, detention facility, runaway shelter and a youth corrections facility	NS	"Teens"	No control group/ Public School, Medical Clinics, Detainees and runaways

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
McTavish, 1994[19]	Qualitative	User level	Breast cancer	Individuals interested in their own health care	Interactive consumer website	Home/ residence	1993 and 1994	Stage 1 or 2 breast cancer	No control group/ Users of CHESS program in Chicago Pilot Study
Cavan, 2003[20]	Pilot trial	User level	Diabetes	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	29-61 yr	No control group/ Patient with type 1 diabetes
Feil, 2000[21]	A study in a primary care setting	User level	Diabetes	Individuals interested in their own health care	Interactive consumer website	Home/ residence	1 yr	40-75 yr Female Have current internet access Type 2 diabetes Healthy Diagnosed at least 1 year Not moving or staying in the area Can read or write English Under 40 or over 75 years Male Current internet access No type 2 diabetes Incapacitated or too ill Diagnosed less than 1 year Moving or not in area Can't read or write English	No control group

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
Zeman, 2006[22]	A study on PDA implementation problem	System level User level	Mental health	NS	Disease specific sensor	Clinician office	NS		No control group
Bryce, 2008[23]	Combination of qualitative methods and quantitative methods	User level System level	Diabetes	Individuals interested in their own health care	Web-Based Portal for Management of Diabetes		Between August 2004 and January 2005	participate were over the age of 21years, Were English-speaking, received a diagnosis of type 1 or type 2 diabetes mellitus, Agreed to attend a focus group session and complete a survey	
Leslie, 2005[24]	RCT	User level	Physical Activity/ Diet/ Obesity	Individuals interested in their own health care	Interactive consumer website	NS			
Ferrer-Roca, 2004[25]	mobile phone text messaging (short message service; SMS) for diabetes management	User level System level	Diabetes	Individuals interested in their own health care	mobile phone text messaging	Home/ residence	8 months	All patients had a diagnosis of diabetes and were aged 18–75 years. Patients had to have their own personal mobile phone, or have access to one belonging to a relative.	
Lenert, 2003[26]	Pilot	User level	Smoking Cessation	Individuals interested in their own health care	Interactive consumer website	NS			

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
Kressig, 2002[27]	To determine if older adults are capable and willing to interact with a computerized exercise promotion interface	User level	Physical Activity/ Diet/ Obesity	Individuals interested in their own health care	Interactive consumer website			participants if they were 60 years of age and older and without medical contraindication for exercise.	
Brug, 1998[28]	RCT	User level	Physical Activity/ Diet/ Obesity	Individuals interested in their own health care	computer-generated tailored poster				individualized computer-generated nutrition information
Boberg, 1995[29]	Survey	User level	HIV/AIDS	Individuals interested in their own health care	Interactive consumer website (CHESS)	Home/ residence		people living with AIDS/HIV infection	CHESS
Shaw, 2001[30]	RCT	System level	All cancer	Individuals interested in their own health care		Physician office	January 1, 1996 to August 1, 1997	Eligible patients were 18 to 80 years old, spoke English, had never had a colonoscopy, and were not scheduled to receive.	Interactive Computer-assisted Instruction Program
Strecher, 1994[31]	RCT	User level	Smoking cessation	Individuals interested in their own health care	computer-generated tailored letter	Home/ residence	During March and April 1990	Eligible patients were 40 to 65 years old Had seen a family physician in the practice no more than 6 months before being interviewed, had telephones	Generic health letter/ Tailored health letter

Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

Author, year	Design	Barrier type	TARGET Condition	Consumer	Application	Location	Year/ duration	Inclusion / Exclusion	Control/ Interventions
								with available and working numbers	

NS = not specified, CHESS = Comprehensive Health Enhancement Support System, yr = year, RCT = randomized controlled trial, CHESS = Comprehensive Health Enhancement Support System

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Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

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Evidence Table 41. Description of all study designs addressing barriers KQ 2 (continued)

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Evidence table 42. Characteristics of consumers in studies addressing barriers to CHI applications

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital status	Other characteristics
Simon, 2008[1]		Mean, 56.68 range, 36-89 SD, 11.22	AA: 26 (40) Caucasian: 39 (60)	USD <20,000, 20 (31) 20,000-50,000, 11 (17) >50,000, 29 (45)	<8 yr, 22 (34) 8-12 yr, 27 (41) 12-16 yr,16 (25)	NS		NS	Internet access: Use, 52 (80), computer at home, 52 (80) internet at home, 46 (71) Frequency on-line: Daily, 27 (42) several times a week, 11 (17) once a week or less, 14 (22) never, 13 (20)
Cimino, 2001[2]	No control group	NS	NS	NS	NS				NS
Keselman, 2007[3]	No control group		White non-Hispanic, 95 API, 2 Other, 5		8-12 yr, 9 12-16 yr, 48 >16 yr, 39		M, 14 F, 89		
Shaw, 2008[4]	CHESS users	Mean, 51.81 SD, 12.11	White non-Hispanic, 144(100)	NS	Some junior high, 1 (0.7) Some high school, 12 (8.3) High school degree, 48 (33.3) Some college, 39 (27.1)	NS		NS	Stage of cancer: Early stage (stage 0, 1, 2), 97 (67.4)
Nijland, 2008[5]	No control group	NS	NS	NS	NS	NS		NS	NS
Morak, 2008[6]	Obese patient with mobile phone	Mean, 48 range, 24-71	NS	NS	NS	NS		NS	BMI: mean, 35.6 SD, 5.2
Steele, 2007[7]	Face to face n,52	Mean, 38.3 SD, 12.6	NS	NS	NS	NS		NS	BMI: mean, 31.59 SD, 7.47 Physical activity: mean, 76.4

Evidence table 42. Characteristics of consumers in studies addressing barriers to CHI applications (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital status	Other characteristics
									SD, 93 H/O internet use : <6 months, 9(17.3) 6-12 months=1 (1.9) 1-1.5 yr, 5 (9.6) >2 yr, 6 (11.5)
Steele, 2007[7]	Intervention	Mean, 39.3 SD, 14.4	NS	NS	NS		M, 11 (21.6) F, 40 (78.4)	NS	BMI: mean, 31.63 SD, 7.9 Physical activity: mean, 80.8 SD, 96.8 H/O internet use : <6 months, 1(2.0) 6-12 months, 2 (3.9) 1-1.5 yr, 3 (5.9) >2 yr, 7 (13.7) H/O internet use : <6 months, 1(2.0) 6-12 months, 2 (3.9) 1-1.5 yr,3 (5.9) >2 years,7 (13.7)
Wangberg, 2008[8]	No control group,	Mean, 37.3 range, 33.2–41.4	NS	NS	NS	NS	F, (63)	NS	Type I Diabetes:72 Insulin use:78 HbA1C:7.7
Wangberg, 2008[8]	High self-efficacy	Mean, 42.9 range, 38.0–47.9	NS	NS	8-12 yr, (8)		F,(50)	NS	Type I Diabetes:(50) Insulin use: (71)
Lober, 2006[9]	All participants	Mean, 69 range, 49-92	NS	NS	NS	NS	F,(82)	NS	
Stock, 2006[10]	All subjects n,32	Mean, 30.8 range, 18-54 SD, 12.1	NS	NS	NS	NS		NS	

Evidence table 42. Characteristics of consumers in studies addressing barriers to CHI applications (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital status	Other characteristics
Mangunkusumo, 2007[11]	Intervention	Mean, 15 range, 13-17	Dutch, (76.5) Other, (23.5)		Lower secondary/ Vocational, (59.1) International secondary, (18.6) Upper secondary, (22.3)	NS	M,(43.9)	NS	
Ferney, 2006[12]	Define, low self-efficacy	NS	NS	NS	NS	NS		NS	NS
Ferney, 2006[12]	Study group	18-44 yr, 16 45-65 yr, 24	NS	NS	12-16 yr, 23	Employed		Married/ partner: 31	Physical activity: sufficient, 24
Temesgen, 2006[13]		Range, 30-59	White non-Hispanic, 7(87.5) NS, 1, (12.5)		All finished high school			NS	Employment: over half were employed
Owen, 2004[14]	Intervention	Mean, 53.9	White non-Hispanic, (84) Black non-Hispanic, (16)	USD median, 45,000	Yr mean, 14			NS	Clinical Stage (%): 1:28.7 2:40.1 3:11.5 4:19.7
Lahdenpera, 2000[15]	Intervention	Mean, 46 range, 32-63	NS	NS	NS	Low, 13 higher income, 14	M, 9 (42.9) F, 12 (57.1)	NS	
Weber, 1998[16]	Comparison	Mean, 30.5 SD, 7.8	NS	NS	NS	NS		NS	NS
Weber, 1998[16]	Patients	Mean, 50.7 SD, 19.4	NS	NS	NS	NS		NS	
Jenkinson, 1998[17]	No control group	NS	NS	NS	NS	NS		NS	NS
Paperny, 1997[18]	Public School	Mean, 15.5 range, 15-	NS	NS	NS	NS	F, (51)	NS	
Paperny, 1997[18]	Medical clinics/ health fairs	Range, 13-19	NS	NS	NS			NS	
Paperny,	Detainees and	Mean, 15.4	NS	NS	NS	NS		NS	NS

Evidence table 42. Characteristics of consumers in studies addressing barriers to CHI applications (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital status	Other characteristics
1997[18]	runaways	range 13-							
McTavish, 1994[19]	Intervention	Range, 36-66	NS	NS	NS	NS		NS	Computer experience: Any prior:
Cavan, 2003[20]	Patients with type 1 diabetes n,6	Mean, 36 range, 29-61	NS	NS	NS	NS		NS	
Feil, 2000[21]	Define, healthy group	NS	NS	NS	NS	NS		NS	NS
Feil, 2000[21]	Participants	Mean, 59.2 SD, 6.9	NS	NS	NS	NS		NS	Own computer,53.1 Familiar with computers , 1.7 (0.68) Years diagnosed, 9.5 (7.7)
Zeman, 2006[22]	Participants	NS	Black non-Hispanic, (83)	USD <30,000, (40)	12-16 yr, (65)	NS		NS	NS
Bryce, 2008[23]	Preportal group	mean, 53 SD, 13	Nonwhite, 7(33)		High school graduate 6 (29) Some college 7 (33) College graduate 2 (10) Postgraduate degree 6 (29)				Owns a computer (%) 13 (62) Type 1 diabetes (%) 1 (5)
	portal-user group	mean, 55 SD, 11	Nonwhite, 4(22)		High school graduate 1 (6) Some college 5 (28) College graduate 4(22) Postgraduate degree 8 (44)				Owns a computer (%) 17 (94) Type 1 diabetes (%) 2(11)
Leslie, 2005[24]	Print Website-delivered intervention	mean age of 43 years			72% had completed secondary school or higher				
Ferrer-Roca, 2004[25]	Participants	range 18-75							

Evidence table 42. Characteristics of consumers in studies addressing barriers to CHI applications (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n(%)	Marital status	Other characteristics
Lenert, 2003[26]	Participants	mean, 46yrs	Caucasian, (84)		some college education (75)		F (78)		15 of 34 had no or very little computer experience
Kressig, 2002[27]	Participants	mean, 70.4 SD, 6.9 range, 60 - 87years			some college education or more, 33		M 17 F 17		
Brug, 1998[28]	Control Intervention	mean, 44 SD, 14			college degree (42)		F (82)		
Boberg, 1995[29]	CHESS (the Comprehensive Health Enhancement Support System)	mean, 34.9yrs	White, (78.1) Non-White, (21.9)	Average $15,010	Average 13.9 years	No (47.8) Yes (52.2)	M (82.8) F 17.2	Living Status Alone(24.8) Not alone (75.2)	AI DS Stage Symptomatic (65.5) Nonsymptomatic (34.5)
Shaw, 2001[30]	Interactive Computer-assisted Instruction Program	mean, 53.9yrs SD, 13.83yrs			College degree, (58)		F (56)		some exposure to computers (88)
Strecher, 1994[31]	Control Intervention	mean, 49.5yrs					F (67.7)		

AA = African-American, Yr = year, NS = Not specified, SD = standard deviation, SES = Socioeconomic Status, M = Male, F = Female, USD = United States Dollar
C = Caucasian, BMI = body mass index, API = Asian/Pacific Islander

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31. Strecher VJ, Kreuter M, Den Boer D-J, Kobrin S, Hospers HJ, Skinner CS. The effects of computer-tailored smoking cessation messages in family practice settings. 1994; 39(3):262-70.

Evidence table 43. All barriers identified to the use of CHI applications

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
Simon, 2008[1]	**Barrier type:** user-level barriers Other: privacy **Barrier under study:** CHI application use too time consuming; confidentiality/privacy; control of information; lack of technical infrastructure. Patient preferences: not comfortable giving history to provider in person either; did not need a risk assessment; using an electronic tool to record data as opposed to paper and pen **Other important barriers identified during study:** knowledge literacy. **Target condition:** breast cancer; any form of familial cancer. Other: family history of cancer	Non-validated survey	Respondents also cited incentives to use an electronic tool for recording family h/o cancer: save time, help researchers and help speed research for people "in their culture", to pass on to family, something new.	This finding suggests that, in this population, computer literacy and Internet access per se may not be the most important predictors of whether mammogram patients are or are not interested in using an online computer program to record their FHC. As a result, a challenge of research on the clinical utility of electronic tools for recording FHC will be to characterize the contexts in which they are deployed, with regard to what users (and nonusers) understand about security and privacy of online information, and the means whereby the computer tool is integrated into clinical care or research.
Cimino, 2001[2]	**Barrier type:** user-level barriers; systems-level barriers. **Barrier under study:** application usability; incompatibility with current care; knowledge literacy; lack of technical infrastructure. **Target condition:** personal health record	Non-validated survey Qualitative		use of the system enhanced patient understanding of their condition and improved patient-physician communication
Keselman, 2007[3]	**Barrier type:** user-level barriers; systems-level barriers. **Barrier under study:** application usability; confidentiality/privacy; control of information; knowledge literacy; language. **Target condition:** multiple -patients' information and comprehension needs related to their medical records.	Non-validated survey		the present study suggests that work in the area of machine translation into consumer friendly forms, user-friendly presentation of difficult concepts and multiple-view representation have the promise of improving health records review experience for lay readers
Shaw, 2008[4]	**Barrier type:** user-level barriers **Barrier under study:** cultural; knowledge literacy. Patient preferences: beliefs affect goals & values; well being (functional and emotional)	Validated survey	C-SHIP Model Factors Cancer-relevant encodings and self-construal's functional well-being Cancer-relevant beliefs and expectancies. Health self-	The variables associated with the C-SHIP model appeared to have more frequent relationships with experiential as compared with didactic

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
	Target condition: breast cancer.		efficacy. Cancer-relevant affects. Emotional well-being Negative emotion Cancer-relevant goals and values Need for information Cancer-relevant self-regulatory competencies and skills Participation in health care Health information competence Barriers to information Social support	information seeking.
Nijland, 2008[5]	**Barrier type:** user-level barriers; systems-level barriers. **Barrier under study:** application usability; incompatibility with current care. **Target condition:** various health complaints - symptom review	Qualitative	"caregiver" means physician in this article	Quality Demand Identified Patient Problems User-friendliness (n = 106, 40.8%) Navigation problems: Lack of a search engine Lack of an adequate search option Unclear navigation structure; hyperlinks were nonexistent or useless Unclear or unattractive layout of Web pages No features for printing information Technical problems: Software bugs Drop-down menus or back buttons failed Quality of care (relevance, comprehensibility of information; responsiveness) (n = 146, 56.1%) Problems with relevance of information: Information provided by the digital medical encyclopedia was too general to be useful Information provided by the virtual body was too limited to be useful Self-care advice insufficiently tailored to personal needs Problems with comprehensibility of information: Semantic mismatch between system and users because of unclear medical terms and lack of features to verbalize a problem

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				in their own vocabulary Self-care advice hard to interpret Self-care advice frightening Problems with responsiveness: Caregiver used more than prescribed response time to answer patients¡¯ questions Implementation (policy, training) (n = 8, 3.1%) Lack of education: Underuse or misuse of applications because of lack of education Uncertainty about regulations for using Internet for self-care
Morak, 2008[6]	**Barrier type:** user-level barriers **Barrier under study:** application usability ; CHI application use too time consuming; **Barrier under study:** lack of technical infrastructure ; Patient preferences: opinion of using own mobile phone or PC **Target condition:** obesity	Non-validated survey		About half of all participants were able to perform the data acquisition procedure after studying the manual without any additional explanation. In a few cases they obtained technical assistance from younger relatives. It was mainly patients with poor technical skills who contacted the helpdesk and requested further tuition by telephone
Steele, 2007[7]	**Barrier type:** systems-level barriers. **Barrier under study:** application usability; knowledge literacy; lack of technical infrastructure. **Target condition:** physical activity/diet	Non-validated survey Qualitative		Preference and satisfaction. Face to face=92% IM=69% IO=65% On a scale of 1–5 (strongly disagree to strongly agree) participants were also asked to rate their overall satisfaction related to understanding of the program content, and credibility of the information provided (Table 3). No significant differences in ratings across intervention groups were found. Participants reported similar means across groups for credibility [F(2, 154) = 1.36; p >

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				0.05] and understanding [F(2, 154) = 1.35; p > 0.05]. Responses to the 'personal relevance and usefulness of the program activities' in the FACE group were also high (4.3 0.69) (this item was assessed under website acceptability for the IM and IO groups). Seventy-four percent of IM, and 57% of the IO participants reported accessing the website from home. The rest of the IM participants accessed the Internet from work with a small percentage using Internet cafes and friends. The rest of the IO participants accessed the Internet outside of the home environment with the majority being at work, and a small percent at Internet cafes and university/cafe campuses. In terms of website usability, (user-friendliness, presentation, navigation, and relevance) participants rated the website favorably as shown in Table 4. There were no significant differences between IM and IO (p > 0.05).
Wangberg, 2008[8]	**Barrier type:** User level **Barrier under study:** Patient preferences: perceived usefulness; lack of viral marketing; number of accesses. **Target condition:** diabetes	Non-validated survey, scale was not reported	Perceived usefulness might also be seen as a user lever barrier	The mean score on perceived usefulness was 3.6 (CI95% = 3.1–4.1), which corresponds to a slightly positive attitude. There was no difference in perceived usefulness between the two groups, F(1,27) = 0.29, P = .60 Four of 28 (14%) users would recommend the site to a friend. Use of the site was greatest during the first

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				days, and declined rapidly thereafter. The mean time spent on the site was 45.2 min (CI95% = 37.1– 53.3), and the mean number of visits was 5.9 (CI95% = 3.9–8.0). The checkbox for the targeted daily self-care behavior was accessed most often, while only 4 of 28 users had downloaded any videos. There was no significant correlation between total time spent at the site and improvement in selfcare, r = .10, P = .60, nor between time spent at the site and perceived usefulness, r = .04, P = .83.
Lober, 2006[9]	**Barrier type:** user-level barriers **Barrier under study:** knowledge literacy; physical limitations; cognitive impairment; health literacy; computer anxiety. **Target condition:** PHR use by elderly population.	Empirical based on trial data. Report by the nurse helping the patient to use the system.		Elderly and disabled residents of the EHA were able to create and maintain a PHR, although the majority could not do so independently due to computer anxiety and a lack of computer literacy, cognitive and physical impairments, and health literacy
Stock, 2006[10]	**Barrier type:** systems-level barriers. **Barrier under study:** application usability. **Target condition:** intellectual disabilities.	Empirical based on trial data	The average number of prompts for participant to complete the navigation using the pocket voyager interface was 1.41, while the average need for assistance when using the mainstream windows CE operating system was 5.34. Similarly participant made an average of only .78 errors when using the PVP. Compared to an average of 3.22 errors made when using the mainstream interface. One	see comments

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
			of the major barriers to access in the mainstream windows CE operating system is it complexity(several different methods for accomplishing the same task), button icons by themselves did not provide enough information to participants (non-readers) to enable independent program identification	
Mangunkusumo, 2007[11]	**Barrier type:** systems-level barriers **Barrier under study:** application usability. Patient preferences: acceptability; usability; credibility **Target condition:** physical activity/diet (specify)	Validated survey Non-validated survey		Using the Internet for the adolescent preventive health care procedure is feasible and positively evaluated by users.
Ferney, 2006[12]	**Barrier type:** systems-level barriers. **Barrier under study:** application usability. Patient preferences: no published studies on user-centered website design and development **Target condition:** physical activity website.	Qualitative		Four major themes emerged, relating to 'design', 'interactivity', 'environmental context' and 'content'. Recommendations for features and services recommended by participants under each of these themes are summarized in in the reported barriers column (question 3)
Temesgen, 2006[13]	**Barrier type:** user-level barriers; systems-level barriers **Barrier under study:** application usability ; CHI application use too time consuming; incompatibility with current care; knowledge literacy; lack of technical infrastructure Patient preferences: goals and expectations; finances **Target condition:** HIV/AIDS	Non-validated survey	They gave patients laptops and internet access so did not assess the barrier.	our patient population was mainly rural-based adding geographic isolation and a relative lack of access to computers and the Internet to the many other difficulties commonly shared by HIV-infected people It was of interest to us to determine whether the ever-increasing complexities of HIV medicine and the transformation of HIV infection into a chronic Condition will be reflected in a greater utility and appreciation

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				for systems like CHESS.
Owen, 2004[14]	**Barrier type:** user-level barriers **Barrier under study:** application usability; lack of technical infrastructure. Patient preferences: expect internet based therapy to work. **Target condition:** breast cancer.	Non-validated survey(did examine internal consistency)		An increasing percentage of women with breast cancer, nearly 70% in our most recent sample, have access to the internet, and nearly 66% report that internet-based APT is equally or more likely to result in improved physical and mental health than face-to-face therapy. When made aware of the availability of participating in internet-based APT, 45% asked to become a member of a small therapy group. Among patients who had access to the Internet and declined to participate, few cited logistical constraints as a reason for not being involved.
Lahdenpera, 2000[15]	**Barrier type:** user-level barriers **Barrier under study:** confidentiality/privacy; incompatibility with current care; knowledge literacy; lack of technical infrastructure. Patient preferences: lack of personal contact with provider; patients attitude to IT **Target condition:** hypertension	Qualitative		Even though the patients understood that the treatment of hypertension was up to them, they felt the need for something to remind them about the treatment. Their experience of IT and whether or not they had a computer at home did not influence the decision to participate in the intervention “If there is now is edoctorusing another computer at the health centre, there will be no benefit in using it. But when there is a doctor or a nurse, we get help from them, and then it is a good thing to use."
Weber, 1998[16]	**Barrier type:** user-level barriers **Barrier under study:** CHI application use too time consuming; knowledge literacy. Patient preferences:	Validated survey Non-validated survey		Mixed results as far as the relationship between experience or attitude and opinion of the survey.

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
	Target condition: mental health: psychiatric inpatients			
Jenkinson, 1998[17]	**Barrier type:** user-level barriers **Barrier under study:** application usability Patient preferences: visual preferences and information needs of patients. **Target condition:** cancer: prostate	Qualitative		Patients confirmed their need for more information about the diagnosis of prostate cancer, available treatments and side effects. Patients confirmed the computer as a suitable vehicle for conveying information. Visual preferences were noted about the interface/design/layout/type.
Paperny, 1997[18]	**Barrier type:** user-level barriers **Barrier under study:** confidentiality/privacy; control of information; incompatibility with current care. Patient preferences: automated health education. **Target condition:** HIV/AIDS Other: STD	Qualitative	Interactive, computer-assisted identification of high-risk behaviors and health needs is thorough, accurate, painless, and easy and saves interviewer time.	Avoidance, mistrust, discomfort and breach of confidentiality in sharing sensitive problems is almost eliminated with this automated method of interview and health education
McTavish, 1994[19]	**Barrier type:** user-level barriers **Barrier under study:** application usability ; knowledge literacy **Target condition:** breast cancer.	Empirical based on trial data Non-validated survey	The geographic barrier (location, cost, child care) were easily over some by their in-home use of the CHESS computer	CHESS appears to be extremely user-friendly and lack of computer experience is not a barrier to use.
Cavan, 2003[20]	**Barrier type:** User barriers **Barrier under study:** application usability ; internet access **Target condition:** diabetes	Pilot study	Internet access is becoming more reliable, a rapid and preferably automated method of data entry would minimize the risk of data loss.	No data
Feil, 2000[21]	**Barrier type:** user-level barriers **Barrier under study:** application usability; CHI application use too time consuming; knowledge literacy; lack of technical infrastructure; access. **Target condition:** diabetes	Non-validated survey	The home based intervention was free of charge, convenient (the participant were loaned a specialized computer) and designed to mitigate frequent participation barriers such as cost, transportation, child care, travel costs and work schedules	The result shows the internet intervention can appeal to a wide range of type 2 patients regardless of gender, disease severity and computer familiarity, thus mirroring the general public's adoption of the internet
Zeman, 2006[22]	**Barrier type:** user-level barriers; systems-level barriers **Barrier under study:** application usability ; CHI	Empirical based on trial data Non-validated survey;	Lack of physician interest and motivation is a critical barrier even if technology offers a low-	Lack of physician interest and motivation is a critical barrier even if technology offers a low-

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
	application use: too time consuming; confidentiality/privacy; control of information ; cultural; Knowledge literacy; utility; **Target condition:** mental health : range of psychiatric conditions	research assistant recorded this	cost alternative, requires few additional resources, is easy to use, and provides evidence-based diagnostic and treatment information.	cost alternative, requires few additional resources, is easy to use, and provides evidence-based diagnostic and treatment information.
Bryce, 2008[23]	**Barrier type**: user-level barriers, systems-level barriers. Barrier under study: Comparison of preportal participants to portal users about interest in a number of features of a portal. Also, participants were queried about the acceptability of fees. The substantial investment to develop a portal was discussed as a system level barrier. **Target condition:** diabetes	Qualitative	In general, preportal participants anticipated features to be more useful than portal users actually found them to be, with the exception of electronic communication with healthcare practices. Most participants did not find fees acceptable.	Potential and actual users of a diabetes portal favored capabilities aimed largely at self management, education, and communication, but ratings of actual users were not better than those of potential users. Most participants were opposed to paying for access.
Leslie, 2005[24]	**Barrier type**: User-level barriers **Barrier under study:** application usability **Target condition:** Physical Activity/ Diet/ Obesity	Non-validated survey		The use of websites to deliver health behavior change programs provides many new opportunities and challenges Websites may be a far more 'passive' medium than has been previously assumed. It may be necessary to make websites more dynamic and to update website material regularly to make them more appealing and useful to potential users. The key challenge in providing effective programs is in finding the most appropriate methods to recruit, actively engage and maintain participant interest in the program materials.
Ferrer-Roca, 2004[25]	**Barrier type**: User-level barriers, systems-level barriers. **Barrier under study:** application usability, User satisfaction **Target condition:** Diabetes	Non-validated survey		the trial results suggest that SMS may provide a simple, fast, efficient and low-cost adjunct to the medical management of diabetes at a distance. In our case it was particularly

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				useful for elderly persons and teenagers, age groups that are known to have difficulty in controlling their diabetes well.
Lenert, 2003[26]	**Barrier type**: User-level barriers **Barrier under study:** application usability, complex design **Target condition:** Smoking Cessation	Non-validated survey		this pilot study suggests that design of Internet applications that motivate changes in health behavior may need to differ from applications designed to educate and inform.
Kressig, 2002[27]	**Barrier type**: user-level barriers **Barrier under study:** application usability, user friendliness **Target condition:** Physical Activity/ Diet/ Obesity	Non-validated survey		the data from this study support the potential of interactive technology in health promotion among the expanding older population
Brug, 1998[28]	**Barrier type**: user-level barriers **Barrier under study:** application usability **Target condition:** Physical Activity/ Diet/ Obesity	Non-validated survey		computer-generated individualized feedback can be effective in inducing recommended dietary changes and that iterative feedback can increase the longer term impact of computertailored nutrition education on fat reduction.
Boberg, 1995[29]	**Barrier type**: user-level barriers **Barrier under study:** application usability **Target condition:** HIV/AIDS	Non-validated survey		This study demonstrates that computers, which are often characterized as sterile, information-only, and intimidating, can be used very successfully to provide information, analysis, and support to people facing a health crisis such as HIV infection
Shaw, 2001[30]	**Barrier type**: System-level barriers **Barrier under study:** application usability **Target condition:** all cancer	Non-validated survey		The results of this study demonstrate that the addition of a multimedia interactive program to the process of patient education may

Evidence table 43. All barriers identified to the use of CHI applications (continued)

Author, year	Barriers and target conditions	DATA collection method	Comment	Conclusions
				affect patient satisfaction and the delivery of information required for informed consent
Strecher, 1994[31]	**Barrier type**: User-level barriers **Barrier under study:** application usability **Target condition:** Smoking Cessation	Non-validated survey		Results from both studies indicate positive effects of computer-tailored smoking messages among moderate to light smokers

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Evidence table 43. All barriers identified to the use of CHI applications (continued)

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Evidence table 43. All barriers identified to the use of CHI applications (continued)

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Evidence Table 5. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Breast cancer									
Gustafson, 2001[1]	Individuals interested in their own health care	Interactive consumer computer-based program	Home/ residence	Accrued between April 1995 and May 1997	<60 yr, Women within 6 months of diagnosis of breast cancer, Not homeless, able to give informed consent, Understand and answer sample questions from the pretest Not active illegal drug users		Given copy of Dr. Susan Love's Breast Book	CHESS intervention on home computer connecting to central server	**1**
Gustafson, 2008[2]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	Women within 61 days of breast cancer diagnosis. Not homeless, able to give informed consent, understand and answer sample questions from the pretest		1.Choice of several books on breast cancer or set of audiotape OR 2. Access to the Internet	CHESS interactive website, General website and the Internet	**2**
Breast cervical prostate and laryngeal cancer									
Jones, 1999[3]	Individual interested in their own health care	Interactive consumer website	Clinician office	1996-1997 patients identified	Existing breast, cervical, prostate, or laryngeal, cancer patients receiving radiotherapy at one oncology center	Receiving palliative treatment, No knowledge of diagnosis, visual or mental handicap , severe pain or symptoms	1. Booklet information- 2. General information about cancer, organized on computer as hypertext document	Personalized information- summary of their medical record & hypertext links to terms. Access to general system menu	**1**

Yr = year, CHESS = Comprehensive Health Enhancement Support System, NS = Not specified

Evidence Table 5. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Reference List

1 Gustafson DH, Hawkins R, Pingree S *et al*. Effect of computer support on younger women with breast cancer. J Gen Intern Med 2001; 16(7):435-45.

2 Gustafson DH, Hawkins R, Mctavish F *et al*. Internet-based interactive support for cancer patients: Are integrated systems better? 2008; 58(2):238-57.

3 Jones R, Pearson J, McGregor S *et al*. Randomised trial of personalised computer based information for cancer patients. BMJ 1999; 319(7219):1241-7.

Evidence Table 6. Description of consumer characteristics in RCTs addressing the impact of CHI applications on intermediate outcomes (KQ1b)

Author, Year	Control Intervention	Age	Race, n(%)	Income	Education, n (%)	SES	Gender, n (%)	Marital Status	Other characteristics
Breast cancer									
Gustafson, 2001[1]	Allocated standard intervention	Mean, 44.4 SD, 7.1	White non-Hispanic (72)	USD 40,000, (50.8)	12-16yr,(40.2)	NR		Living with partner, (72.6)	Insurance: Private Insurance, (84.7)
	Received CHESS intervention, a home based computer system	Mean, 44.3 SD, 6.6	White non-Hispanic (76)	USD 40,000, (58.1)	12-16 yr, (45.8)	NR		Living with partner, (71.9)	Insurance: Private Insurance, (86)
Gustafson, 2008[2]	Usual Care with books	NS	NS	NS	NS	NS	NS	NS	NS
		NS	NS	NS	NS	NS	NS	NS	NS
Breast cervical prostate and laryngeal cancer									
Jones, 1999[3]	Booklet information	NS	NS	NS	NS	NS	NS	NS	NS
		NS	NS	NS	NS	NS	NS	NS	NS

NS= Not Specified, SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, USD = United States Dollar

Reference List

1 Gustafson DH, Hawkins R, Pingree S *et al*. Effect of computer support on younger women with breast cancer. J Gen Intern Med 2001; 16(7):435-45.

2 Gustafson DH, Hawkins R, Mctavish F *et al*. Internet-based interactive support for cancer patients: Are integrated systems better? 2008; 58(2):238-57.

3 Jones R, Pearson J, McGregor S *et al*. Randomised trial of personalised computer based information for cancer patients. BMJ 1999; 319(7219):1241-7.

Evidence table 7: Outcomes in studies addressing KQ1b, impact of CHI application on intermediate outcomes

Author, year	Outcomes	Control Intervention	n	Measure at BL	Measure at time point 2	Measure at final time point	Mean difference (95% CI)	Significance
Gustafson, 2001[1]	Social Support	Control	125		2 month mean,78.4	5 month mean, 79.3	2 mos: 2.4 (-1.2-5.9) 5 mos: 4.9 (1.4-8.4)	2 mos: NS 5 mos: p <0.01
		CHESS	121		2 month mean,80.2	5 month mean, 84.2		
	Information competence	Control	125		2 month mean, 65.6	5 month mean, 65.8	2 mos: 4.8 (1.5-8.1) 5 mos: 3,5 (0.0-6.9)	2 mos: p <0.01 5 mos: p 0.05
		CHESS	121		2 month mean, 70.4	5 month mean, 69.3		
	Unmet information needs	Control	125		2 month mean, 67.2	5 month mean, 69.6	2 mos: 2.8 (-2.7-8.4 5 mos: -2.6 (-8.2-2.9)	2 mos: NS 5 mos: NS
		CHESS	121		2 month mean, 70.0	5 month mean, 67.0		
	Participation, behavioral involvement	Control	125		2 month mean, 73.1	5 month mean, 72.8	2 mos: 2.5 (-1.1-6.1) 5 mos: 1.7 (-2.3-5.6)	2 mos: NS 5 mos: NS
		CHESS	121		2 month mean, 75.6	5 month mean, 74.5		
	Participation, level of comfort	Control	125		2 month mean, 74.3	5 month mean, 76.5	2 mos: 6.4 (2.1-10.7) 5 mos: 2.6 (-1.4-6.7)	2 mos: p <0.01 5 mos: NS
		CHESS	121		2 month mean, 80.7 SD,	5 month mean, 79.1		
	Confidence in doctors	Control	125		2 month mean, 77.3	5 month mean, 79.0	2 mos: 5.7 (1.0-11.3) 5 mos: 3.8 (-2.2-9.8)	2 mos: p <0.05 5 mos: NS
		CHESS	121		2 month mean, 83.0	5 month mean, 82.8		

Evidence table 7: Outcomes in studies addressing KQ1b, impact of CHI application on intermediate outcomes (continued)

			2 month		Effect size (p value)	4 month		Effect size (p value)	9 month		Effect size (p value)
Gustafson, 2008[2]	Social support	Control	83	CHESS minus control: mean, 0.16 SD, 0.49	0.32 (0.039)	78	CHESS minus control: mean, 0.25 SD, 0.53	0.46 (0.004)**	75	CHESS minus control: mean, 0.21 SD, 0.55	0.38 (0.021)*
		Internet	79	Internet minus control: mean, -0.08 SD, 0.56	-0.14 (.39)	80	Internet minus control: mean, -0.03 SD, 0.60	0.05 (0.77)	75	Internet minus control: mean, 0.06 SD, 0.58	0.10 (0.57)
		CHESS	90	CHESS minus Internet: mean, 0.16 SD, 0.49	0.47 (0.003)**	85	CHESS minus Internet: mean, 0.20 SD, 0.56	0.35 (0.027)	80	CHESS minus Internet: mean,0.13 SD, 0.54	0.24 (0.14)
	Health & information competence	Control	83	CHESS minus control: mean, 0.12 SD, 0.47	0.25 (0.126)	78	CHESS minus control: mean, 0.07 SD, 0.40	0.17 (0.32)	75	CHESS minus control: mean, 0.18 SD, 0.48	0.38 (0.028)
		Internet	79	Internet minus control: mean, -0.03 SD, 0.48	-0.06 (0.69)	80	Internet minus control: mean, -0.05 SD, 0.45	-0.10 (.53)	75	Internet minus control: mean, 0.06 SD, 0.49	0.12 (0.48)
		CHESS	90	CHESS minus Internet: mean, 0.17 SD, 0.39	0.44 (0.007)**	85	CHESS minus Internet: mean, 0.19 SD, 0.40	0.23 (0.15)	80	CHESS minus Internet: mean, 0.12 SD, 0.37	0.24 (0.16)

* "p<0.05. CHESS vs. control and Internet vs. control comparisons share alpha, thus p<0.025 for significance"
** "p<0.01. CHESS vs. control and Internet vs. control comparisons share alpha, thus p<0.025 for significance"

NS = not significant, CHESS = Comprehensive Health Enhancement Support System, SD = standard deviation, mos = months, BL = baseline, CI = confidence interval

Evidence table 7: Outcomes in studies addressing KQ1b, impact of CHI application on intermediate outcomes (continued)

Author, year	Outcomes	Control intervention	n	No. (%) 95% CI on %	P value of difference Personal vs. general information on computer	P value of difference Computer vs. booklet
Jones, 1999[3]	Satisfaction Score >2 No. (%) a few days after information given	Booklet	150	58 (40) 32 to 48	0.04 (personal better)	0.77
		Computer-Personal Information via computer	156	68 (46) 38 to 54		
		Computer - General information about cancer	128	41 (34) 26 to 42		
	Prefer computer to 10 minute consultation with professional (at 3 months of follow up)	Booklet	150	12/122(10)		
		Computer-Personal Information via computer	156	38/131(29)		
		Computer - General information about cancer	128	22/110 (20)	0.12	<0.001 (computer more likely)

Evidence table 7: Outcomes in studies addressing KQ1b, impact of CHI application on intermediate outcomes (continued)

Reference List

1. Gustafson DH, Hawkins R, Pingree S *et al*. Effect of computer support on younger women with breast cancer. J Gen Intern Med 2001; 16(7):435-45.
2. Gustafson DH, Hawkins R, Mctavish F *et al*. Internet-based interactive support for cancer patients: Are integrated systems better? 2008; 58(2):238-57.
3. Jones R, Pearson J, McGregor S *et al*. Randomised trial of personalised computer based information for cancer patients. BMJ 1999; 319(7219):1241-7.

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Diet/exercise/physical activity NOT obesity									
Adachi, 2007[1]	Individuals interested in their own health care	Tailored advice based on answers to a Computerized questionnaire	Home/ residence	2002/ January to September	20-65 yr, BMI greater≥24, BMI greater≥ 23 with mild Hypertension, Hyperlipidemia, or DM	BMI≥30, history of major medical or psychiatric problems or orthopedic problems that prohibited exercise, received a diet and/or exercise program within 6 months, currently/previously /planned to be pregnant within 6 months	Untailored self-help booklet with 7-month self monitoring of weight and walking; Self-help booklet only	Computerized behavioral weight control program with 6-month weight and targeted behavior's self-monitoring; computerized behavioral weight control program only	**0**
Anderson, 2001[2]	Consumers interested in their own health	Interactive computer based program	Kiosk based computers located in supermark -ets	NS	NS	NS	No intervention-control condition	Computerized nutrition intervention	
Brug, 1998[3]	General public interested in their own health	Computer-generated feedback letters	Home based	NS	NS	NS	General Information	Tailored Feedback; Tailored + Iterative Feedback	
Brug, 1999[4]	Individuals interested in their own health	Computer-tailored nutrition education	Computer based; otherwise non-specified	NS	NS	NS	First intervention (comparison group) provided subjects with personal letters with tailored dietary feedback about fat, fruit and	The second intervention (experimental group), tailored letters with dietary feedback was supplemented by feedback about personal outcome expectancies, perceived	

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
							vegetables only	social influences and self-efficacy expectations	
Campbell 1994[5]	Adult patients from four North Carolina family practices	individually computer-tailored nutrition messages	Home based	Between September and November 1991	Office staff recruited participants as they checked in for any type of medical appointment.	patients who were too ill or mentally unable to complete the baseline survey	Messages were mailed to participants	An intervention group, which received tailored nutrition messages; a comparison intervention group, which received nontailored nutrition messages; The tailored intervention consisted of a one-time, mailed nutrition information packet tailored to the participant's stage of change, dietary intake, and psychosocial information.	
Campbell, 1999[6]	Low income women enrolled in the Food Stamp program	Interactive computer based program	Facility based (food stamp office)	January through April, 1995	18 years of age or older, spoke English and either had children under 18 living at home or were pregnant	NS	No Intervention	Computer-based intervention consisted of a tailored soap opera and interactive 'info-mercials'	

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
								that provided individualized feedback about dietary fat intake, knowledge and strategies for lowering fat based on stage of change	
Campbell, 2004[7]	Participants in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC)	CDROM program	Clinic-based	NS	Being at least 18 years of age, receiving WIC benefits for self or child(ren), and speaking and understanding English. For those women who were pregnant or breast-feeding, it was required that they have at least one prior nutrition session with a WIC nutritionist before being referred to the computer program	Women deemed as high risk by the nutritionist (eg, owing to pregnancy complications) were excluded from the study because of the probable need for more intensive counseling and follow-up.	Control group completed the surveys but did not receive the intervention until after follow-up	Interactive tailored nutrition education	
Haerens, 2005[8]	Middle school adolescents)	Computer-tailored feedback	School based	Measures were assessed at the beginning (September 2003) and repeated at	NS	NS	No intervention	Intervention with parental support and intervention alone	

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
				the end of the school year (June 2004).					
Haerens, 2007[9]	Individuals interested in their own health care (students in randomly selected 7th grade class)	Interactive computer-tailored intervention	Remote location: school	Year, 2005 (November)/ 50 minute intervention with 3 month follow up	7th grade students, parental consent		No intervention	50-min class (in 7th grade) using the computer tailored dietary fat intake intervention	**0**
Haerens, 2009[10]	Adolescent population	Web-based computer tailored intervention	Home Based	February–March 2007	NS	NS	Generic feedback letter	Tailored Feedback letter	
Hurling, 2006[11]	Individuals interested in their own health	Internet-based exercise motivation and action support system (Test system)	Computer based; otherwise non-specified	NS	NS	taking of prescription medication, known heart conditions or related symptoms and receipt of advice from a health professional not to engage in physical activity or exercise	Non-interactive Internet-based physical activity system)	Interactive Internet-based physical activity system)	
Hurling, 2007[12]	Individuals interested in their own health care	Internet and mobile phone for self reported physical activity	Home/ residence	Duration, 3 month, September to December, 2005.	30-55 yr, Body mass index 19-30, Not vigorously active, Not taking regular prescription medication, Internet and e-mail access,	Employee of Unilever, 1 or more items on the PAR-Q, 1 or more items on the Rose Angina Questionnaire	No intervention	Internet and mobile phone based intervention	**2**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					Mobile phone user				
King, 2006[13]	people with type 2 diabetes	Interactive CDROM	Facility based	NS	At least 25 years old; diagnosed with type 2 diabetes for 6 months or more; able to read and write in English; and able to perform moderate level PA	NS	generic health risk appraisal CD-ROM	Interactive CD-ROM	
Kristal, 2000[14]	Enrollees of a large health maintenance organization	Computer-generated personalized letter and computer generated behavioral feedback	Home-based	NS	GHC enrollment, age (18–69) and an ability to complete the baseline survey in English.	Living outside of area or no longer enrolled in GHC	Usual Care Group (no intervention)	Tailored, Self-Help Dietary Intervention	
Lewis, 2008[15]	Sedentary adults interested in their own health	Web-based computer-tailored Feedback	Computer/ Home based	January 2003 through May 2006	NS	NS	Standard Internet	Motivationally-Tailored Internet	
Low, 2006[16]	Individuals interested in their own health care	Interactive consumer website (*Student Bodies,*	NS	2001	(F) first or second year college, northeast private, liberal arts college	Women with previous diagnosis of eating disorders or who were currently purging,	Control	*Student Bodies* with moderated discussion, *Student Bodies* with un-moderated discussion, *Student Bodies* with no discussion	**2**
Mangunkusumo, 2007[17]	Individuals interested in their own health care:	Internet site	Remote location (e.g. library internet	NS	Secondary school students of the same grade		Preprinted generic advice on fruit consumption	Tailored feedback on fruit consumption and an online	**1**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
	student--with parental consent		cafe); at a secondary school				and a mailed referral where applicable after baseline assessment	referral where applicable after baseline assessment	
Marcus, 2007[18]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	15 Jan 2003 through 6 June 2006	≥18 yr, sedentary (<90 minutes of physical activity each week)	History of coronary or valvular heart disease, Hypertension, Diabetes mellitus, chronic obstructive pulmonary disease, stroke, osteoarthritis, orthopedic problems that would limit treadmill testing, or any other serious medical condition that would make physical activity unsafe or unwise, consuming 3 or more alcoholic drinks per day on 5 or more days of the week, Current or planned pregnancy, planning to move from the area within the next year, current suicidal ideation or psychosis, current clinical depression and/or		Tailored print, Tailored internet, Standard internet	**3**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
						hospitalization because of a psychiatric disorder in the past 6 months, current clinical depression and/or hospitalization because of a psychiatric disorder in the past 6 months, taking medication that may impair physical activity tolerance or performance , and/or previous participation in exercise trials of authors			
Napolitano, 2003[19]	Individuals interested in their own health care	Interactive consumer website	Home/ residence, Remote location: work place	12 weeks	18-65 years old, 120 minutes or less of moderate intensity physical activity per week, 60 minutes or less of vigorous intensity physical activity per week	Coronary artery disease, Stroke, Alcoholism or substance abuse, Hospitalization for a psychiatric disorder in the last 3 years, Currently suicidal or psychotic, Orthopedic problems that could limit exercise, and current or planned pregnancy	Wait list control group	Internet web site plus weekly email tip sheets	**0**
Oenema, 2001[20]	Individuals interested in their own health care	Interactive consumer website,	Classroom or office of adult education institutes	NS		Insufficient understanding of Dutch	Non-tailored nutrition information letter	Received we-based tailored nutrition education program	**0**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
			(sites of recruitment)						
Richardson, 2007 [21]	Sedentary adults with type II Diabetes	Enhanced pedometers with embedded USB ports, uploaded detailed, time-stamped step-count data to a website called Stepping Up to Health; and received automated step-count feedback, automatically calculated goals, and tailored motivational messages	Home/ residence	NS	At least 18 years of age and had type 2 diabetes. Eligible participants also reported regular e-mail use, and had access to an Internet-connected computer with a Windows 2000 or XP operating system and an available USB. Participants also had to be able to communicate in English, provide written consent, and obtain medical clearance to start a walking program from a primary care physician, endocrinologist, or cardiologist.	If they had used a pedometer in the past 30 days or were pregnant.	Participants randomized to receive LG were instructed to focus on total accumulated steps.	Participants randomized to receive SG were instructed to focus on bout steps. They were encouraged to set their pedometer to display bout steps (labeled aerobic steps on the Omron pedometers), and they were assigned weekly automatically calculated bout steps goals based only on bout-step data uploaded from the previous week.	
Smeets, 2007[22]	Individuals interested in their own health care	Tailored newsletter computer generated based on information about the Individuals	Home/ residence	15 months	18-65 yr,		Control group receiving one general information letter	Intervention group, receiving one tailored letter	**-1**
Spittaels,	Healthy	Web based	Home	NS	20 and 55 years of	NS	No	website-	

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
2007[23]	adults interested in their own health		based		age, had no history of cardiovascular diseases, and had access to the Internet		intervention	delivered physical activity intervention – with or without computer tailored feedback	
Spittaels, 2007[24]	Individuals interested in their own health care	Interactive consumer website	Work	NS	25-55 yr, internet access at home or work	History of cardiovascular disease	Online non-tailored standard physical activity advice	Online tailored physical activity advice + email, Online tailored physical activity advice only	**1**
Tan, 2005[25]	Individuals interested in their own health care	Interactive consumer website	Home/ residence, Remote location: work place,	NS	18-65 yr, Command of Dutch language, Access to computer with a CD-ROM		No information	Tailored information, Generic information	**1**
Vandelanotte, 2005[26]	Individuals interested in their own health care	Interactive computer-tailored intervention	University computer lab	NS	20-60 yr	Complaints related to physical activity, Complaints related to fat intake (cardiovascular disease, diabetes, anorexia, problems with stomach, liver, gallbladder or intestine)	Tailored physical activity and fat intake Interventions after 6 month FU	Tailored physical activity and fat intake intervention at baseline, Tailored physical activity intervention at baseline and tailored fat intake intervention at 3 months,	**1**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
								Tailored fat intake at baseline, and tailored physical activity at 3 months	
Verheijden, 2004[27]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	Duration, Baseline collected between September 2002 to December 2002 with 8 month follow up	Greater than or equal to 40 years old, Diabetes mellitus type 2, Hypertension, Dyslipidemia	No internet access	Usual care	Usual care plus web-based nutrition counseling and social support program	**0**
Wylie-Rosett, 2001[28]	Individuals (BMI > 25 kg/m2) in a freestanding health maintenance organization	Computerized tailoring	Kiosk based	NS	BMI > 25 kg/m2+ one cardiovascular risk factor	Intention to move beyond commuting distance	Work book only	Computer tailored feedback; computer tailored feedback plus staff consultation	
Eating disorder									
Winzelberg, 2000[29]	Individuals interested in their own health care	Interactive consumer website	Home/ residence	NS	(F), West coast public university students Desire to improve body image satisfaction	History of Bulimia or anorexia, currently engaged in purging activities, BMI below 18	No intervention	Interactive consumer web site	**0**
Nutrition intervention									
Bruge, 1996[30]	Individuals interested in their own health care	Interactive consumer website	NS	NS	Employees of Royal Shell laboratory in Amsterdam, Netherlands		Non-tailored group; general nutrition information	Tailored group; computer generated feedback letters	**2**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
Silk, 2008[31]	Individuals interested in their own health care Mothers or pregnant	Interactive consumer website	Home/ residence, Remote location: community agency or extension service office	2 weeks	18-50 years, (F), one or more children or pregnant, poverty (yearly income less than or equal to 185% of the federal poverty index		Pamphlet	Website Video Game	**0**
Overweight and binge eating									
Jones, 2008[32]	Individuals interested in their own health care	Interactive consumer website	NS	2005; 16 weeks	≥85th percentile for age-adjusted BMI, binge eating or overeating behaviors at a frequency of ≥1 times per week in the previous 3 months, access to a computer and the Internet, not currently enrolled in a formal binge eating or weight loss program (eg, Weight Watchers), absence of any medical condition in which the actual condition or treatment affects weight and/or appetite, absence of anorexia nervosa		Wait list control group	SB2-BED	**1**

Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Consumer under study	CHI Application type	Location	Year data collected/ duration of intervention	Inclusion criteria	Exclusion criteria	Control	Intervention	Jadad score
					and bulimia nervosa				

NS = not specified, yr = year

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Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

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Evidence Table 8. Description of RCTs addressing KQ1b (impact of CHI applications on intermediate outcomes) (continued)

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Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
diet/exercise/physical activity NOT obesity									
Adachi, 2007[1]	Control	Mean, 46.3 SD, 8.6	NS	NS	NS	NR			Height (cm): mean, 157.6 SD, 5.9 Body weight (kg): mean, 65.1 SD, 6.4 BMI (kg/m2): mean, 26.1 SD, 1.6
	Behavioral weight control program with 6-month weight and targeted behavior's self-monitoring	Mean, 46.6 SD, 10.1	NS	NS	NS	NR			Height: mean, 157.5 SD, 6.1 Body weight (kg): mean, 65.3 SD, 6.4 BMI (kg/m2): mean, 26.2 SD, 1.4
	Untailored self-help booklet with 7-month self monitoring	Mean, 46.6 SD, 9	NS	NS	NS	NR			Height: mean, 155.7 SD, 5.2 Body weight (kg): mean, 63.4 SD, 5.5 BMI (kg/m2): mean, 26.1 SD, 1.5
	Behavioral weight control program	Mean, 45.3 SD, 10.4	NS	NS	NS	NR			Height: mean, 157.0 SD, 5.5 Body weight (kg): mean, 64.8 SD, 6.5 BMI (kg/m2): mean 26. SD, 1.5
Anderson, 2001[2]	Control	NS	NS	NS	NS	NS	NS		
	Intervention	NS	NS	NS	NS	NS	NS		
	Sample statistics	NS	White (92)	Median annual	Mean years of education	NS	F (96)		.70 children (SD 1.00, p<.001)

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
				$35,000; $20,000 or less (12)	14.78±2.11; 12 years or fewer (20)				
Brug, 1998[3]	Control-General Information	NS	NS	NS	NS	NS	NS		NS
	Tailored Feedback; Tailored + Iterative Feedback	NS	NS	NS	NS	NS	NS		NS
	Baseline Statistics	44 (SD 14) years.	NS	NS	College degree (42)	NS	F (82)		Mean body mass index was 23.7 (SD 5.9) for women and 24.6 (SD 3.7) for men.; mean fat score at baseline was 27.2 (SD 5.2); mean number of daily servings of vegetables and fruit were 1.0 (SD 0.4) and 2.2 (SD 1.7), respectively. Mean attitude scores at baseline (on a -3 to 3 scale) were 2.0 (SD 1.4) toward fat reduction and 2.5 (SD 0.8) and 2.3'(SD 0.9) toward increasing vegetables and fruit. Self-efficacy (range -3 to 3) expectations were 0.6 (SD 1.8), 1.3 (SD 1.7), and 1.2 (SD 1.9) toward reducing fat and

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									increasing vegetables and fruit, respectively.
Brug, 1999[4]	Comparison 163	M 41.3	NS	NS	NS	NS	NS		BMI 23.9
	Experimental 152	M 38.6	NS	NS	NS	NS	NS		BMI 24.2
Campbell, 1994[5]	No messages (124)	NS	NS	NS	NS	NS	NS		NS
	Tailored messages (134)	NS	NS	NS	NS	NS	NS		NS
	Non-tailored messages (136)	NS	NS	NS	NS	NS	NS		NS
	Baseline characteristics	Average age of 40.8 years	Minority enrollment (19.0)	Median annual household level was $30 000 to $39 000,	(mean 13.6 years),	NS	F (75.3)		NS
Campbell, 1999[6]	Control 212	28.9 (0.59)	Caucasian 10.8 African-American 82.1 Hispanic 1.9 American Indian 1.9 other ethnicity 3.3	NS	Less than high school (33.0) high school graduate or GED (36.3) beyond high school (30.7)	NS	NS		Mean child number (SE) 2.1 (0.09) High autonomy (71.2) Feel need to lose weight (62.3)
	Intervention 165	30.2 (0.67)	Caucasian 7.3 African-American 87.3 Hispanic	NS	Less than high school (33.9) High school graduate or GED (37.0) beyond high school	NS	NS		Mean child number (SE) 2.2 (0.10) High autonomy (77.0) Feel need to lose weight (59.4)

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
			1.2 American Indian 0.6 other ethnicity 3.6		(29.1)				
Campbell, 2004[7]	Control-No intervention (166)	27.5 (8.6)	African American 26.7; White non-Hispanic 60.6; Other 12.7	NS	High school 17.1; High school or GED 67.1; Beyond high school (any trade/beauty school/college) 15.8	NS	F(97)		Pregnant (19), Breast-feeding (5); Number of children, mean (SD) 2.0 (1.1)
	Computer tailored interactive nutrition education (141)	27.3 (7.9)	African American 39.7; White non-Hispanic 48.9; Other 12.7	NS	High school 21.3; High school or GED 66.7; Beyond high school (any trade/beauty school/college) 12.0	NS	F(98)		Pregnant (23); Breast-feeding (4) Number of children, mean (SD) 1.9 (1.0)
Haerens, 2005[8]	Control condition (n 5 schools, 759 pupils)	12.85 (0.71)	NS	NS	NS	Lower SES (52.4)	Girls (58.8)		NS
	Intervention with parental support (n schools, 1226 pupils)	13.04 (0.79)	NS	NS	NS	Lower SES (68.0)	Girls (40.1)		NS
	Intervention alone (n 5 schools, 1006 pupils)	13.24 (0.87)	NS	NS	NS	Lower SES (78.9)	Girls (15.6)		NS
Haerens, 2007[9]	No intervention	Mean, 13.2 SD, 0.5	NS	NS	General, 84 (55.6) Technical-	NR	F,111 (73.5)		Stage of change: Pre-contemplation,

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
					vocational, 67 (44.4)		M,40 (26.5)		36 (24.8) Contemplation, 8 (5.5) Preparation, 12 (8.3) Action, 34 (23.4) Maintenance, 55 (37.9) Dietary fat intake: mean, 113.9 SD, 46.3
	Intervention	Mean, 13.3 SD, 0.5	NS	NS	General, 90 (58.8) Technical-vocational, 63 (41.2)	NR	F,103 (67.3) M, 50 (32.7)		Stage of change: Pre-contemplation, 42 (28.2) Contemplation, 4 (2.7) Preparation ,11 (7.4) Action, 44 (29.5) Maintenance, 48 (32.2) Dietary fat intake: mean, 116.3 SD, 50.1
Haerens, 2009[10]	Control-Generic feedback information	NS	NS	NS	NS	NS	NS		NS
	Computer tailored feed back	NS	NS	NS	NS	NS	NS		NS
	Baseline Characteristics	14.6 _ (1.2)	NS	NS	NS	NS	(526 boys, 645 girls		NS
Hurling, 2006[11]	Control 22	M 34.9	NS	NS	NS	NS	F 78		NS
	Intervention 25	M 34.0	NS	NS	NS	NS	F72		NS
Hurling, 2007[12]	No intervention	Mean, 40.1 SD, 7.7	White non-Hispanic, (97)	NS	NS	NR	F, (70)		Household broadband access: yes, (22) Weight in kg: mean, 73.9

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									SD, 10.2 BMI: mean, 26.5 SD, 4.1 Initial IPAQ self0report level of physical activity (MET min): mean, 3868 SD, 2257
	Internet and mobile phone intervention	Mean, 40.5 SD, 7.1	White non-Hispanic, (100)	NS	NS	NR	F (64)		Household broadband access: Yes, (29) Weight in kg: mean, 75.1 SD, 11.7 BMI: mean, 166.3 SD, 6.6 Initial IPAQ self0report level of physical activity (MET min): mean, 4350 SD, 3200
King, 2006[13]	Generic health risk appraisal CD-ROM	61.0 (11.0)	Hispanic (8.2) White (79.1)	Income Less than $10,000 5.3 $10,000 to $29,999 20.0 $30,000 to $49,999 35.3 $50,000 to	Completed high school (27.4) Technical school (37.6) Completed college (22.9) Graduate degree (12.1)	NS	F(51.3)		Married (63.7); Taking insulin (19.1); Body mass index (kg/m2) (*M*, *SD*)) 31.9 (7.2); Comorbiditiesd (*M*, *SD*) 3.1 (2.1); Smokers 11.9

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
				$69,999 18.7 $70,000 to $89,999 12.0 $90,000 or more 11.9					
	Interactive CD-ROM	61.9 (11.7)	Hispanic (17.4) White (74.3)	Income Less than $10,000 4.8 $10,000 to $29,999 24.8 $30,000 to $49,999 27.0 $50,000 to $69,999 20.0 $70,000 to $89,999 9.7 $90,000 or more 8.2	Completed high school (27.4) Technical school (37.6) Completed college (22.9) Graduate degree (12.1)	NS	F(50.0)		Married (67.8); Taking insulin (24.7); Body mass index (kg/m2) (*M*, *SD*) 31.4 (7.0) ; Comorbiditiesd (*M*, *SD*) 2.9 (1.9) ; Smokers (8.2)
Kristal, 2000[14]	Usual Care (730)	NS	NS	NS	NS	NS	NS		NS
	Intervention (729)	NS	NS	NS	NS	NS	NS		NS
	Base line characteristics	44.9 ± 14.9	White 85.9; Black 4.5; Asian 5.8;	(%, $1,000), <25	NS	NS	M (50.9)		Body mass index (x 6 SD) 26.5 6 5.0

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
			Hispanic 3.0; Other 0.8	(12.2); 25–34 16.9; 35–49 25.4; 50–69 23.7; 701 21.7					
Lewis, 2008[15]	Standard Internet	NS	NS	NS	NS	NS	NS		NS
	Motivationally-Tailored Internet	NS	NS	NS	NS	NS	NS		NS
	Baseline Statistics	NS	Caucasian (76.3)	NS	NS	NS	Women (82.7)		NS
Low, 2006[16]	Control	NS	Students of color (8.4)	NS	NS	NR			NS
	Student bodies with a moderated discussion	NS	NS	NS	NS	NR	F (100)		NS
	Student bodies with a un-moderated discussion	NS	NS	NS	NS	NR	F (100)		NS
Mangunkusumo, 2007[17]	Internet	Mean, 15 range, 13-17	Dutch, (76.5) Turkish (5.0) Moroccan (3.3) Surinamese (2.4) Antillean/Arubans (0.4) Other (12.3)	NS	NS	NR	M, (43.9)		Lower secondary/vocational, (59.1) Int. secondary, (18.6) Upper secondary, (22.3)
	Control	NS	NS	NS	NS	NR	NS		NS
Marcus, 2007[18]	Control	46.3 (9.4)	NS	NS	NS	NR			NS
	Tailored print	Mean, 445	White non-	USD	College graduate	NR	F, (83.7)	Married,	BMI:

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
		SD, 9.6	Hispanic, (77.9)	>50,000, (57.0)	(or doing post graduate work), (72.1)			(69.8)	mean, 29.1 SD, 6.2 Employment: employed, (80.2)
	Tailored internet	Mean, 44.5 SD, 9	White non-Hispanic, (82.7)	USD >50,000, (58.0)	College graduate (or doing post graduate work), (64.2)	NR	F, (81.5)	Married, (63.0)	BMI: mean, 29.7 SD, 6.5 Employment: employed, (90.0)
	Control	46.3 (9.4	White non-Hispanic, (84.1)	USD >50,000, (53.7)	College graduate (or doing post graduate work), (64.6)	NR	F, (82.9)	Married, (55.6)	BMI: mean, 29.5 SD, 5.5 Employment status: employed, (89.0)
Napolitano, 2003[19]	Wait list control group	NS	NS	NS	NS	NR			NS
	Internet	NS	NS	NS	NS	NR			NS
Oenema, 2001[20]	Non-tailored nutrition information letter	NS	NS	NS	NS	NR			NS
	Web based tailored nutrition education	NS	NS	NS	NS	NR			NS
Richardson, 2007[21]	Lifestyle Goals (LG) Group (17)	52 ± 12	White (76), Black (18), Other (6)	<30,000 (18), 30,000-70,000 (18), >70,000(65)	HS diploma or GED (6), Some college (47), College degree (18), Graduate degree (29)	NS	M (29) F(71)		Baseline Average Daily Step Count 4,157 ± 1,737; Baseline BMI 38.6 ± 8.2.; Baseline Blood Pressure Systolic 133 ± 18, Diastolic 80 ± 9; On Insulin No (88), Yes (12); Internet Usage (Home) Never (6), ≤ 4 times per month (12),

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									Several times a week (12),Almost every day (65)
	Structured Goals (SG) Group (13)	53 ± 9	White (77), Black (8), Other (15)	<30,000(8), 30,000-70,000 (31), >70,000 (62)	HS diploma or GED (8), Some college (15), College degree (46), Graduate degree (31)	NS	M (38) F(62)		Baseline Average Daily Step Count 5,171 ± 1,769; Baseline BMI 35.3 ± 8.6.; Baseline Blood Pressure Systolic 136 ± 12, Diastolic 82 ± 11; On Insulin No (69), Yes (31); Internet Usage (Home) Never (23), ≤ 4 times per month (8), Several times a week (23),Almost every day (46)
Smeets, 2007[22]	Control group receiving one general information letter	Range, 18-65 Mean, 47 SD, 11	NS	NS	Primary or basic vocational school(10), Secondary vocational level or high school degree (42), Higher vocational school, college degree, or university degree(48)	NR	F (57)		NS
	Computer generated tailored newsletter	NS	NS	NS	NS	NR	NS		NS
Spittaels, 2007[23]	No Intervention	Age in years 40.7 (5.3)	NS	NS	Higher education 72.7	NS	F(66.7)		Employed 87.8; Compliance with PA recommendations 37.9; Stages of change

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									Precontemplation 6.1 Contemplation 19.8 Preparation 36.6 Action 8.4 Maintenance 29.0; BMI in kg/m2 24.1 (3.5); PA at moderate intensity in min/day 30.9 (36.4)
	Website with computer tailored feedback	Age in years 43.3 (5.7)	NS	NS	Higher education 61.9	NS	F (65.3)		Employed 86.2 ; Compliance with PA recommendations 47.4; Stages of change Precontemplation 3.5 Contemplation 8.7 Preparation 40.5 Action 11.6 Maintenance 35.8; BMI in kg/m2 25.0 (3.7); PA at moderate intensity in min/day 40.9 (40.5)
	Website without computer tailored feedback	Age in years 39.6 (5.0)	NS	NS	Higher education 67.4	NS	F (66.7)		Employed 84.5 ; Compliance with PA recommendations 44.2 ; Stages of change Precontemplation 6.2 Contemplation 15.5 Preparation 34.1 Action 12.4 Maintenance 31.8 ; BMI in kg/m2 24.6 (3.6) ; PA at moderate intensity in min/day 39.5 (42.3)
Spittaels, 2007[24]	Standard advice	Range, 25-55	NS	NS	College or university	NR	F (27)		BMI: mean, 24.4

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
		mean, 40.9 SD, 8			degree(59.6)				SD, 3.1 Work status: Factory workers (22) Office workers (51) Managers (27) Stages of Change: Pre-contemplation (10.7) Contemplation (17.9) Preparation (10.7) Action (10.0) Maintenance (49.3)
	Tailored advice + email	Range, 5-55 mean, 39.7 SD, 8.9	NS	NS	College or university degree(63.4)	NR	F (38.8)		BMI: mean, 24.3 SD, 3 Work status: Factory workers (22.4) Office workers (60.3) Managers (17.2) Stages of Change: Pre-contemplation (6.9) Contemplation (13.8) Preparation (11.2) Action (12.9) Maintenance (55.2)
	Tailored advice	Range, 25-55 mean, 39.3 SD, 8.7	NS	NS	College or university degree(68.9)	NR	F (32)		BMI: mean, 24.4 SD, 3.5 Work status: Factory workers (21.3) Office workers (51.6) Managers (27.0) Stages of Change: Pre-contemplation (7.6) Contemplation (13.4) Preparation (10.1)

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									Action (16.0) Maintenance (52.9)
Tan, 2005[25]	No information	NS	NS	NS	NS	NR			NS
	Tailored Information	NS	NS	NS	NS	NR			NS
Tate, 2006[26]	No counseling	Mean, 49.9 SD, 8.3	Minority 6(9)	NS	College graduate(49)	NR	F: 55, (82)	49 (73)	Weight: mean, 88.3 (13.9) body mass index: 32.3 (3.7) internet experiences, y: 4.7 (2.9) Waist circumference, cm: 106.4 (11.3) Weekly internet use, h: 4.5 (4.9)
	Human email counseling	Mean, 47.9 SD, 11.4	Minority 8(13)	NS	College graduate(56)	NR	F: 54,(84)	53(83)	Weight: mean, 89.0 (13.0) body mass index: 32.8 (3.4) internet experiences, y: 4.1 (2.3) Waist circumference, cm: 107.4 (10.8) Weekly internet use, h: 4.7 (5.3)
	Automated feedback	Mean, 47.9 SD, 9.8	Minority 6(10)	NS	College graduate (59)	NR	F: 53,(87)	46(75)	Weight: mean, 89.0 (13.2) body mass index: 32.7 (3.5) internet experiences, y: 4.4 (2.2) Waist circumference, cm: 107.6 (11.2) Weekly internet use, h: 5.0 (4.2)
Vandelanotte, 2005[27]	Control	NS	NS	NS	NS	NR	NS		NS
	Sequential Interactive computer	NS	NS	NS	NS	NR	NS		NS

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
	tailored intervention								
	Simultaneous interactive computer tailored intervention	NS	NS	NS	NS	NR	NS		NS
Verheijden, 2004[28]	Usual care	Mean, 64 SD, 10	NS	NS	≤ High school13 (18) , Intermediate22 (30), ≥B.Sc. level38 (52)	NR	M: 43 (59) F: 30 (41)		Lifestyle: Never smoke:28 (39) Ex-smoker: 38 (52) Current smoker: 7 (9) Alcohol >3 glasses/wk: 39 (54) mean, Exercise >3 times/wk: 45 (61) Medication use: HTN: 49 (67) Dyslipidemia:23 (31) DM type 2: 13 (18) Stage of Change: Pre-contemplation: 12 (16) Contemplation: 4 (5) Preparation: 5 (7) Action: 3 (4) mean Maintenance: 50 (68)
	Web-Based Targeted Nutrition Counseling and Social Support	Mean, 62 SD, 11	NS	NS	≤ High school 15 (21), Intermediate 31 (42), ≥B.Sc. level27 (37)	NR	M: 38 (52) F: 35 (48)		Lifestyle: Never smoker: 26 (35) Ex-smoker: 37 (51) Current smoker: 10 (14) Alcohol>3 glasses/wk: 41 (56) mean, Exercise>3 wks/wk: 46 (63)

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
									Medication use: HTN: 49 (67) Dyslipidemia: 26 (35) DM type 2: 9(13) Stage of change: Pre-contemplation: 11 (15) Contemplation: 2 (3) Preparation: 7 (1) Action: 9 (13) mean, Maintenance: 50 (68)
Wylie-Rosett, 2001[29]	Work book only	52.5± 11.50	White 100(86.2)	NS	Education>1 yr in college 99 (85.3)	NS	F 88 (75.7)		NS
	Computer tailored feedback	52.7± 11.27	White 195 (82.6)	NS	Education>1 yr in college 193 (81.8)	NS	F 199 (84.3)		NS
	computer tailored feedback plus staff consultation	51.6± 12.14	White 193 (81.8)	NS	Education>1 yr in college 192 (85.6)	NS	F 197 (83.5)		NS
Eating disorder									
Bruge, 1996[30]	Non-tailored group	Mean, 39 SD, 8	NS	NS	University training (34) Technical degree (59) Less than high school (7)	NR	M (83)		Fat consumption/day: 28.0(5.3) Vegetable servings/day: 1.00 (0.31) Fruit servings/day: 1.61(1.14)
	Intervention group	NS	NS	NS	NS	NR	NS		NS
Silk, 2008[31]	Video game	Mean, 33, SD, 8.28	European American (68)	Yearly income less or	Less than college (87)	NR	F (100)		NS

Evidence Table 9. Description of consumer characteristics in RCTs addressing KQ 1b (impact of CHI applications on intermediate outcomes) (continued)

Author, year	Control Interventions	Age	Race, n(%)	Income	Education, n(%)	SES	Gender, n (%)	Marital Status, n(%)	Other
			African American (25) Latino (5) Asian (1) Other (1)	equal to (185) of federal index: (100)	High school or GED equivalent (44)				
	Web site	NS	NS	NS	NS	NR	NS		NS
	Define	NS	NS	NS	NS	NR	NS		NS
Winzelberg, 2000[32]	No intervention	Mean, 20 range, 18-33 SD, 2.8	White non-Hispanic, (53) Black non-Hispanic, (3) Latino/Hispanic, (35) API, (5) Other, (3)	NS	NS	NR	F (100)		NS
	Intervention	NS	NS	NS	NS	NR	NS		NS
Overweight and binge eating									
Jones, 2008[33]	Wait list control group	Mean, 15.2 SD, 1.1	White non-Hispanic, 32 Black non-Hispanic, 6 Latino/Hispanic, 10 API, Other, 5	NS	Grade in school, n: 9th, 20 10th, 19 11th, 13 12th, 1	NR	F, 35 M, 18		Born in United States (92) BMI: mean, 30.64 SD, 5.97
	SB2-BED	Mean, 15 SD, 1	White non-Hispanic, 35 Black non-Hispanic, 2 Latino/Hispanic, 12 Other, 3	NS	Grade in school, n: 9th 26 10th 16 11th 10 12th 0	NR	F, 38 M, 14		Born in United States :(96) BMI: mean, 30.58 SD, 4.9

NR= Not Reported, NS= Not Specified, SD= Standard Deviation, SES= Socioeconomic Status, Yr= year, CBT= Cognitive Behavioral Therapy, WL= Wait List, BMI= Body Mass Index, QOL= Quality of Life, USD= United States Dollars, Female = F, Male = M, AIAN = American Indian/Alaska Native