



# Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006

Mary E. Larimer<sup>a,\*</sup>, Jessica M. Cronce<sup>b</sup>

<sup>a</sup> Department of Psychiatry and Behavioral Sciences, University of Washington, Box 356560, Seattle, WA 98195, United States

<sup>b</sup> Department of Psychology, Yale University, PO Box 208205, New Haven, CT 06520-8205, United States

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## Abstract

This paper serves to update a prior review of the literature on individual-focused prevention and treatment approaches for college drinking [Larimer, M.E. & Cronce, J.M. (2002). Identification, prevention and treatment: A review of individual-focused strategies to reduce problematic alcohol consumption by college students. *Journal of Studies on Alcohol Suppl.* 14, 148–163.], and covers the period from late 1999 through 2006. No support was found for information/knowledge approaches alone, or for brief values clarification approaches alone or with other informational content. Evidence was found in support of skills-based interventions and motivational interventions that incorporated personalized feedback, with or without an in-person intervention. Normative re-education interventions received mixed support, though personalized normative feedback was associated with positive outcomes. Significant advances have been made over the past seven years with respect to mailed and computerized feedback interventions, and interventions with mandated students. Much of the research reviewed suffered from significant limitations, particularly small sample sizes, attrition, and lack of appropriate control groups. More research is needed to determine the best methods for disseminating such interventions on college campuses, as well as additional research on interventions with high-risk groups of students. © 2007 Published by Elsevier Ltd.

*Keywords:* Alcohol; College drinking; Prevention; Intervention

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\* Corresponding author. Tel.: +1 206 543 3513; fax: +1 206 543 9520.

E-mail addresses: [larimer@u.washington.edu](mailto:larimer@u.washington.edu) (M.E. Larimer), [jessica.cronce@yale.edu](mailto:jessica.cronce@yale.edu) (J.M. Cronce).

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The final report of the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) Task Force on College Drinking (NIAAA, 2002) has been influential in shaping prevention efforts on campuses nationwide. The report also served to stimulate research, aided by several major NIAAA-funded requests for applications on college drinking prevention. Thus, over the past seven years the literature on college drinking interventions has been rapidly expanding. The current paper reviews recent literature on individual-focused college drinking interventions, and serves to update the 2002 Task Force report. Individual-focused interventions are those that focus on demand reduction of individual drinkers through provision of information or skills to influence student decision-making and behavior. Interventions targeting supply reduction or increased costs of consumption through policy or environmental strategies are not included, as these are addressed in a recent review by [Toomey, Lenk, and Wagenaar \(2007\)](#).

## 1. Method

Our earlier review ([Larimer & Cronce, 2002](#)) served as the basis for the Task Force recommendations related to individual-focused interventions. As in the prior paper, in the current paper we review the efficacy of individual-focused interventions overall, and their efficacy in high-risk populations. All levels of prevention (universal, indicated, and selective; [Institute of Medicine, 1994](#)) are included, as are interventions implemented in a variety of formats (one-on-one, small group, classroom, mailed/written or computerized/internet). We also review strategies for identification, referral, and recruitment of students

Table 1

Search terms used to identify studies

*Base search terms*

Alcohol+(campus\*, college\*, university, universities, student\*, or school\*)+(screening, prevention, intervention, treatment\*, program\*, group\*, or class\*)+(assess\*, evaluate, evaluation, efficacy or effectiveness)

*Specific intervention keyword searches (base search terms +)*

Information\*, informative, knowledge, awareness, education\*, values, goals, attitudes, perceptions, norms, normative, reeducation, re-education, clarification, challenge, Alcohol 101, cognitive, behavioral, cognitive-behavioral, skills, training, ASTP, expectancy, expectancies, BAC, BAL, blood alcohol, subjective intoxication, discrimination, monitoring, self-monitoring, self-assessment, self-help, manual, journal\*, diary, life skills, stress, management, stress-management, time, time-management, assertiveness, assertive, refusal, balance, multicomponent, multi-component, motivation\* or feedback

*Special population keyword searches (base search terms +)*

Adult children of alcoholics, COA, Greek\*, fraternit\*, sororit\*, athle\*, sport\*, freshm\*, first year, first-year, mandate\*, sanction\*, violat\* or enforcement

*Identification, recruitment and referral search terms (base search terms +)*

Advertise\*, market\*, outreach, remind\*, incentive\*, media, radio, flyer\*, flier\*, poster\*, newspaper\*, magazine\*, television, TV, internet, web\*, electronic, diagnos\*, measure\*, instrument, health, medical, doctor\*, nurse\*, outpatient, peer\*, police, judicial, mandate\*, sanction\*, adjudicate\*, security, policy, violat\*, or diversion

Note. Asterisk (\*) indicates “wild card” symbol to allow for variants on the selected words (e.g., diagnos\* would pull up “diagnose,” “diagnoses,” “diagnosis” and “diagnostic”).

for alcohol prevention. Inclusion criteria were intentionally broad, to provide a comprehensive overview of recent prevention outcomes. Consistent with our prior review (Larimer & Crouce, 2002) and reviews of the alcohol treatment literature (Miller & Willbourne, 2002) studies must (1) include at least one active individual-focused alcohol prevention/intervention condition; (2) assess at least one behavioral outcome (such as reduction in total drinks per week, peak consumption, heavy episodic or “binge” drinking, blood alcohol concentration (BAC), and/or alcohol-related negative consequences); (3) include at least one control or comparison condition (assessment only, wait-list, attention, or alternative intervention); and (4) utilize some method of prospective randomization to condition (at the level of the individual or the group/class). Where measured, changes in hypothesized mediating variables such as attitudes, knowledge, normative perceptions, or alcohol expectancies are also reported. Moderators (such as gender, drinker status, family history) are reported if included in study analyses.

The methodological quality of the included studies is also assessed. Consistent with the conventions used by Miller and Wilbourne (2002), less than 70% participant retention is noted as a limitation, and more than 80% retention is noted as a relative strength. As very short-term follow-ups (one month or less) are likely inadequate to document behavioral changes, and longer follow-ups (six months or more) are desirable for documenting maintenance, the former is noted as a limitation whereas the latter is noted as a strength. Follow-up periods of 12 months or more are noted as providing the strongest evidence of maintenance (Miller & Wilbourne, 2002). Sample size is also addressed, with studies of fewer than 25 participants per condition described as very small, fewer than 50 per condition as small, and 100 or more per condition as large. Study quality is used to help determine the strength of the evidence in support of our conclusions.

Studies were identified through searches of electronic databases including PsycInfo, Medline, and ProQuest Dissertations and Theses. Search terms were consistent with those utilized in our earlier review to maintain comparability (see Table 1 for a complete list of search terms). Consistent with the original review,

we also examined reference sections from other recent prevention reviews (Barnett & Read, 2005; Larimer, Crounce, Lee, & Kilmer, 2005; Walters, Miller, & Chiauzzi, 2005; Walters & Neighbors, 2005; White, 2006) to identify eligible studies. Authors identified through these searches were contacted to request unpublished work on this topic to reduce bias in conclusions. Although our search produced more than 1000 hits in the period from 1999 through 2006, only 42 studies met inclusion criteria for the current review.

Table 2  
Summary of studies reviewed by Larimer and Crounce (2002)

Education/awareness programs		
Information/knowledge programs	Values clarification programs	Normative re-education programs
Darkes and Goldman (1993)	Barnett, Far, Mauss, and Miller (1996)	Barnett et al. (1996)
Flynn and Brown (1991)	Meacci (1990)	* Schroeder and Prentice (1998)
Garvin, Alcorn, and Faulkner (1990)	* Sammon, Smith, Cooper, and Furnish (1991)	
* Kivlahan, Marlatt, Fromme, Copell, and Williams (1990)	Schroeder and Prentice (1998)	
Meier (1988)	* Thompson (1996)	
Roush and DeBlassie (1989)		
Schall, Kemeny, and Maltzman (1991)		
Cognitive/behavioral skills-based programs		
Specific alcohol-focused skills training	Multi-component alcohol skills training	General life skills training/lifestyle balance
<i>Expectancy challenge interventions</i>	Ametrano (1992)	* Murphy, Pagano, and Marlatt (1986)
* Darkes and Goldman (1993)	* Baer et al. (1992)	* Rohsenow, Smith, and Johnson (1985)
* Darkes and Goldman (1998)	* Garvin et al. (1990)	
Jones, Silvia, and Richman (1995)	Jack (1989)	
<i>Self-monitoring/self-assessment</i>	* Kivlahan et al. (1990)	
* Cronin (1996)	Marcello, Danish, and Stolberg (1989)	
* Garvin et al. (1990)	* Miller (1999)	
* Miller (1999)		
Motivational/feedback-based approaches		
Brief motivational interventions	Mailed or computerized motivational feedback	
* Anderson, Larimer, Lydum, and Turner (1998)	* Agostinelli, Brown, and Miller (1995)	
* Aubrey (1998)	* Walters, Bennett, and Miller (2000)	
* Borsari and Carey (2000)	* Walters, Martin, and Noto (1999)	
* D'Amico and Fromme (2000)		
* Dimeff (1997)		
* Larimer et al. (2001)		
* Marlatt et al. (1998)		
* Monti et al. (1999)		
Intensive treatment and medication		
* Davidson, Swift, and Fitz (1996)		

Note. Asterisk (\*) indicates study that showed significant differences between relevant experimental group and control/comparison group on one or more drinking-related outcomes (e.g., quantity or frequency of consumption, negative consequences). See Table 1 in Larimer and Crounce (2002) for a full summary of all study details.

## 2. Prevention and treatment strategies

Interventions are organized into three broad categories: educational/awareness, cognitive/behavioral skills-based, and motivational/feedback-based (see [Table 2](#) for a full list of studies reviewed in [Larimer & Crouce, 2002](#)). Within each category, interventions are further grouped into sub-categories based on the nature of their focal component. As many interventions have multiple components, classification is intended to serve as a useful heuristic rather than an absolute categorical model. Studies included in the current review are listed in [Table 3](#), to which the reader is referred for details on sample size, assignment to condition, assessment timing, retention, and study outcomes. Finally, [Table 4](#) details the number of studies providing supporting evidence for a given intervention approach across the two reviews.

### 2.1. Education/awareness programs

#### 2.1.1. Information/knowledge programs

[Lysaught, Wodarski, and Parris \(2003\)](#) compared a pamphlet with information about risks of drinking, in which participants recorded information about their own drinking, to a wait-list control. Both conditions resulted in reductions in number of drinks per week over time, and neither reduced heavy episodic drinking. A significant difference between groups in number of drinks per week is reported; however, appropriate statistics (i.e., means, standard deviations, significance values) are not reported. Alcohol consequences were not assessed. Positive alcohol expectancies declined for both groups. The authors note sample size and attrition are limitations, but don't report rates.

[Neighbors, Spieker, Oster-Aaland, Lewis, and Bergstrom \(2005\)](#) assigned students to receive or not receive a mailed, humorous birthday card encouraging moderation one week prior to their 21st birthday. Using a post-test only design, they found no effect of the birthday card on estimated BAC during the 21st birthday celebration. Low response rate was a limitation of the study.

Similarly, [Smith, Bogle, Talbott, Gant, and Castillo \(2006\)](#) mailed two cohorts of students one of five cards approximately one week prior to their 21st birthday. The primary card, Be Responsible About Drinking (B.R.A.D.), relayed the personal story of a college student (Brad McCue) who died as a result of drinking excessively while celebrating his 21st birthday. Comparison cards included one aimed at correcting normative misperceptions of drinking (SN), one with tips for use of protective drinking behaviors (INFO), one that combined the messages contained in the SN and INFO cards (COMB), and a control card with a generic birthday greeting. Although some differences were evident when the assorted intervention cards were compared with one another, no significant differences emerged between the groups who received the control card and the various intervention cards on drinking or alcohol-related consequence measures.

Seven additional studies included an information/knowledge condition as a comparison group against which to evaluate other interventions ([Collins, Carey, & Sliwinski, 2002](#); [Keillor, Perkins, & Horan, 1999](#); [LaChance, 2004](#); [Murphy et al., 2001](#); [Neal & Carey, 2004](#); [Kypri et al., 2004](#); [Sharmer, 2001](#)), with none finding effects on drinking or consequences for the information condition. Despite lack of no-treatment control conditions in these studies, the consistency of findings suggests information-only techniques are not efficacious for changing drinking or problems.

Table 3  
Summary of methodologies and outcomes for studies included in the current review

Study	N (% of invited sample recruited) participants	Assessments (% retained from recruited sample)	Intervention conditions	Behavioral outcomes
Barnett et al. (2004, 2007- this volume)	227 (65) mandated students	Pre-test (100), 3 months (95), 12 months (95)	1. Alcohol 101 CD-ROM 2. Alcohol 101 CD-ROM+ booster 3. Motivational interview with personalized feedback (MIPF) 4. MIPF+ booster	Reductions in drinking days and heavy-drinking days at 3 months with no differential treatment effect. At 12 months, MIPF was associated with <i>increases</i> in drinking frequency, and Alcohol 101 was associated with <i>increases</i> in drinks per drinking day, relative to each other.
Borsari and Carey (2005)	64 (89) mandated students	Pre-test (100), 3 months (96), 6 months (84)	1. Motivational interview with personalized feedback (MIPF) 2. Multi-components skills intervention	Reductions in alcohol use from baseline to 6-month follow-up in both groups. Greater reductions in negative consequences in MIPF group.
Carey et al. (2006)	509 (81.70) college students	Pre-test (100), 1 month (97.84), 6 months (87.23), 12 months (77.80)	1. Timeline followback (TLFB) 2. TLFB+brief motivational intervention (TLFB+BMI) 3. TLFB+BMI+decisional balance (TLFB+BMI+DB) 4. BMI 5. BMI+DB 6. Assessment only control (AO)	Reductions in alcohol use from baseline to 1-month follow-up for TLFB and all four BMI conditions. Reductions in consequences in the four BMI conditions at 1-month follow-up. Reductions maintained for the BMI conditions at 12 months follow-up, but not the TLFB condition.
Chiauzzi et al. (2005)	265 (84) heavy-drinking college students, assigned to condition using urn randomization	Pre-test (100), 1 month (NR), 3 months (80)	1. Web-based motivational feedback intervention; <a href="http://MyStudentBody.com">MyStudentBody.com</a> (MSB) 2. Information only control web site; Alcohol and You	Reductions in peak drinks per drinking day and composite drinking index scores for MSB at 1 month (post-test); no differences between groups at 3-month follow-up. Reductions in consequences for women, but not men, in MSB.

Collins and Carey (2005)	131 (100) heavy-drinking college students	Pre-test (100), 2 weeks (98), 6 months (64)	<ol style="list-style-type: none"> <li>1. Individual guided decisional balance exercise</li> <li>2. Written DB exercise without in-person guidance</li> <li>3. Assessment only control</li> </ol>	No significant group differences on any drinking outcome (total number of drinks consumed, peak number of drinks consumed, number of heavy-drinking episodes).
Collins et al. (2002)	100 (90) heavy-drinking students	Pre-test (95), 6 weeks (94), 6 months (65)	<ol style="list-style-type: none"> <li>1. Mailed motivational feedback (MF)</li> <li>2. Brochure with alcohol information</li> </ol>	Significant reductions in drinks per heaviest drinking week and frequency of heavy-drinking episodes at 6-week follow-up (trend at 6-month follow-up) in MF.
Corbin et al. (2001)	87 (NR) college students	Pre-test (NR), 2 weeks (71.3)	<ol style="list-style-type: none"> <li>1. Expectancy challenge (no beverage administration)</li> <li>2. Assessment only control</li> </ol>	No reductions in alcohol consumption in either group with some indications of <i>increases</i> in drinking (non-significant for a 3-way interaction).
Donohue et al. (2004)	113 (NR) college students	Pre-test (100), 1 month (92)	<ol style="list-style-type: none"> <li>1. Alcohol 101 CD-ROM</li> <li>2. Cognitive-behavioral skills training</li> </ol>	Reductions in drinking in both groups. Greater reductions in quantity and frequency of consumption by high-risk students in skills training group.
Fromme and Corbin (2004)	452 community (NR) and 124 mandated (52) college students, randomly assigned to condition and peer or professional provider	Pre-test (100), 4 weeks (73/85), 6 months (49/61)	<ol style="list-style-type: none"> <li>1. Peer-led multi-component skills group (Lifestyle Management Class; LMC)</li> <li>2. Professionally-led LMC</li> <li>3. Assessment only (wait-list) control</li> </ol>	Reductions in drinking after drinking in LMC group. Trend toward male mandated LMC participants having greater reductions in heavy drinking relative to females and wait-list participants.
Gregory (2001)*	71 (24) college athletes	Pre-test (100), post-test (79)	<ol style="list-style-type: none"> <li>1. 3-session BMI feedback/skills group</li> <li>2. 2-session BMI feedback/skills group</li> <li>3. Feedback/skills workbook</li> </ol>	Decreased alcohol-related problems in 2- and 3-session groups. No significant decreases in drinking.
Guarna (2000)*	67 (58) female heavy episodic drinkers, matched and randomly assigned	Pre-test (100), 1 week (100), 3 months (85)	<ol style="list-style-type: none"> <li>1. Drink/BAC monitoring skills group</li> <li>2. Basic alcohol knowledge/skills group</li> </ol>	No significant differences in alcohol use or negative consequences between groups at post-test or follow-up.

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Table 3 (continued)

Study	N (% of invited sample recruited) participants	Assessments (% retained from recruited sample)	Intervention conditions	Behavioral outcomes
Hunt (2004)*	158 (NR) male college students, randomly assigned by block of participants	Pre-test (100), 1 month (100)	1. Computer-based expectancy challenge with video and other interactive components 2. Non-interactive, didactic computer-based expectancy challenge 3. Attention control	Reductions in average drinks per day and mean drinks per drinking day in all groups. No effect of any group on number of heavy-drinking episodes. No changes in positive or arousing alcohol expectancies.
Keillor et al. (1999)	33 (100) male mandated students	Pre-test (93.9), 1 week (75.8), 3 weeks (NR)	1. Video-based expectancy challenge 2. Alcohol information	No significant differences on drinking variables between groups at post-test and no significant reductions in drinking from baseline to post-test in either group.
Kulick (2002)*	70 (NR) female college students of which 27 were COA; assignment based on COA status and participant's schedule	Pre-test (97.1), 4 weeks (NR), 6 weeks (77.1)	1. Social/sexual expectancy challenge 2. Cognitive/motor expectancy challenge 3. Assessment/attention control	Significant reductions in number of drinks consumed per week at follow-up in all three groups. No differential treatment effect.
Kypri et al. (2004)	104 (94) heavy drinkers	Pre-test (100), 6 weeks (80), 6 months (90)	1. Computer-generated personalized BMI feedback 2. Leaflet with alcohol information	Significantly lower total consumption, frequency of heavy consumption, and personal problems in feedback group at 6 weeks. Lower personal & academic problems at 6-months.
Labrie (2002)*	96 (NR) male volunteers who screened positive for frequent alcohol use and risky sexual behavior	Pre-test (100), post-test (100), 1 month (80)	1. Alcohol-reduction decisional balance 2. Condom-use decisional balance	Reductions in quantity and frequency of consumption at 1-month follow-up in alcohol-reduction decisional balance group.
LaChance (2004)*	225 (NR) mandated students	Pre-test (100), post-test (92), 3 months (80), 6 months (80)	1. Group motivational feedback (BMI) 2. Multi-component skills intervention 3. Alcohol information only	Decrease in problematic alcohol use in BMI group. Reductions in negative consequences in BMI and skills group.



LaForge, in Saunders et al. (2004)	1067 (77) heavy drinkers	Pre-test (100), 3 months (80), 6 months (80), 12 months (77)	1. Mailed personalized BMI feedback 2. Assessment only control	Significant reductions in high-risk drinking (composite variable) and consequences for women by 3 months, maintained throughout 12 months. No effects for men.
Larimer et al. (2007)	1488 (35) randomly selected students	Pre-test (100), 12 months (67)	1. Mailed personalized BASICS feedback and protective behavioral tips 2. Assessment only control	Significant reductions in alcohol use (composite) and likelihood of heavy drinking compared to controls, and increased likelihood of maintaining abstinence for baseline abstainers in feedback condition. No effect on consequences.
Lewis and Neighbors (2006)	185 (NR) high-risk drinkers	Pre-test (100), 1 month (89)	1. Gender neutral computerized personalized normative feedback (PNF) 2. Gender-specific PNF 3. Assessment only control	Both PNF conditions reduced drinking norms, overall alcohol use, typical weekly drinking and drinks per drinking occasion. Gender- specific PNF more efficacious for women higher in gender identity.
Lysaught et al. (2003)	60 (NR) college students	Pre-test (NR), 12 weeks (NR)	1. Pamphlet with personalized drinking information 2. Assessment only (wait-list) control	Reductions in number of drinks consumed per week in both groups; no significant differences between the two groups on any measure of drinking or negative consequences.
McCambridge and Strang (2004, 2005)	200 (NR) young adults (ages 16–20) who reported weekly use of marijuana or stimulants	Pre-test (100), 3 months (89.5), 12 months (81)	1. Single-session motivational interview (MI) focused on poly- substance use 2. Assessment only control	Reductions in drinks per week, frequency of cannabis use, and likelihood of smoking at 3-month follow-up in the MI group; however, these effects were not maintained at 12-month follow-up.
McNally and Palfai (2003)	76 (NR) college students	Pre-test (100), 4 weeks (100)	1. Motivational interviewing (MI) based on self-ideal discrepancy 2. Normative re-education (NRE) with alcohol information 3. Attention control	Reduction in frequency of heavy episodic alcohol consumption in NRE condition. Decrease in negative consequences in NRE condition and control. No decreases in drinking or consequences in MI group.
McNally et al. (2005)	73 (100) frequent heavy episodic drinkers	Pre-test (100), post-test (100), 6 weeks (100)	1. 30-minute BASICS motivational feedback BMI 2. Attention control	Main effect for time on drinks per week, heavy drinking, and alcohol problems. Significant group by time interactions on all three drinking outcomes favoring BMI.

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Table 3 (continued)

Study	N (% of invited sample recruited) participants	Assessments (% retained from recruited sample)	Intervention conditions	Behavioral outcomes
Murphy et al. (2004)	54 (81) heavy drinkers, stratified by gender and randomly assigned	Pre-test (100), 6 months (94)	1. BASICS interview 2. BASICS feedback without interview	Significant reductions in negative consequences and measures of alcohol consumption in both groups. Women showed greater reductions in drinking.
Murphy et al. (2001)	84 (85) heavy drinkers, stratified by gender and randomly assigned	Pre-test (100), 3 months (94), 9 months (94)	1. BASICS interview (BMI) 2. Alcohol information video/discussion 3. Assessment only control	No overall group differences. Heavier drinkers (median split) in BMI showed significantly greater reductions in weekly consumption and frequency of heavy episodic use at 3-month follow-up (trend at 9 months).
Musher-Eizenman and Kulick (2003)	46 (NR) female moderate to heavy drinkers	Pre-test (97.8), 4 weeks (87), 6 weeks (80.4)	1. Social/sexual expectancy challenge 2. Assessment/attention control	Significant reductions in number of drinks consumed per week at follow-up in both groups. No differential treatment effect.
Neal and Carey (2004)	92 (69) heavy-drinking students, stratified by gender	Pre-test (100), 3 weeks (99)	1. Personalized normative feedback 2. Modified values clarification 3. Informational pamphlet	No significant effects on drinking behavior in any group.
Neighbors et al. (2004)	252 (66) students	Pre-test (100), 3 months (79), 6 months (82)	1. Personalized normative feedback (PNF) 2. Assessment only control	Reductions in alcohol consumption in PNF group mediated by reductions in perception of drinking norms.
Neighbors et al. (2006)	214 (51) heavy-drinking students	Pre-test (100), 2 months (86.45)	1. Computer-based personalized normative feedback (PNF) 2. Assessment only control	Reductions in weekly drinking in PNF group mediated by reductions in perceived drinking norms. Reductions in negative consequences in PNF moderated by controlled orientation.
Neighbors et al. (2005)	164 (32.5) students about to celebrate their 21st birthday	1 week post-test only (100)	1. Birthday card encouraging moderation 2. Assessment only control	No differences in 21st birthday BAC between groups.

Palmer (2004)*	90 (53) mandated and 214 (58) high-risk volunteer students	Pre-test (100), 1 week (88 M, 70 V), 3 months (84 M, 80 V)	1. Mandated Alcohol Skills Training Program (ASTP) group 2. Voluntary ASTP group 3. Voluntary assessment only control	Reduced drinking and consequences for voluntary STP and control with no differential treatment effect. No changes in drinking or consequences in mandated ASTP condition overall. ASTP reduced peak drinking for mandated students lower in defensiveness.
Peeler et al. (2000)	262 (NR) college students, randomly assigned by class section	Pre-test (100), 6 weeks (61)	1. Self-management class (SMC) 2. SMC with norms challenging (NC)	No changes in drinking behavior in SMC or NC.
Sharmer (2001)	360 (100) students, randomly assigned by class	Pre-test (77.5), 4 weeks (82), 8 weeks (74), 12 weeks (69)	1. Alcohol 101 CD-ROM 2. Motivational speaker 3. Assessment only control	No significant difference between groups on post-intervention drinking at any follow-up.
Smith (2004)	774 (NR) freshmen, randomly assigned by class section	1 month (post-test only) (100)	1. Values clarification with alcohol information (SAP) 2. SAP with normative re-education	No significant difference between groups on alcohol consumption measures.
Smith et al. (2006)	444 (38.88) and 550 (61.38) college students	Post-test only (100)	1. B.R.A.D. card 2. Social norms (SN) card 3. Safe drinking tips (INFO) card 4. SN/INFO card 5. Control card	No significant difference between groups on alcohol consumption or negative consequence measures.
Stamper et al. (2004)	874 (62) freshmen, randomly assigned by class section	Pre-test (100), 1 month (100)	1. Values clarification with alcohol information (SAP) 2. SAP with normative re-education	No significant difference between groups on alcohol consumption measures.
Walters et al. (2007)	106 (100%) heavy-drinking freshman	Pretest (100%), 8 weeks (71.7%) 16 weeks (77.4%)	1. Web-based personalized normative feedback (PNF) 2. Waitlist control	Reductions in drinking quantity, peak BAC, and negative consequences in both groups at 8- and 16-weeks follow-up, with significantly greater drinking reductions in the PNF group at 8- weeks. No group differences in negative consequences.

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Table 3 (continued)

Study	N (% of invited sample recruited) participants	Assessments (% retained from recruited sample)	Intervention conditions	Behavioral outcomes
White et al. (2006)	235 (96) mandated students	Pre-test (100), 3 months (94.5)	1. In-person BASICS motivational feedback interview (BMI) 2. Written BASICS feedback only	Reductions in drinking quantity and heavy episodic drinking episodes, alcohol and drug consequences, and likelihood of smoking cigarettes or using marijuana in both conditions. No differences between written and in-person BMI feedback.
Wiers and Kummeling (2004)	25 (44.6) heavy-drinking college students	Pre-test (NR), 5 weeks (NR)	1. Social/sexual expectancy challenge 2. Assessment only control	Significant reductions in number of drinks per month at post-test in both groups. No differential treatment effect.
Wiers et al. (2005)	96 (NR) college students	Pre-test (95.8), 1 week (NR), 1 month (NR), 5 months (NR)	1. Expectancy challenge (EC) 2. Attention control	Reductions in consumption for men in the EC group at follow-up. No differential effect of the intervention for women.
Wood, in Wiers et al. (2003)	204 (NR) college students	Pre-test (NR), 1 month (NR), 3 months (72)	1. Expectancy challenge (EC) 2. Personalized feedback (PF) 3. EC+PF, counterbalanced 4. Assessment only control	Significant reductions in past 30-day consumption at 1 and 3 months in the EC condition. Significant 3-way interactions suggesting differential reductions in drinking for women and men at post-test and follow-up.

Asterisk (\*) indicates study is unpublished. "NR" denotes that the percentage was "not reported".

### 2.1.2. Values clarification programs

Three studies identified in the current review included values clarification in the comparison group (Neal & Carey, 2004; Smith, 2004; Stamper, Smith, Gant, & Bogle, 2004); however, none found any effects on behavioral outcomes.

### 2.1.3. Normative re-education programs

Four studies tested in-person normative re-education interventions. McNally and Palfai (2003) compared a group self-norm discrepancy condition (norms plus alcohol information; S-N) to a self-ideal discrepancy intervention (S-I) based on motivational interviewing and an attention control group (AC). The S-N group decreased frequency of heavy drinking compared to AC. Both S-N and AC groups decreased negative consequences, with no differences between groups. There were no changes in drinking or consequences in the S-I group. The study was limited by small sample size and short follow-up. Attrition was not reported.

Peeler, Far, Miller, and Brigham (2000) evaluated the efficacy of a 15-week self-management class with some alcohol focus compared to the self-management class plus a small group normative re-education component. Results indicate that neither group reduced on any indicator of alcohol use, and consequences were not assessed at follow-up. Greater reductions in perceived drinking norms and more moderate alcohol attitudes were found in the normative re-education group. The study had a large sample size at baseline, but was limited by high attrition and class-level random assignment leading to non-comparability between groups.

Smith (2004) and Stamper et al. (2004) compared a brief, interactive, values clarification program (SAP) to an enhanced condition with the same values clarification/information components plus normative re-education (PAN), in two studies. Using a post-test only design, Smith (2004) found no effects on drinking outcomes in either group, and negative consequences were not reported. PAN participants reported lower perceived norms than the SAP group. Stamper et al. (2004) found PAN reduced drinking frequency from pre- to post-assessment, with no decrease for SAP. However, due to lack of baseline group comparability this may represent regression to the mean. There were no other effects of either intervention on drinking. Again, participants in PAN reduced perceptions of the norms compared to SAP. Lack of information on baseline comparability in one study (Smith, 2004) and randomization at the class level leading to non-comparability in the other (Stamper et al., 2004), lack of a no-treatment control, and failure to report or account for attendance at the intervention class are limitations.

Four studies evaluated normative feedback as a stand-alone intervention Walters, Vader and Harris (2007) compared personalized normative feedback (PNF) delivered via the internet to a wait-list control. Participants in the PNF condition received feedback comparing their drinking to U.S. adult and college drinking norms immediately following completion of the baseline assessment via the electronic-Check-Up to Go (e-CHUG; <http://www.e-chug.com>) program. Results at 8-weeks follow-up indicated that PNF participants reported greater reductions in their peak BAC and number of drinks consumed per week than control participants, and drinking reductions were mediated by perceived norms estimates. However, group differences were no longer evident at 16-weeks follow-up, and PNF and control did not differ in terms of negative consequences at any time point. Large sample size was a strength of this study.

Neighbors, Larimer, and Lewis (2004) compared PNF, delivered by computer without any other feedback or in-person intervention, to assessment only (AO). Participants completed computerized baseline assessment, and PNF participants received immediate graphic PNF. PNF participants significantly reduced alcohol use and consequences (reported as a latent construct including quantity and frequency of drinking, peak consumption, and consequences) compared to control participants, as well as their perceptions of the norms for drinking. Changes in perceived norms mediated drinking reductions. In

Table 4

Comparison of studies reviewed by Larimer and Crounce (2002) and studies included in the current review

Prevention and treatment categories	Number of studies providing support/total studies	
	Larimer and Crounce (2002)	Current review
Education/awareness programs		
Information/knowledge programs	1/7	1/10
Values clarification programs	2/5	0/3
Normative re-education programs	1/2	6/8
Cognitive/behavioral skills-based programs		
Alcohol-specific skills		
Expectancy challenge interventions	2/3	2/7
Self-monitoring/self-assessment	3/3	1/1
Multi-component alcohol skills training	7/10	4/8
General life skills training/lifestyle balance	2/2	0/1
Motivational/feedback-based approaches		
Brief motivational interventions	8/8	10/14
Mailed or computerized motivational feedback	3/3	7/8
Intensive treatment and medication	1/1	0/0

Note: Ratio indicates the number of studies showing support for the efficacy of a given intervention in reducing relevant behavioral outcomes (e.g., quantity or frequency of alcohol consumption; alcohol-related negative consequences) out of the total number of studies including this type of intervention as an experimental or comparison group. As studies differ in their methodological quality, the limitations of these studies should be considered when evaluating the strength of the evidence in support of a particular intervention. The number of studies may exceed the number of references provided in Tables 2 and 3 as some authors reported more than one study in a given manuscript.

a second study, Neighbors, Lewis, Bergstrom, and Larimer (2006) found participants who received PNF reported reductions in total drinks per week at follow-up, and again reductions were mediated by changes in perceived descriptive norms. Further, individuals who were less self-determined (controlled orientation; Deci & Ryan, 1985a,b) reported greater reductions in negative consequences in the PNF condition compared to AO. Large sample size and good retention were strengths of both studies.

Lewis and Neighbors (2006) expanded on results of the prior studies by comparing gender-specific PNF (emphasizing norms for women or men depending on participants' gender) to gender neutral PNF (as utilized in prior studies) or AO. Results again indicated that PNF (neutral and specific) led to reductions in perceived norms, and to reductions in overall alcohol use, drinks per week and drinks per occasion. Changes in gender-specific normative perceptions mediated the effects of PNF on drinking outcomes for women, but not for men. Women higher in gender identity were more likely to change drinking after receiving gender-specific PNF. Low attrition was a strength of the study, whereas short-term follow-up was a limitation.

Taken together, findings indicate normative re-education interventions are efficacious in modifying both behavioral and attitudinal normative perceptions. Evidence is mixed regarding the impact of an in-person normative re-education component on drinking behavior or consequences. Interventions including PNF as a stand-alone intervention (Neighbors, Larimer et al., 2004; Neighbors et al., 2006) or encouraging participants to compare personal drinking to the norms (McNally & Palfai, 2003) have shown better efficacy than generic normative re-education content, and gender-specific normative feedback may be more efficacious for women, particularly those high in female gender identity (Lewis & Neighbors, 2006).

## 2.2. Cognitive/behavioral skills-based programs

### 2.2.1. Alcohol-specific skills

2.2.1.1. *Expectancy challenge interventions.* Seven new expectancy challenge studies were identified, most of which included a beverage administration component patterned after [Darkes and Goldman \(1993\)](#); i.e., experiential expectancy challenge [EEC]). [Musher-Eizenman and Kulick \(2003\)](#) compared an EEC intervention targeting social/sexual enhancement expectancies against an attention control group in female moderate to heavy drinkers. Both groups significantly reduced drinks per week, with no differential intervention effect. There were lower sexual enhancement and tension reduction expectancies in the intervention condition at post-test, but these differences were lost at follow-up. Very small sample size presented a limitation, but over 80% of the sample was retained.

[Wiers and Kummeling \(2004\)](#) compared a mixed-gender social/sexual EEC group to an AO control group. There were significant reductions in number of drinks per month and positive expectancies, and a significant increase in negative expectancies, in both groups. Positive expectancies for a low dose, but not a high dose, of alcohol significantly decreased in the EEC group relative to the AO group; however, no differential effects on drinking were evident. The study was limited by very small sample size. Also using a mixed-gender group, [Weirs, van de Luitgaarden, vand den Wildenberg, and Smulders \(2005\)](#) compared a one-session version of the three-session EEC utilized by [Darkes and Goldman \(1993\)](#) to attention control. Weekly drinking and heavy episodic drinking were reduced for men in EEC. Women in both conditions reported a significant decrease in weekly drinking, with no changes in heavy drinking in either group. Negative consequence outcomes were not reported. The intervention was effective in changing self-reported alcohol expectancies, but not latent drinking associations (as assessed by the Implicit Association Test; [Greenwald, Nosek & Banaji, 2003](#)). Changes in drinking were partially mediated by changes in arousal expectancies for men. Reductions in drinking for men should be interpreted with caution, as marginally ( $p = .05$ ) significant differences emerged only in week 3 (not in prior or subsequent weeks) and may be a chance fluctuation. Failure to correct for multiple comparisons when setting the experiment-wise alpha level presents a limitation.

Wood (in [Wiers et al., 2003](#)) compared a two-session EEC to AO control. Individuals in EEC reported lower levels of consumption at follow-up relative to AO. Women in EEC reduced overall consumption and typical weekly use more in the short-term, with larger effects for men emerging later. No effects on alcohol expectancies were evident on two explicit expectancy measures; however, scores on a new expectancy challenge process measure predicted consumption at 3 months and partially mediated intervention effects on this outcome.

[Keillor et al. \(1999\)](#) assigned male disciplinary-referred students to view a video (VEC) showing other students undergo an EEC (as opposed to actually serving beverages to participants) or to attend the university's standard alcohol information (AI) course. Both VEC and AI procedures were delivered in two 90-minute sessions. There were no differences in follow-up drinking between groups and no reductions in drinking over time in either condition. The AI group increased in alcohol knowledge, but no group differences were found for alcohol expectancies. Group differences may have been obscured by the very small sample size.

[Hunt \(2004\)](#) assigned participants from three sites in blocks by date of participation to one of three conditions: an interactive expectancy challenge (EC) presentation with video and didactic components designed to be highly engaging, a purely didactic EC condition (without video or interactive components), and an attention control (didactic EC format focusing on safe driving practices rather than

alcohol). Participants in all groups reduced average drinks per day and mean drinks per drinking day from baseline to follow-up, with no differences across interventions. No effect was evident on proportion of heavy-drinking days or on positive/arousing expectancies. Unfortunately, drinking data from national and local holidays (including spring and summer break) were excluded from analyses, which could have profoundly influenced results.

Corbin, McNair, and Carter (2001) compared an EC group that relied solely on group discussion of expectancies without beverage administration to an AO control group. Participants in the EC group reported significant reductions in global positive, sexual, social and personality expectancies; however, reductions in alcohol consumption were not evident. Although not statistically significant, there was a trend for a time by condition by gender interaction. Female participants in the expectancy challenge intervention condition appeared to have a greater *increase* in average weekly consumption during the three weeks of the study (intervention week inclusive), and male participants in the intervention condition had a smaller *increase* in consumption, compared to same-sex controls. Small sample size was a limitation.

Taken as a whole, these studies suggest that EEC interventions are associated with reductions in drinking for men, but corresponding effects for women have only been demonstrated in a single study (Wood, in Wiers et al., 2003). EC interventions without an experiential component have not had beneficial effects on drinking, and one study noted iatrogenic effects of didactic EC for women (Corbin et al., 2001). Several studies suffer from significant methodological limitations, thus it would appear premature to conclude this strategy is efficacious for men only.

*2.2.1.2. Self-monitoring/self-assessment.* Carey, Carey, Maisto, and Henson (2006) compared six groups, three of which received a timeline followback (TLFB; Sobell & Sobell, 1996) interview alone or in combination with a basic brief motivational intervention (BMI) or a BMI enhanced with a decisional balance (DB) component. Compared to an AO control group, participants who received the TLFB without BMI demonstrated reductions in drinks per week and per drinking day, peak BAC, and heavy-drinking frequency at 1-month follow-up. No differences between TLFB and AO were evident for alcohol-related consequences, and differences on drinking outcomes were no longer present at 12-month follow-up. TLFB did not appear to increase efficacy of BMI when the two interventions were combined. Retention and long-term follow-up were the strengths of the study.

### *2.2.2. Multi-component alcohol skills training*

Eight studies evaluating 10 multi-component skills interventions were identified as part of this review. Sharmer (2001) evaluated Alcohol 101 (Reis, Riley, Lokman, & Baer, 2001), an interactive computerized skills intervention, compared to a motivational speaker and an AO control condition. There were no significant differences in drinking or consequences between groups at any follow-up. Attrition was a limitation.

Donohue, Allen, Maurer, Ozols, and DeStefano (2004) also evaluated Alcohol 101 compared to a cognitive-behavioral skills intervention involving consideration of personally relevant negative consequences and modeling of drink refusal skills. Both groups reported comparable reductions in drinks per occasion, with no overall significant difference. However, high-risk students in the skills intervention reduced drinks and drinking days per month significantly more than Alcohol 101 participants, though Alcohol 101 was rated more favorably. The study was limited by lack of a no-treatment control group to evaluate overall efficacy.



Barnett et al. (2004, 2007-this volume) compared Alcohol 101 to a BMI feedback interview for students mandated to intervention due to a policy violation or alcohol-related medical emergency. Participants in both conditions reduced drinking frequency and heavy-drinking days at 3 months, with no differences between groups. At 12 months, Alcohol 101 participants reported *increases* in drinks per drinking day over time and relative to BMI, however BMI participants reported *increases* in drinking frequency relative to Alcohol 101 participants. Both groups reported increases in motivation to change immediately post-intervention, and decreased perceptions of peer drinking at 3 and 12 months. There were no changes in consequences over time. Large sample and low attrition were the strengths of the study, whereas lack of a wait-list or AO control condition was a weakness.

Borsari and Carey (2005) compared a one-on-one multi-component skills session including presentation of information regarding alcohol and tips for reducing alcohol-related harm to a BMI session including similar content but with personalized feedback and MI strategies with mandated students. Both conditions reduced the number of heavy drinking episodes from baseline to follow-up with a trend toward reduced peak BAC as well, but BMI participants had significantly larger reductions in negative consequences than skills participants. The study was limited by small sample size and lack of an AO or wait-list control group.

Fromme and Corbin (2004) evaluated a multi-component skills training class incorporating both lifestyle and alcohol-specific skills training (Lifestyle Management Class; LMC) against a wait-list control. Participants (mandated and voluntary mixed-risk students) were assigned to receive the LMC from a trained peer or a professional. LMC participants reduced driving after drinking compared to controls, and voluntary LMC participants higher in readiness to change reduced heavy drinking relative to controls and those lower in readiness. There was a trend toward mandated LMC males showing greater reductions in heavy drinking relative to females and wait-list controls. Study strengths include large sample size and long-term follow-up in the voluntary sample. A weakness is short-term follow-up of the mandated wait-list sample.

LaChance (2004) compared a 6-hour multi-component skills workshop (FAC), a 3-hour group BMI condition (including personal feedback, alcohol skills, and risk-reduction information), and a 3-hour didactic alcohol information (AI) lecture in a sample of mandated students. Participants in both the FAC and BMI groups significantly reduced negative consequences of drinking in comparison to the AI condition. However, BMI produced significantly greater reductions in hazardous drinking in comparison to both FAC and AI conditions. BMI produced greater increases in drink refusal self-efficacy, which partially mediated outcomes.

Guarna (2000) compared a skills intervention (i.e., monitoring drinking, attending to amount consumed, BAC estimation, limit-setting, and risk-reduction) to a comparison intervention also involving skills components (i.e., watching alcohol-related movies, discussion of alcohol's biphasic effects, and generating and discussing risk-reduction strategies). There were no differences in drinking or consequences between groups at follow-up. Data were not analyzed longitudinally, and follow-up was conducted in summer when students may reduce drinking without intervention. Small sample size and lack of an AO control group are also limitations.

Finally, Palmer (2004) assigned high-risk volunteer students to a 2-session group Alcohol Skills Training Program (VASTP) or AO control (VAO), and also compared VASTP participants to mandated students required to receive ASTP (MASTP). Participants in all groups reported increases in readiness to change at 3-month follow-up. Both VASTP and VAO reduced peak drinking, total drinks per week, and negative consequences over time, with no differences between groups. MASTP participants reported no

changes in drinking or consequences over time. However, defensiveness moderated these results, with MASTP participants lower in baseline defensiveness reporting significant reductions in peak drinks per occasion compared to those high in defensiveness. Mandated students drank less at baseline than did high-risk volunteers, making direct comparisons difficult. Absence of a wait-list or no-treatment comparison group for mandated students is also a limitation.

Taken as a whole, research on multi-component skills interventions continues to provide support for this approach, though the evidence is less strong than in our prior review (Larimer & Crounce, 2002). Consistent with our prior review, the current studies suggest that multi-component skills interventions are more efficacious than educational interventions alone (LaChance, 2004) and than assessment only for mandated and voluntary samples (Fromme & Corbin, 2004).

### 2.2.3. *General life skills training/lifestyle balance*

As described above, Peeler et al. (2000) compared a general life skills intervention to an enhanced intervention with a norms-challenging component and found no reductions in drinking or consequences over time.

## 2.3. *Motivational/feedback-based approaches*

### 2.3.1. *Brief motivational interventions*

Three studies reviewed above compared multi-component skills interventions to individual or group BMI. Two (LaChance, 2004; Borsari & Carey, 2005) found BMI was superior to skills on at least one outcome, whereas Barnett et al. (2004, 2007-this volume) found contradictory findings, with initial reductions in drinking followed by Alcohol 101 CD-ROM *increasing* quantity per occasion and BMI *increasing* frequency of drinking by 12 months. BMI participants were more likely to pursue additional counseling at 3 months and used more protective behavioral strategies at both follow-ups relative to Alcohol 101. Help-seeking and protective strategies mediated the effects of the BMI intervention on drinking quantity per occasion.

One additional study reviewed above (McNally & Palfai, 2003) found motivational interviewing (MI) without personalized feedback was not as efficacious as a normative re-education intervention or attention control in changing drinking or negative consequences. In contrast, McNally, Palfai, and Kahler (2005) compared a 30-minute individual motivational feedback intervention, modified from the BASICS (Dimeff, Baer, Kivlahan, & Marlatt, 1999) curriculum, to attention control for frequent heavy episodic drinkers. Results indicated reductions in average drinks per week, heavy-drinking episodes, and negative consequences for the BMI intervention as compared to controls. BMI was also associated with increased self-ideal drinking discrepancy and increased cognitive dissonance immediately post-intervention, but neither of these mediated the intervention effect. The study is limited by relatively small sample size and short-term follow-up.

McCambridge and Strang (2004, 2005) assigned illicit drug-using students to receive either individual MI or AO control. The MI focused on poly-substance use. Results indicated reductions in drinks per week, frequency of cannabis use, and likelihood of smoking at 3-month follow-up in the MI group compared to controls; however, these effects were not maintained at 12-month follow-up. Large sample size, good retention, and long-term follow-up are strengths of the study, whereas failure to control for experiment-wise error rate and failure of cluster randomization to yield comparable groups at baseline are limitations.

Using a high-risk sample, Collins and Carey (2005) compared an individual guided decisional balance (DB) exercise to a written DB exercise without in-person guidance and AO. There were no significant

differences in outcome between groups, and no significant drinking reductions over time. The study was limited by small sample size and high attrition. As indicated, Carey et al. (2006) replicated and extended this research by evaluating additive effects of an individual BMI with or without the addition of a TLFB interview and a DB exercise. Results indicated BMI with or without TLFB was efficacious in reducing drinks per week and per drinking day, peak BAC, heavy-drinking frequency, and negative consequences at 1-month follow-up as compared to AO and TLFB only, with effects maintained through 12 months. However, DB did not enhance the efficacy of the BMI; results suggested addition of DB to BMI had iatrogenic effects in comparison to BMI alone. In contrast, Labrie (2002) found support for individual DB interventions targeting either alcohol use or high-risk sexual behavior among male volunteers. Participants at-risk for alcohol use and risky sexual behavior were randomly assigned to an alcohol-reduction DB or a condom-use DB. Participants generated pros and cons for changing or remaining the same, were prompted for pros and cons not spontaneously mentioned, and pros of change rated as most important were discussed using MI strategies. The alcohol but not the condom intervention increased readiness to change drinking, decreased intentions to drink heavily, and reduced drinking quantity and frequency in the 30 days post-intervention. Results suggest the effect of each intervention was specific to the behavior targeted and not the result of assessment reactivity or maturation. The study was limited by small sample size and short-term follow-up.

Gregory (2001) tested a 3-session BMI and skills group, including personalized feedback on alcohol use, norms, and consequences, as well as skills for reducing risks, against a 2-session BMI and skills intervention with less focus on skills content, and a workbook containing the same skills information and feedback without in-person interaction. Both BMI skills groups reported reduced harmful consequences of drinking in comparison to the workbook only, with no changes in drinking in any of the groups. The 3-session group resulted in decreases in perceived norms for drinking and positive alcohol outcome expectancies compared to the workbook and two-session feedback conditions. This research was limited by low participation, high attrition, lack of AO control group, and apparent failure of randomization.

Murphy et al. (2001) assigned heavy drinkers to a 50-minute individual BASICS (Dimeff et al., 1999) interview, an educational intervention (AI; a video+20 min of individual discussion of generic alcohol information), or AO control. There was no overall reduction in drinking or consequences; however, heavier drinkers (upper 50%) in BASICS significantly reduced drinks per week and frequency of heavy episodic drinking compared to AO and AI. The study was limited by small sample size, particularly within the subgroup of heavy drinkers. Murphy et al. (2004) extended these findings by assigning heavy drinkers to a 30–50-minute in-person BASICS interview or written BASICS feedback alone. Participants in both groups significantly reduced drinks per week, frequency of drinking and heavy drinking, and negative consequences, with no differences between groups. Women reported greater decreases in drinking than men. Retention was excellent, however small sample size and lack of an AO control group are limitations. Similarly, White et al. (2006) randomized mandated students to a 2-session BMI patterned after BASICS (Dimeff et al., 1999), or written BASICS feedback only. Both groups reported comparable reductions in the number of drinks consumed, peak BAC, frequency of drinking and heavy drinking, marijuana use, and cigarette use, with no differences between groups. Large sample size is a strength of the study, whereas lack of an AO or wait-list control group is a limitation.

Finally, Neal and Carey (2004) assigned heavy drinkers to receive alcohol information (didactic lecture and pamphlet on alcohol's physiological effects), a BMI feedback session (including normative feedback, negative consequences, and alcohol information), or a "personal strivings" condition (feedback regarding individual goals and alcohol's effects on those goals, similar to values clarification).

There were no effects on drinking in any condition at 3-weeks follow-up, though there were greater normative discrepancy ratings and increased intention to change in the MI condition. Short-term follow-up is a limitation.

### 2.3.2. *Mailed or computerized motivational feedback*

Eight new studies of mailed, written, or computerized motivational feedback were identified in this review. Two of these studies were previously described (Murphy et al., 2004; White et al., 2006). As noted above, they found comparable reductions in drinking and consequences between in-person and written feedback.

Collins et al. (2002) compared mailed motivational feedback to an educational brochure about alcohol's effects. Feedback participants significantly reduced drinks per heaviest drinking week and frequency of heavy episodic drinking at 6 weeks in comparison to education participants, but this effect was no longer significant at 6 months. There was no effect on negative consequences of drinking. The study was limited by attrition and small sample size, as well as lack of an AO control condition.

Chiauszi, Green, Lord, Thum, and Goldstein (2005) assigned students to a web-based motivational feedback condition (MyStudentBody.com; MSB) or an information-only control web site (Alcohol and You; AAY). The interventions were delivered over 4 weekly 20-minute sessions. MSB was associated with reduced peak drinks per drinking day and composite drinking index scores compared to AAY at post-test, but by 3-month follow-up there were no differences between groups. Women in MSB reported reduced negative consequences, whereas men did not.

Kypri et al. (2004) assigned hazardous drinkers in a University Health Center to receive an informational leaflet or computerized assessment with personalized MI feedback. Feedback participants significantly reduced total consumption, heavy drinking episodes, and personal consequences relative to controls at 6-weeks. By 6 months consumption differences were no longer evident, but both personal and academic consequences were reduced in the feedback group relative to controls. Kypri and McAnally (2005) attempted to replicate and extend these findings, utilizing a primary care feedback (FB) intervention, which included information on fruit and vegetable consumption, physical activity, and hazardous drinking, compared to repeated AO and minimal assessment (MA; post-test only) control groups. Fruit and vegetable consumption and exercise were improved in the FB group relative to MA but not AO, with no differences in hazardous drinking rates across the three groups. Good retention was a strength of this study, whereas relatively short-term follow-up (6 weeks) was a limitation.

Laforge (in Saunders, Kypri, Walters, Laforge, & Larimer, 2004) reports preliminary results of a large study comparing personalized feedback reports by mail to an AO control condition. Women in the feedback group reduced drinking (reported as a composite of "binge" drinking frequency, drinks per drinking day, and peak consumption) and negative consequences relative to controls, and these changes persisted through 12 months. There were no effects for men in this sample. Large sample size and long-term follow-up were strengths of the study.

Larimer et al. (2007) assigned students to receive mailed BASICS feedback (MBASICS) and risk-reduction tips, or to AO. Results indicated MBASICS was associated with reduced heavy-drinking episodes and reduced weekly drinking in comparison to AO, as well as increased maintenance of abstinence among students not drinking at baseline. There were no effects on consequences. Use of behavioral risk-reduction strategies mediated efficacy of the intervention. Large sample size and long-term follow-up are strengths of the study; attrition and low recruitment are limitations.

Taken as a whole, the results continue to provide support for BMI for college drinking. Given strong support for this approach, researchers have begun to evaluate individual intervention components as well as implementation of these interventions in group, mailed, and on-line formats. The current review suggests that these interventions may be most useful when personalized feedback is included as a component; in particular, when personalized *normative* feedback, BAC skills training, and protective behavioral strategies are incorporated. Group interventions incorporating these elements have also shown evidence of efficacy (LaChance, 2004). Decisional balance exercises alone or with other BMI components have received mixed support suggesting the need to proceed with caution (Carey et al., 2006; Labrie, 2002), and MI style without personalized feedback was not efficacious in one study (McNally & Palfai, 2003). Research continues to support mailed or computerized motivational feedback in the absence of any in-person intervention. Three studies (Chiauzzi et al., 2005; Laforge, in Saunders et al., 2004; Murphy et al., 2004) suggest that feedback may be more efficacious for women than men.

### 3. Intervening with high-risk sub-populations

Recent research has begun to address the extent to which individual intervention effects are generalizable to different high-risk populations. The evidence in support of interventions described above as applied to specific high-risk populations of students is summarized below.

#### 3.1. Children of alcoholics (COAs)

Kulick (2002)<sup>1</sup> found reduced drinking in both expectancy challenge (EC) and control groups (AC) for COA and non-COA women, but no differences between EC and AC. As all participants completed daily drinking diaries during the intervention, it is possible that drinking changes resulted from this specific skills intervention (self-monitoring).

#### 3.2. Fraternity/sorority members

Several studies in the current review (Collins et al., 2002; Murphy et al., 2004, 2001) found no differences in response of Greek and non-Greek members to skills-based, normative re-education, or BMI/feedback interventions, suggesting members of these organizations are similarly responsive to these interventions despite being at higher-risk and drinking more than other college students.

#### 3.3. Athletes

Gregory (2001) found that a 3-session MI feedback plus skills group and a 2-session feedback group both led to reductions in use and consequences compared to a workbook with the same content, with some results favoring the 3-session intervention. Thus, athletes appear responsive to similar approaches as the broader population, though intervention recruitment is a problem for athletes.

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<sup>1</sup> Primary outcomes of one of the interventions evaluated by Kulick (2002) have been published (see Musher-Eizenman and Kulick (2003) in Section 2.2.1.1 *Expectancy challenge interventions*). Analyses based on COA status are only available in the unpublished dissertation (Kulick, 2002). As both manuscripts are reporting on the same study, the same limitations apply.

### 3.4. Freshmen students

Numerous studies with primarily or entirely freshmen samples (Barnett et al., 2004; Carey et al., 2006; Collins et al., 2002; Donohue et al., 2004; LaForge, in Saunders et al., 2004; Larimer et al., 2007; McNally & Palfai, 2003; Murphy et al., 2004; Murphy et al., 2001; Neal and Carey, 2004; Neighbors, Larimer et al., 2004; Neighbors et al., 2006; Palmer, 2004; Smith, 2004; Stamper et al., 2004; Walters et al., 2007) support the efficacy of BMI, feedback alone (BMI and/or normative feedback), and skills interventions within this group.

### 3.5. Mandated students

Seven studies of mandated populations were reviewed. Results are encouraging: four multi-component skills and five BMI/feedback interventions were associated with reduced alcohol use or negative consequences (Barnett et al., 2004, 2007-this volume; Borsari & Carey, 2005; Fromme & Corbin, 2004; LaChance, 2004; White et al., 2006), whereas an EC intervention (Keillor et al., 1999) and one skills intervention (Palmer, 2004) were not associated with drinking reductions (though Palmer found mandated students lower in defensiveness did reduce drinking following intervention). Several studies involved small samples and high attrition. In addition, while ethical difficulties with AO control groups for mandated samples are noted, many studies lacked a wait-list condition and most utilized active comparison groups (often with content overlap), making it difficult to evaluate intervention effects distinct from effects of the sanction itself on suppressing drinking in this population. Nonetheless, research generally supports application of Tier I interventions (NIAAA, 2002) to this population.

## 4. Identification, referral, and recruitment strategies

In addition to determining the efficacy of preventive efforts, it is important to consider how best to identify students in need of prevention services, encourage access to services, and retain students in services. Early research suggested that students were uninterested in alcohol prevention, and those most in need of such services were least likely to access them (Black & Coster, 1996). More recently, research indicates alcohol use is positively correlated with interest in participating in alcohol prevention studies (Neighbors, Palmer et al., 2004), with drinkers more interested than non-drinkers, and at-risk drinkers more interested than light drinkers. However, this relation is quadratic rather than linear; individuals who exceeded seven to nine drinks per drinking occasion were somewhat less likely to participate than those who drank less. These findings provide encouragement for prevention efforts, as students who are at-risk, but not the heaviest drinkers, account for the largest proportion of alcohol-related harm on campus. However, they do suggest the need to improve methods of identifying, referring, and recruiting the heaviest drinkers into prevention and intervention programs. Recommendations and guidance for this vexing problem based on recent research are provided below.

### 4.1. Marketing and outreach efforts

Palmer, Kilmer, and Larimer (2006) found that students report significantly greater interest in attending an alcohol prevention program when food (pizza and soda), a convenient location, and for heavier drinkers, an informational message regarding how they could benefit, were advertised. These findings suggest that marketing of prevention services can impact interest even among heavy drinkers.

#### 4.2. Use of standardized screening instruments

A survey of 234 college health centers across the nation (Foote, Wilkens, & Vavagiakis, 2004) revealed only a minority (32.5%) of centers routinely screened for alcohol problems. Approximately 96% of individuals who sought services at these centers were reportedly screened. By comparison, the 67.5% of centers that reported they did not regularly screen for alcohol problems reported that on average only 10.4% of patients were screened during their visit. Perhaps most disconcerting was that less than 12% of centers reported using standardized screening measures, and the majority of these (70.4%) used the CAGE (Ewing, 1984), a measure repeatedly found to be unsuitable for this population due to inadequate sensitivity stemming from over-emphasis on more severe, chronic problems (Larimer and Crouce, 2002).

Recent efforts have been made to validate brief screening measures for college populations to identify individuals likely to meet criteria for an alcohol use disorder (e.g., the CUGE [Aertgeerts et al., 2000; Van Den Bruel, Aertgeerts, Hoppenbrouwers, Roelants, & Buntinx, 2004]; the Alcohol Use Disorders Identification Test [AUDIT; Aertgeerts et al., 2000; Kelly, Donovan, Chung, Cook, & Delbridge, 2004; Kokotailo et al., 2004]), identify individuals who are engaging in frequent and/or heavy episodic consumption (e.g., NIAAA questions assessing typical and episodic drinking patterns over the past 12 months; NIAAA, 2003), or describe the extent and nature of alcohol-related consequences experienced by the individual (e.g., the College Alcohol Problem Scale — Revised [CAPS-r; Maddock, Laforge, Rossi, & O'Hare, 2001]; the Young Adult Alcohol Consequences Questionnaire [YAACQ; Read, Kahler, Strong, & Colder, 2006]); however, more research is needed to establish the gender, ethnic and racial parity of these measures and their respective thresholds (e.g., West & Graham, 2001).

#### 4.3. Health center and emergency room screening

Although prior research has shown college health centers and emergency rooms to be efficacious venues for screening and intervention, as reported by Foote et al. (2004), this is not yet a common practice. Kypri et al. (2004) reported computerized screening and feedback in a college health center led to reduced drinking, but a replication study failed to find efficacy of this approach when combined with other health feedback (Kypri & McAnally, 2005).

#### 4.4. Peer training for identification, referral, and provision of services

The use of student peers to provide alcohol prevention services has been suggested to reduce costs of disseminating interventions outside the research context. Prior research (Larimer et al., 2001; O'Leary et al., 2002) suggests the effectiveness of peer providers may be moderated by the gender of the intervention recipient; however, Fromme and Corbin (2004) found peers were equally effective in producing behavior change in mandated and voluntary samples for both men and women. One additional study in this review found a peer-delivered BMI intervention was efficacious (Donohue et al., 2004).

#### 4.5. Police/judicial referrals

Although evidence is emerging to support BMI and skills interventions for judicially mandated students, additional research regarding effectiveness of mandates compared to marketing and outreach for

encouraging entry and retention and improving outcomes is needed. One study (Palmer, 2004) found that screening in psychology classes yielded significantly more heavy-drinking students than were obtained through disciplinary referrals. Mandated students had higher intervention completion rates than volunteers, but were higher in defensiveness upon intervention entry, and defensiveness moderated effects of the intervention for these students.

## 5. Conclusion and summary of research priorities

In the past seven years, considerable new research on individual-focused interventions for college drinking has emerged. Consistent with recommendations of Larimer and Crouce (2002) and the NIAAA Task Force report (NIAAA, 2002), the majority of studies tested modifications of Tier I interventions (Saltz, 2004/2005). Much of the research continues to suffer from methodological limitations, including low response rates, small samples, high attrition, lack of appropriate control conditions, short follow-up periods, and failure of randomization to produce equivalent groups, which should be considered when drawing conclusions. Conclusions of the current review mirror many of those drawn from our earlier paper (Larimer & Crouce, 2002), with modest, yet important, revisions.

As with our prior review, no evidence emerged in support of information/knowledge interventions alone. Further, three interventions based on values clarification or “personal strivings” in conjunction with alcohol information found no effects on drinking or consequences, consistent with the previous conclusion that this approach had limited impact on drinking.

Considerable interest in normative re-education programs, including individual and small group interventions, has emerged recently. In the current review, findings consistently indicated that normative re-education interventions produced changes in perceived drinking norms, and inclusion of personalized normative feedback (PNF) (computer-administered or in-person) also produced reductions in drinking and/or consequences, which were mediated by changes in normative perceptions. Interventions without PNF had less evidence of efficacy in reducing drinking.

Research continues to support the efficacy of skills-based interventions, including self-monitoring/self-assessment and multi-component skills interventions, though evidence was more mixed than in our prior review. Additionally, research continues to strongly support brief motivational interventions (BMI) with personalized feedback, delivered individually, in groups, or as stand-alone feedback with no in-person contact. In studies comparing BMI to skills-based interventions, some evidence suggests that BMI is more efficacious on at least some outcomes (Borsari & Carey, 2005; LaChance, 2004), but these findings are not consistent across all studies (Barnett et al., 2004, 2007-this volume), and the two appear comparable on most outcomes. Similarly, research comparing in-person to written BMI feedback suggests the two show comparable effects (Murphy et al., 2004; White et al., 2006), but one study found two in-person group MI and skills interventions were more efficacious than a workbook with feedback (Gregory, 2001). None of these studies included AO or wait-list controls and several involved small samples. Thus, more research is needed to determine if and when in-person intervention is necessary, and to evaluate the relative efficacy of skills versus BMI approaches. Studies that evaluate mediators and moderators of efficacy for these Tier I interventions, and disentangle the effects of their various components, are also high priorities in order to continue to improve outcomes. The current review found gender moderated efficacy in some studies (with women more responsive) but not in others. Drinker status was also not a consistent moderator of efficacy, suggesting more research is needed to evaluate under what conditions interventions work better for different types of individuals.



There also remains a need for additional methodologically sound research (using true random assignment, larger sample sizes, and comparison to wait-list, assessment only, and/or minimal assessment controls) evaluating several intervention strategies for students including in-person normative re-education interventions, and BAC training. In addition, research on expectancy challenge interventions continues to be needed. Despite recent studies of this procedure, most have suffered from methodological challenges, and have failed to replicate prior positive findings (especially with women). There remains a need for high-quality research evaluating the original EEC protocol (Darkes & Goldman, 1993, 1998) over longer follow-up periods, for both women and men, and comparing didactic and experiential methods. Further, no studies in the current review evaluated intensive treatment or medication for students, which leaves an important gap in the literature regarding the continuum of care for this population.

Perhaps the most significant addition to the literature since our prior review is the increase in research with mandated students. Though still preliminary, research is encouraging regarding the efficacy of BMI and skills-based interventions in reducing drinking and consequences in this population. However, additional research with mandated students is needed, using strong research designs and large sample sizes. In particular, research is needed that helps to disentangle the effects of the disciplinary sanction from effects of post-sanction interventions on drinking outcomes. Further, research is needed to address intervention efficacy in other at-risk populations, including athletes, COAs, and members of fraternities and sororities. Nonetheless, existing research suggests these populations are responsive to the same types of interventions as are other students. Considerable research indicates that freshmen students are responsive to a wide variety of interventions, suggesting implementation of brief interventions with entering freshmen may be particularly efficacious in reducing overall drinking on campus. In addition to research on intervention efficacy, more research is needed evaluating methods for implementing and disseminating interventions, including research on marketing, outreach, routine screening, peer delivery of services, and judicial referral. Given consistent evidence in support of BMI and skills interventions, research is now needed on best practices for training individuals to provide these interventions. Finally, research on the optimal combinations of individual interventions and environmental strategies is also needed (Toomey et al., 2007).

As with our prior review, evidence suggests campuses interested in implementing individual-focused prevention programs should consider BMI or skills-based programs, preferably incorporating PNF, BAC training, and protective behavioral strategies for risk-reduction, as well other personalized feedback components. In-person implementation of these interventions may not be necessary. Rather, the use of electronic screening and provision of brief mailed or computerized feedback may be a useful first step, followed by in-person intervention. These interventions could be implemented within high-risk groups, and integrated into other opportunistic points of contact such as health or counseling center visits. The use of trained student peers to implement in-person interventions continues to be supported (Fromme & Corbin, 2004). Campuses may also consider offering screening and brief intervention as a voluntary procedure, as research indicates with careful marketing of such services heavy-drinking students will be interested in participating (Palmer et al., 2006). Offering food, beverages, or other low-cost incentives may also be helpful in encouraging individuals to access these opportunities.

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