The Relationship Between Collaboration Readiness and Scientific Productivity in the Transdisciplinary Research on Energetics and Cancer (TREC) Centers

Brooke Stipelman[1], Annie Feng[2], Kara Hall[1], Dan Stokols[3], Richard Moser[1], Nathan Berger[4], Michael Goran[5], Robert Jeffery[6], Anne McTiernan[7], Mark Thornquist[7], Linda Nebeling[1], Amanda Vogel[1]

[1]Division of Cancer Control and Population Sciences, National Cancer Institute; [2] SAIC, Frederick, [3]University of California, Irvine; [4]Case Western Reserve University; [5]University of Southern California; [6]University of Minnesota; Fred Hutchinson Cancer Research Center

Introduction

In recent decades there has been growing interest in the use of transdisciplinary (TD) research teams to facilitate scientific advances in health outcomes, practice, and policy. As investments in team science have grown, the importance of evaluating the scientific and societal outcomes of these TD research teams has increased. Moreover, there is a need to better understand the individual level characteristics and team processes that ultimately influence these outcomes. The TREC centers are an initiative funded by NCI to promote TD collaborations in research on energy balance and cancer. As part of an ongoing effort to evaluate the processes and outcomes associated with conducting TD research, TREC members completed a baseline survey which assessed a number of factors believed to be associated with collaboration readiness (i.e., antecedent conditions that exert a disproportionately strong influence on the success of a TD collaboration). These findings were then linked to basic bibliometric data to examine the relationship between baseline measures of collaboration readiness and subsequent research productivity and collaboration.

Research Questions

• Are baseline measures of collaboration readiness associated with greater research productivity and collaborative efforts among TREC investigators?

• Are there specific aspects of collaboration readiness that are particularly influential in predicting research productivity and collaborative efforts among TREC investigators ?

Method

Sample
47 TREC members who completed a baseline survey at the start of the initiative and remained a part of a TREC center for at least 2 years.

Measures
TREC Baseline Survey
• The TREC baseline survey was a self-report questionnaire that consisted of a number of subscales designed to measure aspects of collaboration readiness. All scales were scored on a 0 to 5 point scale.
   - Research Orientation Scale (ROS)
   - Institutional Resources Scale
   - Collaborative Productivity Scale:
   - General Collaborative Activities Scale:
   - Perceived Interpersonal Collaboration Scale

• The survey was administered to all TREC participants during the first 6 months of the initiative.

Bibliometric Data
• Information regarding number of publications, presentations and coauthors was pulled from a list compiled by the TREC Coordination Center that records all publications and presentations directly supported by TREC funds and those stimulated by TREC funds. Publications included those submitted, in revisions, in press, and published.

Results

Table 1: Means and Standard Deviations of Collaborative Factor Scales and Publication Outcomes

Variable	Mean	SD
ROS Scale		
Unidisciplinary	2.19	.80
Multidisciplinary	4.51	.61
Institutional Resources	4.16	.64
Interpersonal Collaboration	4.32	.67
Collaborative Productivity	4.27	.71
General Collaborative Activities	4.97	.86
Total # of Publications (per investigator)	7.94	12.70
Total # of Presentations (per investigator)	7.64	10.87
Average # of Publication Coauthors (per investigator)	6.9	3.0

Results

Table 2: Correlations between Collaborative Factors and Publication Outcomes

	Total # of Pubs	Average # of Co-Authors	Total # of Pres	General Collab Activities	Institution Resources	Inter Collab	ROS Factor1 (Uni)	ROS Factor2 (Multi)
Total # of Pubs	---	.059	**.710****	.132	-.149	**.323***	-.143	.134
Average # of Co-Authors	---	---	.013	-.038	-.096	**-.370***	.000	-.062
Total # of Pres	---	---	---	.173	.011	**.303***	**-.322***	**.333***
General Collaborative Activities	---	---	----	---	.044	.182	-.353*	**.518****
Institutional Resources	---	---	---	---	---	**.497****	-.076	**.358****
Interpersonal Collaboration	---	---	---	---	---	---	-.073	.222
ROS Factor1 (Uni)	---	---	---	---	---	---	---	**-.340****
ROS Factor2 (Multi)	---	---	---	---	---	---	---	---

*p< .05 ** p < .01

Results

Table 3: Linear Regression of Collaborative Factors as Predictors of Publication Outcomes

Independent	Dependent	Parameter Estimate	StdErr	ProbChiSq
ROS Scale 1	Total Pubs	-0.23	0.24	0.336
	AvCoPub	0.00	0.09	1.000
	Total Pres	-0.51	0.28	0.070
ROS Scale 2	Total Pubs	0.38	0.38	0.317
	AvCoPub	-0.05	0.14	0.705
	Total Pres	1.37	0.49	**0.006**
Perceived Interpersonal Collaboration	Total Pubs	1.17	0.35	**0.001**
	AvCoPub	-0.34	0.15	**0.020**
	Total Pres	0.75	0.35	**0.033**
TREC Collaborative Activities	Total Pubs	0.28	0.28	0.315
	AvCoPub	-0.02	0.09	0.823
	Total Pres	0.40	0.36	0.257
Institutional Resources	Total Pres	-0.49	0.39	0.209
	AvCoPub	-0.08	0.13	0.557
	Total Pres	0.03	0.44	0.948

Conclusions

• Regression analysis shows perceived interpersonal collaboration at baseline was significantly related to increased number of publications, number of presentations, and average number of publication co-authors. Results remained significant after controlling for gender, professional rank, and discipline.

   - Suggest early perception of interpersonal processes (e.g., trust, cohesion, communication) play an important role in predicting the productivity of a center.

• The Mulitdisciplinary ROS Factor at baseline was significantly related to total number of presentations. Findings remained significant after controlling for gender, professional rank, and discipline.

   - Findings suggest that early intrapersonal characteristics such as the propensity to endorse multidisciplinary values and behaviors are predictive of at least one type of research productivity.

• Measures of contextual-environmental conditions (i.e., Institutional Resources, Collaborative Productivity, and General Collaborative Activities) were not significantly related to research productivity.

   - Mean scores on these subscales were fairly high (4.16-4.97 out of 5) suggesting that TREC participants feel they have adequate resources activities in place to conduct their research.

   - The lack of variability within these scales may have precluded our ability to find differences.

• Future studies should include larger sample size, measures at multiple time points in the collaboration, a more refined measure of contextual-environmental conditions, a more conservative estimate of productivity (e.g., published manuscripts only), and assessment of productivity at later stages in the funding cycle.