

Running title: Setting the stage

The Behavior Change Consortium:
Setting the Stage for a New Century of Health Behavior Change Research

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Abstract

The Behavior Change Consortium (BCC), a collective of 15 NIH-funded behavior change projects, was conceived with the goal of evaluating the efficacy and effectiveness of novel ways of intervening in diverse populations to reduce tobacco dependence, and improve physical activity, nutrition, and other health behaviors. The purpose of this article is to provide a general introduction and context to this theme issue by: 1) reviewing the promises and challenges of past efforts related to promoting change for three key health behaviors; 2) reviewing successful intervention strategies and principles of health behavior change; 3) discussing major theoretical approaches for obtaining successful behavior change; 4) setting BCC activities within the context of recent recommendations for the behavioral and social sciences; and 5) providing an organizational framework for describing each of the projects within this consortium. In addition to the rich database on behavioral outcomes for tobacco dependence, physical activity, and diet, the BCC represents a unique opportunity to share data and address cross cutting intervention research issues critical for strengthening the field of behavior change research.

Introduction

In the late 1970s, the Surgeon General's Report, "Healthy People" (U.S. Department of Health and Human Services (DHHS), 1979), focused national attention on the relationship between health and behavior by documenting the extent to which lifestyle contributed to chronic disease outcomes in the United States. Since then, health professionals and the general public have become increasingly aware of the role behavior plays in promotion of health and the prevention of disease and disability (Hamburg *et al.*, 1982; McGiniss and Foege, 1993; Smedley and Syme, 2000).

Over the past two decades efforts have focused on identifying various modifiable risk factors that impact health behaviors, and setting up national targets for improving the overall health of Americans (DHHS, 2000). As a result, improvements in health and longevity for Americans have been noted (Manton, 1997; Manton and XiLiang, 2001; Smedley and Syme, 2000). One recent report on six health behaviors found that even minimal intervention strategies addressing tobacco use, alcohol and other drugs abuse, unhealthy diet, sedentary lifestyle, and risky sexual practices could produce clinically significant changes at the population level (Orleans *et al.*, 1999). Still, the need remains to go beyond epidemiological studies that simply link health and behavior. Given that only a small percentage of national health objectives have been fully met (DHHS, 2000), future efforts must focus on understanding the vast range of factors affecting various lifestyle choices, finding better ways to implement strategies that encourage health promoting behaviors, and reducing health-impairing activities and environments.

The Behavior Change Consortium (BCC), a collective of 15 NIH-funded behavior change grant projects (see summary Table 1) with support from the American Heart

Association and the Robert Wood Johnson Foundation (RWJF), started in 1999 with the intent of evaluating the efficacy and effectiveness of novel ways of intervening in diverse populations to reduce tobacco dependence, and improve key health behaviors (NIH, 1999). The BCC also strives to advance the existing health-related behavior change literature by furthering an appreciation of cross-cutting intervention research issues. Each article that follows describes the nature and magnitude of the particular problem(s) being addressed by one BCC project, reviews that study's goals and treatment setting, and discusses the decision-making process undertaken before selecting specific theories and intervention strategies. The manuscripts also discuss how theories of choice have been translated into testable interventions, and provide logic models of hypothesized intervention effects.

The purpose of this article is to provide a general introduction and context to this theme issue by: 1) reviewing the promises and challenges of past efforts related to promoting change for three key health behaviors; 2) introducing successful intervention strategies and principles of health behavior change; 3) discussing major theoretical approaches for obtaining successful behavior change; 4) setting BCC activities within the context of recent recommendations for the behavioral and social sciences; and 5) providing an organizational framework for describing each of the projects within this consortium.

Key Health Behaviors: Opportunities and Challenges*

* Some material is drawn from materials prepared for an Invitational Workshop on "Maintaining Healthy LifeStyles: A Lifetime of Choices."

Tobacco Dependence

Background: Cigarette smoking is the leading cause of preventable death in the United States (CDC, 1997). Although, smoking prevalence rates among adults have declined since the beginning of the 20th Century, there has been a recent leveling of this trend. Before World War 1, 60% of Americans smoked; by the mid-1960's, fewer than 30% were smoking; and by the mid-1990's fewer than 25% of the adult population were smokers. Smoking rates also decrease with age, with less than 15% of those 65 and older using tobacco products. Furthermore, more than 40 million Americans have succeeded in quitting smoking cigarettes. Currently, 46.5 million adult Americans smoke cigarettes.

Recent successes: Many effective smoking cessation approaches, policies and resources are available to help those interested in quitting. Also there is a rapidly emerging consensus on the necessary and key elements of successful programs.

Shortfalls: In the U.S. alone, tobacco-related disease results in more than 440,000 deaths annually, representing over 5.6 million years' potential life lost and health-related economic losses of about \$157 billion a year (CDC, 2002). Although overall smoking rates have gone down over the past century, recent increases among youth, and females in general, are of particular concern. Furthermore, while older people are less likely to smoke, those who do face substantial problems quitting. Despite efforts that have been made to decrease smoking rates over the past several decades, a number of threats to eliminating tobacco dependence remain. These include skillful marketing campaigns produced by tobacco companies; media glamorization of smoking to young people; lack of consistent government policy on tobacco regulation; behavior change programs that fail to meet the needs of the individual's stage of readiness; a dearth of programs that

extend beyond individual level interventions and focus on environment; and poor incentives for healthcare professionals to provide preventive counseling.

Opportunities: Effective smoking cessation approaches are not being implemented. The challenge is to get recommendations, such as those provided by the Tobacco Use and Dependence Clinical Practice Guideline Panel (2000), put into practice, especially within primary care settings. Implementation requires clinician training, institutional changes to support the delivery of smoking cessation interventions, and reimbursement for counseling and pharmacotherapy. Smoking cessation programs that take into account ethnic, gender, and age-specific differences in smoking behaviors are also needed, as well as more aggressive youth smoking prevention programs and policies.

The BCC Approach: Of the five sites focusing on tobacco dependence within the BCC, there is no clear consensus of theoretical approach. This will provide interesting comparative data at follow-up when we examine the effectiveness of various theory-based interventions. Commonalities are found in the utilization of “home” as an intervention setting, and belief in the importance of self-efficacy as a mediating variable. The vast majority of sites targeting tobacco dependence have taken a multi-risk approach, partnering with nutrition/diet behaviors, in part because these same research projects are focusing on specialized populations with co-morbidity, such as high-cholesterol levels, heart disease, or obesity. In an effort to capitalize on the similarities among these projects, supplementary funds are being used to spearhead multi-site activities and analyses geared toward understanding intervention effects on smoking behaviors.

Nutrition/Diet

Background: Although malnutrition is not a major health problem for most Americans, dietary factors are associated with four of the 10 leading causes of death, with obesity strongly linked to conditions such as heart disease, diabetes, and certain cancers.

Recent successes: There has been a reduction in the percent calories from fat in the American diet. For example, average daily consumption of vegetables, fruits and grain products has increased over the past decade, although current public health goals for these areas remain unmet. Concerted public health programs have been successful in changing dietary behaviors. In the past decade, there has been an increase in the reporting of nutritional information and a greater availability of healthful food choices in supermarkets and restaurants. Additionally, the prevalence of overweight decreases with advancing age among people 55 years and older, with White women being least likely to be overweight.

Shortfalls: There has been an alarming increase in obesity rates, with over 50% of middle-aged and older Americans now characterized as overweight. Obesity is especially acute in poor, underserved and minority populations. The intake of fat grams per day has not changed: however, percent calories from fat decreased because Americans are eating 250-300 calories more per day, much of it from carbohydrates, especially refined sugars. Several threats to good nutrition can be identified, including widely available great-tasting but unhealthy foods at low cost, market competition resulting in larger portions, and billions of advertising dollars targeting children and families.

Opportunities: While there have been some improvements in dietary behaviors, the majority of Americans do not meet the nation's dietary guidelines. Strategies for

establishing healthy dietary behaviors must start in childhood and continue through old age. Programs linking strategies for promoting good dietary habits and increased physical activity need to be developed and tested, especially in healthcare settings. There also needs to be further testing of clinical interventions for obesity that combine nutritional and physical activity counseling with emerging pharmacotherapeutic agents.

The BCC Approach: The 10 sites focused on a nutrition/dietary intervention (either reduction in dietary fat or increased intake of fruits and vegetables) are relatively diverse in their approaches. At least 12 theoretical models are being utilized, of which the five most common are motivational interviewing (Miller and Rollnick, 1993), self-determination theory (Deci and Ryan, 1980), social cognitive/learning theory (Bandura, 1986), social ecological theory (Bronfenbrenner, 1979), and transtheoretical model (Prochaska and Velicer, 1997). Despite this theoretical diversity, common mediating variables for dietary behaviors include decisional balance, group cohesion, outcome expectations, self-efficacy, social norms, and social support. Additional similarities can be found at the level of intervention setting, with clinic- and home-based approaches being the most frequently employed. Without fail, BCC sites addressing nutrition have adopted a multibehavioral approach to behavior change, the vast majority of which are also attempting to increase physical activity/exercise in one or more comparison group.

Physical Activity/Exercise

Background: There has been a shift away from an exclusive emphasis on intensive aerobic exercise toward the recognition of the health benefits from a wider range of moderate intensity physical activity, including lifestyle activities that are more

feasible to sustain. In fact, at least two-thirds of the able-bodied older population reports exercising at least once a week.

Recent successes: In recent years, there have been several successful intervention programs that have increased various types of exercise without increasing pain or discomfort for middle-aged and older Americans (CDC, 2001). More attention is currently being paid to multilevel determinants of physical activity behaviors in adults, with RWJF supporting a coalition of community and professional organizations to bring together behavioral, environmental and policy strategies to increase physical activity among adults age 50 and older (RWJF, 2001).

Shortfalls: Only 27% of adolescents meet national objectives of engaging in 30 minutes or more of moderate physical activity most days of the week (CDC, 2001). Similarly, fewer than one in four adults engage in regular physical activity at levels recommended by the Surgeon General's report on physical activity and health (DHHS, 1996, 2000), and older adults are especially unlikely to meet the public health goals for sustained activity. Environmental and sociocultural threats to physically active lifestyles include barriers related to environmental design and safety issues; fewer physical education classes for children and adolescents; legal barriers preventing after school use of recreational facilities; and the increased popularity of sedentary activities, such as watching television or spending time on the computer.

Opportunities: The challenge here is to design programs, services and environments that allow Americans to sustain more physically active lifestyles. This includes the need to extend the reach of current interventions by bringing programs to underserved populations, and making environmental changes that will reduce barriers to

sustained physical activity. There is also a call to increase the delivery of physical activity counseling by primary care providers and to test interventions that address barriers to the delivery of preventive counseling in primary care settings.

The BCC Approach: Similar to those sites addressing nutrition behaviors, the 12 sites focused on physical activity/exercise have several diverse theoretical approaches, although the five most popular are motivational interviewing, self-determination theory, social cognitive/learning theory, social ecological theory, and transtheoretical model. The mediating variables most common to these research projects are identical to those common for nutrition interventions, with the addition of processes of change as a mediating mechanism for physical activity/exercise. There is clear agreement on the need for intervention at several levels, including community, home, and clinic. In addition, the vast majority of sites have opted for a multibehavioral approach to behavior change by including nutrition as an intervention focus, including three sites that have included multiple measures for assessing physical activity in older adults.

Identifying Successful Intervention Strategies

Theory-based interventions that have been developed and evaluated in the health promotion field typically have been aimed at a single level of impact (e.g., personal or interpersonal, organizational or institutional, environmental, or policy/legislative). Despite acknowledgment of the contextual importance of the environmental or policy, or admonishments about “blaming the victim,” most health-related interventions to-date are aimed downstream at the personal or interpersonal level (McKinlay, 1995). Improving the success of health behavior change programs requires the development of more

powerful, scientifically based behavior change strategies, along with broad dissemination of effective interventions that currently exist (Orleans *et al.*, 1999). Fortunately, there is a growing consensus about successful intervention strategies and principles of health behavior and behavior change. These include guidelines formulated by the Canyon Ranch Expert Panel, entitled *Maintaining Healthy Lifestyles* (International Longevity Center-USA, 2000), many of which are exemplified by one or more of the 15 BCC research projects.

Successful intervention strategies

1. Successful intervention strategies include the use of self-regulatory skill training (e.g., goal setting, self-monitoring, use of feedback and social support, relapse prevention or preparation training), with ongoing social support and guidance from a trained interventionist.
 - The Community Health Advice by Telephone Project (Stanford Center for Research in Disease Prevention; A. King, *et al.*, 2002) examines how mode of delivery affects long-term adherence to social-cognitive support strategies.
 - The Illinois Institute of Technology (Sher *et al.*, 2002) combines attempts to reduce cardiac risk by optimizing the social support and motivational opportunities available through couples in long-term relationships.
 - The PAQS Project (Miriam Hospital/Brown University; Borrelli *et al.*, 2002) compares an intervention based on the behavioral action model to one based on the precaution adoption model.
2. Worksite interventions involving combinations of competition, individual and group goal-setting, and management support can help change health behaviors.

- The PHLAME project (Oregon Health Sciences University; Moe *et al.*, 2002) compares a team-based social learning intervention with an individual-level approach using motivational interviewing.
3. Primary care physicians and nurse-care managers can deliver more effective behavior change strategies for helping patients quit smoking, increase physical activity, or change their diets.
 - One BCC study (University of Rochester; Williams *et al.*, 2002) requires that counselors and physicians use principles of self-determination theory in their smoking cessation and diet interventions.
 4. Interventions involving point-of-choice information have a positive effect in three health behavior areas (i.e., smoking, nutrition, and physical activity).
 - The Healthy Youth Places Project (Kansas State University; Dzewaltowski *et al.*, 2002) includes a multilevel intervention with several environmental change teams aiming to create attractive school lunch options and after-school physical activity programs.
 5. Policy/legislative level of impact strategies aimed at deterring cigarette smoking have met with success. Such policies include smoke-free building and transportation regulations, and statewide increases in cigarette taxation.
 - In addition to KSU (see above), at least two other BCC projects are encouraging changes in policy at various levels as part of their diet and physical activity interventions: Oregon Research Institute (Toobert *et al.*, 2002), and the Harvard School of Public Health (Peterson *et al.*, 2002). These projects are

implementing interventions based on applications of social ecological theory in school, community, or clinic settings.

Emphases for a New Century of Behavior Change Research

A paradigm shift in behavior change research has taken place in recent years; one that promises a better approach to health promotion. Two major reports—one commissioned by the Office of Behavioral and Social Research at the National Institutes of Health on *New Horizons in Health* (National Research Council, 2001) and a second produced by the Institute of Medicine on *Promoting Health: Intervention Strategies from Social and Behavioral Sciences* (Smedley and Syme, 2000)—arrive at remarkably similar conclusions about the best strategies for intervening in the lives of Americans to improve overall health and functioning. While public health advocates have long recognized the importance of the greater societal and environmental context (e.g., McLeroy *et al.*, 1988; Green and Keuter, 1991), the aforementioned reports emphasize a new way of thinking about a social-environmental approach to health and behavior health interventions. The ecological model for the 21st Century recognizes the wide range of influences on individuals and behaviors, and recognizes a multilevel approach to intervention that includes an integration of individual, community, organizational, and societal systems.

While some previous interventions have been successful in getting individuals to initiate positive health behaviors, successes have been modest and maintenance of intervention effects unlikely to sustain over time (International Longevity Center-USA, 2000; Glasgow *et al.*, 1999; King *et al.*, 1998; Rothman, 2000). Interventions that include a social-environmental approach are believed to be more sustainable and cost-effective

over the long-term (Orleans, 2000), and although community-level interventions are not usually as intense as individual interventions, they have the potential of reaching more people and thus having a greater impact on population health (Emmons, 2001). Still, it is important to remember that interventions must be multilevel, and that strategies to motivate behavior change and understand an individual's readiness to change must also be part of the total intervention armamentarium (Prochaska and Velicer, 1997).

Promoting Behavioral Health: The BCC Approach

The behavioral medicine perspective is also important for understanding the complex interactions among multiple behaviors, physiological and psychological mechanisms and health outcomes (Ory *et al.*, 1992). The BCC initiative recognized this new direction by calling for the testing of multiple intervention approaches, where research groups would test one preferred model of behavior change. Adherents of single theoretical approaches, such as Social Cognitive Theory, are further expanding their models to give weight to both individual and social influences (Bandura, 1977, 1997). For example, researchers at the University of Minnesota (C. King *et al.*, 2002) are evaluating two theory-based interventions derived from a social cognitive model, the Exercise Plus Program (University of Maryland; Resnick *et al.*, 2002) is evaluating the relative effectiveness of exercise training programs alone and those combined with behavior-based intervention strategies on self-efficacy and outcome expectations, and researchers at Cornell University (Charlson *et al.*, 2002) are employing concepts from behavioral economics with a behavioral psychology intervention.

A second BCC emphasis—intervening on multiple behaviors—promises to push the field in new directions. Instead of taking a disease focus, this initiative was predicated on physiological synergy of different behaviors, with a behavior such as exercise affecting an array of disease processes and outcomes such as cardiovascular disease, diabetes, arthritis, depression and so forth (RWJF, 2001). The SENIOR Project (University of Rhode Island; Clark *et al.*, 2002) tests the efficacy of single versus multiple health behavior interventions delivered community-wide to older adults utilizing a public health recruitment model with an individually tailored intervention approach.

Despite several decades of research, there is less clarity about the interrelationship among different health-related behaviors. The popular assumption that interventions directed at one behavior will extend to others has not been clearly substantiated. One of the greatest challenges in the health behavior field has been to understand on which behavior(s) to intervene and in what order—simultaneously or sequentially. A new paradigm in this arena is to let individuals choose the behavior they want to change (Dodge *et al.*, 2002). While these new insights are intended to improve the efficacy and effectiveness of intervention approaches, they offer challenges in the design and evaluation of intervention studies. The BCC has addressed some of these complex, cross-cutting issues, discussed in the summary article (Nigg *et al.*, 2002).

Common approaches across the BCC

Table 1 summarizes the 15 BCC projects. Two studies are focused on children or adolescents, 10 on adults, and four on older adults (N.B. one study includes both adults and children). This diversity in age groups is related to variations in entry health and functioning, and illustrates the need to tailor interventions by functional capacity,

personal preferences, and context of each population of interest. Project HOPE (University of Tennessee, Memphis; Coday *et al.*, 2002) targets the social environment of underserved inner-city communities in an effort to reduce sedentary behavior. These investigators have found special challenges met by others in recruiting hard-to-reach populations (Levkoff *et al.*, 2000). The Healthy Body/Healthy Spirit Project (Emory University, Resnicow *et al.*, 2002) provides the opportunity to explore the added benefit of developing culturally specific interventions delivered in a church-based setting.

BCC projects focus on either multiple behaviors or multiple theoretical approaches. Eleven focus on at least two behaviors, seven test at least two intervention strategies, and four examine both multiple behaviors and approaches, adding a degree of complexity not previously experienced by most investigators. BCC researchers at the University of Michigan are testing computer-based tailored feedback interventions that simultaneously impact multiple risk behaviors and utilize several theoretical approaches (Strecher *et al.*, 2002)—a perspective that dovetails one of the major premises from *New Horizons in Health* (NRC, 2001): There are multiple pathways to diverse outcomes.

One final way of grouping the different projects is by their predominant mediator variables. Although investigators may be intervening on different health-related behaviors and/or illnesses, there is some commonality in the mediators that are being targeted via different theory-based intervention approaches. We have broadly defined a mediator as any variable that can be said to account for the relation between the predictor and the outcome (i.e., mediators explain how external events take on internal psychological significance; Baron and Kenny, 1986). A cross-site review of constructs employed by the 15 projects suggests that a small number of mediators are being

consistently utilized. The most common mediators found across BCC studies are, in alphabetical order: 1) decisional balance (pros and cons); 2) goal-setting; 3) outcome expectations; 4) self-determination/autonomy; 5) (self-)efficacy; 6) social support; and 7) stress. While these findings reflect other theoretical considerations in the literature about variables that account for a large amount of variance throughout the behavior change process (Fishbein *et al.*, 2001), we have found an enormous amount of conceptual ambiguity and measurement variation across the mediators. For example, mediators with similar labels may be defined differently (e.g., self-efficacy as a psychological, social and behavioral construct), while very similar constructs may have variant labels (e.g., perceived stress and stress; autonomous motivation and self-determination). In recognition of the importance of better conceptual and methodological precision in furthering understanding of intervention processes and outcomes, members of the BCC are working to address these discrepancies in order to compare common theoretical constructs across projects.

In examining predominant approaches, we must report that the vast majority of these interventions are still at the individual or interpersonal level. There is, however, a growing appreciation of social and environmental barriers or facilitators that are discussed in the more individual-level problem solving self-management strategies, as evidenced by the number of mediator variables being utilized to that effect. Nevertheless, we also recognize that different theories are often best suited to different units of practice, be they individuals, groups, or organizations (Glanz and Maddock, 2000).

Discussion

Over the past two decades great strides have been made in identifying a host of modifiable public health risk factors. Of three major health-risk behaviors tobacco dependence, lack of physical activity, and poor diet—smoking cessation interventions have the longest history and are now the most likely to be multilevel in their approach. It is encouraging to note that national efforts in promoting physical activity are now pointing to the importance of combining individual and environmental approaches (International Longevity Center-USA, 2000; RWJF, 2001; Stewart, 2001). Similarly, some of the difficulties in conducting ecological research are being overcome by the introduction of new analytical methods and measurements (NRC, 2000; Yen, 1999).

In 1999, NIH recognized these new directions by calling for the testing of multiple intervention approaches that go beyond the more typical strategies. The 15 BCC projects are also confronting several common themes/issues that can inform the behavior change intervention process. These include, but are not limited to engaging and maintaining enrollment of participants; consistent delivery of interventions; translation of behavior change research into real-world settings; utilization of complex methodologies and emerging statistical applications; and consensus on behavioral outcomes that define success.

The BCC's emphasis on multi-level approaches to multiple behavior interventions promises to push the field in new directions. It also strives to advance the existing health-related behavior change literature by furthering an appreciation of cross-cutting intervention research issues. Collectively, the BCC represents a unique opportunity to set the tone for a new century of behavior change research.

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Table 1.1. Behavior Change Consortium Project Summary

Principal Investigator (Institution)	Submission Title	Primary Purpose	Target Population (N)	Intervention Setting^a	Behaviors^b	Theoretical Approach to Treatment/ Intervention^c	Mediating Variables^d
B. Borrelli, Ph.D. (Miriam Hospital/ Brown University)	Motivating Parents of Kids With Asthma to Quit Smoking	Increased smoking cessation among parents of children with asthma; improve asthma in the child	Smokers, who have children with asthma (288)	C	4	B,J	5,16,21
M. E. Charlson, M.D. (Cornell University)	Improving Health Behaviors and Outcomes After Angioplasty	Improved health behaviors and outcomes in coronary artery disease patients	Angioplasty patients, with or without stent (660)	B	1,3	E	22
P. G. Clark, Sc.D. (University of Rhode Island)	Stage-based Health Promotion With the Elderly (The SENIOR Project)	Increased physical activity and fruit & vegetable consumption in older adults	Seniors aged 65+ (1,300)	C	2,3	R	5,20,21
D. A. Dzewaltowski, Ph.D. (Kansas State University)	Youth Environments Promoting Nutrition and Activity	Increased physical activity and fruit and vegetables consumption in youth	Middle-school children (2,200; 16 schools)	D	1,2,3	M,N	8,9,10, 14,21,22
D. L. Elliot, M.D. (Oregon Health Sciences University)	Promoting Healthy Lifestyles: Alternative Models' Effects	Improved diet and physical activity in firefighters	Firefighters (600; 35 fire stations)	E	1,2,3,7	H,M,Q,R	3,8,14,20, 21,22,23
R. Garrison, Ph.D. (University of Tennessee, Memphis)	The Health Opportunities With Physical Exercise (HOPE) Trial	Increased physical activity in at-risk adults	Overweight, sedentary, low-SES adults (360)	A,B	3	L,M,O	5,18,21,23

Table 1.2. Behavior Change Consortium Project Summary (continued/...)

Principal Investigator (Institution)	Submission Title	Primary Purpose	Target Population (N)	Intervention Setting ^a	Behaviors ^b	Theoretical Approach to Treatment/ Intervention ^c	Mediating Variables ^d
T. Goldman Sher, Ph.D. (Illinois Institute of Technology)	A Couples Intervention for Cardiac Risk Reduction	Long-term adherence to physical activity, weight management and medication adherence regimens in cardiac patients	Cardiac patients and partners (160 couples)	B,C	1,2,3,6	C,K	5,23
R. W. Jeffrey, Ph.D. (University of Minnesota)	Theory-based Interventions for Smoking and Obesity	Long-term success in smoking cessation and weight loss	Adult smokers (600); Overweight adults (300)	C	4,7	G	14,19,26
A. C. King, Ph.D. (Stanford University)	Exercise Advice by Human or Computer: Testing Two Theories	Increased physical activity among middle- aged and older adults	Older adults aged 55+ (225)	C	3	K,O	3,5,6,12,14, 17,20,21,23
K. E. Peterson, Sc.D. (Harvard School of Public Health)	Reducing Disease Risk in Low-Income, Postpartum Women	Improved diet and physical activity in low- income, postpartum women	Low-income, minority, post- partum, females (700)	B,C	1,2,3	H,N	1,7,21,23
B. Resnick, Ph.D. (University of Maryland)	Testing the Exercise Plus Program Following Hip Fracture	Increased physical activity in female hip fracture patients	Women, post-hip fracture (240)	C	3	A,M	14,20,21
K. A. Resnicow, Ph.D. (Emory University)	Health Promotion Through Black Churches	Increased physical activity and fruit and vegetables consumption in African- American adults	African- American adults (1,000)	A	2,3	H	12,14,21

Table 1.3. Behavior Change Consortium Project Summary (continued/...)

Principal Investigator (Institution)	Submission Title	Primary Purpose	Target Population (N)	Intervention Setting ^a	Behaviors ^b	Theoretical Approach to Treatment/ Intervention ^c	Mediating Variables ^d
V. J. Strecher, Ph.D. (University of Michigan)	Tailored Interventions for Multiple Risk Behaviors	Increased smoking cessation rates, diet and physical activity in adults	Adults (2,700)	C	2,3,4	A,F,H,I,K,M,P,R	4,5,11,13, 21,23,24,26
D. J. Toobert, Ph.D. (Oregon Research Institute)	Enhancing Support for Women At Risk for Heart Disease	Reduced CHD risk in postmenopausal women with type 2 diabetes	Postmenopausal women with type 2 diabetes (250)	A	1,3,4,5,	M,N	1,8,17,18, 21,23,24
Geoffrey C. Williams, M.D., Ph.D. (University of Rochester)	Self-determination, Smoking, Diet, and Health	Decreased tobacco use and LDL cholesterol in adults smokers	Adult smokers (1,000)	B	1,4	K	3,15

Note. ^a **Intervention Setting:** A=community. B=health facility (e.g., clinic, hospital). C=home. D=school. E=workplace.

^b **Behaviors:** 1=dietary fat intake. 2=fruit and vegetable consumption (5-a-day). 3=physical activity/exercise. 4=smoking. 5=stress management. 6=medication adherence. 7=weight loss.

^c **Theoretical Approach:** A=Attribution Theory. B=Behavioral Action Model. C=Cognitive Behavioral Theory. D=Cognitive Evaluation Theory. E=Economic Model of Behavior Change. F=Health Belief Model. G=Model of Behavioral Initiation and Maintenance. H=Motivational Interviewing. I=Patient Empowerment Readiness Model. J=Precaution Adoption Process Model. K=Self-Determination Theory. L=Social Action Theory. M=Social Cognitive/Learning Theory. N=Social Ecological Theory. O=Social Influence Model. P=Solution-Focused Therapy. Q=Theory of Reasoned Action. R=Transtheoretical Model.

^d **Key Mediators:** 1=attendance/service utilization. 2=attributions. 3=autonomous motivation/self-determination. 4=cues to action. 5=decisional balance. 6=extrinsic motivation. 7=food insecurity. 8=group cohesion. 9=group efficacy. 10=group environment. 11=health risk behaviors. 12=intrinsic motivation. 13=motivation. 14=outcome expectations. 15=perceived competence. 16=perceived risk. 17=perceived stress. 18=problem solving. 19=process expectations. 20=processes of change. 21= self-efficacy. 22=social norms. 23=social support. 24=stress. 25=television viewing. 26=withdrawal symptoms.