

## Worksite-based research and initiatives to increase fruit and vegetable consumption

Glorian Sorensen, Ph.D., M.P.H.,<sup>a,b,\*</sup> Laura Linnan, Sc.D., C.H.E.S.,<sup>c</sup>  
and Mary Kay Hunt, R.D., M.P.H.<sup>a</sup>

<sup>a</sup>Center for Community-Based Research, Dana-Farber Cancer Institute, Boston, MA 02115, USA

<sup>b</sup>Department of Health and Social Behavior, Harvard School of Public Health, Boston, MA 02115, USA

<sup>c</sup>Department of Health Education and Health Behavior, University of North Carolina School of Public Health, Chapel Hill, NC 02115, USA

Available online 2 March 2004

### Abstract

**Background.** Worksite initiatives to promote increased consumption of fruits and vegetables include a wide range of programs. Some initiatives focus on the physical and informational environments, with the dual aim of increasing the availability of healthful food options and providing education and support through point-of-choice labeling and signage.

**Methods.** Authors reviewed recent literature on comprehensive worksite health promotion programs that have addressed some type of environmental/organizational intervention to increase fruit/vegetable consumption.

**Results.** This review revealed that environmental/organizational initiatives rely on management commitment, supervisory support, and supportive organizational structures to sustain policy efforts over time. Program effectiveness is enhanced when they are based on social ecological approaches; include worker participation in program planning and implementation (e.g. employee advisory boards and peer-delivered interventions); address multiple (vs. single) risk factors for change; and integrate workers' broader social context (e.g. families, neighborhoods, etc.).

**Conclusions.** Priorities for future worksite-based interventions include identifying and reducing barriers to organizational and environmental change, addressing social disparities in fruit and vegetable consumption, addressing social contextual factors driving behaviors, and building expanded networks of community partnerships. Future research is needed to identify key policy and program components that will yield meaningful increases in fruit and vegetable consumption; barriers/facilitators of organizational and environmental change within worksites; effective community-based participatory methods; and methods to disseminate cost-effective interventions for all worksites.

© 2004 The Institute For Cancer Prevention and Elsevier Inc. All rights reserved.

**Keywords:** Worksites; Environment; Nutrition

### Introduction

Increasingly, worksites have been a focal point for educational and environmental interventions to promote consumption of fruits and vegetables [1,2]. Worksites offer access to a large proportion of the adult population, serve as a vehicle for delivering interventions across multiple levels of influence including individual, interpersonal, and environmental or organizational and policy influences, and provide a

means of creating and maintaining social norms supportive for healthy eating. The possibility of reaching many persons, even when combined with small to modest intervention effects, can yield important public health benefits [3].

In this paper, we review worksite-based interventions, including environmental and policy approaches and comprehensive programs that address individual behavior change and change in the workplace environment and are designed to increase the consumption of fruits and vegetables. We focus on the published research available in the peer-reviewed literature. It is beyond the scope of this paper to provide an exhaustive review. Rather, we comment on studies that report findings from comprehensive worksite health promotion programs. Based on this overview, we

\* Corresponding author. Center for Community-Based Research, Dana-Farber Cancer Institute, 44 Binney Street, Boston, MA 02115. Fax: +1-617-632-1999.

E-mail address: [glorian\\_sorensen@dfci.harvard.edu](mailto:glorian_sorensen@dfci.harvard.edu) (G. Sorensen).

discuss priorities for designing workplace interventions and promising directions for future research.

### Environmental and policy initiatives

Glanz et al. [4] defined environmental and policy initiatives as those strategies that do not require individuals to self-select into defined educational programs. Within work-sites, these interventions include modifications in the physical, social, and information environments; organizational change and support; and interventions that recognize the neighborhood of the worksite as part of the workplace environment [5].

#### *Interventions targeting the physical and information environment*

Several studies published in the late 1980s and early 1990s reported the results of research focusing on the physical and information environment [4]. These studies tracked purchasing patterns using direct observation or cash register receipts to assess the impact of increasing the availability of on-site healthful food options, subsidized or free food options, and point-of-choice labeling and signage. For example, Jeffrey et al. [6] examined whether increasing the variety of offerings and reducing prices would increase the consumption of fruits and salads in a worksite cafeteria; fruit and salad purchases increased 3-fold during the intervention period compared to other time periods. Catering policies stating that healthful food options will be served at company functions have also been suggested as an important environmental change that worksites can implement to support healthy dietary patterns [2], although we are not aware of studies testing the efficacy of this approach. Overall, the studies of interventions targeting the physical and information environment have been limited by small sample sizes, non-randomized designs, and the dearth of effective measures of environmental policies [4].

#### *Organizational support and commitment*

The success of environmental and comprehensive interventions to promote fruit and vegetable consumption is dependent upon the organizational commitment and support provided for these initiatives. Management support at all levels of the organization has an impact on whether organizations will adopt programs that increase access to healthful foods [7]. The commitment of the worksite and its management to worker health may be reflected in the company's mission statement, the budget provided to support these initiatives, assignment of staff responsibility for program oversight and operation, or the involvement of workers in worksite wellness committees or employee advisory boards [8]. In programs that address nutrition endpoints such as

fruit and vegetable consumption, food service management support is critical to intervention implementation. Management support can also help increase worker participation in educational programs offered at work [9,10].

Often blue-collar workers are less likely than white-collar workers to have access to health promotion programs [11]. When programs are available, blue-collar workers may be less likely to participate due to a range of structural barriers. For example, supervisors function as gatekeepers controlling worker access to health promotion activities [7,12]. To keep production lines moving, supervisors may refuse to allow workers to attend programs on company time. Further barriers include working overtime, shift work, the need for child care, having a second job, car-pooling to work, long distances between the plant and the employee's home, and responsibilities at home [13]. As noted above, support and commitment from management representatives who place a high priority on comprehensive programs for worker health can help to reduce these structural barriers for blue-collar as well as white-collar workers. In addition, new intervention methods (e.g., web-based interventions or self-help or other off-work programs) may make it feasible to plan programs around worker schedules or bring educational programs to production and break areas to overcome these barriers.

Management support can also reinforce social norms supportive of healthful eating [14]. The management can reinforce healthy food-related social norms by providing healthful food choices in cafeterias, vending machines, and at company functions. Related organizational policies such as the structure of breaks (e.g., amount of time allowed, timing of breaks in the day, rules about accessing food during breaks) may also provide support for healthful eating at work.

#### *The influence of neighborhoods*

The worksite neighborhood and surrounding environment can provide important opportunities for influencing healthful eating at work. Specifically, the food shops, fast food outlets, restaurants, and grocery stores on or near the worksite grounds are likely to be accessed by workers before, during, and after work hours. Although we are unaware of any studies that have examined the influence of neighborhood surroundings on worker eating patterns, Oldenburg et al. [5] include an assessment of neighborhood factors in their Checklist of Health Promotion Environments at Worksites (CHEW). Similarly, in the Treatwell 5-a-Day intervention, project health educators provided health center staff with instructions on selecting foods from the menus of restaurants in the neighborhood [15]. Such settings may be important in terms of access to and cost of fruits and vegetables, the influence of competing options such as fast food or catering trucks with limited healthy food options, opportunities for edu-

cation regarding healthy food choices, and exposure to advertising.

### Comprehensive programs

Comprehensive approaches to worksite promotion of fruit and vegetable consumption may include the application of the social ecological model which serves as a framework for targeting interventions at multiple levels of influence, incorporating participatory strategies, placing behavioral interventions within the broader social context in which workers live and work, and addressing multiple risk-related behaviors. A coordinated and systematic intervention plan is an important element of any comprehensive worksite-based effort to increase fruit and vegetable intake.

#### *Application of a social ecological model*

This framework recognizes that behavior is affected by multiple levels of influence, including individual factors, interpersonal processes, institutional or organizational factors, community factors, and public policy [16,17]. Although limited, the worksite research testing this approach has produced promising results. For example, the Seattle 5-a-Day worksite study incorporated employee input using employee advisory boards and based their intervention strategy on an ecological framework that combined interventions both for individuals and the workplace environment [18]. They recruited 28 worksites with cafeterias and randomized worksites to intervention and minimal intervention control conditions. The intervention was based on sequencing of intervention strategies following a stage of change model with individuals as well as the information environment and changes in cafeteria food service. In worksites in the intervention condition, workers increased consumption of fruits and vegetables on average 0.3 servings per day more than in the minimal intervention control condition ( $P < 0.05$ ), based on assessments with a food frequency questionnaire. These results were supported by unobtrusive observation of food choices in the cafeterias.

#### *Participatory strategies*

Participatory strategies are a means of assuring that interventions within worksites include programs that address workers' needs, interests, and priorities by involving them in the process. The employee advisory boards used in the Seattle 5-a-Day study represent one method used to elicit worker participation in program planning and delivery. Such committees can become an established part of worksite operations [19,20] and thereby increase the likelihood that programs will be institutionalized at the end of the study period. Peer delivery is another method of worker involvement. The Arizona 5-a-Day study used peer educators to deliver interventions to blue-collar workers employed in

public sector worksites [21]. Using social network analyses, these investigators identified social networks within participating worksites and randomized these networks to intervention and minimal intervention control conditions. The intervention resulted in significant increases in servings of fruits and vegetables relative to changes seen in the control group (a difference of 0.46 servings, as measured by a food frequency questionnaire).

#### *Social context*

Worker dietary patterns are also influenced by the social contexts in which they live and work including the worksite culture, family influences, cultural norms, social supports, and the neighborhoods in which they live. An example of research in this area is the Treatwell 5-a-Day study, which randomized worksites to one of three conditions: a minimal intervention control condition; a worksite intervention that included a multilevel intervention guided by employee advisory boards; and a worksite-plus-family intervention, which added a family outreach component to the standard worksite intervention [15]. Increases in fruit and vegetable consumption were greatest in the worksite-plus-family condition, which was 0.5 serving per day greater than the control condition ( $P = 0.18$ ).

#### *Multiple risk factor interventions*

Increasingly, worksite health promotion studies have examined multiple health behaviors within a single intervention. By addressing multiple behaviors, it may be feasible to promote change in gateway behaviors; some research indicates, for example, that increases in physical activity may serve as a gateway to changes in other health behaviors [22]. Also, researchers have shown that addressing other worksite issues related to worker health, such as the potential for exposures to occupational hazards, maybe an important means of increasing worker participation in programs [23].

#### *Tailored interventions*

In their review of dietary interventions to prevent disease, Bowen and Beresford [24] found that in general, individual or group counseling delivered by health professionals resulted in greater levels of change than population-based strategies delivered through channels such as communities and worksites. One study tested the efficacy of seven one-to-one counseling sessions in the workplace and found significant positive change in energy expenditure, physical activity during sports, cardiorespiratory fitness, and percentage of body fat and blood cholesterol. This intervention, however, was delivered to only 131 workers [25]. Because of the many people in this country at risk for chronic disease, however, it is not likely that we will be able to reduce the national prevalence of chronic disease by con-

ducting one interpersonal encounter at a time. Rather, we must look for ways to increase the magnitude of the intervention effect using population-based strategies [3,26].

Computer-tailored interventions, which have been found to be more effective in changing health-related behaviors than non-tailored approaches [27–29], might make it possible to bring individualized counseling to many people through settings such as churches and worksites [24,30].

Tailored interventions typically use print communication [30], telephone counseling [31,32], or interactive communication technology [33–36] to enhance the relevance of interventions to the daily lives of participants. Data for tailoring interventions are collected from extensive written, telephone, or in-person questionnaires. They are algorithm-based and use expert systems or computer-based systems to match individual participant information needs or wants from the assessment questionnaire with specific messages held in a message “library”. These messages are developed to address variation in theory-linked constructs such as motivation levels (e.g., stage of readiness to change); self-efficacy to perform the behavior; or types or amounts of social support. Combining data from an individual’s assessment with appropriate messages and graphics offers the advantage of a personalized intervention for a specific individual in the absence of one-to-one counseling [3,37]. Additional research is needed to determine if the delivery of tailored health messages through community-based channels is both feasible and effective [24].

### Priorities for future interventions

Future worksite interventions aimed at using environmental and policy approaches to increase fruit and vegetable consumption can benefit from the lessons learned in studies conducted to date. It is important to identify and address barriers to and enhance facilitators of organizational and environmental changes within worksites. Strategies to assure management commitment to comprehensive programs need to be developed and refined for application in a range of settings. Understanding the role of multiple levels of management and how to mobilize them to support healthy food choices at work will enhance these strategies. Building a “business case” for adopting healthful food options at work is likely to contribute to eliciting such support. Creating effective partnerships between public and private groups, and nurturing those partnerships in ways that will enhance program interventions, will be critically important.

Understanding the careful balance among price, benefits, taste, and convenience and how these factors drive employee demand for healthful food choices must be addressed in future programs. Increasing the availability of good-tasting foods that are reasonably priced and convenient will require creative interventions that include a variety of new partners, such as labor, business, marketing interest groups, public health, and employer groups.

Future programs need to be based on an understanding of the changing work demographics and changing work environment to create new intervention strategies that take these realities into account. For example, we need to extend beyond the traditional model of the permanent employee in a stationary work setting to consider the work realities of mobile workers, such as construction laborers whose worksite may change from week to week, sales personnel who work from a home or company base but are on the road, transportation workers whose worksite is consistently on the move, and contingent workers such as contract and temporary workers. Addressing the needs of employees who work in small, blue-collar worksites is particularly important given the large proportion of workers employed by small worksites. In response to these changing demographics, promising directions for intervention methods include web-based interventions, increased availability of healthy food choices at work, and offering discounts to employees who purchase healthful foods at work or in neighboring stores or restaurants.

### Promising directions for future research

Research is needed to shed light on the mechanisms of organizational change, to understand processes that influence dietary change, and to identify intervention program components that contribute to these changes. Process evaluation is one method that can help clarify key components associated with effective interventions, help explain variability in results, and inform future efforts in similar areas [38–41]. Future environmental and organizational research needs to identify barriers to and facilitators of change within worksites. There is a need for designs that allow us to test the independent and combined effects of environmental and individual strategies for increasing fruit and vegetable intake, and to understand employee, worksite, and vendor needs.

In response to the call for assessment of environmental and organizational factors that support healthful behavior change [5,42], several instruments using measures of physical, social, and informational influences have been proposed and validated [5,43–45] and can now be used by researchers and practitioners. In the future, worksite health promotion would also benefit from research that combines interventions across settings (e.g., worksite plus family; worksite plus community), testing the independent and combined effects on the workers’ eating patterns. Also, we need to search for methods that encourage worker participation [46] and measures of participatory involvement [47], especially among ethnic minorities and blue-collar workers who have had limited access to health promotion programming [46]. We need to continue assessing the cost-effectiveness of various approaches in order for the research community to provide practitioners with effective interventions that are feasible in the real-world setting.

Furthermore, to help establish benchmarks for success, to facilitate monitoring of positive changes over time, and to report on achievements relative to the Healthy People 2010 Goals/Objectives for the nation, we believe that a national survey of worksites administered every several years is critically important. An ongoing synthesis of existing research is also needed to identify effective interventions that are both sustainable and ready for dissemination in the real-world setting.

Currently, investigators and funding agencies are calling for studies of the process of dissemination of tested interventions that have been found to be efficacious [3,48,49]. There are few reports of research related to the dissemination of successful programs, including fruit and vegetable and other nutrition programs, in the literature [50,51]. It is beyond the scope of this paper to review the dissemination of worksite interventions in depth; however, in terms of promising new directions for future research, it is significant to note that investigators suggest diffusion of innovations [52–55] and the RE-AIM framework [56–58] as useful theoretical foundations for studying dissemination. Below we summarize attributes of interventions that have been found to enhance the likelihood of dissemination and adoption [54,59–61] using worksite health promotion interventions as examples.

Interventions that are less complex and can be used without having to go through a major process of adaptation [54] and those that are compatible with existing practices and perceived as having a relative advantage to existing practices [54,62] are more likely to be adopted. Flexibility in program implementation [9,63] and having an opportunity to try a program before full-scale implementation also enhance the chance of workplace adoption [63,64]. Worksites most likely to adopt health promotion interventions have demonstrated an interest in employee health through such structures as identification of a program champion [63,65], the company's mission statement, allocation of funds for employee health promotion programs or including health promotion in job descriptions [66,67], and the existence of adequate linkage systems such as supportive managers and benefit plans help in the diffusion process [9,62,68].

The transfer of health promotion programs from research to practice requires careful attention both to core elements of the interventions that need to be maintained to assure fidelity to the tested intervention and elements that can be adapted to new settings in which the intervention is implemented [61,63]. Pentz et al. [69] have demonstrated that training in the use of the intervention is crucial to its proper transfer. Researchers have suggested characteristics of effective interventions that might form the basis for the identification of core elements in interventions such as the 5-a-Day worksite programs described above. These include the use of a comprehensive ecological model [4,59,70] that is theoretically based and appropriately intense [59]. Planning for sustainability and dissemination of positive out-

comes is needed as part of overall program planning. Creating effective partnerships between public and private groups and identifying ways to nurture those partnerships will enhance program dissemination.

Further research can help to refine programs for delivery in a range of settings, from small worksites to multinational corporations. The social ecological model compels us to understand broader forces influencing dietary patterns in the worksite [16,71]. New theories may be required to help us understand and test strategies for mobilizing at all levels of the ecologic framework [72,73,74]. Important avenues for future research are introduced by the assumption that work settings are situated within a broad structure of community settings, including economic systems influencing corporate health, the health care system, and the regulatory environment [75]. For many workers, trends toward worksite downsizing, the spread of technological innovations, and part-time employment are changing the structure of work and need to shape the development and delivery of future worksite health promotion programs. Understanding these external forces shaping internal worksite realities is likely to contribute to the effectiveness of comprehensive programs promoting worker health within healthy workplaces.

## References

- [1] Sorensen G, Hunt MK, Cohen N, et al. Worksite and family education for dietary change: the Treatwell 5-A-Day Program. *Health Educ Res* 1998;13(4):577–91.
- [2] Abrams DB, Boutwell WB, Grizzle J, Heimendinger J, Sorensen G, Varnes J. Cancer control at the workplace: the Working Well Trial. *Prev Med* 1994;23:1–13.
- [3] Sorensen G, Emmons K, Hunt MK, Johnston D. Implications of the results of community intervention trials. *Annu Rev Public Health* 1998;19:379–416.
- [4] Glanz K, Sorensen G, Farmer A. The health impact of worksite nutrition and cholesterol intervention programs. *Am J Health Promot* 1996;10(6):453–70.
- [5] Oldenburg B, Sallis JF, Harris D, Owen N. Checklist of health promotions environments at worksites (CHEW). *Am J Health Promot* 2002;16(5):288–99.
- [6] Jeffery R, French S, Raether C, Baxter J. An environmental intervention to increase fruit and salad purchases in a cafeteria. *Prev Med* 1994;23:788–92.
- [7] Linnan L, Graham A, Weiner B, Emmons K. Managers knowledge, attitude and beliefs about worksite health promotion. *Am J Health Promot* [submitted for publication].
- [8] Goodman RM, Steckler AB. A model for the institutionalization of health promotion programs. *Fam Commun Health* 1989;11:63–78.
- [9] Orlandi MA. The diffusion and adoption of worksite health promotion innovations: an analysis of barriers. *Prev Med* 1986;15:522–36.
- [10] Crump CE, Shegog R, Gottlieb NH, Grunbaum JA. Comparison of participation in federal worksite and community health promotion programs. *Am J Health Promot* 2001;15(4):232–6.
- [11] Sorensen G. Worksite tobacco control programs: the role of occupational health. *Respir Physiol* 2001;189:89–102.
- [12] Morris W, Conrad K, Marcantonio R, Marks B, Ribisl K. Do blue-collar workers perceive the worksite health climate differently than white-collar workers? *J Health Promot* 1999;13(6):319–24.

- [13] Alexy B. Workplace health promotion and the blue-collar worker. *AAOHN J* 1990;38(1):12–6.
- [14] Linnan L, LaMontagne A, Stoddard A, Emmons K, Sorensen G. Worksite-level norms concerning smoking, nutrition and occupational health and safety practices: results of the WellWorks-2 study. In review.
- [15] Sorensen G, Stoddard A, Peterson K, et al. Increasing fruit and vegetable consumption through worksites and families in the Treatwell 5-A-Day Study. *Am J Public Health* 1999;89(1):54–60.
- [16] Stokols D, Pelletier K, Fielding J. The ecology of work and health: research and policy directions for the promotion of employee health. *Health Educ Q* 1996;23(2):137–58.
- [17] McLeroy K, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q* 1988;15(4):351–77.
- [18] Beresford SAA, Thompson B, Feng Z, Christianson A, McLerran D, Patrick DL. Seattle 5-A-Day worksite program to increase fruit and vegetable consumption. *Prev Med* 2001;32:230–8.
- [19] Hunt MK, Lederman R, Potter S, Stoddard A, Sorensen G. Results of employee involvement in planning and implementing the Treatwell 5-A-Day worksite study. *Health Educ Behav* 2000;27(2):223–31.
- [20] Strycker LA, Foster LS, Pettigrew L, Donnelly-Perry J, Jordan S, Glasgow RE. Steering committee enhancements on health promotion program delivery. *Am J Health Promot* 1997;11:437–40.
- [21] Buller DB, Morrill C, Taren D, et al. Randomized trial testing: the effect of peer education at increasing fruit and vegetable intake. *J Natl Cancer Inst* 1999;91(17):1491–500.
- [22] Emmons KM, Linnan LA, Shadel WG, Marcus B, Abrams DB. The Working Healthy Project: a worksite health-promotion trial targeting physical activity, diet, and smoking. *J Occup Environ Med* 1999;41(7):545–55.
- [23] Sorensen G, Stoddard A, Ockene JK, Hunt MK, Youngstrom R. Worker participation in an integrated health promotion/health protection program: results from the WellWorks Project. *Health Educ Q* 1996;23(2):191–203.
- [24] Bowen DJ, Beresford SA. Dietary interventions to prevent disease. *Annu Rev Public Health* 2002;23:255–86.
- [25] Proper KI, Hildebrandt VH, Van der Beek AJ, Twisk JW, Van Mechelen W. Effect of individual counseling on physical activity fitness and health: a randomized controlled trial in a workplace setting. *Am J Prev Med* 2003;24(3):218–26.
- [26] Abrams DB, Mills S, Bulger D. Challenges and future directions for tailored communication research. *Annals Behav Med* 1999;21(4):299–306.
- [27] Brug J, Campbell M, van Assema P. The application and impact of computer-generated personalized nutrition education: a review of the literature. *Patient Educ Couns* 1999;36:145–56.
- [28] Skinner CS, Campbell MK, Rimer BK, Curry S, Prochaska JO. How effective is tailored print communication? *Annals Behav Med* 1999;21(4):290–8.
- [29] Strecher VJ. Computer-tailored smoking cessation materials: a review and discussion. *Patient Educ Couns* 1999;36(2):107–17.
- [30] Campbell MK, Tessaro I, DeVellis B, et al. Effects of a tailored health promotion program for female blue-collar workers: health works for women. *Prev Med* 2002;34(3):313–23.
- [31] Delichatsios HK, Hunt MK, Lobb R, Emmons K, Gillman MW. EatSmart: efficacy of a multifaceted preventive nutrition intervention in clinical practice. *Prev Med* 2001;33:91–8.
- [32] Emmons KM, Butterfield R, Puleo E, et al. Smoking among participants in the childhood cancer survivor study cohort: the partnership for health study. *J Clin Oncol* 2003;21(2):189–96.
- [33] Prochaska JJ, Zabinski MF, Calfas KJ, Sallis JF, Patrick K. PACE+: interactive communication technology for behavior change in clinical settings. *Am J Prev Med* 2000;19(2):127–31.
- [34] Campbell MK, Honess-Morreale L, Farrell D, Carbone E, Brasure M. A tailored multimedia nutrition education pilot program for low-income women receiving food assistance. *Health Educ Res* 1999;14(2):257–67.
- [35] Henderson J, Noell J, Reeves T, Robinson T, Strecher V. Developers and evaluation of interactive health communication applications. The science panel on interactive communications and health. *Am J Prev Med* 1999;16(1):30–4.
- [36] Oenema A, Brug J, Lechner L. Web-based tailored nutrition education: results of a randomized controlled trial. *Health Educ Res* 2001;16(6):647–60.
- [37] Kreuter M, Farrell D, Olevitch L, Brennan L, Rimer B, editors. Tailoring health messages: customizing communication with computer technology. London: Lawrence Erlbaum Associates; 1999.
- [38] Flay BR. Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. *Prev Med* 1986;15(5):451–74.
- [39] Scheirer MA, Shediak MC, Cassady CE. Measuring the implementation of health promotion programs: the case of the breast and cervical cancer program in Maryland. *Health Educ Res* 1995;10(1):11–25.
- [40] Linnan L, Steckler A. Process evaluation for public health interventions and research: an overview. In: Steckler A, Linnan L, editors. Process evaluation for public health interventions and research. San Francisco, CA: Jossey-Bass; 2002. p. 1–23.
- [41] Linnan L, Thompson B, Kobetz E. The Working Well Trial: selected process evaluation results. In: Steckler A, Linnan L, editors. Process evaluation for public health interventions and research. San Francisco, CA: Jossey-Bass; 2002. p. 155–183.
- [42] Bracht NF. Organizing for community health promotion: a guide. Newbury Park, CA: Sage Publications; 1990.
- [43] Steenhuis IH, van Assema P, Glanz K. Strengthening environmental and educational nutrition programmes in worksite cafeterias and supermarkets in The Netherlands. *Health Promot Int* 2001;16(1):21–33.
- [44] Golaszewski T, Fisher B. Heart check: the development and evolution of an organizational heart health assessment. *Am J Health Promot* 2002;17(2):132–53.
- [45] Ribisl KM, Reischl TM. Measuring the climate for health at organizations: development of the worksite health climate scales. *J Occup Med* 1993;35(8):812–24.
- [46] Glasgow RE, McCaul KD, Fisher KJ. Participation in worksite health promotion: a critique of the source. *Health Educ Q* 1993;20(3):391–408.
- [47] Linnan L, Fava JL, Thompson B, Emmons KM, et al. Measuring participatory strategies: instrument development for worksite populations. *Health Educ Res* 1999;14(3):371–86.
- [48] National Institute on Drug Abuse. Reviewing the behavioral science knowledge base on technology transfer. In: Backer TE, David SL, Saucy G, editors. NIDA research monographs, Washington, DC: U.S. Government Printing Office; 1995.
- [49] Gruman J, Frolick M, editors. Putting evidence into practice: The OBSSR report of the Working Group on the Integration of Effective Behavioral Treatments into Clinical Care. Bethesda, MD: Office of Behavioral and Social Sciences Research, National Institutes of Health; 1998.
- [50] Oldenburg BF, Sallis JF, French ML, Owen N. Health promotion research and the diffusion and institutionalization of interventions. *Health Educ Res* 1999;14(1):121–30.
- [51] Oldenburg BF, French ML, Sallis JF. Health behavior research: the quality of the evidence base. *Am J Health Promot* 2000;14(4):253–7 [iii].
- [52] Brink SG, Basen-Engquist K, O'Hara-Tompkins NM, Parcel GS, Gottlieb N, Lovato CY. Diffusion of an effective tobacco prevention program: Part 1. Evaluation of the dissemination phase. *Health Educ Res* 1995;10(3):283–95.
- [53] Parcel GS, O'Hara-Tompkins NM, Harrit RB, et al. Diffusion of an effective tobacco prevention program, Part 2: Evaluation of the adoption phase. *Health Educ Res* 1995;10(3):297–307.
- [54] Rogers EM. Diffusion of innovations. New York: The Free Press; 1995.

- [55] Emmons KM, Thompson B, Sorensen G, et al. The relationship between organizational characteristics and the adoption of workplace smoking policies. *Health Educ Behav* 2000;27(4):483–501.
- [56] Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999;89(9):1322–7.
- [57] Glasgow RE, Lichtenstein E, Marcus AC. Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *Am J Public Health* 2003;93(8):1261–7.
- [58] Bull SS, Gillette C, Glasgow RE, Estabrooks P. Work site health promotion research: to what extent can we generalize the results and what is needed to translate research to practice? *Health Educ Behav* 2003;30(5):537–49.
- [59] Morrissey E, Wandersman A, Seybolt D, Nation M, Crusto C, Davino K. Toward a framework for bridging the gap between science and practice in prevention: a focus on evaluator and practitioner perspectives. *Educ Program Plan* 1997;20(3):367–77.
- [60] Richmond R. Retracing the steps of Marco Polo: from clinical trials to diffusion of interventions for smokers. *Addict Behav* 1996;21(6):683–97.
- [61] Cameron R, Brown KS, Best JA. The dissemination of chronic disease prevention programs: linking science and practice. *Can J Public Health* 1996;87(2):550–3.
- [62] Orlandi MA, Landers C, Weston R, Haley N. Diffusion of health promotion innovations. In: Glanz K, Lewis FM, Rimer BK, editors. *Health behavior and health education*. San Francisco: Jossey-Bass Publishers; 1990. p. 288–313.
- [63] Price RH, Lovion RP. Prevention programming as organizational reinvention: from research to implementation. In: Silverman MM, Anthony V, editors. *Prevention of mental disorders, alcohol and drug use in children and adolescents*. Rockville, MD: DHHS; 1989. p. 97–123.
- [64] Johnson J, Meyer M, Woodworth M, Ethington C, Stengle W. Information technologies within cancer information service: factors related to innovation adoption. *Prev Med* 1998;27(5 Pt 2):S71–83.
- [65] O'Loughlin J, Renaud L, Richard L, Gomez LS, Paradis G. Correlates of the sustainability of community-based heart health promotion interventions. *Prev Med* 1998;27(5 Pt 1):702–12.
- [66] Haines A., Donald A., editors. *Getting research findings into practice*. Second ed. London: BMJ Publishing Group; 2002.
- [67] Dobbins M, Cockerill R, Barnsley J, Ciliska D. Factors of the innovation, organization, environment, and individual that predict the influence five systematic reviews had on public health decisions. *Int J Technol Assess Health Care* 2001;17(4):467–78.
- [68] Kraft JM, Mezzoff JS, Sogolow ED, Neumann MS, Thomas PA. A technology transfer model for effective HIV/AIDS interventions: science and practice. *AIDS Educ Prev* 2000;12(Suppl 5):7–20.
- [69] Pentz MA, Trebow E, Hansen WB, et al. Effects of program implementation on adolescent drug use behavior: the Midwestern Prevention Project (MPP). *Eval Rev* 1990;14(3):264–89.
- [70] Bero LA, Grilli R, Grimshaw JM, Harvey E, Oxman AD, Thomson MA. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. *BMJ* 1998;317:465–8.
- [71] McKinlay JB. The promotion of health through planned sociopolitical change: challenges for research and policy. *Soc Sci Med* 1993;36(2):109–17.
- [72] Linnan LA, Sorensen G, Colditz G, Klar N, Emmons K. Using theory to understand the multiple determinants of low participation in worksite health promotion programs. *Health Educ Behav* 2001;28(5):591–607.
- [73] DiClemente R, Crosby R, Kegler M, editors. *Emerging theories in health promotion practice and research: strategies for improving public health*. San Francisco: Jossey-Bass, Inc; 2002.
- [74] Linnan L, LaMontagne A, Stoddard A, Emmons K, Sorensen G. Norms and their relationships to health behaviors in worksite settings: An application of the Jackson Return Potential Model. *Am J Health Behav* [in press].
- [75] Linnan L, Marcus B. Worksite-based physical activity programs and older adults: current status and priorities for the future. *J Aging Phys Act* 2001;9:S59–70.