Healthy Eating Strategies in the Workplace

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Abstract

Purpose—There is a clear link between dietary behavior and a range of chronic diseases, and
overweight and obesity constitute an indirect risk in relation to these diseases. The worksite is a
central venue for influencing dietary behavior. The purpose of this paper is to provide an overview
of workplace influences on worker dietary patterns.

Design/methodology/approach—The paper reviews the evidence of the effectiveness of
dietary health promotion, and provides a brief overview of appropriate theoretical frameworks to
guide intervention design and evaluation. The findings are illustrated through research examples.

Findings—Through case studies and published research, it is found that workplace dietary
interventions are generally effective, especially fruit and vegetable interventions. There is less
consistent evidence on the long term effectiveness of workplace weight management
interventions, underscoring the need for further research in this area. This paper also reports
evidence that changes in the work environment, including through health and safety programs,
may contribute to enhancing the effectiveness of workplace health promotion, including dietary
interventions. Organizational factors such as work schedule may also influence dietary patterns.
The social ecological model, the social contextual model and political process approach are
presented as exemplar conceptual models that may be useful when designing or assessing the
effects of workplace health promotion.

Originality/value—Using the worksite as setting for influencing health by influencing dietary
patterns holds considerable promise and may be instrumental in reducing workers' risk of chronic
diseases.

Keywords

Workplace; nutrition; obesity; health promotion; occupational safety and health

1. Introduction

There is clear evidence that an unhealthy diet is related to increased risk for a range of
chronic diseases, including heart disease, diabetes, and cancer (American Institute for
Cancer Research, 2007). Diet plays a direct role in increasing risk of these chronic diseases,

and additionally contributes to increased risk indirectly through overweight and obesity (American Institute for Cancer Research, 2007). Dietary recommendations to reduce chronic disease risk include lowering saturated fat, trans-fat, and red meat consumption, and increasing fruit and vegetable intake (American Institute for Cancer Research, 2007, National Institutes of Health, 2002).

Worksites represent an important venue for influencing dietary patterns. Given the considerable time workers spend on their jobs, worksites offer an important venue to reach large numbers of workers in order to provide on-going education as well as healthy food options. In addition, through worksites it may be possible to support behavior changes long-term through co-worker support, changes in the foods available at work, and consideration of other work-related factors associated with workers' dietary patterns (Sorensen et al., 2004b, Sparling, 2010, Story et al., 2008, Egerter et al., 2008). There is a growing body of evidence supporting the efficacy of these worksite approaches in promoting healthy diets (Glanz et al., 1996, Hennrikus and Jeffery, 1996, Benedict and Arterburn, 2008, Matson-Koffman et al., 2005, Janer et al., 2002, Engbers et al., 2005, Pelletier, 2009).

The purpose of this paper is to provide an overview of workplace influences on worker dietary patterns. We review the evidence for the efficacy and effectiveness of workplace efforts to improve dietary behaviors, overweight/obesity, and the food environment. While some studies have focused on demonstrating *efficacy*, that is quantifying the magnitude of intervention effect under highly controlled study designs with homogenous populations that maximize internal validity, others have aimed to demonstrate *effectiveness*, that is study designs that seek to balance internal and external validity by implementing the intervention with more 'real world' settings and representative participants (Flay, 1986). We further examine other workplace influences on workers' dietary habits, including the efforts to prevent work-related illness and injury, reduce work-related stress, and expand work-related benefits and resources. In addition, recognizing the importance of the application of appropriate theoretical frameworks to guide intervention design and evaluation, we provide a brief overview of several models that may be applied to workplace efforts to promote a healthy diet. Although this manuscript is not meant to provide an exhaustive review of the literature, throughout these sections we provide research examples to exemplify the research findings for dietary behaviors.

2. Evidence for efficacy and effectiveness: Influencing dietary behaviors through the worksite

There is a growing body of literature on the effectiveness of workplace programs in improving workers' dietary habits. Workplace initiatives have targeted a number of dietary behaviors, including fruits and vegetables, fat, red meat intake, and fiber. A review of nutrition and cholesterol worksite programs from 1980 to 1995 reported that approximately half of 26 reviewed studies demonstrated a significant effect on one or more dietary behaviors (Glanz et al., 1996). A more recent review of workplace efforts to improve fruit and vegetable intake identified factors employed by successful programs, including organizational support, targeting multiple levels of influence and participants' social context (see section 4.1 and 4.2), encouraging worker participation, and addressing multiple health behaviors (Sorensen et al., 2004b).

Much of the worksite research on dietary interventions has focused on fruit and vegetable intake. In the U.S., nine studies were conducted in the 1990s under the National Cancer Institute's '5-a-day for Better Health' program to increase fruit and vegetable intake; three were implemented in workplaces (Sorensen et al., 1999, Buller et al., 1999, Beresford et al., 2001). Each intervention focused on more than one level of influence including individual

workers, their social networks, and changes in the food environment. These studies resulted in significant improvements in fruit and vegetable consumption, with an average effect size of 0.3-0.5 servings of fruits and vegetables per day. Subsequent analyses of the 5-a-day studies conducted among adults demonstrated that improvements in knowledge and self-efficacy were significant mediators of the observed increases in fruit and vegetable intake (Campbell et al., 2008). Similar research has also been conducted in Europe. For example, in Denmark, the '6-a-day' worksite study implemented changes over an 8 month period among canteen staff of five workplaces, focusing on improving the taste and preparation of fruit and vegetables (Lassen et al., 2004). One year post-baseline, this pre-test/post-test study resulted in an average increase of approximately 1 serving of fruits and vegetables per day per participant.

Several studies have focused on providing tailored interventions to promote dietary changes for individual workers. For example, in the U.S., the Tools for Health study was conducted among construction laborers, and included tailored and targeted print materials as well as motivational-interviewing based telephone calls. This intervention resulted in a significant 1.5 serving increase in the intervention group, compared to a slight decrease (-0.09) in the control group. (Sorensen et al., 2007a). As another example, the U.S.-based "Alive" [A Lifestyle Intervention Via Email] was an automated program that promoted changes in multiple dietary behaviors among non-medical employees of a large healthcare organization using a series of emails tailored to individual and family factors (*e.g.*, having children in the home) (Sternfeld et al., 2009). Over a 4-month follow-up, participants made several significant changes relative to the control group, including a 0.35 serving increase of fruits and vegetables, 0.75g decrease in saturated fat, and 0.29g decrease in trans-fat.

Other research has explored the role of worksite environmental changes to promote dietary changes by increasing access to healthy foods. While some studies have reported increased intake of fruit and vegetables, reduction in self-reported intake of fat and increased sales of healthy foods as a result of labeling or increased access to healthy foods, others have shown no dietary changes in relation to such environmental modifications (Matson-Koffman et al., 2005, Engbers et al., 2005). Reducing food prices may also contribute to dietary improvements. In two studies, French and colleagues found that reducing prices on healthful snacks in vending machines can increase sales of these snacks (French et al., 2001). For example, in the latter of these two studies, the effect of lowering the price and increasing the availability of healthy foods was tested in vending machines used by workers at four bus garages in the U.S (French et al., 2010). Using input from the employee advisory group, more healthful beverages, snacks, and entrees were increased to reach a benchmark of 50% of offerings in the healthy category. These targeted foods were priced 10% lower than their normal price. Compared to the no-intervention control group, garages in the intervention group increased sales of healthy items including snacks.

A growing literature is also exploring the efficacy of workplace interventions to support weight management or weight reduction for overweight or obese workers (Hennrikus and Jeffery, 1996); (Benedict and Arterburn, 2008). In a review of 11 randomized trials from 1995-2006, modest weight loss of -0.2 to -6.4kg was noted in intervention groups compared to control groups over a range of 2 – 18 month follow-up across studies ((Benedict and Arterburn, 2008). We briefly review three U.S. studies that have been conducted since this review. First, a study targeted to the physical and social environment of metropolitan transit workers, found a non-significant mean BMI change of -0.14, 18-months post baseline compared to workers in the garages in the control group (French et al., 2010). The authors concluded that worksite environmental interventions may be less effective when workers, such as bus drivers, mainly spend their workdays away from the worksite (French et al., 2010). Second, a pre-test/post-test trial with truck drivers included several components: team

weight loss competitions, behavioral computer-based training, self-monitoring, and telephone coaching using motivational interviewing. The intervention resulted in a significant decrease in body weight of 7.8 lbs 6-months post baseline (Olson et al., 2009). Finally, an intervention for employees was conducted at six hospitals using strategies targeting the social and physical environment such as displaying print materials, working with the food service staff to increase offerings of healthful foods, and nutrition labeling at the cafeteria (Lemon et al., 2010). Results indicated no significant effects on BMI in intent-to-treat analyses, however, those who participated in more intervention events achieved a decrease in BMI (0.012 units) with each unit increase in participation (scale 0-100) after 2 years. Overall, these studies demonstrate the potential of worksite weight management interventions as well as the challenges, particularly in promoting a sufficient level of participation and exposure to intervention components. Clearly, further work is needed pertaining to long-term follow-up in randomized controlled trials (Benedict and Arterburn, 2008).

This diverse group of studies representing a range of workers and workplace settings point to several key intervention components, including providing ongoing maintenance and support for targeted changes, responding to workers' day-to-day work experiences, addressing the social and physical workplace environment, and tailoring to individual factors using principles of behavioral theory (*e.g.* stage of change) (Prochaska et al., 1997). These factors are explored further in section 4.

3. Healthy eating in the context of the work environment

Workers' dietary patterns are also likely to be influenced by other factors in the work environment. As illustrated in Figure 1, other workplace initiatives contributing to worker health may also spill over to influence workers' dietary patterns. In addition to educational programming and policies to improve worker health behaviors such as diet, worksites may be engaged in efforts to prevent work-related illness and injury, reduce work-related stress, and expand work-related resources (Egerter et al., 2008).

3.1 Preventing work-related injuries and illness

Although they focus on different pathways to worker health, occupational health and safety and worksite health promotion share the common aim of promoting worker health, with complementary functions in protecting and enhancing the health of workers. There is growing evidence that an integrated or coordinated approach across these parallel paths may contribute to enhanced effectiveness in promoting health behaviors as well as influencing the work environment (Sorensen and Barbeau, 2004, Institute of Medicine et al., 2005, Sorensen et al., 2002). This principle of integrating worksite health promotion and occupational health and safety is the underpinning of the WorkLife Initiative of the US National Institute of Occupational Safety and Health [I], and was recently endorsed by the US American Heart Association for cardiovascular health promotion (Carnethon et al., 2009).

The evidence for the effectiveness of this approach in improving diet and related outcomes is only beginning to emerge. One study testing an integrated approach to worker health within small manufacturing businesses found a significant effect on increasing fruit and vegetable consumption (Sorensen et al., 2005). In another study testing an integrated safety and health intervention for truck drivers, a reduction in body weight and significant improvements in safe driving were found (Olson et al., 2009). Two recent reviews have

[I]www.cdc.gov/niosh/worklife

provided frameworks for this coordinating occupational safety and health interventions with those targeting obesity and nutrition behaviors. First, Schulte and colleagues provided a rationale for this focus in relation to obesity, concluding that there may be an association between obesity and workplace risks such as hazardous exposures on the job. For example, there is evidence to indicate that obesity may increase the risk of some occupational diseases, including musculoskeletal disorders, cardiovascular disease, and asthma. At the same time, these authors observed that workplace efforts to address both occupational hazards and obesity must take care that efforts do not result in blaming individual workers for their obesity (Schulte et al., 2007). Second, Reavley and colleagues described a systematic approach for bringing together key stakeholders (*e.g.*, health educators, representatives from government, occupational health and safety officers) to develop a detailed logic model for the Australian WorkHealth Program. The model integrates the promotion of health behaviors, including nutrition and obesity, with safe work environments and ongoing quality improvement for the prevention and management of osteoarthritis (Reavley et al., 2010).

3.2 Addressing work-related stress and other organizational factors

Organizational factors in the work environment, such as work-related stress and work schedules, can also affect food choices and risk of obesity. In a large three-country analysis of the association between job strain and working overtime with food behaviors and obesity, although no significant relationships were found with the fully adjusted models for food behavior, working overtime was associated with obesity among women in London (Lallukka et al., 2008). Others have similarly reported the relationship of work schedule factors and psychosocial stressors to obesity, as well as other unhealthy behaviors such as heavy alcohol use and lack of exercise (Kivimaki et al., 2002, Siegrist and Rodel, 2006, Kouvonen et al., 2006). Work scheduling may influence dietary patterns through the pathway of sleep. For example, recent findings from a workplace study of mobile workers in the U.S. found that although low job strain, higher perceived job satisfaction and supervisor support were associated with more healthful sugary drink and/or snack intake, these effects were mediated by levels of adequate sleep, indicating the important role of sleep habits especially among workers with rotating schedules or shift work (Devine et al., 2003, Buxton et al., 2009). Additionally, qualitative evidence has underscored the relationship of work flexibility and the ability to manage work and family responsibilities to healthy eating strategies such as planning meals ahead of time and bringing fruit from home to work (Devine et al., 2003).

A strategy to address work conditions and limited time to prepare healthful meals is being evaluated in an ongoing Danish research project [II]. Canteen Takeaway is a program that assists worksites in establishing a service of making ready-to-heat meals available to employees for purchase at the worksite, for taking home as an evening meal. This study is investigating the potential impact of this program on the dietary patterns of employees and their families, as well as improvements in the healthiness of meals, the potential financial benefits for the employer, and the characteristics of workers who participate. For the worksite, this service may contribute to improving employees' work-life balance, because it might reduce time needed for shopping, preparing, and cooking the meal and cleaning afterwards. A small study at a white collar worksite compared dietary intake on days in which canteen takeaway was and was not offered using four, 24-hour dietary recalls (Hansen et al., 2009). Initial data showed that intake of fruits and vegetables was higher (up to 220g, approximately 1-2 servings) on days in which canteen takeaway was offered for both men and women, but was only statistically significant for women.

[II]www.kantinetakeaway.dk

3.3 Expanding work-related resources and benefits

In considering the impact of work on employee health and health behaviors, it is important to consider as well the role of the broad range of resources and benefits provided through employers. Workplace efforts in ensure adequate pay, provide training opportunities to increase opportunities for promotions, and expand job-related benefits, particularly for those from disadvantaged backgrounds, may bolster workplace health promotion efforts, including efforts to promote healthy eating. (Egerter et al., 2008). Efforts to reduce disparities in availability of the range of work-related resources may also include access to employee assistance programs (providing counseling referrals for substance abuse, financial, and legal difficulties) and workplace health promotion programs, which are is lower among workers who are blue-collar, lower paid, and part-time (Stoltzfus, 2006).

A variety of resources are increasingly available to address these disparities and improve workers' access to these benefits. Examples of initiatives for increasing access to higher-ranking work can be drawn from federally-funded programs, such as the U.S. *Jobs Corp* [III] or non-profit organizations, such as the U.S. *Year Up* program [IV]. *Year Up* seeks to provide paid training opportunities with their corporate partners to young urban youth across 5 U.S. cities while also providing college credit. Finally, other organizations address issues related to work benefits and resources including improving workplace flexibility, helping family caregivers, and improving financial standing of workers. The non-profit research organization *Families and Work Institute* [V] is an example of a group that seeks to collect information about the interactions between work and family life and provide recommendations to act upon their findings.

4. Conceptual models to guide interventions and evaluations

A conceptual model based on established social and behavioral theories can provide a useful structure to guide the design, delivery and evaluation of workplace health promotion programs. We provide three examples of conceptual frameworks that inform intervention design at multiple levels.

4.1 Social Ecological Model

Social ecological models have a long-standing background, drawing from both public health and psychology fields. Social ecological models serve as a comprehensive framework to guide health behavior interventions and describe how health behaviors may be influenced by multiple levels, usually including individual factors (*e.g.* demographics, behaviors, cognitions), social environment (*e.g.* family, co-workers, friends), physical and organizational environment settings (*e.g.* worksites), and macro-level environments (*e.g.* societal values, food marketing) (Story et al., 2008). One of the early models of the interaction of multiple levels of change and individual behavior was described by Bronfenbrenner in 1979, in which interactions between social groups (*e.g.* family), various settings (*e.g.* school, work), and larger social systems (*e.g.* cultural beliefs) were described (Bronfenbrenner, 1979); later versions of this model emphasize the influence of multiple levels over the lifecourse and in successive generations (Bronfenbrenner, 2000). As noted in section 2.3, changes to the work environment can have a beneficial impact on healthy eating behaviors, including through food availability on-site (cafeteria, vending machines), nutrition labeling of these offerings, and visibility of promotional material (Story et al., 2008). In addition to articulating the multiple levels of influence on health behaviors, social

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[III]http://www.jobcorps.gov/home.aspx
[IV]http://www.yearup.org/
[V]http://www.familiesandwork.org/

ecological models also rely on additional core principals, including the assumptions that there are interactions among these levels of influence, that interventions across multiple levels are likely to be more effective, and that interventions should focus on specific behaviors (Sallis et al., 2008).

The Treatwell 5-a-Day study provides one example of an intervention relying on a social ecological model (Sorensen et al., 1999). In this study, 22 worksites were randomly assigned to one of three conditions: a minimal intervention control group; a worksite intervention group, which included a worksite-based intervention that promoted increased fruit and vegetable consumption through worker engagement, educational programming, and increased access to fruits and vegetables in the work setting; and a worksite-plus-family intervention group, which included the worksite-based intervention plus outreach efforts to workers' families. This intervention illustrates the potential impact of multiple levels of influence, including educational efforts to build individual knowledge and attitudes, worksite environmental changes, and promotion of changes within the family. This study found significant between-group differences, with the worksite-plus-family intervention having the greatest impact on improvements in fruit and vegetable consumption corresponding to a 0.5 serving increase compared to the control group (Sorensen et al., 1999)

4.2 Social Contextual Model

The social contextual model was designed to guide intervention planning and evaluation by identifying social contextual factors that are amenable to change through interventions, and additional characteristics of the social context that may be important in informing intervention design. Specifically, the model delineates pathways through which population characteristics, such as income or occupation, influence health behaviors such as diet. By illuminating these pathways that reflect the realities of people's day-to-day life experiences, the intention of the model is to improve the design of interventions by increasing their relevance to their intended audiences. This framework distinguishes between *modifying conditions*, that is, factors that independently impact on outcomes but which are not influenced by the intervention, and *mediating mechanisms*, which can be modified by the intervention. Social context, including life experiences, social relationships, organizational structures and societal influences, may function as either modifying conditions or mediating mechanisms, depending on their location within or outside the causal pathway between the intervention and the outcomes (Sorensen et al., 2003). Designing (Sorensen et al., 2004a, Stoddard et al., (in review), Sorensen et al., 2005) interventions that are responsive to both mediating and modifying conditions has been shown to promote beneficial changes in eating behaviors and to address disparities by race/ethnicity (Emmons et al., 2005) and occupation (Sorensen et al., 2005).

The Healthy Directions-Small Business study used the Social Contextual Model to design an intervention targeting dietary patterns and physical activity among low-income, multi-ethnic workers in 26 manufacturing industries (Sorensen et al., 2005). For example, recognizing that workers may live in a neighborhood with limited access to supermarkets selling affordable fruits and vegetables, intervention programming was responsive to this condition by working with management to establish policies for offering healthy food options at the workplace. Stratifying the analyses by occupational class, findings revealed a significant improvement in fruit and vegetable consumption among workers, although not among managers. Further analyses explored the role of the social context on changes in fruit and vegetable consumption, and found that key social contextual factors at the individual and interpersonal levels were significantly associated with increased fruit and vegetable intake, including being born outside the U.S., more social ties, and supportive social norms (Sorensen et al., 2007b).

4.3 Political Process Approach

The Political Process Approach, also integrates organizational context and has been applied to workplace health promotion, including efforts to increase the consumption of fruits and vegetables at worksites (Thorsen et al., 2005). According to this approach, worksite health promotion can also be seen as a worksite change process. Where the Social Contextual Model highlights social-contextual factors at the organizational level among other levels, the Political Process Approach emphasizes the political processes that occur in the workplace organization. When planning or assessing the effects of worksite health promotion, it is important to be aware of the political processes that shape worksite norms, values, and patterns of conflict and consensus. Existing social compromises may develop over time, resulting in social norms and values, also termed 'stiffened politics,' implying that these norms and values are no longer questioned in the daily practice of the worksite (Kamp, 2000). The underlying principles behind these norms and values are called the "social constitution" of the worksite (Hildebrandt and Selz, 1989). This term was developed by the German industrial sociologists Hildebrandt and Seltz, in 1989 to challenge the technical and economic models predominant at the time. Political processes occur when the social constitution is put under pressure. For example, resistance to planned health promotion programs may occur when they are viewed as exerting control over what has been seen as private health behaviors such as weight, smoking habits, or freedom to choose unhealthy food in the canteen (Olsen, 1994). When planning such programs, it is important to be aware of these worksite-specific norms and values and related social practices, and recognize the need for addressing these norms and values as part of the planning, for example through involving employee representatives (Thorsen et al., 2005).

5. Discussion

As this paper describes, the workplace offers considerable promise in playing a part in promoting worker health through improvements in dietary patterns and weight management. Worksite health promotion approaches have also been recommended internationally. For example, the World Health Organization 2004 report, "Global Strategy on Diet, Physical Activity and Health," endorsed workplaces as "important settings for health promotion and disease prevention. People need to be given the opportunity to make healthy choices in the workplace in order to reduce their exposure to risk…Workplaces should make possible healthy food choices…" (World Health Organization, 2004). The European Network for Workplace Health Promotion has issued a number of statements of common goals and recommendations for workplace health promotion, including the Luxemburg Declaration on Workplace Health Promotion in the European Union, the Lisbon Statement on Workplace Health in Small and Medium-Sized Enterprises, and the Barcelona Declaration on Developing Good Workplace Health Practice in Europe [VI].

5.1. Implications for best practice

Sets of 'best practices' have been proposed by several organizations; assessing research studies according to a standard list of best practices for workplace health promotion provides a more complete understanding of different study components and offers a point of comparison between studies. For example, the U.S. National Institute of Occupational Safety and Health has established a set of essential elements to guide programs and policies for workplace health promotion [VII]. These essential elements are divided into four sections: 1) organizational culture and leadership, which includes linking program and business objectives and obtaining management support; 2) program design, which includes

[VI]http://www.enwhp.org/publications.html
[VII]http://www.cdc.gov/niosh/worklife/essentials.html

building integrated systems, using effective communication, promoting worker participatory strategies, tailoring to the needs of the specific workplace, using incentives/rewards, and planning for sustainability; 3) program resources, including implementing incremental start-up plans, providing adequate staffing, budget, and resources, and being accountable for program and outcomes; and 4) program evaluation, which includes checking for and carrying out corrective action using feedback loops. The conceptual models we reviewed in Section 4 also provide guidance for implementing programs across levels, including programs for individual workers (such as targeting across the stages of change, using goal setting, and building self-efficacy for change) and programs that seek to change or recognize the social environment, work conditions, and the physical environment. While the use of best practices such as these are available to guide workplace health promotion efforts, further work is needed to identify barriers and facilitators to using best practices so that effective programs can be more broadly disseminated.

5.2 Implications for future research

The research examples provided throughout this paper illustrate effective approaches that have been undertaken to address healthy eating in the workplace and establish evidence for intervention efficacy. Further research is needed to explore the linkages between health promotion efforts for individual workers and efforts to improve the organizational, physical and social environments at work. Strengthening these linkages could serve to maximize the impact of change within a multi-level program. Furthermore, in light of documented disparities in dietary patterns by socio-demographic characteristics such as racial/ethnic groups and occupational classes (U.S. Department of Health and Human Services, 2000, Thompson et al., 2009, Kant et al., 2007, Thane et al., 2007), continued research is needed to identify and understand relevant social contextual variables in order to improve strategies to encourage healthy eating behaviors in the workplace. In addition, research is needed to identify best processes for sustaining and disseminating effective programs, in order to assure the ongoing impact of these efforts.

Acknowledgments

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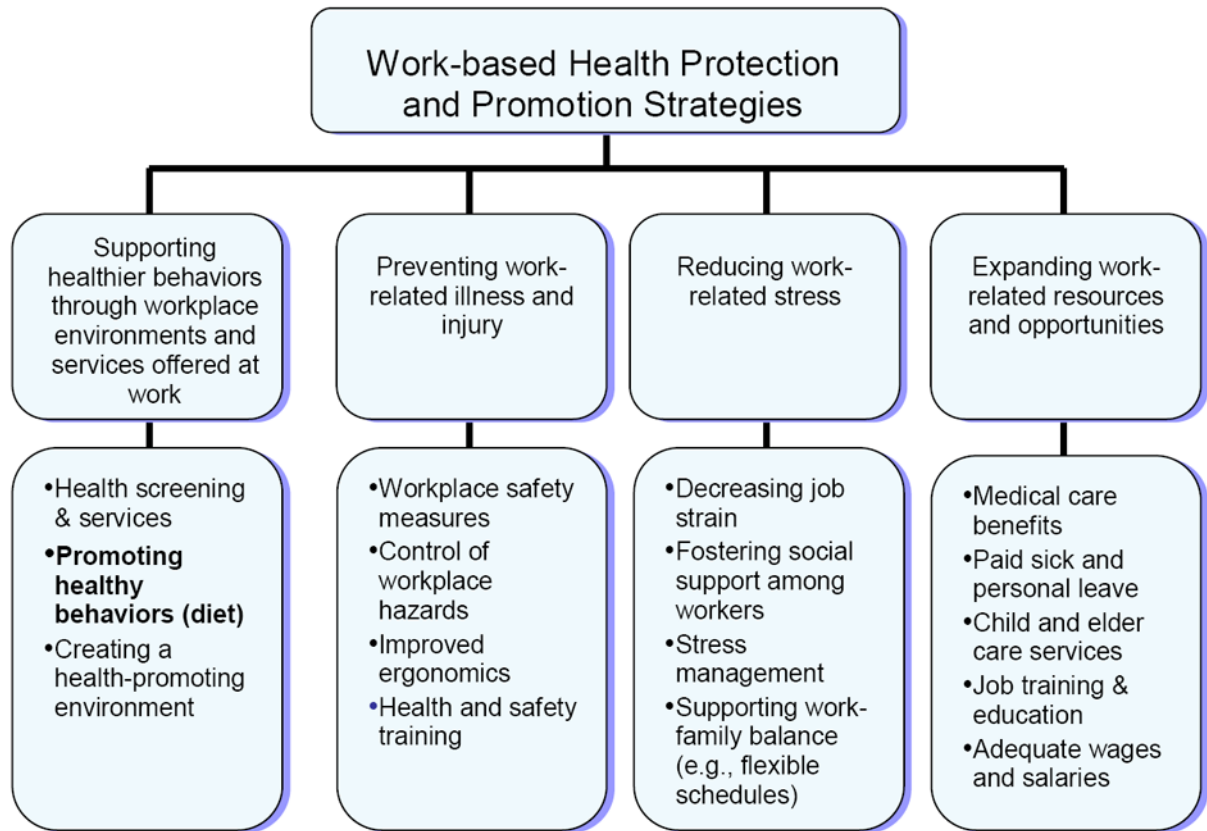
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Figure 1.
Framework of Strategies to Improve Healthy Eating through the Workplace