

Impact of a Worksite Diabetes Prevention Intervention on Diet Quality and Social Cognitive Influences of Health Behavior: A Randomized Controlled Trial

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ABSTRACT

Objective: To evaluate the impact of a worksite diabetes prevention intervention on secondary outcomes regarding the change in diet quality and components of the Health Action Process Approach (HAPA) theoretical framework.

Design: Pretest-posttest control group design with 3-month follow-up.

Setting: University worksite.

Participants: Employees aged 18–65 years with prediabetes (n = 68).

Intervention: A 16-week group-based intervention adapted from the *Diabetes Prevention Program*.

Main Outcome Measures: Diet quality was assessed using the Alternative Healthy Eating Index 2010; HAPA components were assessed via written questionnaire.

Analysis: Repeated-measures ANOVA compared the between- and within-group change in outcomes across time.

Results: Significant difference occurred between groups for the change in consumption of nuts/legumes and red/processed meats postintervention and for fruits at 3-month follow-up (all $P < .05$); a significant increase in total Alternative Healthy Eating Index 2010 score occurred postintervention in the experimental group ($P = .002$). The changes in action planning, action self-efficacy, and coping self-efficacy from HAPA were significantly different between groups after the intervention; the change in outcome expectancies was significantly different between groups at 3-month follow-up (all $P < .05$).

Conclusions and Implications: The worksite intervention facilitated improvement in diet quality and in planning and efficacious beliefs regarding diabetes prevention. Further research is needed to evaluate the long-term impact of the intervention.

Key Words: type 2 diabetes mellitus, worksite, diabetes prevention, diet quality, self-efficacy (*J Nutr Educ Behav.* 2016;48:160-169.)

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INTRODUCTION

Lifestyle interventions can effectively decrease the incidence of type 2 diabetes mellitus (T2DM) in high-risk patients.¹ Diet and physical activity (PA) are the cornerstones of lifestyle modification.² Increased PA has been shown to reduce T2DM risk,³ and moderate to vigorous activities

(MVPA) performed during daily life in bouts of 10 minutes or more are beneficial.⁴ Likewise, a recent meta-analysis found that healthy dietary patterns that focused on nutrient-dense foods were associated with a 20% reduced risk for T2DM.⁵

The Alternative Healthy Eating Index 2010 (AHEI) was created as a measure of diet quality and targets

nutrient-dense foods associated with reduced disease risk.⁶ The AHEI score represents how well diets conform to recommendations for consumption of foods from food groups (eg, vegetables, whole grains) as well as guidelines on fat, sugar, and sodium, and the score can be used to assess the relation between adherence to the Dietary Guidelines for Americans and the occurrence of health outcomes.⁷ High AHEI scores were associated with significant risk reduction for all-cause mortality and T2DM.⁸

Adopting a nutrient-dense diet and changing PA-related behaviors requires concerted effort and perseverance. Self-efficacy (SE) determines the amount of effort and perseverance one will invest in a behavior⁹; higher levels of SE have been related to greater behavioral change. For example, higher baseline levels of SE for PA were associated

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with higher levels of leisure PA at study end in the *Diabetes Prevention Program* (DPP).¹⁰ Similarly, for each unit improvement in SE for eating a low-fat diet in the DPP, there was almost a threefold greater likelihood of achieving 7% weight loss at study end.¹¹

The Health Action Process Approach (HAPA) model addresses the social cognitive influences of health behavior, such as SE, inherent in goal-based nutrition and PA interventions. The development of an intention or goal is a motivational process that differs from the subsequent preparation, performance, and evaluation of the target behavior.⁹ Greater insight into the social cognitive factors that contribute to lifestyle change will inform health behavior theory and guide the development of more effective lifestyle interventions. The purpose of this research was to evaluate the impact of a worksite diabetes prevention intervention on HAPA-related outcomes, nutrient density, and diet quality as measured by the AHEI, and 10-minute bouts of PA among employees with prediabetes.

THEORETICAL FRAMEWORK

The HAPA differentiates between a motivational phase of behavior change leading to an intention to change and an action, or volitional, phase of behavior change leading to implementation of the behavior.^{9,12,13} Within both phases, different patterns of social cognitive factors have a role. In the motivational phase, an intention to act is based on risk perceptions, outcome expectancies, and perceived SE. Risk perception assesses the perceived vulnerability for poor health outcomes (eg, prediabetes). Outcome expectancies contribute to forming an intention for the target behavior. Self-efficacy represents belief in one's capability to perform the behavior and perceived SE operates in concert with positive outcome expectancies to form an intention to act. Planning bridges the gap between an intention to act and acting on the behavior. However, successful behavior change requires not only getting started but also persisting until the goal is attained. Self-efficacy remains influential after an intention

has been formed until the new behavior becomes habitual. The Health Action Process Approach provides a framework to examine how individuals resist temptation and recover from setbacks, and HAPA postulates that there are different phases of SE beliefs. Action SE refers to developing a motivation to act. Coping SE describes optimistic beliefs about one's capability to sustain a behavior regardless of barriers encountered and includes the perceived capability to enact better strategies, extend greater effort, or persist longer. Similarly, recovery SE describes individuals' conviction to get back on track after being derailed. Individuals with a high degree of recovery SE trust their ability to regain control after a setback or failure. Different SE beliefs may be held simultaneously with the assumption that they operate in a different manner. For example, recovery SE is most useful when resuming an interrupted chain of action, whereas action SE is most useful when facing a formidable barrier to act. However, the relation between different SE beliefs and the change in lifestyle behaviors has received little empirical attention.

METHODS

Study Design

The researchers employed a pretest-posttest control group design at a university worksite and randomly assigned participants to treatment groups. After randomization, the experimental group proceeded through the 16-week DPP intervention. The control group received an information booklet regarding lifestyle changes for diabetes prevention¹⁴; they received no further contact from intervention staff. All participants completed a second assessment at 4 months and a third assessment occurred 7 months from baseline.

Participants and Recruitment

To be eligible, participants had to be employees of the university and aged 18–65 years with prediabetes. A risk questionnaire and point-of-care glucose testing to assess prediabetes (ie, impaired fasting glucose) were used. Individuals completed the 7-item American Diabetes Association diabetes risk assessment questionnaire,¹⁵

height and weight measurement, and collection of a fingerstick blood sample to assess fasting capillary blood glucose or hemoglobin A1c for people with a body mass index 25–50 kg/m² and an American Diabetes Association risk score ≥ 5 . Individuals with a fasting glucose of 100–125 mg/dL or an A1c value of 5.7% to 6.4% were identified as having prediabetes.¹⁶

Potentially eligible people completed the Physical Activity Readiness Questionnaire and those who answered positively to ≥ 1 questions were excluded.¹⁷ Individuals who were diagnosed with diabetes, chronically using corticosteroids, participating in a structured weight loss program, preparing for bariatric surgery in the next 12 months, planning to leave university employment, or had moved from the community were ineligible. Women who were pregnant or lactating or planning to become pregnant also were ineligible.

Participants were recruited through electronic advertisements on the university newswire, campus flyers, and a news story in the employee newspaper, and through direct mailings to employees with health insurance who completed the university health risk assessment and had a random glucose value of 110–199 mg/dL. Contact details were provided on recruitment material for individuals to contact to receive more information. All procedures were followed in accordance with the ethical standards of the Institutional Review Board at Ohio State University, and participants provided written, informed consent.

Worksite Diabetes Prevention Intervention

The experimental group received the 16-week *Group Lifestyle Balance* intervention.¹⁸ Weekly 60-minute group sessions were held and facilitated by a lifestyle coach using the program manual. Two coaches were involved in the study and each completed the 2-day training program before study initiation. Participants received a written manual with session material, food, and PA trackers for self-monitoring; a graph for tracking weekly weights; and a booklet with the nutrient content of commonly consumed foods for

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