Supplementary Table 8. Workplace-Based Approaches to Improve Diet and Physical Activity.

Diet and Physical Activity

Author, y	Design	Population	Outcomes	Intervention/Exposure	Findings
Engbers et al, 2005[121]	Systematic review of controlled trials (with or without randomization) evaluating workplace environmental modifications to improve diet, physical activity, or other health indicators	Healthy employees in manufacturing, education, service, state agencies, health care, sales (insurance, computer, food), and telecommunications	• Knowledge or behaviors related to diet, physical activity, or other health indicators • Follow-up in all trials identified ranged from 3 mo to 2.4 y.	All trials included worksite interventions to improve diets: • Glasgow et al, Emmones et al, Sorenson et al, and Hebert et al used point-of-purchase food labeling, but how the labeling was used was not specified. • Kronefeld et al, Beresford et al, Glasgow et al, Pegus et al, Sorenson et al, and Emmons et al expanded the availability of healthy products/enhanced visibility of healthy food; most distributed posters and bulletins. • Glasgow et al, Pegus et al, Sorenson et al, and Emmons et al implemented healthy food options in vending machines. All interventions were multicomponent, combining environmental changes with education, counseling, and distribution of info (brochures, kick-off events, flyers, etc).	• Glasgow et al: 2 studies, same intervention, 1995—no effects on dietary intake, tobacco use, and cholesterol levels; 1997— no effect on cholesterol levels, significant decrease in fat intake, significant increase in self-reported exercise • Emmons et al: significant increase in exercise behavior and consumption of fruits and vegetables • Sorenson et al: 2 studies— – Treatwell 1992: no significant changes in fiber intake, significant decrease in dietary fat – Treatwell 5-day 1999: worksite plus family—significant increase in fruit and vegetable intake compared with worksite intervention and control • Sorenson et al: Working Well Trial 1996—significant increase in fruits and vegetables consumption, insignificant decrease in smoking • Sorenson et al: Well Works Trial 1998—significant decrease in fat intake, significant increase in fruit and vegetable consumption and fiber, no effect on smoking; 2002—no significant changes between conditions on fruit and vegetable intake, smoking cessation rates higher in 1 intervention condition • Hebert et al: identical subjects to Sorenson 1992, increase in vegetable consumption, decrease in ground/processed meat consumption, high correlation between priori intervention targets and behavior • Kronefeld et al: increase in consumption of chicken, few other changes in dietary habits; increase in exercise in both intervention and control groups; decrease in number of smokers in intervention group • Beresford et al: larger increase in fruit and vegetable intake in intervention than in control sites (both significant) • Pegus et al: significant increase in knowledge of cardiac risk factors, diet, and BP management;

					improvements in exercise, diet, nutrition, smoking, BMI, BP, and cholesterol but no significant differences from control • Braeckman et al: no change in cholesterol levels, significant increase in nutrition knowledge, significant decrease in total energy and fat intake, increase in BMI in intervention group • Strong evidence on effectiveness of worksite dietary interventions to alter fruit, vegetable, and fat intake • Many studies of lower quality: only 4 of 13 trials overall could be qualified as high quality; outcome measures were often self-reported; none of the studies described randomization process Physical activity • See entry in the next section of this Table, below.
Anderson et al, 2009[267]	Systematic review of RCTs of worksite interventions on diet and/or physical activity for adults	RCTs in worksites	Any adiposity-related outcomes, including weight, BMI, or body fat	US Task Force on Community Preventive Services review of diet and/or physical activity interventions at worksites: • Most studies combined informational and behavioral strategies to influence diet and physical activity. • Fewer studies modified the work environment (eg, cafeteria, exercise facilities) to promote healthy choices.	At 6–12-mo follow-up, the overall pooled effect estimate showed • Weight reduction of 1.26 kg (95% CI, −4.6, −1.0) based on 9 RCTs • BMI reduction of 0.5 kg/m^2 (95% CI, −0.8, −0.2) based on 6 RCTs • Heterogeneity not identified by sex or worksite settings.
Groeneveld et al, 2010[268]	Systematic review of RCTs that targeted workers; aimed at improving diet and/or physical activity; and measured CVD risk factors	31 RCTs identified	Body weight, body fat, BP, blood lipids, and/or blood glucose	Diversity of interventions identified, including counseling, group education, and exercise. Of the 31 trials, 18 were judged to be of high quality. .	• Strong evidence was found for a beneficial effect on body fat. • Among higher-risk populations, there was also strong evidence for a beneficial effect on body weight. • Due to inconsistencies in results between studies, there was no evidence for the effectiveness of interventions on the remaining outcomes.
Engbers et al, 2006, 2007[122,123]	Controlled trial	N=452 and 515 office workers at 2 government	• Brief dietary questionnaire • BMI, waist/hip circumference, skin-fold	Food Steps Trial: 1-y intervention: • Diet: Product information sheets placed near foods, indicating calorie values in terms of exercise.	Dietary habits: • No significant effects on consumption of fruits, vegetables, or dietary fat Physical activity: • Not reported

		worksites	thickness, BP, cholesterol levels • Measures at 3 and 12 mo	Every 4 wk, 1 of 6 food groups was highlighted. Leaflets with information on healthy food, BP, and cholesterol were left in the canteen. • Activity: Focus on increasing use of stairs by point-of-decision prompts on ground floor elevator doors; use of footprint graphics on the floor to lead employees to stairwells; motivational quotes, poems, and exercise facts posted on the windows between floors; and slim mirrors on every other staircase floor • Control group: no treatment	Physiologic risk factors, among those with a BMI ≥23: • At 1 y, there were no significant differences in anthropometric measures between groups. • When compared with controls, the intervention group had significant favorable changes in total cholesterol (women only); HDL cholesterol (men only); and the total-HDL ratio. • When compared with controls, BP was actually significantly increased in the intervention group (+5 mm Hg, $P<0.001$).
Lowe et al, 2010[112]	Quasi-experimental (pre-/postintervention)	N=96 hospital employees	Worksite cafeteria lunch purchases as assessed by scanned purchasing cards, comparing 3 mo before vs after the intervention	• Group 1: Environmental changes in the cafeteria, including addition of selected healthier options along with food labeling (calories, energy density, macronutrients) for all foods sold during lunch • Group 2: Environmental changes in the cafeteria plus pricing incentives and 4 1-h group sessions of nutrition education on strategies for decreasing energy density of the diet	• In a comparison of before vs after the intervention, total calories and percent energy from fat at lunch decreased (≈70 less kcal and 5% less energy, respectively; $P<0.01$ each). • There were no differences between the 2 intervention groups, ie, the addition of pricing incentives and nutrition education did not appear to have any additional impact. However, the sample size was small and may have not been adequately powered after attrition of subjects.
Physical Activity					
Author, y	**Design**	**Population**	**Outcomes**	**Intervention/Exposure**	**Findings**
Engbers et al, 2005[121]	Systematic review of controlled trials (with or without randomization) evaluating workplace environmental modifications to improve diet, physical activity, or other health	Healthy employees in manufacturing, education, service, state agencies, health care, sales (insurance, computer, food), and	• Knowledge or behaviors related to diet, physical activity, or other health indicators • Follow-up in all trials identified ranged from 3 mo to 2.4 y.	3 trials included worksite interventions to increase physical activity: • Walking track on factory grounds • Posters and bulletin boards to encourage use of stairs • New or upgrading of worksite fitness facilities, plus route for walking during lunchtime All interventions were multicomponent, combining environmental changes with education, counseling, and distribution of information	Physical activity • Adding a worksite walking track did not significantly improve CVD risk factors. Improvements were seen in both intervention and control groups. • Posters and bulletins for stairs did not significantly increase activity. Exercise improved in both intervention and control groups. • Adding or upgrading worksite fitness facilities significantly increased physical activity. • Studies were generally of lower quality, with self-reported outcomes and no clear description of randomization procedures.

	indicators	telecommunications		(brochures, kick-off events, flyers, etc).	Diet See entry in prior section of this Table, above.
Engbers et al, 2007[269]	Observational, cross-sectional	N=186 office workers with BMI ≥23 at 2 government agencies	• Self-reported stair use: how often stairs were used, how many floors covered • Objective measures using detection device, chip card	Worksite 1 • 6-story building, staircases visible and located directly next to elevator Worksite 2 • 12-story city hall building, tighter security, stairs not accessible from 1st floor, stairs hidden (Baseline data from Food Steps Trial)	• Worksite 1: Men and normal-weight employees used stairs more often and covered more floors than did women and overweight employees, respectively. • Worksite 1: Men had significantly higher values on objective stair-use frequency (P=0.002) and objective number of floors covered (P<0.001) compared with worksite 2. • No significant differences were found between worksite 1 and 2 for women.
Schwetschenau et al, 2008[272]	Observational, cross-sectional	N=88 employees of a Midwestern company	Membership in and use of workplace fitness centers	Survey of worksite employees to assess perceived barriers to using worksite fitness centers	• The perception that the fitness center had inadequate exercise facilities was associated with a lower likelihood of membership. • Among members, embarrassment about exercising in front of colleagues was associated with lower frequency of use.
Schwartz et al, 2009[271]	Observational, cross-sectional	N=293 employed adults in Montgomery County, Maryland	• Accelerometer determined steps per weekday • Self-reported walking home from work	8 built-environment characteristics near workplace (presence of sidewalks, crosswalks/pedestrian signals, cul-de-sacs, bicycle or pedestrian trails, trees along streets, no litter, four-way intersections, too much traffic) and 4 workplace policies (presence of exercise facilities, exercise programs, showers, and lockers)	• No built-environment characteristic near the workplace was significantly associated with measured amounts of weekday walking. • Some built-environment characteristics were positively associated with self-reported walking home from work, including the presence of sidewalks, crosswalks, and pedestrian signals near the workplace. • All 4 workplace policies were positively associated with weekday walking (P<0.05).
Nicoll et al, 2009[270]	Quasi-experimental	N=299 office building employees in Texas	• Stair use from infrared monitors and card readers • Survey of stair use and attitudes and behaviors toward physical activity.	• Natural experiment: 1 bank of skip-stop elevators, which stop only at every 3rd floor, requiring users to take stairs to other floors, with nearby stairs made open and appealing • Control: Traditional elevator core and fire exit stairwell on the other side of the building	• The open stair near the skip-stop elevator was used 33 times more than the enclosed fire stair in traditional core (117,619 entries for skip-stop stairs, 3570 entries for traditional stairs). • Initial attitudes toward skip stop: 32% satisfied, 32% neutral, and 35% dissatisfied • Attitudes 22 mo later: 48% satisfied, 27% neutral, and 25% dissatisfied • 73% of employees used stairs daily.
Pedersen et al, 2009[273]	RCT	N=549 employees in Denmark	• Self-reported physical activity. • Physical fitness by maximal muscle strength, maximal O_2	Resistance training: • Allotted 1 h per week during work for intervention activities • Traditional dynamic strengthening exercises with dumbbells and isometric exercises General physical exercise:	After 1 y: • There were no changes in self-reported physical activity. • Both interventions decreased percentage of body fat (mean decrease 2.2%, P<0.01) and systolic BP (mean decrease 6.4 mm Hg, P<0.001). • There were also small increases (≈10%) in muscle

			uptake • Heart rate • BMI • Percent body fat • BP	• Allotted 1 h per week during work for intervention activities • Steppers placed at copy machine, punch bags placed in the hall, Nordic walking group sessions, step counters, and 8-min exercise CD • Employees also encouraged to increase physical activity during leisure time Control: • Information on health-enhancing activities except for physical activity, with formation of discussion groups • Allotted 1 h per week during work hours for intervention activities	strength and maximal O_2 uptake. • There were no significant differences in BMI or productivity.
Gilson et al, 2007[274]	RCT	N=64 university employees in the United Kingdom (58 women, 6 men)	• Pedometer step counts assessed at 1, 5, and 10 wk • Percentage of body fat • Waist circumference • BP	Intervention group 1: • Designated campus walking routes • At least 15 min of continuous brisk walking every workday • Weekly emails for 10 wk Intervention group 2: • Incorporating walking into daily tasks • Accumulation of step counts, "walk and talk" • Weekly emails for 10 wk Control: no treatment	At 10 wk: • Steps decreased in control group and increased in both treatment groups, with a net difference of about 1800 steps per day ($P<0.002$). • There were small, nonsignificant changes in other health variables.
Comprehensive Worksite Wellness Programs					
Author, y	**Design**	**Population**	**Outcomes**	**Intervention/Exposure**	**Findings**
Pelletier 2001, 2005, 2009[275-277]	Systematic reviews of RCTs and quasi-experimental studies that evaluated both clinical and cost outcomes	Published studies from the United States, including 15 from 1998-2000, 12 from 2000-2004, and 16 from 2004-	• Clinical outcomes • Cost outcomes	Comprehensive worksite wellness programs, defined as programs that provided ongoing health promotion and disease prevention that integrates specific components into a coherent, ongoing program and is consistent with corporate objectives.	Evidence from 1998-2000 (15 studies): • Many methodologic limitations were identified. • Overall data indicate benefits for both clinical and cost outcomes, in particular for facets of programs that identify and provide individualized risk reduction for high-risk employees. Evidence from 2000-2004 (12 studies): • Methodologic limitations continue and are perhaps even worse. • In the context of these important limitations, these studies provide additional evidence of benefits for both clinical and cost outcomes.

		2008			Evidence from 2004-2008 (16 studies): • Nearly all studies were quasi-experimental; only 1 RCT was identified. • Overall conclusions are unchanged from prior reviews.
Cahill et al, 2008[282]	Systematic review of controlled workplace interventions for smoking cessation	51 studies published through 2008	• Smoking cessation attempts • Smoking cessation	Randomized and quasi-RCTs allocating individuals, workplaces, or companies to intervention or control conditions to promote smoking cessation. Most studies randomized individuals at the workplace (rather than randomizing workplace-level interventions) to various interventions, including group therapy, individual counseling, self-help materials, nicotine replacement therapy, and social support.	Due to heterogeneity in study methods, formal meta-analysis was not performed. Qualitative impressions of the authors were summarized. Among 37 studies of individual-level interventions: • Group programs, individual counseling, and nicotine replacement therapy each increased cessation rates in comparison with no treatment or minimal intervention controls. • Self-help materials were less effective. Among 16 studies of workplace-level interventions: • Strong evidence was not seen that comprehensive programs reduced prevalence of smoking. • Incentive schemes increased cessation attempts, but there was less evidence that they increased the rate of actual quitting.
Calderon et al, 2008[278]	Quasi-experimental (pre- vs postintervention)	N=366 employees, average age 49 y, 75% male	2- and 5-mo changes from baseline in CVD risk factors over 3 y of the program	Kennedy Space Center Cardiovascular Disease Risk Reduction Program: A worksite program to identify employees with high cholesterol from voluntary monthly screening visits and target their CVD risk factors through health education phone counseling. Phone counseling consists of reviewing lab values with participants, discussing dietary fat intake frequency using an intake questionnaire, and promoting increase in exercise frequency.	At 2 mo: • Decreases in systolic BP (P=0.03); diastolic BP (P=0.002); total cholesterol, LDL cholesterol, and dietary fat intake (P<0.001 each); and increase in exercise frequency (P=0.04) At 5 mo: • Decreases in triglycerides (P=0.05) and total cholesterol, LDL cholesterol, and dietary fat intake (P<0.001 each)
Chung et al, 2009[279]	Quasi-experimental (pre- vs postintervention)	N=343 Chrysler employees, age >18 y	• Smoking status • Physical activity • HDL, LDL, total cholesterol • BP • Diabetes • Overall estimated Framingham risk	• Intervention: 18-mo approach to improve CVD risk: – Employees were stratified into 3 risk categories: low (no CVD), moderate (treated and controlled CVD), or high (newly diagnosed CVD). – All received more targeted education/individualized intervention than general employees, including meeting with a nurse, receiving a starter	Compared with baseline, postintervention: • Smoking decreased by 14%. • 36% of participants lost weight. • Mean BMI decreased slightly from 28.4 to 28.2 (P=0.04). • Mean systolic and diastolic BP decreased by 6.7 mm Hg (P<0.0001) and 1.1 mm Hg (P=0.02), respectively. • Mean total cholesterol/HDL-C ratio was lower (P=0.02). • Predicted RR of CVD was 12.7% lower (P=0.01)

				kit, and focusing on realistic and measurable goals to reduce risk. – Moderate-/high-risk employees also received additional progress meetings and small-group educational sessions. • Control: All employees received general education, a CVD risk profile assessment and BMI calculator, general seminars on CVD topics, information in company newsletters, a toll-free number for questions, and physical activity guidelines.	• At baseline, 68.5% were low risk, 21.6% were moderate risk, and 9.9% were high risk. At conclusion, 71.1% were low risk, 21.6% were moderate risk, and 7.3% were high risk, for an overall RR reduction of 12.7% (P=0.01). • The proportion of subjects who reported being active for 30-60 min most days of the week increased from 0.5% to 57%. • 86% planned to maintain lifestyle changes. • 95% thought it was important for employers to offer a workplace health promotion program.
Milani and Lavie, 2009[280]	RCT	N=308 employees and N=31 spouses, randomized to active intervention (N=185) vs usual care (N=154)	• 6-mo changes in risk factors • Total medical claim costs the year before and the year after intervention • Cost-effectiveness.	Intervention: 6-mo worksite health intervention using cardiac rehabilitation and exercise training staff, consisting of worksite health education, nutritional counseling, smoking cessation counseling, physical activity promotion, selected physician referral, and other health counseling	• Improvements were seen in body fat (–9%; P=0.001), HDL-C (+13%; P=0.0001), diastolic BP (–2%; P=0.01), health habits (–60%; P=0.0001), total health risk (–25%; P=0.0001), quality of life (+10%; P=0.001), and other symptoms (depression –33%, anxiety –32%, somatization –33%, hostility –47%; all P<0.001). • Of employees categorized as high risk at baseline, 57% were converted to low-risk status. • Average employee annual claim costs decreased 48% (P=0.002) for the 12 mo after the intervention, whereas control employees' costs remained unchanged (–16%; P=NS). • Compared with the costs of intervention, the savings represented a 6-fold return on investment.
Racette et al, 2009[281]	RCT	N=151 employees age >18 at worksites within a large medical center in St Louis, Missouri	At 6 mo and 1 y: • Diet • Fitness • BMI, body composition • BP • Blood lipids • Overall estimated Framingham risk	Intervention: • Personal health report • Transtheoretical Model of Behavior Change • Pedometers, weekly healthy snack cart, on-site Weight Watchers meetings, on-site group exercise program, monthly lunchtime seminars, monthly newsletters, walking maps, team competitions, participation cards, participation rewards • Registered dietitian available weekly Control: • Personal health report	In the intervention group: • Increased daily servings of fruits and vegetables from 4.7 at baseline to 7.8 at 6 mo and 7 at 1 y (P<0.01); smaller improvements in control (4.3 at baseline, 5.3 at 6 mo, 5.1 at 1 y) • Decreased intake of saturated fat, fatty meats, and fried foods at 6 mo and 1 y (P<0.001) • Increased daily physical activity (P<0.001) as shown in an increase in walking/moderate activities (P<0.01) • Percentage of employees in lowest Framingham risk category increased from 40% to 57% at 1 y (P<0.01); no significant change in control. • At 1 y, percentage with metabolic syndrome decreased from 38% to 25% in intervention (P=0.02) and 29% to 18% in control (P=0.07).

BP indicates blood pressure; BMI, body mass index; RCT, randomized controlled trial; CI, confidence interval; CVD, cardiovascular disease; HDL, high-density lipoprotein; HDL-C, high-density lipoprotein cholesterol; LDL, low-density lipoprotein; RR, relative risk; and NS, not significant

Note: Reference numbers (eg, Engbers et al, 2005[121]) appearing in this supplementary table correspond with those listed in the reference section of the statement. For the purposes of this supplementary table, these meta-analyses or systematic reviews (see "Author, y" column) are considered the primary citation. Additional studies mentioned in the primary citation may be included in the "Intervention/Exposure" and "Findings" columns. The additional studies can be accessed through the primary citation.