Published in final edited form as:

J Occup Environ Med. 2011 March ; 53(3): 245–252. doi:10.1097/JOM.0b013e31820c9023.

Combining Environmental and Individual Weight Management Interventions in a Work Setting Results From the Dow Chemical Study

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Abstract

Objective—To evaluate the comparative effectiveness of environmental weight loss interventions alone versus in combination with an individual intervention.

Methods—A quasiexperimental design compared with outcomes for two levels of environmental interventions and for participants who did or did not simultaneously self-select into an individually focused weight loss intervention (YW8). ANCOVA and logistic regression techniques were used to examine risk outcomes.

Results—Employees who participated in YW8 were no more successful at losing weight than those exposed to only the environmental interventions. Approximately, 13.5% of each group lost at least 5% of their body weight; overall changes in mean body weight and body mass index were negligible in both groups.

Conclusions—Simple worksite environmental modifications may help with weight maintenance, but are not likely to result in substantial weight reductions even when combined with low-intensity individual interventions.

Mounting concerns over the health, productivity, and financial implications of the obesity pandemic has prompted many employers to expand their health promotion efforts in the areas of weight management and obesity prevention.¹ Although most of these efforts continue to emphasize educational and individual behavior change strategies, there is growing recognition of the importance of environmental or contextual factors, or the idea that physical and organizational environments can be designed or modified to more effectively encourage and support healthy eating and increased physical activity.²⁻⁻⁶ This shift in workplace programming, though still in its early stages,^{3,7} converges with several broader trends in disease prevention and health promotion, including the application of social-ecologic theory,^{8,9} participatory and capacity building approaches,^{10,11} and settings-based health promotion.¹² All of these trends signal the increased salience of the environmental context, both in terms of the physical and social environments.

The term *obesogenic* has been used to refer to environments that promote high energy intake and sedentary behavior.¹³⁻⁻¹⁵ Under ideal circumstances, a key advantage of environmental

interventions is that their associated health benefits can be realized with little direct or intentional action on the part of the individual.¹⁶ This reasoning works for some environmental interventions, such as installing airbags in automobiles or adding fluorine to water supplies. However, most environmental modifications designed to promote healthy eating and physical activity are much less direct or automatic in terms of benefits. Initiatives such as installing walking trails, fitness centers, healthy vending snacks, and labels on food service items only serve to prompt certain behaviors or to make these behaviors easier to perform. In Stokols' terms, such actions increase the health promotive capacity of the environment.¹⁷ Policy also can be a powerful tool for creating healthier environments; the success of *smoke-free* policies in workplaces is a case in point.¹⁸⁻⁻²² But to date, such universal or zero-tolerance type policies have not been applied with respect to weight management or physical activity. This situation may change, however, in the wake of recent health care reform legislation at the federal level.²³

Each of the health promotion trends identified earlier emphasizes the fundamental importance of environment-behavior linkages and the need to focus on both the individual and the environment.^{8,24} Within the worksite health promotion community, there is the general view that the most effective interventions utilize a combination of complementary individual and environmental strategies.^{6,24--28} As such, most prior studies employing environmental interventions targeting weight management in work settings have used them in conjunction with educational and other types of individual behavior change interventions. As a result, it usually has been impossible to differentiate between the effects of the combined interventions and those of the environmental interventions alone.

The Current Study

This study was conducted as part of an obesity prevention effectiveness trial conducted in conjunction with the Dow Chemical Company (hereafter referred to as *Dow*). Two levels of environmental interventions were examined in this study. The moderate intensity condition utilized a set of inexpensive and widely applicable environmental modifications aimed primarily at creating a more supportive work environment for physical activity and healthy eating. The high-intensity condition included all of the moderate interventions and several additional elements designed to engender a relatively high level of management engagement and support for the weight management goals of the project. The overall results from this trial showed small but significant weight-related outcomes for participants exposed to the environmental interventions. More specifically, participants in both treatment conditions maintained their weight and body mass index (BMI) whereas control participants gained 1.3 pounds and increased their BMI values by 0.2 during the 2-year period.²⁹ Weight-related outcomes were better in the intense than moderate treatments but did not reach statistical significance. Detailed information on the design and overall results from this study have been presented in several other publications.²⁹⁻⁻³³

Although the principal focus of this research was to assess the effectiveness of different levels of environmental interventions on weight management outcomes, the intervention package also included a voluntary, individually focused weight management program called the Why Weight Challenge (YW8). Because this intervention component was voluntary, it provided a rare opportunity to assess the comparative effectiveness of environmental interventions alone versus the combination of environmental and individual interventions.

Two general aims guided the present analyses. The first aim was to determine whether employees who self-selected into the individual intervention (YW8) while being exposed to environmental interventions would achieve greater reductions in weight-related outcomes than those exposed only to the environmental interventions. Logically, the combination of

interventions should provide a more comprehensive experience and greater access to weight loss information and resources. Those choosing to participate in YW8 might also be more motivated or ready to lose weight. The second aim was to evaluate the differential effects of the two levels of environmental modifications in conjunction with YW8. How important is the level or extent of environmental support? The intense treatment condition targeted organizational culture and sought to boost leadership commitment to employee health. Would this additional layer of environmental changes produce higher levels of employee participation and engagement in YW8 and greater weight loss success compared to participants exposed to only the moderate environmental interventions?

Methods

Study Overview and Design

This study took place in cooperation with Dow. Dow provides a broad range of products and services to people in 160 countries, including fresh water supplies, food products, pharmaceuticals, paints, packaging, and personal care items. Fifty-four percent of Dow's US employees are laborers, clerical staff, or technical workers. The remaining workers are professionals or managers (44%) or are in sales (2%). Most (75%) of Dow's employees are men, 82% are white, and their average age is 43 years.

Twelve Dow sites were recruited for the overall study nine intervention worksites in Texas ($N = 8$) and Louisiana ($N = 1$), and three control sites in West Virginia ($N = 1$), New Jersey ($N = 1$), and Louisiana ($N = 1$). In all, 10,281 employees were eligible to participate in the study (8013 at intervention sites and 2268 at control sites). The target goal for the overall study was to recruit 6000 employees from this pool of eligible employees (ie, 60% participation rate).

The three control sites were designated by Dow's leadership. The nine intervention sites were matched on size and other relevant measures and then randomly assigned to the moderate or intense environmental intervention conditions based on a coin flip. The control sites did not receive the environmental interventions and employees did not have access to the YW8 intervention. The environmental intervention was in place over a 2-year period from April 2006 to March 2008.

Study participants were asked to complete Health Risk Assessments (HRA) and participate in biometric screenings at three different time points: immediately prior to the intervention period (time 1/baseline), mid-way through the 2-year intervention period (time 2/mid-point), and at the conclusion of the intervention period (time 3/postintervention). At time 1, 5124 employees participated in the HRA (49.8% participation rate). Of the time 1 HRA participants, 3504 also enrolled for the biometric screenings (68.4% of HRA participants).

Because this study was not a randomized design, baseline demographics were examined to determine whether there were significant differences between the environmental interventions only and the environmental and individual intervention participants. Differences were controlled for when they were significantly related to intervention group and the outcome variables (eg, weight, BMI, physical activity risk). More detailed information on the design and methods employed in this study can be found in some of the other publications related to the overall study.²⁹⁻³³

Participants

The starting point for the present analyses was the time 1 to time 3 cohort of participants. This cohort consists of 2431 employees who completed the HRA at both time 1 and time 3, of which 1521 also provided biometric data. From this cohort, we then excluded all

participants from control sites ($n = 529$), those who had moved from one site to another site of different intervention intensity during the study period ($n = 29$), and those who set a goal to gain weight ($n = 14$). Thus, the present analyses were based on 1859 employees. From this total, 1111 (60%) also participated in the YW8 intervention. Broken down by intensity level, there were 235 YW8 participants and 134 nonparticipants at the moderate sites; and 876 YW8 participants and 614 nonparticipants at the intense sites.

Environmental Interventions

Two levels of environmental interventions were employed in the overall study. The moderate interventions were composed of two main components: (1) environmental prompts that encouraged employees to make healthy food choices and be physically active; and (2) point-of-choice messages to encourage healthy eating and physical activity, such as strategically placing signs in front of stairwells, vending machines, and cafeterias. Other parts of the intervention included modifying vending machine items and cafeteria menus, creating and marking walking paths at all sites, disseminating targeted messages that encouraged healthy eating and physical activity, establishing wellness ambassadors at local departments, and developing an employee recognition program for those adopting or encouraging others to adopt healthy lifestyles. YW8 was bundled within the moderate interventions.

The high-intensity condition included all the moderate intervention elements and added elements designed to directly influence organizational culture and boost leadership commitment to employee health. At these sites, interventions included (1) setting health objectives as a component of the sites' management goals, (2) providing management training on health-related topics, (3) compiling and sharing feedback reports to site and senior leaders at corporate headquarters on the sites' achievement of certain program participation targets, and (4) providing additional support and training to the wellness ambassadors. These activities were designed to encourage worksites to explicitly include employee health as an important business objective, and to hold site leadership accountable for employees' engagement in health promotion programs.

YW8 Challenge

The YW8 challenge was a relatively straightforward individual weight management program. Participation in YW8 was voluntary. Those choosing to participate in YW8 had to register for the program and select a personal weight loss goal. Employees could register at any time during the year; however, program registration was promoted and typically occurred during the first quarter of each year. During registration, employees reported their current weight and selected a weight loss goal from the following options: lose 1 to 5 pounds, lose 5 to 10 pounds, lose 10 to 15 pounds, lose 15 to 20 pounds, lose 20 or more pounds, maintain current weight, or gain weight. Following registration, each participant received a pedometer, a food journal, and weight and exercise tracking forms for their personal use. Other YW8 program components included a monthly E-mail consisting of health messages, resources, ideas, and various weight management activities and resources; monthly conference calls with a health expert; and access to the YW8 web page. Employees were asked to self-report their weight at three quarterly checkpoints throughout the year. YW8 was available to employees at all nine intervention sites.

Measures and Data Collection Procedures

Health risk and biometrics—Behavioral risk data were collected using a standardized HRA instrument developed by the research organizations participating in the National Heart Lung and Blood Institute (NHLBI) studies.³⁴ Health Risk Assessments were administered online. Baseline data (collected in the first quarter of 2006 using an electronic HRA survey

instrument) consisted of employee demographic information and self-reported health behaviors. All HRA participants were offered the opportunity to set up an appointment for biometric screenings but not all of them took advantage of the free service. Biometric data were collected using standardized protocols developed by Dow Health Services. The screening measures were collected by health professionals shortly after HRAs were administered. Employees who participated in the biometric screenings were provided individual written feedback and counseling on their health risks. Follow-up HRA and biometric assessments were collected during the first quarters of 2007 (T2) and 2008 (T3). Biometric measures included height, weight, BMI, total cholesterol, and blood glucose. Cholesterol and blood glucose values were analyzed as continuous variables and categorically dichotomized as high versus low risk based on standard clinical definitions of high risk. Body mass index was analyzed as both a continuous and categorical variable, that is, normal (not at risk/low risk, BMI = 18.0--24.9), overweight (moderate risk, BMI = 25.0--29.9) or obese (high risk, BMI = 30.0+). Body mass index was calculated from the height and weight measurements collected from participants. Weight was analyzed as a continuous variable and weight loss and was also analyzed as a categorical variable (0.05%--4.9%, 5.0%--9.9%, and $\geq 10.0\%$ of body weight) per recommendations by Christian, Tsai, and Bessesen.³⁵

Behavioral health-risk outcomes, dichotomized as high versus low risk, were scored using several HRA questions and included indicators for poor nutrition and lack of physical activity. Poor nutrition was defined as consuming four or more fast food meals per week, or two or more sweetened beverages per day, or three or fewer fruit and vegetable servings per day. Lack of physical activity was defined as engaging in any moderate or strenuous physical activity less than once per week.

YW8—Employees enrolled in YW8 by setting a weight-related goal and reporting their baseline weight at sign up (March 2006 or March 2007). They were then asked to provide self-reported weight information three times after signup at 3-month intervals (June, September, and November). For purposes of this study, YW8 participants were defined as those who set a goal to maintain or lose weight (ie, excluded those who chose to gain weight), reported at least one weight after sign up, participated in YW8 in either year (2006 or 2007), and who did not move to a new worksite at a different intensity of environmental intervention during the study (eg, excluded those who transferred from a moderate site to an intense site). The analyses presented in this article used body weights recorded at the biometric screenings rather than self-reported weights.

Statistical Methods

All hypothesis tests were conducted in SPSS v.17.0 and use $\alpha = .05$ for statistical significance criterion. Hypotheses were tested using HRA and biometric data from 2006 and 2008 in a pretest (T1)/posttest (T3) design that included an YW8 participation variable based on the 2006 and 2007 YW8 participation data. Continuous risk outcomes were analyzed using repeated measures ANCOVA and categorical risk outcomes were analyzed using logistic regression on difference scores categorized as those who decreased their risk (1) versus those who did not (0). In these models participant group (YW8 participation and environmental intervention intensity) was the grouping variable of interest and covariates (age, sex, job type, ethnicity, and education) were included where they were significantly associated with the grouping variable and the outcome variable. Covariates were coded using company human resources data.

Analyses exploring the impact of environmental intervention intensity on various participation and engagement variables were conducted using linear and logistic regressions.

The independent variable of interest was the environmental intervention intensity (moderate intensity was the reference group), and the following control variables were also included in the models sex, education, ethnicity, job type, age, baseline BMI, supportive work environment, employer interest in health, and, in some cases, weight management goal.

Results

Comparison of YW8 and Non-YW8 Participants

The first set of analyses compared employees at the nine environmental intervention sites who participated in the individual-focused YW8 intervention versus those who did not. These findings are summarized in Tables 1 and 2.

The YW8 intervention was quite popular among employees; approximately 60% of those eligible in the T1-T3 cohort enrolled in the YW8 intervention. Significant differences between the YW8 and non-YW8 groups were found for education ($P < 0.000$) and job type ($P < 0.004$). Why Weight Challenge participants were better educated and were more likely to be employed in managerial or professional job categories. Trends approaching significance were obtained for sex and BMI. The YW8 group contained somewhat more women than men ($P = 0.070$) and those with higher BMIs ($P = 0.056$).

However, employees who participated in the individually focused YW8 intervention were no more successful at losing weight than those who were only exposed to the environmental interventions. The YW8 and non-YW8 groups did not differ in terms of BMI, percent overweight, percent obese, or percent of body weight lost. About 13.5% of employees in both groups lost 5% or more of their body weight during the 2-year intervention period. Evidence indicates that a weight loss of 5% conveys measurable health benefits.^{36,37} Employees who participated in YW8 fared somewhat better in terms of physical activity, blood glucose, and cholesterol risk, but none of these findings reached statistical significance (P s < 0.054 – 0.073).

Moderate Versus Intense Environmental Interventions

The second purpose of this study was to assess whether the intense set of environmental interventions (relative to the moderate level) engendered greater employee participation and engagement in the YW8 intervention and/or greater success in losing weight.

Scores from the Environmental Assessment Tool (EAT) were used to check on the effectiveness of the environmental manipulation (moderate versus intense). The EAT was developed specifically for this study to capture changes in the physical and social/organizational environment over time. The development and validation of this tool is described in other publications.^{31,33} The EAT is an observational checklist that yields a total score (100 points maximum) and three subscores environmental supports for nutrition and weight management, environmental supports for physical activity, and general supportive organizational characteristics. Analysis of EAT scores showed that the moderate and intense conditions differed significantly across time in terms of supports for nutrition and weight management and general organizational supports.³³ No differences were found for physical activity. This was not surprising because the only intervention specifically targeting physical activity was the installation of marked walking paths, which took place at all nine intervention sites. In summary, the environmental manipulation appeared to be effective.

Table 3 summarizes the results for YW8 participation and engagement. Employees at the intense sites were no more likely to participate in YW8 than those at the moderate sites, and the intense sites did not attract a higher percentage of overweight or obese employees into the individual intervention. Repeat participation in YW8 (ie, enrollment in both 2006 and

2007) was somewhat greater at the intense sites, but this difference did not reach statistical significance ($P < 0.099$). Participants at the intense sites (relative to the moderate sites) did not set more challenging weight loss goals or self-report their weight more frequently. Finally, YW8 participants at the intense sites were no more successful in achieving their weight loss goals than their counterparts at the moderate sites (see Table 3).

Table 4 presents the environmental only versus environmental and YW8 comparisons by treatment condition (moderate and intense). At the moderate sites, there were no differences in behavioral or biometric outcomes between those who did or did not participate in the YW8 intervention. The intense group presented a slightly different picture. Those who participated in YW8 at the intense sites were 1.87 times as likely as nonparticipants to reduce their risk of physical inactivity ($P = 0.0082$). Additionally, participation in YW8 at the intense sites resulted in a smaller increase in blood glucose over the 2-year intervention period ($P = 0.036$). These effects, however, did not carryover to any of the weight-related outcomes (weight%, body weight lost, BMI%, obesity%, overweight %, or body weight lost %).

As a final set of analyses, we restricted the sample to those who participated in YW8 at the moderate sites versus those who participated in YW8 at the intense sites. There were no significant differences for any of the behavioral or biometric measures.

Discussion

Employees at worksites implementing environmental weight management interventions who also self-selected into the individual weight loss intervention (YW8) were no more successful in losing weight than those exposed to only the environmental interventions. Changes in mean body weight and BMI were negligible across the 2-year intervention period for both groups. In terms of categorical outcomes, about 13.5% of each group lost at least 5% of their body weight during the intervention period. The level of environmental support did not impact YW8 participation or engagement. Why Weight Challenge participants at the intense sites did show significantly more positive changes in physical activity behavior compared to nonparticipants, but these effects did not translate into superior weight-related outcomes.

The lack of more impressive weight loss results in this study raises some interesting and potentially important questions about the use of environmental interventions in workplace weight loss initiatives. First, it is important to realize that the moderate environmental interventions used in this study were not designed with intensity in mind. The goal for the moderate environmental interventions was to utilize a set of simple, low cost interventions that would be easy to implement in a wide variety of workplaces and that could be sustainable over time.³⁰ Environmental interventions target whole populations or workforces rather than individuals. Intensity in terms of environmental interventions has not been defined in the literature, but because most environmental interventions are designed to make healthy choices easier, intensity would seem to vary as a function of the extent to which this is accomplished. Environmental modifications that make a healthy behavior much easier would be more intense than those that make the same behavior only slightly easier. Likewise, an intervention that simply prompts a health behavior (such as signs encouraging stair use) would be less intense than one that substantially facilitates the behavior. Using this logic, the moderate environmental interventions in the present study were not very intense. For example, the vending intervention involved labeling healthy items and having at least 25% healthy snacks in vending machines. This represented an improvement over prestudy conditions, but it did not make healthy snacking particularly easy or unhealthy snacking particularly difficult. On the basis of the results of this study, a set of simple environmental

modifications in the workplace is not likely to produce much weight loss among employees but may make weight maintenance easier. The potential for more potent or facilitative environmental interventions, however, should not be dismissed and merits future study.

The intense environmental condition in this study sought to engage leadership and create a more positive and supportive climate for health at the sites. Process measures in the larger study generally showed that this engagement occurred with some fading during year 2 of the intervention.^{33,38} But to a considerable extent, this leadership engagement failed to impact frontline employees at a subjective or perceptual level. Employee perceptions of the health climate at work improved with the interventions at all sites but were not different (more positive) at intense compared to moderate sites.³⁹ This does not mean that management engagement or support is not important; rather, it suggests that management support must be effectively communicated and result in visible actions and tangible changes that impact the daily work life of average, rank-and-file employees. Indeed, environmental interventions may be most effective when they are publicized through multiple channels and accompanied by policy actions that materially facilitate and reinforce the desired behavioral outcomes. As with other types of interventions, environmental interventions should be conceptually structured and their intended impacts carefully mapped.³⁹⁻⁴²

The present results also draw attention to the selection and use of individual weight loss interventions in work settings. We know quite well that the effectiveness of behavioral weight loss interventions increases as a function of intervention intensity.^{7,35,43-45} For behavioral interventions, intensity is usually assessed in terms of the frequency or amount of participant contact.^{7,35,44} However, intervention intensity is usually achieved at the cost of intervention reach. In worksite interventions, the goal is often to reach as many people as possible and to be economical in terms of time demands and costs. Consistent with this, YW8 provided only limited direct person-to-person contact. Some informal personal contact was available, if requested, when participants set their initial weight loss goals. After that, the monthly conference calls provided the principal opportunity to access information directly from a nutrition or exercise specialist or from other participants. Process evaluation data indicated that participation in the conference calls was quite limited. Participant use of available resources such as pedometers and food diaries was optional and not actively monitored. The YW8 intervention could easily be implemented in a wide variety of work settings, but it may be unreasonable to expect such simple and self-directed interventions to produce substantial weight loss alone or even in combination with moderate environmental supports. Such programs may be useful for weight maintenance and for focusing employee attention on healthy eating and weight management issues. More comprehensive worksite programs may need to triage participants into programs of appropriate intensity.

A third and related issue involve the appropriate goals for broad-based worksite weight management efforts. Comparison of pooled weight loss results from systematic reviews of worksite-based interventions^{7,43} generally show lower levels of weight loss than those achieved in the broader weight loss literature.⁴⁴ Some of this difference is almost certainly attributable to intervention intensity, but some is probably due to the characteristics of the participants themselves. Most worksite health promotion initiatives cast a wide net and allow all willing employees to participate. In contrast, weight loss interventions in primary care and other clinical settings frequently limit participants to those classified as obese or very overweight, or to those who are prediabetic or who otherwise present a specific risk profile. Weight loss results for such groups are likely to be superior to those obtained from a general employee population. The present study started with participants who as a group were overweight but not obese (mean BMI < 30). Over the course of a 2-year intervention period, mean weights and BMI essentially remained unchanged. From the perspective of many worksite programs, this may be a good and realistic outcome: to prevent weight gain

over time. From a population health perspective, this would be a very positive and important outcome.

Limitations

The present study has several limitations. First, the design of the overall study was quasiexperimental. To help control for selection bias in the current analyses, we examined baseline demographics to determine whether there were significant differences between the environmental intervention only and the environmental and individual participants and controlled for these differences where they were significant related to the grouping and outcome variables.

Second, it is important to note that the employee cohort examined in this study is different from the larger group of employees who provided baseline data. Compared to those who completed HRAs at baseline but not at follow-up, the time 1 to time 3 cohort members were more highly educated, more likely to hold salaried or white collar positions, and more likely to be woman. These differences were also apparent among those who choose not to participate in YW8 versus those who did participate. The fact remains that the present sample may not adequately represent the total workforces at the various Dow sites.

Third, not all participants who completed the health risk appraisal also participated in the biometric screening. Employees were strongly encouraged to participate in both components and the screenings were made as convenient as possible and scheduled on company time and at company expense. The analysis of biometric outcomes was limited to those who had provided biometric data. In most respects, missing data were equivalent across the principal groups compared in this study.

A fourth limitation is that the participant sample was not restricted to employees who were obese or very overweight. As such, the weight loss results, or lack of results, are not directly comparable to the overall weight loss literature or to most studies conducted in primary care and other clinical settings.

Conclusion

In conclusion, these results suggest that simple, low-cost environmental modifications at the workplace that encourage employees to make healthy food choices and be physically active may help with weight maintenance in an overweight employee population. The addition of a low-intensity individually focused weight loss intervention does not produce an additive effect and neither intervention is likely to result in substantial weight reductions. Low-cost environmental interventions provide an opportunity for worksites to encourage weight maintenance and control in the general employee population. Additional research is needed to determine whether more comprehensive worksite programs that triage participants into programs of appropriate intensity result in additional weight loss.

Acknowledgments

Funding: Funding for this study was provided by the National, Heart, Lung and Blood Institute (NHLBI), (Grant # R01 HL79546). However, its contents are the sole responsibility of the authors and do not necessarily represent the official views of NHLBI.

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Table 1

Demographics

		Intervention Group		p-value
		Environmental Only	Environmental & YW8	
N =		748	1111	N/A
%		40.2%	59.8%	N/A
Education	Missing	Count	229	
	% within Intervention	30.5%	20.6%	
	Less than bachelors degree	Count	341	
	% within Intervention	26.6%	30.7%	.000
	Bachelors degree	Count	425	
	% within Intervention	31.0%	38.3%	
	Masters or doctorate	Count	116	
	% within Intervention	11.9%	10.4%	
Job Type	Officials, Managers, Professionals, and Sales	Count	562	
	% within Intervention	43.7%	50.6%	
	Technicians, Office & Clerical, and Craft	Count	395	.004
	% within Intervention	37.8%	35.6%	
	Operatives, Laborers, and Service	Count	154	
	% within Intervention	18.4%	13.9%	
Ethnicity	Caucasian	Count	835	
	% within Intervention	75.7%	75.2%	.802
	Hispanic, American Indian, Alaskan Native, Black	Count	276	
	% within Intervention	24.3%	24.8%	
Gender	Male	Count	794	
	% within Intervention	75.3%	71.5%	.070
	Female	Count	317	
	% within Intervention	24.7%	28.5%	
Age	Mean	44.7	44.0	.107

	Intervention Group		p-value
	Environmental Only	Environmental & YW8	
BMI	SD	7.8	8.8
	Mean	28.2	28.8
	SD	5.4	5.4

Table 2
Outcomes for environmental intervention only versus those also in the individual intervention

Outcomes	Year	Env. Only (A)		Env. & YW8 (B)		OR / *(T _{2B} -T _{1B})-(T _{2A} -T _{1A})	Wald χ^2 / *Wilks Lambda	p-value	
		% HR*Mean	*SE	% HR*Mean	*SE				
Behavioral	Poor Nutrition	2006	82.4%	--	76.5%	--	1.21	1.85	0.1735
		2008	74.3%	--	66.9%	--			
	Physical Inactivity	2006	8.5%	--	11.3%	--	1.45	3.42	0.0646
		2008	7.4%	--	7.0%	--			
	Weight*	2006	189.2	2.40	195.6	1.90	-0.32	1.00	0.6907
		2008	189.0	2.34	195.1	1.85			
	Weight loss: .05%-4.9% of BW		33.7%	--	30.2%	--	0.84	1.63	0.2015
	Weight loss: 5.0%-9.9% of BW		10.3%	--	9.8%	--	0.95	0.06	0.8048
Biometric	Weight loss: $\geq 10.0\%$ of BW		3.3%	--	3.9%	--	1.31	0.57	0.4493
	BMI*	2006	28.11	0.29	29.13	0.23	-0.01	1.00	0.9400
		2008	28.24	0.29	29.25	0.23			
	Obesity	2006	27.0%	--	32.6%	--	0.82	0.50	0.4788
		2008	25.3%	--	34.9%	--			
	Overweight	2006	40.1%	--	39.9%	--	1.34	1.58	0.2085
		2008	44.7%	--	41.1%	--			
	Obese or Overweight	2006	67.0%	--	72.5%	--	0.86	0.15	0.7033
		2008	70.0%	--	76.0%	--			
	Blood Glucose*	2006	93.57	1.10	96.04	0.86	-1.91	1.00	0.0539
	2008	96.23	1.10	96.80	0.86				
Blood Glucose Risk	2006	2.7%	--	3.8%	--	2.50	1.89	0.1689	
	2008	3.6%	--	4.6%	--				
Cholesterol*	2006	196.44	2.07	194.62	1.63	3.21	1.00	0.1143	
	2008	192.14	2.02	193.53	1.59				
Cholesterol Risk	2006	6.3%	--	8.9%	--	1.48	3.21	0.0730	
	2008	5.8%	--	7.4%	--				

Notes. "Env." indicates environmental intervention; "HR" indicates high risk; "SE" indicates standard error; "*" indicates a continuous variable; " χ^2 " indicates chi-squared; "BW" indicates body weight; "OR" indicates odds ratio; All analyses control for covariates (age, gender, job type, ethnicity, and education) that were significantly related to the grouping variable and the outcome variable. Categorical outcomes were tested using logistic regression for those who decreased their risk (1) and those who did not decrease their risk level (0 = reference group). Continuous outcomes were tested using repeated measures ANCOVA.

Table 3
Impacts of intervention intensity on participation and engagement variables

		Intense (ref. moderate)
Participation in YW8	All Employees	OR .825
		p-value .284
	Obese or Overweight Employees	OR .778
		p-value .220
Repeat Participation in YW8		OR 1.399
		p-value .099
Difficulty of Goal Set		B -.159
		p-value .491
Number of Reported Weights		B -.173
		p-value .267
Achieved Goal		OR 1.069
		p-value .717

Notes. "OR" indicates odds ratio; "ref." indicates reference category; Analyses control for covariates (age, gender, job type, ethnicity, and education).

Table 4
Outcomes for environmental intervention only versus those also in the individual intervention by environmental intervention intensity

Outcomes	Year	Env. Only (A)		Env. & YW8 (B)		OR / *(T _{2B} -T _{1B})-(T _{2A} -T _{1A})	Wald χ^2 / *Wilks Lambda	p-value			
		% HR/*Mean	*SE	% HR/*Mean	*SE						
Moderate Environmental Intervention											
Behavioral	Poor Nutrition	2006	88.4%	--		78.7%	--		0.64	0.4229	
		2008	76.0%	--		66.1%	--	1.29			
	Physical Inactivity	2006	12.6%	--		9.2%	--		0.63	0.2502	
		2008	6.3%	--		6.0%	--				
	Weight*	2006	186.6	6.92	193.4	5.12		-0.67	0.11	0.7416	
		2008	186.0	6.70	192.2	4.96			0.15	0.7010	
	Weight loss: .05%-4.9% of BW		30.9%	--		28.2%	--	0.87	0.11	0.7369	
	Weight loss: 5.0%-9.9% of BW		7.3%	--		9.4%	--	1.23	0.03	0.8539	
Biometric	BMI*	2006	27.81	.87	28.94	.66		-0.14	0.19	0.6634	
		2008	27.94	.87	28.92	.66			0.01	0.9413	
	Obesity	2006	32.7%	--		37.6%	--	0.95		0.20	0.6520
		2008	30.9%	--		40.9%	--			0.62	0.4312
	Overweight	2006	45.5%	--		42.3%	--	1.26			
		2008	45.5%	--		41.6%	--				
	Obese or Overweight	2006	78.2%	--		79.9%	--	0.52			0.6204
		2008	76.4%	--		82.6%	--				
Intense Environmental Intervention	Blood Glucose*	2006	96.29	2.03	94.69	1.24		1.16	.246		
		2008	96.69	2.46	96.26	1.49			0.32	0.5721	
	Blood Glucose Risk	2006	5.5%	--		2.9%	--	0.57			
		2008	5.5%	--		2.4%	--				
	Cholesterol*	2006	199.25	5.89	192.52	4.36		5.17	1.02	0.3135	
		2008	201.64	5.88	200.08	4.36			1.09	0.2967	
	Cholesterol Risk	2006	10.4%	--		9.4%	--	1.66			
		2008	9.0%	--		8.1%	--				

Outcomes	Year	Env. Only (A)		Env. & YW8 (B)		OR / $*(T_{2B}-T_{1B})-(T_{2A}-T_{1A})$	Wald χ^2 / *Wilks Lambda	p-value
		% HR/%Mean	*SE	% HR/%Mean	*SE			
Behavioral	Nutrition	2006	81.1%	--	--	75.9%	--	
		2008	73.9%	--	--	67.1%	--	1.20 1.36 0.2434
	Physical Inactivity	2006	7.7%	--	--	11.9%	--	
		2008	7.7%	--	--	7.3%	--	1.87 6.99 0.0082
	Weight*	2006	189.1	2.61	195.1	2.13		
		2008	189.1	2.55	194.8	2.08		0.11 0.7455
	Weight loss: .05%-4.9% of BW		34.2%	--		30.7%	--	-0.29 1.39 0.2381
	Weight loss: 5.0%-9.9% of BW		10.9%	--		9.9%	--	0.92 0.13 0.7167
Biometric	Weight loss: $\geq 10.0\%$ of BW		2.9%	--		3.9%	--	1.45 0.86 0.3531
	BMI*	2006	28.25	.34	29.21	.28		
		2008	28.40	.33	29.38	.27		0.02 0.02 0.9000
	Obesity	2006	26.0%	--		31.4%	--	
		2008	24.4%	--		33.4%	--	0.79 0.51 0.4735
	Overweight	2006	39.1%	--		39.3%	--	
		2008	44.6%	--		41.0%	--	1.38 1.44 0.2294
	Obese or Overweight	2006	65.1%	--		70.7%	--	
		2008	68.9%	--		74.4%	--	0.94 0.02 0.8840
	Blood Glucose*	2006	92.01	1.12	95.21	0.81		
		2008	95.57	1.09	96.48	0.79		-2.29 4.39 0.0362
	Blood Glucose Risk	2006	2.2%	--		4.0%	--	
		2008	3.2%	--		5.2%	--	5.65 2.66 0.1030
	Cholesterol*	2006	195.60	2.26	194.47	1.83		
		2008	190.22	2.19	191.63	1.77		2.53 1.30 0.2540
	Cholesterol Risk	2006	5.4%	--		8.8%	--	
		2008	5.1%	--		7.2%	--	1.43 2.09 0.1485

Notes. "Env." indicates environmental intervention; "HR" indicates high risk; "SE" indicates standard error; "*" indicates measure applies to continuous variables or measure is a continuous variable; " χ^2 " indicates chi-squared; "BW" indicates body weight; "OR" indicates odds ratio; All analyses control for covariates (age, gender, job type, ethnicity, and education) that were significantly related to the grouping variable and the outcome variable. Categorical outcomes were tested using logistic regression for those who decreased their risk (1) and those who did not decrease their risk level (0 = reference group). Continuous outcomes were tested using repeated measures ANCOVA.