Steps to Health: Targeting Obesity in the Health Care Workplace
Final Progress Report

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List of Abbreviations

BMI	Body Mass Index
HRA	Health Risk Assessment
LFL	Live for Life (health promotion program at Duke University)
RCT	Randomized controlled trial
SD	Standard deviation
SE	Standard error
STH	Steps to Health (educational occupational weight management program)
STH+	Steps to Health Plus (behavioral occupational weight management program)

Abstract

The workplace can be an important setting for addressing obesity. As increasing numbers of employers offer weight management programs, there is a need for evaluation.

The Steps to Health study (STH) was a randomized trial to evaluate the effectiveness of two preexisting employee weight management programs offered at Duke University and Medical Center.
A total of 550 obese (body mass index [BMI], ≥30 kg/m2) employees were randomized 1:1 to either Steps to Health (STH) or STH+. We also compared the study participants with an observational group of obese employees not taking part in the study.

Baseline data included height/weight, accelerometry, and questionnaires querying physical activity, and dietary intake. Employees were contacted to complete a follow-up visit approximately 14 months after baseline. Health risk appraisal data, human resource data, health insurance claims data, and data on the observational group were available through the Duke Occupational Health Surveillance System. We recontacted the participants to investigate the barriers to participation and behavior change they experienced.

In secondary analyses of health care utilization and health care costs, participants in the two programs were compared using propensity score adjustment. We also compared the two intervention groups with the observational group and compared those who lost weight with those who did not.

In separate analyses of all Duke Employees from the last decade, we set out to evaluate the relationship between BMI and health claims costs over the last decade, assess the strength and nature of the relationship between BMI and costs, and identify comorbidities that may drive increased costs.

At baseline, the mean age was 45 years, 83% were female, 41% white, and 53% black. Mean BMI was 37.2. Participants consumed a mean of 2.37 servings of fruits and vegetables per day (in the past week), participated in 11.5 min of moderate-to-vigorous physical activity, and spent 620 min being sedentary.

At follow-up, there were no clinically, or statistically, meaningful differences in outcomes between the two arms, but there were modest reductions in BMI. In terms of health care utilization and health care costs, there were no significant differences between the two intervention groups, or between these intervention groups and the observational group. However, those who lost weight reduced their overall health care costs.

The main barriers to healthy eating were *Lack of self-control and convenience* and *Lack of access to healthy foods*. The main barriers to physical activity were *Time constraints* and *Lack of interest and motivation.*
In the related analysis of BMI and morbidity, we found that there was a gradual increase in health claims costs with increasing BMI starting at the low end of the recommended BMI range.

The findings of the STH study suggest that to achieve weight loss, behavioral change, and associated morbidity reductions through the workplace, more extensive and intensive interventions, with more attention to motivation and compliance, are required. Common barriers must also be considered when designing workplace management programs to improve their uptake and effectiveness.

Section 1

Significant Findings

The primary aim of the study was to determine whether employees participating in STH+ would lose significantly more body mass than participants in STH. At baseline the mean BMI was 37.02 (SD = 6.14), at the immediate post-intervention follow-up, approximately 14 months post-baseline, the mean BMI reduction in BMI was 0.30 unit (SE = 0.10). The STH participants lost 0.25 BMI units (95% confidence interval [CI], −0.53 to 0.02), and the STH+ participants lost 0.36 BMI units (95% CI, −0.66 to 0.05). Nevertheless, there was no clinically and statistically meaningful difference between the two arms in change in BMI (mean difference of 0.10 units; SE = 0.21; $P = 0.65$). However, the modest reductions in weight in both arms (Mean reduction in weight of 1.9 pounds; SD = 13.0), suggests that both programs have modest impacts, as the standard trend observed in workplace settings is slight annual increases in BMI.

The second aim of the project was to determine whether employees participating in STH+ would experience greater improvements in social-cognitive factors and lifestyle behaviors (physical activity and nutrition) than employees in STH. At baseline, participants consumed a mean of 2.37 servings of fruits and vegetables per day (in the past week), participated in 11.5 min of moderate-to-vigorous physical activity, and spent 620 min being sedentary. At the immediate post-intervention follow-up there were no statistically or clinically meaningful differences between the arms in change social-cognitive factors and lifestyle behaviors. However, both arms showed a decrease in mean daily ounces of sugar-sweetened beverages consumed: 6.49 ounces in STH (95% CI, −9.35 to −3.63; $P < 0.0001$) and 5.66 ounces in STH+ (95% CI,−2.09 to 0.94; P=0.0001). The STH+ arm showed a decrease in mean BMI of 0.36 units (95% CI, −0.66 to −0.05; $P = 0.02$), an increase in mean daily servings of fruit and vegetables of 0.30 servings (95% CI, 0.04 to 0.57; $P = 0.02$), and a decrease in mean percentage of energy intake of fat of 1.52% (95% CI, −2.09 to −0.94; $P < 0.0001$). The STH arm showed an increase in mean moderate-to-vigorous physical activity of 0.17 min/hr/d (95% CI, 0.05 to 0.30; $P = 0.007$) and a reduction in mean sedentary time of 1.3 min/hr/d (95% CI, −2.4 to −0.2; $P = 0.02$).

The third aim of the project was to determine the relative impact of STH+ and STH on health care utilization and health claim reimbursements. To accomplish this aim we first conducted an analysis of BMI and morbidity in a larger dataset that included all claims data for employees who participated in the employee insurance plan at any time between 2001-2011. Using this data, we found that there was a gradual increase in health claims costs with increasing BMI starting at the low end of the recommended BMI range. We added this analysis as a related aim (Aim 5), that was not included in the grant, but we felt was important to characterize the impact of BMI on morbidity and health care costs in our employee population. Then to address aim 3, we looked at the claims data for our study population specifically. We used historic data from up to 1 year prior to the date on the baseline assessments to estimate pre-intervention health care costs and usage, and the data from the year following the end of the intervention to calculate post-intervention costs and usage. We found no significant differences between the two intervention groups in terms of health care costs or utilization. We did find that those who lost weight, regardless of study arm, reduced their overall health care costs.

Aim 4 of the study was to determine the overall relative impact of STH+ and STH on net program costs. Since we found no differences between the two arms for the primary outcome measure of BMI change, we did not pursue further investigation into the net program costs. We did decide to look at health care costs for study participants, in either arm, compared to an observational control group of employees. We used the same pre- and post-intervention periods as described above, and created an observational group using propensity score adjustment to balance risk factors and covariates. In terms of health care utilization and health care costs, there were no significant differences between these intervention groups and the observational group.

Following the completion of primary data collection we added an aim (Aim 6) to identify common barriers, facilitators and motivators that may impact the ability to make behavior changes suggested by the program to

reduce weight. Based on self-reported survey data, we were able to identify the most commonly reported barriers to healthy eating and physical activity. The main barriers to healthy eating were *Lack of self-control and convenience* and *Lack of access to healthy foods*. The main barriers to physical activity were *Time constraints* and *Lack of interest and motivation*. The manuscript detailing these findings is currently under review.

Finally, we conducted some small focus groups with study participants to understand how supportive the work environment is for healthy behaviors, and how it could be improved. The findings, not yet published, point to a number of concrete suggestions to improve both health promotion programs in the workplace, as well as the workplace itself to better support employee healthy weight. These included clearly identifying the program coach as important to success. Participants felt the coach provided motivation and a support system that many people lacked. Many participants noted that even if their weight hadn't decreased, they did notice other health benefits from participating in the program and following the programs' suggestions, including increased energy levels, improved cholesterol and blood pressure and lower body fat percentage.

Translation of Findings.

The findings of the STH study suggest that to achieve weight loss, behavioral change, and associated morbidity reductions through the workplace, more extensive and intensive interventions, with more attention to motivation and compliance, are required. Common barriers must also be considered when designing workplace management programs to improve their uptake and effectiveness.

The findings of this study have been shared with Human Resource and Steps to Health program management in our workplace. As we learn more from the qualitative work we plan to continue to share suggestions from participants on how the workplace, and the specific weight management programs, may be improved to be more effective for employees. They can also serve as a guide for future research into workplace weight management programs, who can benefit from our findings to design programs which may be more intensive or better address the barriers identified by this study.

Outcomes/ Impact.

The findings of this study could guide future research into designing better employee weight management programs. It could also guide workplaces looking to implement an employee weight management program, or make changes to a program they already have in place. The potential outcomes of this project include some detailed suggestions for program managers on ways to increase participation and help support healthy behaviors in their employee population.

Suggestions for the worksite to help remove or reduce barriers and create a more supportive environment for healthy eating and increased physical activity included: increasing the availability of healthy food options, offering free exercise classes onsite, and allowing for flexible work schedules that allow time for exercise or to attend weight management meetings during work hours.

Within weight management programs specifically, coaches can help identify potential barriers, develop strategies for overcoming these barriers and create accountability for the participant's actions in a supportive environment through frequent, convenient contact and group exercise classes. Programs could measure other health outcomes, not just weight, to better gauge the effects of the program.

Section 2

Scientific Report

Background

Given the nation's obesity crisis, increased multilevel efforts to promote weight loss through increased physical activity and improved nutrition among overweight and obese Americans are urgently needed. The workplace may be an ideal and central site to reach large populations of adults with weight control programs. Several federal agencies have called for further pursuit of this opportunity to improve public health. Worksite weight control programs can create short-term weight loss in overweight participants. More controlled trials demonstrating long-term maintenance of weight loss are needed. Interventions targeting workers in health care settings may have both direct and indirect benefits. In addition to having direct positive effects on workers' health, worksite obesity prevention and treatment programs have the potential to increase worker productivity and reduce health care costs, including workers' compensation costs, making such programs economically attractive from the employer's viewpoint.

This study evaluated two existing employee weight management programs offered at Duke University and Medical System (Duke), Steps to Health (STH) and Steps to Health Plus (STH+). Each program is about 12 months in length. STH is a low-intensity educational curriculum involving three contacts over one year while STH+ is a high-intensity behavioral, individually-tailored counseling intervention involving monthly contacts of the year.

In analyses of costs and health care utilization, the participants in the two intervention arms were also compared to an observational control group of employees who did not participate in the weight management program, but met inclusion criteria.

In a separate, but related, analysis of all Duke employees from the last decade, we set out to evaluate the relationship between BMI and health claims costs over the last decade, assess the strength and nature of the relationship between BMI and costs, and identify comorbidities that may drive increased costs.

When evaluating the data collected during Years 1-5 the investigators found that they wanted to learn more about what may have contributed to program participation, behavior change, and weight loss. We requested, and were approved, to use of remaining funds at the end Year 5 for a one year no-cost extension. During the extension period we conducted a follow-up study with participants in both arms of the main study. This included a survey as well as focus groups to collect qualitative data. The addition of the data from the follow-up study helps aid the interpretation of the data and make specific recommendations about workplace interventions was important and provides contextual information that was lacking from the original study.

Specific Aims (unchanged from original proposal)

Aim 1. Determine whether employees participating in STH+ will lose significantly more body mass than participants in STH.

Aim 2. Determine whether employees participating in STH+ will experience greater improvements in social-cognitive factors and lifestyle behaviors (physical activity and nutrition) than employees in STH.

Aim 3. Determine the relative impact of STH+ and STH on 1) reduction in workplace injuries and associated costs, 2) health care utilization and health claim reimbursements, and 3) absenteeism and presenteeism.

Aim 4. Determine the overall relative impact of STH+ and STH on net program costs.

Aim of Related Research

Aim 5. Evaluate the relationship between body mass index and morbidity and how they related to health claim costs.

Additional Aims (addressed during the no-cost extension period)

Aim 6. Identify common barriers, facilitators and motivators that may impact engagement in the program, the ability to make behavior changes.

Aim 7. Evaluate the workplace climate to assess how supportive it is for healthy behaviors and program engagement.

Methods

Using a randomized controlled trial (RCT) design, the primary objective is to determine the effectiveness of a behavioral worksite weight control program relative to an established "usual standard of care" worksite weight control program at reducing BMI through improved lifestyle behaviors. The target population is employees who have been identified during a routine health risk appraisal as having a Body Mass Index ≥ 30.

Employees were recruited to participate in the study during an annual Health Risk Assessment (HRA) event. Existing and new employees completing the HRA were eligible for the study if they meet the following criteria: 1) BMI ≥ 30, 2) able to read and understand study materials which are presented in English, 3) no plans to leave Duke in the next year, 4) not enrolled in the other available individual intervention programs (hypertension, cholesterol or pre-diabetes). HRA staff initially approached employees about the study, and anyone who was interested and appeared to be eligible was referred to the study team.

Once consent was obtained by the study staff employees were asked to complete the baseline study assessments. These included the collection of standardized weight and height measurements, completion of a self-report questionnaire, and wearing an accelerometer. The accelerometer used for the study was an Actical multi-axial accelerometer (model #198-0302, Mini-Mitter Co. Inc., Bend, Oregon). Participants were asked to wear the belted monitors on the right hip during waking hours for 7 consecutive days.

Data obtained from the HRA was also included in the study dataset. During the HRA a nurse measures blood pressure (BP), glucose, and cholesterol. As part of the self-reported HRA, employees reported current illness, diagnoses, and medications they took.

A total of 550 employees were randomized 1:1 to one of the two study arms, STH or STH+. Both STH and STH+ were preexisting employee weight management programs. The study did not change the programs or the way in which they were delivered. Both programs last approximately 12 months, and are embedded in the larger employee wellness program at Duke, but the programs differ in intensity and degree of personalization.

***Steps to Health*:** Participants randomized to Steps to Health (STH) received an educational program targeting healthy lifestyle changes for weight loss. They received 1 face-to-face meeting with a counselor in the first month, followed by monthly mailings of health education materials. They had two telephone counseling sessions (at months 6 and 12), that were coupled with feedback on self-reported weigh.

Steps to Health Plus: Participants randomized to Steps to Health Plus (STH+) received an intensive behavioral intervention. The intervention was stage-based and works with the participant at his/her level of readiness to change using counseling based on motivational interviewing. The program borrowed structure and components from the Johnson & Johnson Health and Wellness Program and, consistent with the Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults, had an overall goal of a 10% reduction in weight over the 12-month program. Participants in STH+ were offered 1) monthly counseling sessions (face-to-face in months 1, 4, 8, and 12, and the rest via telephone), 2) meetings with an exercise physiologist in months 2 and 5 to set goals and troubleshoot barriers related to physical activity, 3) quarterly biometric feedback, 4) targeted health education materials, and, 5) information and active linking with various Duke programs and wellness resources. Participants were also encouraged to make use of eHealth trackers for diet and weight.

Following completion of the intervention program, approximately 14 months following baseline data collection, we conducted a follow-up assessment consisting of standardized weight and height measurements, completion of a self-report questionnaire, and wearing an accelerometer. Participants were also encouraged to complete another HRA at this time.

Data from an observational comparison group consisting of employees who were eligible for the main study but did not take part was also collected. The data from the observational comparison group included a baseline HRA, any other HRAs they completed in the following 3 years, their workers' compensation claims (workplace injuries), and their health insurance claims.

Following the completion of the main STH study, we conducted a follow-up study to investigate how employee weight management programs could be improved for future participants. In the follow-up study, all 323 participants from the STH study who agreed to be contacted for further research were asked to complete a brief questionnaire. Participants received the survey through an email and a paper copy if the online version was not completed. In addition, a random selection of participants was asked to participate in one of a series of focus groups. We asked participants to provide feedback on the motivators, barriers, facilitators and support for healthy eating and physical activity that influenced their program participation, as well as recommendations to improve the program.

Results and discussion

Between January 2011 and July 2012, the study team assessed 876 employees for eligibility. Of those, 117 declined to participate; another 209 employees did not complete the baseline assessments and were not randomized. Of the 550 randomized employees, the mean age at baseline was 45 years, 83% were female, 41% white, and 53% black. Mean BMI was 37.2. Participants consumed a mean of 2.37 servings of fruits and vegetables per day (in the past week), participated in 11.5 min of moderate-to-vigorous physical activity, and spent 620 min being sedentary.

We evaluated comorbid health risks/diseases and found that 10% of the sample either reported type 1 diabetes or had a measured blood glucose ≥ 200 mg/dl. Dyslipidemia (cholesterol level ≥ 200 mg/dl) was identified in 35% of the participants. Hypertension (a systolic BP ≥ 140 mm Hg and/or a diastolic BP ≥ 90 mm Hg, endorsing a diagnosis of high blood pressure, or taking blood pressure medication) was present in 26% of the participants, and a further 20% were identified as having prehypertension (a measured systolic BP between 120-139 mm Hg and/or a diastolic BP between 80-89 mm Hg).

At the time of the immediate post-intervention follow-up two participants who completed the 14-month follow-up were excluded from analysis due to having had bariatric surgery between the baseline and follow-up assessment, and an additional three were excluded due to pregnancy. Of the remaining 545, 435 (80%) provided at least a weight measurement at the 14-month assessment (220 WM; 215 WM+), and were included in these analyses. Eighty-four percent of the participants (367 of the 435) completed all follow-up measures.

The demographic characteristics of the analysis sample closely approximated those of the randomized sample and were primarily female (84%), with a majority black /African American (53%) and a mean age of 45 years.

The mean BMI reduction for the two arms combined was only 0.30 units (SE = 0.10), which was not clinically or statistically significant. However, 16% of participants (n=71) had a reduction in their BMI of 2 units or more. When making comparisons between the two arms we found that the STH participants lost 0.25 BMI units (95% CI: -0.53, 0.02), and the STH+ participants lost 0.36 BMI units (95% CI: -0.66, -0.05), which was not significant (mean difference of 0.10 units, SE= 0.21, p=0.65).

We then evaluated the association between weight loss and participation in the intervention. Mean weight change in both arms was lower with lower participation in the program. In the STH arm, the mean weight change was -3.8 lbs. in those with 0% participation (n=21), and -4.7 lbs. in those with 100% participation (n=7), while in the STH + arm the mean weight change was +3.3 lbs. in those with 0% participation (n=23), and -5.8 in those with 100% participation (n=44).

We also assessed changes in behaviors associated with weight loss, namely diet and physical activity. We saw no differences between the arms, but observed an overall decrease in the mean daily ounces of sugar-sweetened beverages consumed (decrease of 6.49 ounces in STH (95% CI [-9.35,-3.63], $p<0.0001$) and of 5.66 ounces in STH+ (95% CI [(-2.09, -0.94], $p=0.0001$).

To provide an even better rationale for our study and to put our findings in context, we added an aim to the project to evaluate the relationship between body mass index and morbidity and how they related to health claim costs. To accomplish this aim we conducted an analysis of BMI and morbidity in a larger dataset that included all claims data for employees who participated in the employee insurance plan at any time between 2001-2011. Using this data, we found that there was a gradual increase in health claims costs with increasing BMI starting at the low end of the recommended BMI range.

We also evaluated the relationship between the findings above and self-reported exercise frequency. Using the employee claims data from 2001-2011 we found an association between increased exercise frequency and decreased healthcare costs was present in most medical and pharmacy cost categories and was most pronounced among employees declaring 2-3 and 4-5 days of exercise frequency per week. A statistically significant association existed between increased exercise frequency and reduced medical costs from endocrine, metabolism, and nutrition conditions and pharmacy costs from gastrointestinal prescription drugs. Other medical and pharmacy cost categories exhibited a trend towards significantly lower healthcare costs with increased exercise frequency. The manuscript detailing these findings is currently under review.

Using what we learned from evaluating obesity and morbidity in the entire employee population we then addressed aim 3 using the claims data for our study population. We used historic data for up to 1 year prior to the date on the baseline assessments to estimate pre-intervention health care costs and usage, and the data for the year following the end of the intervention to calculate post-intervention costs and usage. We found no significant differences between the two intervention groups in terms of health care costs or utilization. We did find that those who lost weight, regardless of study arm, reduced their overall health care costs.

Aim 4 of the study was to determine the overall relative impact of STH+ and STH on net program costs. Since we found no differences between the two arms for the primary outcome measure of BMI change, we did not pursue further investigation into the net program costs. We did decide to look at health care costs for study participants, in either arm, compared to an observational control group of employees. We used the same pre- and post-intervention periods as described above, and created an observational group using propensity score adjustment to balance risk factors and covariates. In terms of health care utilization and health care costs, there were no significant differences between these intervention groups and the observational group.

Following the completion of primary data collection we added a follow-up study to provide an additional perspective to factors that contribute to program success, or lack of success, such as common barriers, facilitators and motivators. We also wanted to get qualitative feedback on the program from the participants. At the time of the original enrollment to the study, we asked employees if we could re-contact them for additional research, 323 of the 550 randomized participants agreed. We contacted all of those 323 participants to complete a follow-up survey, and 124 (38%) completed the survey. Of the 124 participants, 92% were female, 50% were Black and 44% were White, 30% were less than 40 years old and 39% were 40-50 years old, and 65% had at least an Associate's degree. Survey data collection was completed in December, 2015. We also conducted focus

group interviews with 26 of the participants who completed a survey. Focus groups were held between November, 2015 and January, 2016.

We continue to work on the analysis of the data collected in the follow-up study. We have submitted a manuscript based on self-reported survey data, which is currently under review. We identified the most commonly reported barriers to healthy eating and physical activity. The main barriers to healthy eating were *Lack of self-control and convenience* and *Lack of access to healthy foods*. The main barriers to physical activity were *Time constraints* and *Lack of interest and motivation*.

We have also analyzed the focus group data, and are working on a manuscript detailing the insights gained from the participants. Those findings point to a number of concrete suggestions to improve both health promotion programs in the workplace, as well as the workplace itself to better support employee healthy weight. These included clearly identifying the program coach as important to success. Participants felt the coach provided motivation and a support system that many people lacked. Many participants noted that even if their weight hadn't decreased, they did notice other health benefits from participating in the program and following the programs' suggestions, including increased energy levels, improved cholesterol and blood pressure and lower body fat percentage.

In addition to the planned manuscripts, we will also be presenting the program feedback to leadership in Human Resources at Duke University and the Live for Life program management and staff.

Conclusions

The findings of the STH study suggest that to achieve weight loss, behavioral change, and associated morbidity reductions through the workplace, more extensive and intensive interventions, with more attention to motivation and compliance, are required. Such interventions may include adding social support in the form of group session or competitions, more frequent in-person contacts, or offering more onsite options for exercise. Common barriers must also be considered when designing workplace management programs to improve their uptake and effectiveness.

The findings from our qualitative work also suggest changes in the workplace environment to help remove or reduce barriers and create a more supportive environment. Suggested changes include increasing the availability of healthy food options, offering free exercise classes, and allowing for flexible work schedules that allow time for exercise or to attend weight management meetings during work hours. Within weight management programs specifically, coaches can help identify potential barriers, develop strategies for overcoming these barriers and create accountability for the participant's actions in a supportive environment through frequent, convenient contact and group exercise classes. Programs could measure other health outcomes, not just weight, to better gauge the effects of the program.

Our finding also point out that health care claims cost start rising with BMI at the low end of the normal range. This emphasizes the importance of preventing workers from ever reaching the overweight and obese class 1 categories, and if already overweight or obese, workplace based and other interventions should be instituted. We demonstrated that lower health care costs are related to higher levels of physical activity and that employee weight loss can decrease health care utilization and costs. All of which underscores the importance of effective employee weight management programs. More work is needed to create effective programs to promote weight management in the workplace, and continued evaluation of existing programs is necessary to identify the factors that work and to address barriers to engagement in varying work environments and employee populations.

PHS Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

OMB Number: 0925-0001 and 0925-0002
Expiration Date: 10/31/2018

Study Title: Steps to Health: Targeting Obesity in the Health Care Workplace

Delayed Onset Study? No

If study is not delayed onset, the following sections are required:

Enrollment Type – Cumulative

Using an Existing Dataset or Resource – No

Enrollment Location – Domestic

Clinical Trial – Yes

NIH-Defined Phase III Clinical Trial – No

Racial Categories	Ethnic Categories									
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			Total
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/ Alaska Native	1	0	0	0	0	0	0	0	0	**1**
Asian	6	3	0	0	0	0	0	0	0	**9**
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	**0**
Black or African American	252	37	0	3	1	0	0	0	0	**293**
White	180	49	0	0	0	0	0	0	0	**229**
More than One Race	5	0	0	1	1	0	0	0	0	**7**
Unknown/ Not Reported	2	0	0	7	2	0	0	0	0	**11**
Total	**446**	**89**	**0**	**11**	**4**	**0**	**0**	**0**	**0**	**550**

Publications

Østbye, T., Stroo, M., Eisenstein, E. L., Dement, J. M. [2016]. The effects of two workplace weight management programs and weight loss on health care utilization and costs. *Journal of Occupational and Environmental Medicine,* 58(2), 162-169.

*Related to aim 3, this paper looked at health care utilization and costs.

Østbye, T., Stroo, M., Brouwer, R. J., Peterson, B. L., Eisenstein, E. L., Fuemmeler, B. F., ... & Dement, J. M. [2015]. Steps to Health Employee Weight Management Randomized Control Trial: Short-Term Follow-Up Results. *Journal of Occupational and Environmental Medicine*, *57*(2), 188-195

*Related to aims 1 and 2, this paper looked at changes in weight and diet and physical activity behaviors by program arm. We also evaluated net-program costs as part of aim 4, but with no difference in weight change between the arms we did not present these findings. However, we did estimate the impact of weight loss of health care costs and utilization.

Østbye, T., Stroo, M., Eisenstein, E. L., Peterson, B., & Dement, J. [2014]. Is overweight and class I obesity associated with increased health claims costs?. *Obesity*, *22*(4), 1179-1186.

*Related to aim 3, this paper looked at health care utilization and costs overall and by BMI for the employee population our study population was recruited from.

Østbye, T., Stroo, M., Brouwer, R. J., Peterson, B. L., Eisenstein, E. L., Fuemmeler, B. F., ... & Dement, J. M. [2013]. The steps to health employee weight management randomized control trial: rationale, design and baseline characteristics. *Contemporary clinical trials, 35*(2), 68-76.

Presentations

Clancy SM, Schoenfisch AL, Stroo M, Stankevitz K, Dement J, Østbye T. [2016]. Worksite weight management program participation feedback and suggestions for improvement. Poster presented at the International Congress on Obesity, Vancouver, Canada.

Stankevitz K, Schoenfisch AL, Stroo M, Clancy SM, Østbye T. [2016]. Percevied barriers to healthy eating and physical activity among participants in a work place obesity intervention. Poster presented at the International Congress on Obesity, Vancouver, Canada.

Stankevitz K, Schoenfisch AL, Stroo M, Clancy SM, Østbye T. [2016]. Social support for physical activity and healthy eating among participants in a work place obesity intervention. Poster presented at the International Congress on Obesity, Vancouver, Canada.

Clancy S, Stroo M, Joyner J, Østbye T. Variation in the reported health, exercise and nutrition climate at work. [November, 2015] Poster presentation at Obesity Week, the annual meeting of The Obesity Society, Los Angeles, CA.

Stroo, M., Brouwer, R.J.N., Østbye, T. *Participation in worksite health promotion programs and weight loss in obese workers: Results from the Live for Life study*. [November, 2014] Poster presentation at Obesity Week, the annual meeting of The Obesity Society, Boston, MA.

Østbye, T., Stroo, M., Eisenstein, E.L, Dement, J.M. The relationship between BMI and the use of antidepressant medication in an employee population. Oral presentation at the International Congress on Obesity, March, 2014.

Østbye, T., Stroo, M., Eisenstein, E.L, Peterson, B., Dement, J.M. Weight related comorbidities associated with increased health care costs. Poster presentation at the International Congress on Obesity, March, 2014.

Ostbye, T, Stroo, M, Brouwer, R, Fuemmeler, B, Joyner, J, Eisenstein, E, Peterson, B, Dement, J. Design and Baseline characteristics of the Live for Life Employee Weight Management Study, presented at the European Congress on Obesity, May, 2012.

Inclusion of Gender and Minority Study Subjects

All eligible women who were willing to participate were included in this study. The gender composition of the population at the study site is approximately 61% female. Given this proportion, and the fact that female sex is associated with obesity in the study population, we expected to enroll a significant number of female participants, and a higher percentage of women than can be found in the general US population. In our study 83% of the participants at baseline were female.

All eligible minorities who were willing to participate were included in this study. The racial and ethnic composition of the population at the study site is approximately 21% African American, 8% Asian and Pacific Islander, 2% Hispanic, < 1% American Indian or Alaskan native, and 68% white. Given this breakdown, and the fact that being African American is associated with obesity in the study population, we expected to enroll a higher percentage of African American participants than can be found in the general US population. In our study 41% of the baseline participants identified as white/Caucasian and 53% identified as black/African American.

Inclusion of Children

No children were included in this study due to the limitations of the population Participants in a worksite study were by definition persons of legally employable age. Additionally, persons enrolling in this worksite study must be employees of Duke University and eligible for health benefits. It is Duke's policy that applicants must be aged 18 or older to be eligible for employment. Therefore, the minimum age of inclusion must be 18, since younger persons are not eligible for full-time employment at Duke and therefore would have no representation in the subject pool. Any employees between the ages of 18 and 21 (persons under 21 are considered "children" by the NIH rule) were eligible for the study and were recruited to participate if they met the other inclusion criteria, and were not required parental consent as they had reached 18, the age of majority according to North Carolina state law.

Materials Available for Other Investigators

N/A