

Appendix E-2.35: Evidence Portfolio

Part D. Chapter 4: Food Environment and Settings

What is the impact of worksite-based approaches on the weight status of employees?

Conclusion Statement: Moderate and consistent evidence indicates that multi-component worksite approaches targeting physical activity and dietary behaviors favorably affect weight-related outcomes.

DGAC Grade: Moderate

Key Findings

- This evidence portfolio includes two systematic reviews (Verweij, 2011; Aneni, 2014), one of which included meta-analyses (Verweij, 2011). The systematic reviews examined the impact of worksite-based approaches on the weight status of employees. Collectively, 70 studies published prior to November 2012 were evaluated.
- The studies used a variety of intervention strategies targeting behaviors related to weight status; some were delivered in-person and others were delivered via the internet. The primary outcomes of interest were body weight, BMI, and body fat percentage.
- In the body of evidence available, multi-component interventions, and in particular those that incorporated face-to-face contact and targeted behaviors related to diet and physical activity, were more effective than single-component interventions for eliciting significant improvements in weight-related outcomes. Overall, worksite-based intervention programs significantly decrease body weight, BMI, and body fat percentage. Internet-based programs appear to be the promising approaches for eliciting behavior changes and improving related health outcomes.
- The evidence base includes two reviews evaluating several studies by independent investigators with sufficient sample sizes. Some inconsistencies are evident across studies and may be explained by differences in the populations sampled and methodologies including duration or exposure of intervention and follow-up periods. Although findings indicate that worksite-based approaches effectively improve the weight status of employees, the magnitude of the effect is difficult to assess.

Description of the Evidence

This evidence portfolio includes 2 systematic reviews/meta-analyses published in 2011 and 2014 (Verweij, 2011; Aneni, 2014). Collectively, the reviews included a total of 70 studies published prior to November 2012, with an overlap of two studies between reviews. Study designs included randomized controlled trials (RCTs) and pre/post studies. Verweij *et al* reviewed 43 randomized controlled trials. Aneni *et al* reviewed 29 studies consisting of 18 RCTs and 11 pre/post studies. The systematic reviews had relatively low risk of bias, as evidenced by AMSTAR scores, ranging from 9 and 10 points out of a possible 11 points.

The methodological quality of the studies included in the Verweij *et al* review was independently assessed by two authors using an adapted checklist based on the Cochrane Handbook for Systematic Reviews of Interventions. Twelve criteria for internal validity were included related to selection bias (randomization procedure and similarity of study groups), performance bias (blinding of participants, compliance, and co-intervention), attrition bias (loss-to-follow-up and intention-to-treat), and detection bias (blinding of outcome assessor, timing of outcome assessment, data analyses, data collection

methods, and follow-up). For each article, criteria were scored as positive if the criterion was met, negative if the criterion was not met or unclear if insufficient information was provided for assessment. In cases of disagreement, a third reviewer was consulted for a final decision. For articles that did not contain sufficient information, the study investigators were contacted; if unavailable or they did not respond the item was scored as unclear. Finally, each article received a quality assessment based on the number of positively scored criteria: excellent (10-12), good (7-9), fair (5-6), or poor (0-4).

Aneni *et al* evaluated the quality of the studies included in their review based on two criteria: suitability of study design and methodological quality criteria. Each study was assessed for both components. High quality studies were those that received a grade A or B for study design and had at least 4 of 6 methodological criteria (representativeness, randomization, comparability, credibility of data collection instruments, attrition rate, and effects were attributable to intervention). No studies were excluded due to poor quality. Eighteen studies were rated high quality, one was intermediate, and ten were low quality.

Population

The studies examined employees defined as: 1) generally healthy adults and those at risk for chronic disease (Verweij, 2011) and 2) employee/working populations taking part in interventions requiring access to the internet (Aneni, 2014). The sample sizes reported for individual studies ranged from 33 to 10,282 adults. Of the 43 studies included in Verweij *et al*, 20 were conducted in the United States and 23 were conducted in other highly developed countries. The Aneni *et al* review did not report the location for individual studies. The reviews did not review or present results by gender or race/ethnicity (refer to the Overview Table for review-specific details).

Exposures

The studies included in the reviews examined a variety of worksite approaches for targeting behaviors related to weight status. The studies included in the Verweij *et al* review/meta-analysis examined the effectiveness of workplace interventions targeting physical activity, dietary behavior, or both on weight outcomes. The Aneni *et al* review assessed the impact of internet-based programs aimed at improving cardiovascular health through a variety of behaviors (i.e., diet and physical activity, alone and in combination).

Outcomes

The primary outcomes of the Verweij *et al* review/meta-analysis were weight-related (i.e., body weight, BMI, body fat percentage, waist circumference, waist-to-hip ratio, and the sum of skin-folds). The studies included in the Aneni *et al* review assessed diet, weight, blood pressure, blood glucose, HbA1c, lipids, physical activity, and smoking.

Evidence Synthesis

Verweij *et al* reviewed studies evaluating the effectiveness of workplace interventions targeting physical activity, dietary behavior, or both on weight outcomes. Overall, this review included a meta-analysis of 22 studies indicating that worksite interventions improve weight-related outcomes. Evidence from nine studies (n = 4514) demonstrated that workplace interventions targeting physical activity and dietary behavior significantly reduce body weight [Mean difference: -1.19 kg (95% CI: -1.64, -0.74)]. Evidence from 11 studies (n = 4638) showed that workplace interventions targeting physical activity and dietary behavior significantly reduce BMI [Mean difference: -0.34 kg/m² (95% CI: -0.46, -0.22)]. Findings from three studies (n = 368) indicate that workplace interventions targeting physical activity and dietary behavior significantly reduce body fat percentage as calculated from sum of skin-folds [Mean difference: -1.12% (95% CI: -1.86, -0.38)]. Data from workplace interventions targeting *only* dietary behavior or physical activity were inconsistent with regard to impact on weight-related outcomes.

The Aneni *et al* review aimed to synthesize evidence from internet-based cardiovascular wellness programs in order to guide the implementation and future development of such programs. Seven out of 15 high-quality studies included in the review showed significant improvements in body weight; while seven reported no changes and one study reported an increase in body fat percentage. Four out of five lower-quality studies demonstrated significant improvements in weight. Collectively, the findings regarding the impact of internet-based programs on weight outcomes are inconsistent but promising.

Overview Table

Summary of systematic review examining the impact of worksite-based approaches on the weight status of employees			
Author, Year Study Design AMSTAR Score* Number of Included Studies	Purpose of Review Subject Population Location of Included Studies	Independent Variable Outcomes	Results
<p>Aneni, 2014</p> <p>Systematic review</p> <p>AMSTAR Score: 9/11</p> <p>29 studies</p> <ul style="list-style-type: none"> • 18 high-quality randomized controlled trials • 11 pre/post studies (1 intermediate quality, 10 low quality) 	<p>Synthesize evidence from internet-based cardiovascular wellness programs in order to guide the implementation and future development of such programs</p> <p>Employees/working population</p> <p>Location: not reported</p>	<p>Independent variables: internet-based programs aimed at improving cardiovascular health</p> <p>Outcomes: weight, diet, blood pressure, blood glucose, HbA1c, lipids, physical activity, smoking</p>	<p>20 studies reported on weight, BMI/obesity, waist circumference, skin fold thickness, and/or body fat changes.</p> <p>Of the 15 high-quality randomized controlled trials evaluated, 7 studies demonstrated significant improvements:</p> <ul style="list-style-type: none"> • Weight reduction (n=3) • Reduction in waist circumference (n=5) • Decreased body fat (n=1) <p>Four out of 5 low-quality, nonrandomized studies reported significant improvements in:</p> <ul style="list-style-type: none"> • Weight (-0.8 to -1.4 kg) • Waist circumference (-2.0 to -2.9 cm)
<p>Verweij, 2011</p> <p>Systematic review/meta-analysis</p> <p>AMSTAR Score: 10/11</p> <p>43 randomized controlled trials</p> <ul style="list-style-type: none"> • Target: only diet (n=3), only physical activity (n=14), diet and physical activity (n=26) • Quality: poor (n=20), fair (n=11), good (n=11), excellent (n=1) <p>Meta-analysis included 22 studies</p>	<p>Critically examine the effectiveness of workplace interventions targeting physical activity, dietary behavior or both on weight outcomes</p> <p>Generally healthy adults and those at risk for chronic disease</p> <p>Location: 20 studies in the US, 5 each in Australia, England, 4 in Japan, 3 in Sweden, 2 each in Denmark, Belgium, 1 each in the Netherlands, Canada</p>	<p>Independent variables: worksite interventions targeting diet, physical activity or both</p> <p>Outcomes: body weight, BMI, body fat percentage, waist circumference, waist-hip ratio, sum of skin-folds</p>	<p>Body weight</p> <ul style="list-style-type: none"> • 9 studies targeted diet and physical activity; MD = -1.19 kg (95% CI: -1.64, -0.74) • No studies targeted only diet <p>Body mass index</p> <ul style="list-style-type: none"> • 11 studies targeted diet and physical activity; MD = -0.34 kg/m² (95% CI: -0.46, -0.22) • 1 study targeted only diet thus no conclusion <p>Body fat percentage</p> <ul style="list-style-type: none"> • 4 studies targeted diet and physical activity <ul style="list-style-type: none"> ○ 3 studies used sum of skin folds; MD = -1.12% (95% CI: -1.86, -0.38) ○ 1 study used bioelectrical impedance thus no conclusion • No studies targeted only diet <p>Waist circumference</p> <ul style="list-style-type: none"> • 2 studies targeted diet and physical activity; MD = -1.08 cm (95% CI: -4.18, +2.02) • No studies targeted only diet <p>Waist-to-hip ratio</p> <ul style="list-style-type: none"> • No conclusion due to only one study each targeting diet only and diet and physical activity <p>Subgroup analyses</p> <ul style="list-style-type: none"> • Follow-up duration did not change pooled estimates for body weight or BMI • Studies targeting diet and physical activity with an environmental component (n=3) showed greater reduction in body weight vs. those that did not (n=6); MD = -1.5 kg (95% CI: -1.82, -1.17) vs -1.01 kg (95% CI: -1.63, -0.38)
<p>*Quality assessed by AMSTAR (Shea, 2007: http://www.ncbi.nlm.nih.gov/pubmed/17302989)</p>			

Assessment of the Body of Evidence

Quality and Quantity: Collectively, the evidence base includes 70 independent studies, mostly randomized controlled trials (n=61), evaluated in two rigorous systematic reviews, one of which included meta-analyses. The reviews are of high-quality with AMSTAR scores of 9 and 10 out of 11 possible points.

Consistency: Across individual studies and reviews, worksite-based approaches fairly consistently improved weight-related outcomes. Multi-component programs, in particular those incorporating physical activity and dietary modification, are more effective than single-component programs.

Impact: Improvements in weight-related outcomes demonstrated by the Verweij *et al* meta-analysis are clinically meaningful; however the public health impact of these changes is difficult to ascertain. Also, the findings related to internet-based programs reviewed by Aneni *et al* were inconsistent and not quantified.

Generalizability: The studies included in the Verweij *et al* review/meta-analysis were geographically diverse (both nationally and internationally), but information on the characteristics of the participants was very limited. Also, the Aneni *et al* review did not provide details regarding race, ethnicity, or geographic location for the included studies. Thus, the generalizability of the findings is not known with confidence.

Limitations: The systematic reviews/meta-analysis are of high quality, as well as most of the individual studies included within each of them. Yet, meta-analyses could not be conducted by Aneni *et al* due to the dissimilarity of interventions, heterogeneity of outcomes, and disparate study designs. Some inconsistencies are evident across studies and may be explained by differences in the populations sampled and methodologies including duration or exposure of intervention and follow-up periods.

Implications*

Existing evidence indicates that worksite approaches focused on dietary intake can increase fruit and vegetable intakes of employees. Multi-component programs targeting nutrition education in combination with dietary modification interventions are found to be effective. Additionally, environmental modifications in conjunction with a variety of worksite policies targeting dietary modification, including point-of-purchase information, catering policies, and menu labeling are effective. Thus, these evidence-based strategies should be implemented in worksites through a variety of means, such as corporate wellness programs, food service policies, and health benefits programs. Programs should emphasize multi-component approaches targeting diet and physical activity while policies should support behavior changes associated with improving health outcomes such as increasing the availability of healthy foods within the workplace and encouraging more physical activity throughout the workday. Given that approximately 64 percent of adults are employed and spend an average of 34 hours per week at work, the workplace remains an important setting for environmental and behavioral interventions for health promotion and disease prevention.

Research Recommendation*

Assessments of the effectiveness of worksite interventions that emphasize obesity prevention and weight control among workers across racially/ethnically diverse populations, blue and white collar employees, and at risk populations are needed. Scientifically rigorous studies (especially RCTs) addressing long-term health impact of worksite-based approaches and policies that improve employee diet, physical activity, and body weight control would have public health relevance.

Rationale: In light of the high rates of obesity and overweight, worksite interventions targeting obesity prevention and weight control, via enhanced dietary behaviors and increased physical activity among workers is important. The majority of the studies to date have been conducted for a relatively short period of time, and the long-term impact of these approaches and policies may prove beneficial.

*Because the four worksite questions are complementary, the Dietary Guidelines Advisory Committee chose to develop only one implication statement and research recommendation for all of the questions.

References

1. Aneni EC, Robertson LL, et al. A systematic review of internet-based worksite wellness approaches for cardiovascular disease risk management: outcomes, challenges & opportunities. PLoS One 2014; 9(1):e83594. PMID: 24421894 <http://www.ncbi.nlm.nih.gov/pubmed/24421894>
2. Verweij LM, Coffeng J, et al. Meta-analyses of workplace physical activity and dietary behavior interventions on weight outcomes. Obes Rev 2011; 12(6):406-429. PMID: 20546142 <http://www.ncbi.nlm.nih.gov/pubmed/20546142>