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Number 97

Strategies To Prevent Weight Gain Among Adults



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Strategies To Prevent Weight Gain Among Adults

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The information in this report is intended to help health care decisionmakers—patients and clinicians, health system leaders, and policymakers, among others—make well informed decisions and thereby improve the quality of health care services. This report is not intended to be a substitute for the application of clinical judgment. Anyone who makes decisions concerning the provision of clinical care should consider this report in the same way as any medical reference and in conjunction with all other pertinent information, i.e., in the context of available resources and circumstances presented by individual patients.

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of systematic reviews to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. These reviews provide comprehensive, science-based information on common, costly medical conditions, and new health care technologies and strategies.

Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews can help clarify whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about AHRQ EPC systematic reviews, see www.effectivehealthcare.ahrq.gov/reference/purpose.cfm.

AHRQ expects that these systematic reviews will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. Transparency and stakeholder input are essential to the Effective Health Care Program. Please visit the Web site (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an email list to learn about new program products and opportunities for input.

We welcome comments on this systematic review. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.hhs.gov.

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Strategies To Prevent Weight Gain Among Adults

Structured Abstract

Objectives. Adults tend to gain weight progressively through middle age. Although the average weight gain is 0.5 to 1 kg per year, this modest accumulation of weight can lead to obesity over time. We aimed to compare the effectiveness, safety, and impact on quality of life of strategies to prevent weight gain among adults. Self-management, dietary, physical activity, orlistat and combinations of these strategies were considered.

Data sources. We searched MEDLINE[®], Embase[®], the Cochrane Central Register of Controlled Trials, CINAHL[®], and PsycINFO[®] through June 2012 for published articles that were potentially eligible for this review.

Review methods. Two reviewers independently reviewed titles, abstracts, and articles, and included English-language articles that reported on maintenance of weight or prevention of weight gain among adults. Studies targeting a combination of weight loss with weight maintenance or weight loss exclusively were considered to be outside of the scope of this review. Trials of interventions and observational studies of approaches with at least 1 year of followup with a weight outcome were included. Data were abstracted on measures of weight, adherence, obesity-related outcomes, safety, and quality of life. The timepoints of interest for weight outcomes were: 1 year, 2 years, 5 years, and the last reported timepoint after 5 years. For the other outcomes, we abstracted data only from the last reported timepoint on or after 1 year. We selected a meaningful difference threshold in addition to a statistically significant threshold ($p < 0.05$) for the outcomes. A meaningful between group difference was defined as 0.5 kg of weight, 0.2 units of BMI (based on a 0.5-kg change for an individual with a BMI of 27), or 1 cm of waist circumference per year of followup. We considered an intervention or approach effective if the difference between groups met the meaningful between group difference threshold and was statistically significant. We qualitatively synthesized the studies by population, intervention, and outcome.

Results. We included 58 publications (describing 51 studies) involving 555,783 patients. Two interventions may be effective compared with no intervention at preventing weight gain with moderate strengths of evidence: workplace interventions having individual and environmental components and exercise performed at home by women with cancer. Potentially effective interventions with low strength of evidence include a clinic-based program to teach heart rate monitoring, a combination intervention for mothers of young children, small group sessions to educate college women, and physical activity among individuals at risk of cardiovascular disease and diabetes. Potentially effective approaches described in observational studies having low strength of evidence include eating meals prepared at home among college graduates and less television viewing among individuals with colorectal cancer. When reported, adherence to interventions tended to be below 80 percent. There were no adverse events among the few trials that reported on adverse events. Trial study quality tended to be poor due to knowledge of the intervention by the study personnel who measured the weight of the participants or lack of reporting on this item. This lack of blinding of the outcome assessor along with inclusion of studies that were not designed to prevent weight gain resulted in a low strength of evidence for the majority of comparisons.

Conclusions. The literature provides some, although limited, evidence about interventions and approaches that may prevent weight gain. Although there is not strong evidence to promote a particular weight gain prevention strategy, there is no evidence that *not* adopting a strategy to prevent weight gain is preferable.

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Executive Summary

Background

Condition

One of the Healthy People 2020 national objectives is to increase the prevalence of a healthy weight among adults to 34 percent and to reduce the prevalence of obesity among adults to less than 30 percent.¹ From 2005 to 2008, only 31 percent of adults were a healthy weight.² Obesity was estimated to cost \$79 billion in the United States during 1995. By 2008, health care costs associated with obesity were thought to have risen to \$147 billion. The Federal Government pays about one half of these costs through Medicaid and Medicare spending.³

Body mass index (BMI)—expressed as weight in kilograms divided by height in meters squared (kg/m^2)—is commonly used to classify underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), healthy or normal weight ($\text{BMI} 18.5\text{--}24.9 \text{ kg/m}^2$), overweight ($\text{BMI} 25.0\text{--}29.9 \text{ kg/m}^2$), obesity ($\text{BMI} \geq 30.0 \text{ kg/m}^2$), and extreme obesity ($\text{BMI} \geq 40.0 \text{ kg/m}^2$).

Adults tend to gain weight progressively through middle age. Although the average weight gained per year is 0.5 to 1 kg, the modest accumulation of weight over time can lead to obesity.⁴ The estimated age-adjusted prevalence of overweight and obesity ($\text{BMI} \geq 25.0 \text{ kg/m}^2$) was 68 percent in the United States during 2007 and 2008. Despite the doubling in the prevalence of obesity between 1976 and 1980 and 2007 to 2008 (13 to 34 percent), the prevalence of overweight has remained stable between the same time periods (32 to 34 percent).

Obesity is a risk factor for chronic conditions including cardiovascular disease, type 2 diabetes, arthritis, certain types of cancer, and cancer recurrence.⁵⁻¹² Weight is associated with an increased risk of some forms of cancer and cancer recurrence. There is growing evidence that breast cancer survivors or women with breast cancer have better outcomes if they lose or maintain their weight. Obesity can also be caused by medications used to treat chronic disease, as is the case for antipsychotic treatments,¹³ some treatments for type 2 diabetes,^{14,15} and tamoxifen and aromatase inhibitors for treatment or prevention of breast cancer or cancer recurrence.¹⁶ Higher grades of obesity are associated with excess mortality, primarily from cardiovascular disease, type 2 diabetes, and certain types of cancer.^{16,17}

We aimed to review studies of strategies to prevent weight gain among adults. The strategies of interest were self-management techniques, diet, physical activity, use of the dietary fat absorption inhibitor orlistat, or combinations of these strategies applied at the individual, community, or environment level. These strategies could have been implemented in any setting, including clinical care sites, community settings, higher education institutions, and workplaces. Strategies could have targeted individuals at high risk of gaining weight because of a family history of obesity or diabetes mellitus, personal risk factors for diabetes mellitus and cardiovascular disease (such as borderline values of laboratory measures), use of medication associated with weight gain,¹⁸ or have had more inclusive enrollment criteria.^{19,20}

Scope and Key Questions

We aimed to compare the effectiveness, safety, and impact on quality of life of independent and combined strategies to prevent weight gain among adults. Studies targeting a combination of weight loss with weight maintenance or weight loss exclusively were outside of the scope of this review.

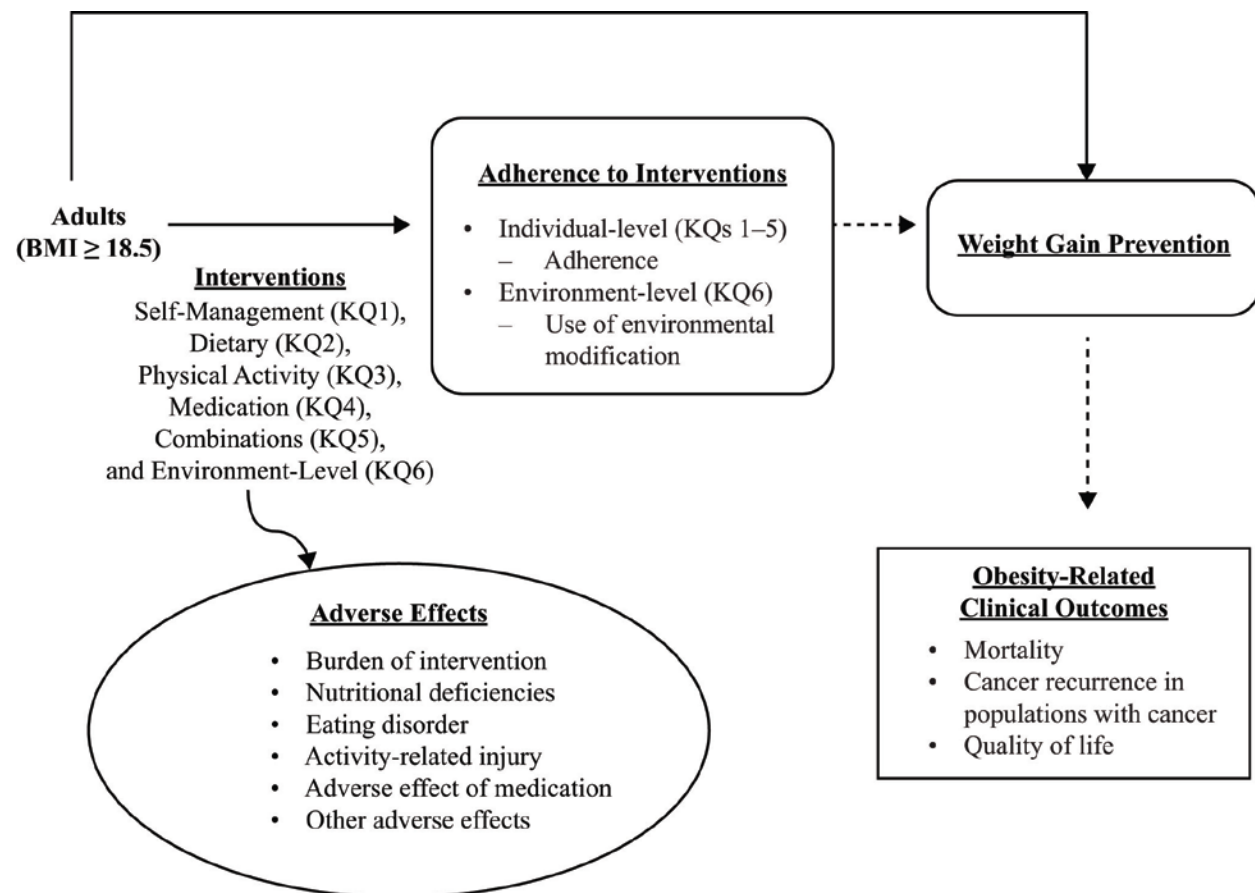
The specific Key Questions (KQ) are:

- KQ1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?
- KQ2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?
- KQ3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?
- KQ4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?
- KQ5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and orlistat strategies for the prevention of weight gain among adults?
- KQ6: What is the comparative effectiveness of environment-level strategies for the prevention of weight gain among adults?

We aimed to answer these questions by reviewing studies of adults that intervened with self-management, diet, physical activity, use of orlistat, or a combination of these interventions, over at least 1 year, on individuals or their environment. Dietary and physical activity strategies inherently include some aspects of self management. Only when self-management did not include traditional diet or physical activity components (i.e., daily weighing or regulating television viewing) was the study was reported in KQ1. Observational studies that followed weight change by these strategies over at least one year were also included. The outcomes of interest were BMI, weight, waist circumference, obesity-related clinical outcomes (mortality, cancer recurrence if applicable and health related quality of life), and adverse effects (Figure A).

Adverse effects included burden of the intervention (which may impact adherence), nutritional deficiencies (for dietary interventions), eating disorders (from an increased focus on weight among non obese individuals), activity related injury (for physical activity interventions), and adverse effects of orlistat.

Figure A. Analytic framework for comparative effectiveness of strategies to prevent weight gain among adults



BMI = body mass index; KQ = Key Question

Methods

Literature Search Strategy

We searched the following databases for primary studies: MEDLINE[®], Embase[®], the Cochrane Central Register of Controlled Trials, CINAHL[®], and PsycINFO[®] through June 2012. We developed a search strategy for MEDLINE, accessed via PubMed[®], and developed comparable searches using the other databases. We also reviewed the reference lists of each included article, relevant review articles, and relevant studies identified in ClinicalTrials.gov.

Title, abstract, and full article reviews were performed by two independent reviewers to identify relevant publications. Only one reviewer had to identify the publication as relevant to be included at title review. At abstract review, both reviewers had to agree that the study did not include any exclusion criteria (Table A). At full article review, both reviewers had to agree that the article met the inclusion criteria. Conflicts were resolved by consensus adjudication.

Relevant data were extracted from eligible trials of interventions and observational studies of approaches with a focus on items related to the population, interventions and approaches, comparisons, outcomes, timing, and setting. Each article was serially abstracted first by a first reviewer and then by a senior reviewer. Serial data abstraction involved a senior reviewer (faculty-level project investigator) abstracting data from articles while having access to the first reviewer's data. Differences in opinion were resolved through consensus adjudication and, for difficult cases, during team meetings. The timepoints of interest for data abstraction of weight outcomes were at 1 year, 2 years, 5 years, and the last reported timepoint after 5 years of followup. For the intermediate outcomes, safety, clinical, and quality of life outcomes, we only abstracted data for the last reported timepoint on or after 1 year.

Quality Assessment of Individual Studies

Study quality was assessed using the Downs and Black methodologic quality assessment checklist (Appendix F in the full report).²¹ This checklist was developed to assess the quality of reporting, internal validity, and external validity of randomized and observational studies. We used information on study quality to assess the risk of bias (using the internal validity items) and directness (using the external validity items) of the studies. Two reviewers independently completed the checklist for each article and came to consensus for each item.

Data Synthesis

When there were three or more studies with comparable interventions and comparable outcome measures, we considered quantitative pooling of the results. We examined the studies' designs for qualitative similarities. Because we found that no groups of studies were amenable to pooling with meta-analyses, we calculated and displayed the mean differences, risk differences or relative risks with 95% confidence intervals (CI) for the individual studies grouped by study population and comparable interventions. Observational studies did not report categories of approaches consistently, prohibiting the use of summary figures.

We selected a meaningful between-group-difference threshold in addition to a statistically significant threshold ($p < 0.05$) for reporting on the outcomes. A meaningful difference threshold was defined as 0.5 kg of weight,^{4,22} 0.2 units of BMI (based on a 0.5 kg change for an individual with a BMI of 27), or 1 cm of waist circumference relative to the comparison group. The meaningful threshold was annualized to account for the different durations of the studies. For example, the weight difference threshold was 1 kg for outcomes reported at 2 years and 2.5 kg at 5 years.

Table A. Study inclusion and exclusion criteria

Population and condition of interest	<p>Adult participants. If a study includes some participants under age 18 years and results are not reported separately for adults, the study will be included as long as 90 percent of the total population is 18 years and older.</p> <p>Studies of overweight and obese patients were included if the study did not describe the goal of the strategy to be weight loss or maintenance of weight after weight loss.</p> <p><i>Excluded</i> studies if they included only women during their pregnancies.</p> <p><i>Excluded</i> studies that included only patients at risk of weight loss (e.g., wasting disease, eating disorders), or with a BMI <18.5.</p>
Interventions and approaches	<p>Studies must have evaluated a strategy of interest as defined by the Key Questions.</p> <p>Included studies of orlistat.</p> <p>Included studies of caloric substitutes, such as olestra or artificial sweeteners.</p> <p>Included studies of lifestyle interventions for KQ5.</p> <p>Included studies implemented at a community level for KQ6.</p> <p><i>Excluded</i> studies if the goal of the study was weight loss, a combination of weight loss and weight gain prevention (without separate reporting of results), or weight maintenance after weight loss.</p> <p><i>Excluded</i> studies of biological determinants (such as genes) as the exposure.</p> <p><i>Excluded</i> studies of herbal supplements, vitamins, and minerals.</p> <p><i>Excluded</i> studies that included a smoking cessation strategy.</p>
Comparisons of interest	<p>Included comparisons of no intervention, usual care, or direct comparison with self management, dietary, physical activity, device, orlistat, or a combination of strategies.</p> <p>Included studies comparing different intensities of the same strategy (e.g., low fat versus high fat diet).</p> <p><i>Excluded</i> studies if a study compared a strategy of interest with only a strategy not of interest.</p> <p><i>Excluded</i> studies if there was no comparison.</p>
Outcomes and timing	<p>One year of observation of weight change during adulthood was required.</p> <p>Weight change must have been reported relative to a strategy of interest. Measures of weight change included weight, BMI or waist circumference.</p> <p>Obesity related adverse effects, quality of life, cancer recurrence*, mortality and study adherence were abstracted only if the study also reported a qualifying measure of weight.</p>
Type of study	<p>Included studies with any sample size from any calendar year that met all other criteria.</p> <p>Included all study designs including prospective (randomized and non randomized), retrospective, crossover, and case control studies. Serial cross sectional studies of the same population were eligible for KQ6.</p> <p>Observational studies had to account for confounding and losses to followup in the design or analysis to be eligible.</p> <p>Crossover studies must have reported at least 1 year of weight change in each phase of the crossover to be included.</p> <p>For KQ1-5 inclusion, the participants measured at the first time point must have been the same participants measured at the later time points.</p> <p>For KQ6 inclusion, the participants measured at the first time point were not required to be the same participants as those measured at the later time points although the communities sampled from had to be the same.</p> <p><i>Excluded</i> studies with no original data (reviews, editorials, comments, letters, modeling only studies).</p> <p><i>Excluded</i> studies published only as abstracts.</p> <p><i>Excluded</i> qualitative studies that did not provide quantitative information on a strategy of interest and weight, such as focus groups or directed interviews.</p>

KQ=Key Question; RCT = randomized controlled trial

*In populations with cancer only.

Rating the Body of Evidence

At the completion of our review, we graded the quantity, quality, and consistency of the evidence addressing Key Questions 1 through 6 by adapting an evidence grading scheme recommended by AHRQ's "Methods Guide for Effectiveness and Comparative Effectiveness Reviews."²³ We created evidence grades for each comparison and outcome by population or setting. We used four domains to yield a final evidence grade: Risk of Bias, Consistency, Directness, and Precision.

We classified evidence pertaining to Key Questions 1 through 6 into four categories: (1) “high” grade (indicating high confidence that the evidence reflects the true effect and further research is very unlikely to change our confidence in the estimate of the effect); (2) “moderate” grade (indicating moderate confidence that the evidence reflects the true effect and further research may change our confidence in the estimate of the effect and may change the estimate); (3) “low” grade (indicating low confidence that the evidence reflects the true effect and further research is likely to change our confidence in the estimate of the effect and is likely to change the estimate); and (4) “insufficient” grade (no evidence identified). A comparison-outcome pair with high strength of evidence was one with low risk of bias, consistency (or not applicable if only one study contributed), directness, and precision. Moderate strength of evidence indicated that *one* of the following was observed: a moderate risk of bias, inconsistency, indirectness, or imprecision. Low strength of evidence indicated a high risk of bias or *two* or more of the following: a moderate risk of bias, inconsistency, indirectness, and imprecision. Details on how the risk of bias, consistency, directness, and precision were identified are provided in the body of the report. For consistency with the reporting of the results, we graded the strength of evidence using the above process for each population or setting.

The team members discussed the process they used to grade the evidence throughout the report writing process. When a team member felt the evidence grade was questionable, this comparison-outcome evidence grade was discussed at a team meeting.

Applicability

We describe the applicability of studies in terms of the degree to which the study population, interventions or approaches, outcomes, and settings were relevant to individuals at risk of weight gain and features that may affect the effectiveness of the strategy.²⁴

The populations included in the studies affect the generalizability of the results. For this reason, we report the results ordered by the studied population. The most inclusive population (adults from the general population not selected based on underlying comorbidity or setting) is reported first, followed by strategies that were evaluated in individuals in a specific setting (workplace based and college based) and finally by groups of individuals with a disease or at risk of a disease (cardiovascular disease, cancer, and mental health).

Defining Effectiveness

For an intervention or approach to be considered effective, it had to meet the meaningful between-group difference and statistical thresholds. We selected a meaningful between-group-difference threshold in addition to a statistically significant threshold ($p < 0.05$) for reporting on the outcomes. A meaningful difference threshold was defined as 0.5 kg of weight,^{4,22} 0.2 units of BMI (based on a 0.5 kg change for an individual with a BMI of 27), or 1 cm of waist circumference relative to the comparison group. The meaningful threshold was annualized to account for the different durations of the studies. For example, the weight difference threshold was 1 kg for outcomes reported at 2 years and 2.5 kg at 5 years.

Results

Results of Literature Searches

From the 24,870 unique articles identified from electronic resources, 58 publications were included describing 51 studies. Thirty-eight trials included 150,081 participants at baseline. The majority (55 percent) of the trials were randomized trials that were not explicitly designed to prevent weight gain. Thirteen observational studies included 420,986 participants at baseline. Most of the observational studies were subanalyses of existing cohorts or randomized trials. Only one of the observational studies came from a cohort that was explicitly designed to measure weight change over time.²⁵

Results by Population or Setting of the Intervention or Approach

The strength of evidence is not high for any of the tested interventions or the approaches described in observational studies to prevent weight gain as measured by changes in BMI, weight, or waist circumference. Other than workplace-based strategies, which have moderate strength of evidence of effectiveness, most evidence was low or insufficient.

When adherence was reported, it tended to be poor, with less than 80 percent adherence to interventions. The one study that assessed awareness of an environmental intervention found inconsistent awareness of all of the components implemented in the workplace.

Very few studies reported on obesity-related clinical outcomes (mortality, quality of life, or cancer recurrence) or adverse effects. All evidence for these outcomes was graded as low or insufficient. No comparative study of orlistat for weight gain prevention was identified, so Key Question 4 has no evidence.

The interventions and approaches that prevented weight gain are described by population and by setting below. In a population, if none of the strategies prevented weight gain, we describe all of the strategies that we identified. The strength of evidence for the body of evidence is provided in Table B, which also includes the evidence about secondary outcomes.

Evidence Among Adults From a General Population

Eleven randomized trials (65,562 participants) and 12 prospective cohorts (418,520 participants) were identified. The strength of evidence is low but indicates that the following may prevent weight gain: low fat diets (effective for 1 year but not longer) compared with nutrition guideline handouts; monitoring heart rate during exercise after being instructed how to perform the monitoring during a routine clinic visit compared with physician advice; group lifestyle sessions and text messages sent to mothers of young children compared with diet and physical activity guidelines handouts; and eating fewer meals prepared outside of the home compared with eating more meals prepared outside of the home.

Evidence Among Obese Adults From a General Population

One randomized trial (124 participants) was identified. The strength of evidence is low that neither behavior was favored to change weight or waist circumference over 18 months between women who were encouraged to walk or bicycle to work compared with those only encouraged to walk to work.

Evidence for Workplace-Based Strategies

Seven randomized trials (76,310 participants) were identified. The strength of evidence is moderate that workplace-based combination strategies prevent weight gain. A work-based intervention that combined diet, physical activity, and environmental interventions resulted in a meaningful and statistically significant prevention of BMI and waist circumference increase at 12 months and prevention of weight gain at 24 months compared with no intervention. Another work-based intervention that combined Internet-based diet and physical activity counseling also prevented weight gain at 24 months compared with no intervention.

Evidence for College-Based Strategies

Two randomized trials (155 participants) were identified. The strength of evidence is low that small group sessions with teaching about healthy lifestyle strategies, not taken for credit, prevent weight gain compared with no intervention.

Evidence Among Adults at Risk for or With Cardiovascular Disease or Diabetes Mellitus

Eleven randomized trials and one nonrandomized trial (4,206 participants) were identified. The strength of evidence is low that physical activity interventions prevent weight gain and waist circumference increases in this population compared with no intervention.

Evidence for Adults With Cancer

Three randomized trials (2,671 participants) and one prospective cohort based on a cancer registry (1,966 participants) were identified. The strength of evidence is moderate that aerobic and resistance exercise performed at home prevent weight gain among women with cancer compared with no intervention. The strength of evidence is low that decreasing television viewing prevents weight gain among people with cancer compared with increasing or no change in television viewing.

Evidence for Adults With Mental Illness

Two trials were identified (163 participants). A randomized trial provided fruits and vegetables to group homes of people with schizophrenia compared with providing fruits and vegetables with education on how to prepare meals. A nonrandomized trial combined a behavioral intervention with education on diet and exercise among patients initiating antipsychotic medications compared with no intervention. There is low strength of evidence that no intervention was favored to prevent weight gain.

Table B. Summary of the strength of evidence*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>General Population</i>								
Self-management	Insufficient	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No diet favored	Low A healthy eating pattern was associated with less weight gain than an unhealthy eating pattern. Eating outside the home was associated with greater weight gain than consuming almost all meals at home.	Low Healthy eating scores 2 z-scores above the mean associated with 2 to 3cm smaller waistlines in Whites and Hispanics.	Low Eating food outside the home one or more times per week associated with a 20-30% increased risk of overweight or obesity compared with eating no meals outside the home. Healthy eating scores associated with a decreased odds of obesity.	Insufficient	Insufficient	Low Low-fat group had 0.1% less mortality than nutrition guidelines group.	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
General Population (continued)								
Physical activity	Low Participants who were taught to monitor their heart rate by their primary care provider during exercise along with advice had a greater decrease in BMI than participants given advice by their doctor without being taught to monitor their heart rate.	Low Increasing physical activity over time is associated with less weight gain than maintaining or decreasing physical activity over time.	Low No strategy favored	Insufficient	Low Adherence with the interventions ranged from 33% to 71%.	Insufficient	Insufficient	Low No serious adverse events occurred.
Combination	Low No strategy favored	Low No strategy favored	Low No strategy favored	Low No strategy favored	Low Adherence ranged from 50% to 73%.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Low No strategy favored	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Obese Only								
Self-management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Low Cycling group had 0.1 unit greater decrease in BMI than walking group.	Low Cycling group had 0.5 cm greater decrease in waist circumference than walking group.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>Obese Only (continued)</i>								
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
<i>Work-Based</i>								
Self-management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>Work-Based (continued)</i>								
Combination	Low Individual level diet and physical activity interventions along with an environmental component prevented BMI increases compared with no intervention.	Moderate Individual level diet and physical activity interventions along with an environmental component prevented weight gain compared with no intervention. Internet-based diet and physical activity counseling prevented weight gain compared with telephone based diet and physical activity counseling. Women in the military who received emails on diet and physical activity lost weight compared with women who received no intervention.	Low Individual level information on diet, physical activity, goal setting instructions and provision of a pedometer and measuring tape prevented waist circumference increases compared with no intervention.	Insufficient	Low Adherence ranged from 17% to 64%.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
College-Based								
Self-management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Low Small group, non-credit sessions with information on goal-setting, diet and physical activity prevented an increase in BMI compared with no intervention.	Low Small group, non-credit sessions with information on goal-setting, diet and physical activity prevented an increase in weight compared with no intervention.	Low No strategy favored	Insufficient	Low 53% of students attended at least 60% of the sessions during year 1; 26% of students attended at least 60% of the sessions during year 2.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
With or at Risk For Type 2 Diabetes Mellitus or Cardiovascular Disease								
Self-management	Low Goal setting results in a meaningful BMI change at one year compared with no intervention.	Insufficient	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No strategy favored	Low No strategy favored	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>With or at Risk For Type 2 Diabetes Mellitus or Cardiovascular Disease (continued)</i>								
Physical activity	Low Endurance exercise training prevented BMI gain compared with no intervention.	Low Endurance exercise training prevented BMI gain compared with no intervention.	Low Endurance exercise training prevented BMI gain compared with no intervention.	Insufficient	Low Adherence to endurance exercise training was 57%.	Insufficient	Insufficient	Insufficient
Combination	Low No strategy favored	Low No strategy favored	Low Aerobic activity and strength training resulted in greater waist circumference decrease compared with no intervention.	Insufficient	Low Adherence ranged from 65% to 100%.	Low No strategy favored	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
<i>Cancer</i>								
Self-management	Low Less than 3 hours per day television viewing associated with less BMI gain after colorectal cancer diagnosis compared with viewing more than 5 hours of television per day.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Low No strategy favored	Insufficient	Insufficient	Low Adherence ranged from 60% to 90%.	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
Cancer (continued)								
Physical activity	Insufficient	Moderate Aerobic and resistance exercise performed at home prevented weight gain at 1 year compared with no intervention.	Insufficient	Insufficient	Low Adherence ranged from 65% to 79% in the exercise groups and was 100% among controls.	Insufficient	Insufficient	Insufficient
Combination	Low A reduced fat diet with self-management counseling among women with newly diagnosed cancer decreased BMI at 1 year compared with counseling on nutritional adequacy that did not teach self-management techniques.	Low A reduced fat diet with self-management counseling among women with newly diagnosed cancer decreased BMI at 1 year compared with counseling on nutritional adequacy that did not teach self-management techniques.	Insufficient	Insufficient	Low Intervention group reduced calories from fat through 5 years of followup.	Insufficient	Insufficient	Low No adverse events occurred.
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table B. Summary of the strength of evidence (continued)*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>Mental Illness</i>								
Self-management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Low No strategy favored	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

BMI = body mass index

*No studies identified orlistat as a strategy to prevent weight gain.

[†]For BMI, weight change, and waist circumference the direction of effect is provided for strategies that met the between group difference threshold.

Discussion

Key Findings and Strength of Evidence

We did not find strong evidence that any strategy prevents weight gain. This conclusion is similar to a previous systematic review on prevention of weight gain.²⁶

Interventions that were potentially effective included a clinic-based program to teach heart rate monitoring, a lifestyle intervention targeted at mothers of young children, workplace interventions with individual and environmental components, small group sessions to educate college women about healthy lifestyles, exercise for individuals at risk of cardiovascular disease and diabetes, and exercise performed at home among women with cancer. Potentially effective approaches, identified from observational studies, included eating meals prepared at home among college graduates and less television viewing among individuals with colorectal cancer.

No strategy was graded as having a high strength of evidence for its effectiveness. Workplace-based interventions and physical activity for women with cancer were graded as having a moderate strength of evidence. All other comparisons had low or insufficient evidence. The strength of evidence was low for many comparisons because the studies were not designed to measure weight maintenance or prevent weight gain and the study staff that measured weight in the intervention studies may have been aware of the participants' exposure groups. For observational studies, only one study mentioned that the original cohort was designed to measure weight longitudinally and qualified as direct evidence.²⁵

Despite the attention on primary prevention of obesity,^{1,27-32} there is little evidence to recommend specific strategies. Existing recommendations are based on intermediate measures of changes in diet or physical activity or cross-sectional measures of weight. For example, the recommendations by the Centers for Disease Control and Prevention for community interventions to prevent obesity acknowledge that the evidence to support the recommendations were not based on sufficiently long studies that measured weight as an outcome, but on short-term changes in food choices or use of environmental modifications to facilitate physical activity.²⁷

Efforts by primary care providers to share information from publications on evidence-based research to prevent weight gain may be limited by the lack of reimbursement for the time to provide information and counseling. The World Health Organization European Ministerial Conference on Counteracting Obesity recommended that primary care providers play a more active role in preventing obesity.³⁰ Although the American Medical Association recommends talking with patients about how to prevent inappropriate weight gain,³³ reimbursement for the time required to provide weight maintenance counseling for the nonobese is not supported by Medicare.^{34,35} The lack of reimbursement may at least partly explain the low adherence with these recommendations by providers. An analysis of the Behavioral Risk Factor Surveillance Survey data in 2003 indicated that only 2.6 percent of individuals with a BMI between 18 and 25 kg/m² received advice to maintain their current weight by a health care provider.³⁶

Although evidence is limited to support strategies associated with weight gain prevention, the rationale to prevent weight gain is sound given the robust evidence that obesity is associated with poor health outcomes,⁵⁻¹² is costly,³ and is difficult to reverse.³⁷

Areas for future research may focus on periods when people are already making other life changes and identifying strategies that people are interested in implementing before using resources to administer an intervention. Three of the interventions targeted populations

experiencing life changes such as attending college³⁸ or beginning to cohabitate with a partner.³⁹ During these periods of change, individuals may be more amenable to accept a lifestyle modification or more likely to be adherent to the changes. Although these interventions did not uniformly result in weight maintenance compared with control or result in higher levels of adherence, designing interventions to be implemented during these and other life changes (e.g., postpartum, retirement, relocating to a new region) may be considered in future research.

Identifying an individual's interest level in an intervention prior to recommending a weight maintenance strategy may also be of interest. Many studies randomized participants to an intervention followed by multiple in-person visits, phone calls, and mailings. One trial opted to provide patients with up to three phone invitations to participate in a walking program compared with an information session. Only 33 percent of those invited to walk took part in a walk.⁴⁰ Allowing the option of participating in an intervention (rather than required visits or phone calls) demonstrates that individuals who consent to participate in a weight-related study may not have the motivation to participate in the particular intervention of interest. Combining a time when a person is already in a period of change with an intervention that an individual is motivated to participate in may be an area for future research.

Applicability

These findings apply primarily to overweight individuals. No study included healthy-weight individuals exclusively. The one study of obese individuals included abdominally obese individuals.

Adherence was poor in many trials. The results may have been more useful if they had been reported by adherence status in addition to the intent-to treat analyses. For example, if participants who adhered to an intervention were more likely to maintain weight than the nonadherent participants, this would have been valuable information.

Behavior change is difficult for individuals whose goal is to prevent weight gain, just as behavior change is difficult for those attempting to lose weight. Workplace interventions with environmental-level change may be a way to help those attempting to prevent weight gain and those who aim to lose weight modify their behavior, especially when the workers are made aware of the intervention. For individuals, eating more meals prepared at home and decreasing television viewing are simple, low-cost changes that prevent weight gain. College groups to discuss healthy diets and physical activity also prevented weight gain. The more intensive diet and physical activity interventions reported few adverse events. Although these intensive interventions did not result in strong evidence to promote their adoption, there is no evidence that *not* adopting a strategy to prevent weight gain is preferable.

Limitations

The strength of evidence is low or insufficient for almost all comparison-outcome relationships. There are several reasons for these low grades based on how we assessed each study's quality and graded the strength of evidence. First, intervention trials were frequently downgraded for lack of blinding, for not reporting the blinding of outcome assessors, or for not accounting for losses to followup. We feel that these quality elements are required to reduce the risk of bias. Although some may argue that an objective measure such as a weight measurement is not subject to bias, we suggest that the role played by a nonblinded assessor still poses a risk of bias in this measurement. Second, we included in this review only observational studies that accounted well for confounding and for losses to followup to ensure that we included only the

highest quality observational studies. The inclusion of only high-quality observational studies narrowed the body of evidence but we could not have confidence in outcomes from studies that did not account for confounding or selection bias. Third, very few interventions had a stated goal of weight maintenance or weight gain prevention, a requirement for having direct evidence. We excluded studies that explicitly mentioned that at least some of the patients had a goal of weight loss. The best-known weight gain prevention trial—the Pound of Prevention trial—was excluded for this reason.⁴¹ Only one observational study was nested within a cohort whose original design had a weight-related outcome of interest.²⁵ Fourth, very few studies reported standard errors or confidence intervals for the between-group differences in change in a weight-related outcome over time. When the majority of studies did not report a measure of variability, we graded the body of evidence as imprecise. In some instances, the studies did not report a mean difference or point estimate stating only *there was no significant difference in weight change between the groups*.

There were also several limitations of the literature base. First, many studies did not report a weight-related goal and yet were included because they did report weight outcomes. We may have inadvertently included some trials that had a goal of weight loss but that did not say so explicitly in the published paper. Studies reported as weight maintenance among overweight and obese individuals may not have been solely targeting weight maintenance, but implicitly implied weight loss. We excluded studies that included specific aims of “weight change” associated with power calculations for an expected decrease in weight among the intervention group. However, some studies did not report power calculations or an expected direction of weight change. These studies were included. We also included observational studies that include participants with unknown weight-related goals. Second, controls had better weight maintenance than expected. In many studies, the weight maintenance in the control groups was better than is expected in a general population. Many control groups had no increase in weight over time. In the general United States population, adults gain about 0.5 kg per year.⁴ Individuals enrolled in intervention studies may be more likely to make behavior changes regardless of the group assignment. It is possible that the knowledge that one will be evaluated on weight regularly may help people to maintain weight without an intensive intervention. This may support the use of simple weight surveillance interventions in a workplace or primary care setting. Third, very few studies reported on obesity-related clinical outcomes or adverse events. Only one study in the general population reported on mortality. The few trials that did report on adverse events stated that none were associated with the intervention. Although, none of these studies stated what adverse events they collected or how they were measured.

Strengths

The greatest strength of the evidence base was the variety of populations included. In addition to including populations with very few exclusion criteria representative of the general population, we also observed a variety of studies targeted at individuals that are known to be more likely to gain weight.

Research Gaps

We suggest that most comparisons and outcomes that have low or insufficient evidence are future research needs. In particular, we recommend future research to examine strategies to prevent weight gain among healthy weight individuals and, separately, overweight and obese individuals. Interventions for individuals initiating antipsychotic medications are also a high

priority given that participants of a trial gained 10 kg in the first year of medication use. Diabetes and some cancer medications are also associated with weight gain. Interventions for patients initiating diabetes medications, tamoxifen, and aromatase inhibitors are also a high priority subpopulation, although weight loss goals may be more relevant for some of these patients.

Different degrees of intensity of the strategies should be compared. Less intensive interventions may be possible given that control groups maintained weight comparable with the intervention groups in most of the studies that we included.

There are design and reporting considerations that should be considered for future studies. Observational cohorts should make measuring weight a stated goal in their protocols if that is the intent. Intervention trials should be of sufficient duration to adequately assess the efficacy of interventions to prevent weight gain. We suggest that 1 year should be a minimum duration of followup for these interventions. Longer followup will make it easier to identify true effectiveness if individuals are expected to gain only 0.5 kg per year.

Conclusions

The evidence provides some, although limited, support for strategies to prevent weight gain. Potentially effective strategies included ones that involve minor behavior change (eating more meals prepared at home) or more major changes (endurance exercise training in a gym at least three times per week). Although there is no strong evidence to promote a particular weight gain prevention strategy, there is no evidence that *not* adopting a strategy to prevent weight gain is preferable.

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Introduction

Background

Condition

One of the Healthy People 2020 national objectives is to increase the prevalence of a healthy weight among adults to 34 percent and reduce the prevalence of obesity among adults to less than 30 percent.¹ From 2005 to 2008, only 31 percent of adults were at a healthy weight.²

Body mass index (BMI) (see Appendix A for a list of acronyms) – expressed as weight in kilograms divided by height in meters squared (kg/m^2) – is commonly used to classify underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), healthy or normal weight ($\text{BMI} 18.5\text{--}24.9 \text{ kg/m}^2$), overweight ($\text{BMI} 25.0\text{--}29.9 \text{ kg/m}^2$), obesity ($\text{BMI} \geq 30.0 \text{ kg/m}^2$), and extreme obesity ($\text{BMI} \geq 40.0 \text{ kg/m}^2$).

The estimated age adjusted prevalence of overweight and obesity ($\text{BMI} \geq 25.0 \text{ kg/m}^2$) was 68 percent in the United States (U.S.) from 2007 to 2008. Despite the doubling in the prevalence of obesity between 1976 to 1980 and 2007 to 2008 (13 to 34 percent), the prevalence of overweight has remained stable between the same time periods (32 to 34 percent). The largest increase in obesity during these times was among Americans who live 200 percent or more below the poverty line.³ Those people living below the poverty line are more likely to live in areas without grocery stores and have fewer places to exercise than individuals who live in more affluent neighborhoods.⁴

Progression to Obesity From Healthy Weight Can Occur Gradually Over Time

Adults tend to gain weight progressively through middle age. Although the average weight gained per year is 0.5 to 1 kg, the modest accumulation of weight over time can lead to obesity.⁵ During 2009 to 2010, 33 percent of men and 32 percent of women age 20 to 39 were obese, compared with 37 and 36 percent at age 40 to 59 and 37 and 42 percent at ages 60 and older.⁶

Obesity Differs by Sex and Ethnicity

The sex specific prevalence of obesity was 32 percent of men and 36 percent of women during 2007 to 2008 in the U.S. The prevalence of obesity is greater among non Hispanic Blacks and Mexican Americans than non Hispanic whites.⁷ Access to healthy food and places to exercise, as well as cultural differences, may contribute to the differences in obesity prevalence.^{4,8}

Obesity Increases Morbidity and Mortality

Obesity is a risk factor for chronic conditions including cardiovascular disease, type 2 diabetes, arthritis, certain types of cancer, and cancer recurrence.⁹⁻¹⁶ Weight is associated with an increased risk of some forms of cancer and cancer recurrence. There is growing evidence that breast cancer survivors or women with breast cancer have better outcomes if they lose or maintain their weight. Obesity can also be caused by medications used to treat chronic disease as is the case for antipsychotic treatments,¹⁷ some type 2 diabetes treatments,^{18,19} and tamoxifen and aromatase inhibitors to treat or prevent breast cancer or cancer recurrence.²⁰ Higher grades of

obesity are associated with excess mortality, primarily from cardiovascular disease, type 2 diabetes, and certain types of cancer.²¹

Obesity Economically Impacts the U.S. Health Care Systems

Obesity was estimated to cost \$79 billion in the United States during 1995. By 2008, obesity costs rose to \$147 billion. The Federal Government pays about half of the cost of obesity and its associated conditions through Medicaid and Medicare spending.²²

Strategies To Prevent Progression to Obesity Among Adults Are Needed

Because the health outcomes for overweight individuals may be more like those of healthy weight individuals than those with obesity, factors associated with the maintenance of overweight are also of interest to serve as intervention points to prevent obesity. Maintenance of non obese weight is considered to be an adult weight between a BMI of 18.5 and 29.9 kg/m² with long term stability within this range.

Strategies to Prevent Progression of Further Obesity Among Adults Are Needed

Adults who have the greatest degree of obesity have higher morbidity and mortality than those whose weight is closer to overweight.²¹ For example, adults with a BMI 40 kg/m² or greater have more co morbidities than those with a BMI of 30 to 39 kg/m².¹ and adults with a BMI greater than 35 kg/m² have more mortality than those with a BMI of 30 to 34 kg/m².² Maintaining an obese weight closer to overweight may be advisable compared with maintaining an obese weight that is progressing to more extreme obesity.

Strategies To Prevent Weight Gain

Multiple strategies have been investigated to identify strategies to effectively maintain weight among adults. These strategies include self management techniques, diet, physical activity, medications, or combinations of these strategies at the individual or community level.

These strategies have been implemented in multiple settings, including clinical care settings, community settings, higher education settings, and workplaces.

Some strategies have targeted individuals at high risk of gaining weight because of a family history of obesity or diabetes mellitus, a diagnosis of these chronic conditions, or because of use of a medication that contributes to weight gain,²³ while others have more inclusive enrollment criteria or are directed at an entire population.^{24,25}

Self-Management Strategies To Prevent Weight Gain

Self-management strategies may include goal setting, self monitoring, problem solving, relapse prevention, and stimulus control.²⁶ Other strategies may include regulating the time spent watching television or sleeping, enhancing self care, or acquiring social support. Weight loss studies suggest that frequent contact with interventionists and self monitoring of weight may be particularly valuable.²⁷ However, participants recruited to studies to prevent weight gain may have less motivation to change their behavior than those recruited to weight loss studies because of the absence of obesity and obesity related disease.²⁷ As a result, the robust literature on self-

management strategies to lose weight and maintenance of weight after loss cannot be applied directly to weight gain prevention.²⁷

To date, the most effective elements of behavioral strategies for weight maintenance are not known. From a public health perspective, less intensive interventions²⁷ and strategies targeting patients at high risk of complications from weight gain are of great interest.

Dietary and Physical Activity Strategies To Prevent Weight Gain

Individuals who are successfully maintaining their weight are successfully balancing energy (kilocalories) intake and energy expenditure. These individuals maintain energy balance by having a consistent intake of adequate, rather than excess, kilocalories.²⁸ Some use specific dietary patterns (e.g., low fat or low carbohydrate).²⁹ Adequate energy expenditure may also come from integration of physical activity into everyday activities or from making time for exercise in the daily routine.²⁹

To date, the types of diet and physical activity strategies used for weight gain prevention have not been systematically evaluated. Specific dietary strategies of interest include eating patterns, macronutrients (such as fiber) from food sources, micronutrients from food sources, and any physical activity strategies such as walking, running, biking, or a training program. Physical activity has cardiovascular and psychological health benefits, making it a suitable strategy for individuals with existing chronic diseases or mental health concerns.^{30,31}

Medications To Prevent Weight Gain

In the U.S., there are several medications approved for weight control in individuals with a BMI of 27 kg/m² or higher. The dietary fat absorption inhibitor, orlistat, has been shown to help maintain weight loss and improve cardiovascular risk factors with continued, long term use.³² Because the sympathomimetic amines (i.e., phentermine or diethylpropion) are only approved by the U.S. Food and Drug Administration for short term use under the indication of weight loss, they are not appropriate for this review.³³

Orlistat is a lipase inhibitor available without a prescription.³⁴ The accessibility of orlistat makes it possible that individuals may use it for weight maintenance independent of weight loss in overweight and obese populations. To identify if orlistat's effectiveness is being tested in these individuals and because orlistat is approved for long term use, the only medication of interest for the review was orlistat.

Environment-Level Strategies To Prevent Weight Gain

The built environment encompasses all of the buildings, spaces, and products created or modified by people.³⁵ Built environment strategies are applied at the community level and affect the environment that a community interacts within.

Built environment strategies may be implemented in multiple settings. Examples of built environment strategies include fast food outlets and corner food stores posting calories or increasing the availability of fresh food. At the neighborhood level built environment strategies may include increasing sidewalks or planting trees to improve walkability. Strategies may be directed toward individuals at high obesity risk such by implementing strategies in communities that include a greater prevalence of low income minority populations. Built environment strategies may also occur within a workplace or school where a subset of the population has access to them.

A previous systematic review that aimed to identify policy studies about weight maintenance, including environment level strategies, did not report identifying any such studies.³⁶ However, the review did not include serial cross sectional or time series studies. A national policy research group, PolicyLink, recently published a report on the impact of access to grocery stores on health related outcomes.³⁷ The authors identified several peer reviewed manuscripts that reported weight as a health related outcome of interest as measured in cross-sectional studies. Weight change was not a priority outcome for the report.

Current Controversies in Weight Gain Prevention

Previous systematic reviews have concentrated on weight loss or maintenance of weight after weight loss.^{38,39} Strategies that are effective for preventing weight gain may be different than strategies that are useful for weight loss or for maintenance of weight after weight loss.

Systematic reviews on the prevention of weight gain or weight maintenance are lacking. Previous systematic reviews on weight gain prevention have allowed the inclusion of studies targeting weight loss in the non obese³⁶ and included studies that were as short as 6 months.²⁷

Synthesis of the predictors of longer term weight gain prevention is needed. Accounting for adherence to weight gain prevention interventions is also needed. Because an intervention can only be effective among those who adhere to it, adherence is an intermediary between the intervention and its effect on long term weight maintenance.

Treatment Guidelines and Meta-Analyses on Weight Gain Prevention

We identified no treatment guidelines for maintenance of weight, although several guidelines and systematic reviews address the maintenance of weight after weight loss.^{6,38-42} Only one previous review with a meta analysis evaluated obesity prevention. The review was conducted as background for a study on the impact of cancer prevention interventions on obesity prevention.³⁶ The primary outcome of interest for the meta analysis was the difference in change in BMI or body weight between the intervention and control groups among studies published from 1996 to 2006 that listed a specific goal of weight gain prevention or weight maintenance in the design of the original trial.

A 2010 Cochrane review examined workplace based diet and physical activity interventions and change in BMI from baseline among non obese and obese employees.⁴³ The investigators found that the interventions decreased weight by 1.3 kg, on average, at 6 to 12 months of followup and that BMI decreased by 0.5 kg/m². The findings are reported as recommendations to implement workplace interventions for controlling overweight and obesity in the Task Force on Community Preventive Services.⁶

Scope and Key Questions

Scope of the Review

The goal was to compare the effectiveness, safety, and impact on quality of life of independent and combined strategies to prevent weight gain among healthy weight, overweight and obese adults. Studies that evaluated interventions targeting a combination of weight loss with weight maintenance, or weight loss exclusively, were excluded. We also excluded studies to prevent excessive weight gain during pregnancy because for normal weight women, weight gain is expected during pregnancy.

The specific Key Questions (KQ) are:

- KQ1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?
- KQ2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?
- KQ3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?
- KQ4: What is the comparative effectiveness of medications for the prevention of weight gain among adults?
- KQ5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?
- KQ6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

We planned to include studies of adults, including various subgroups of individuals at high risk of weight gain, which compared self management, diet, physical activity, use of orlistat, or a combination of these strategies over at least one year. Dietary and physical activity strategies inherently include some aspects of self-management. Only when self-management did not include traditional diet or physical activity components (i.e., daily weighing or regulating television viewing) was the study reported in KQ1. We compared the outcomes of weight, BMI, waist circumference, obesity related clinical outcomes (mortality, health related quality of life, and cancer recurrence), and adverse effects (Table 1 and Figure 1).

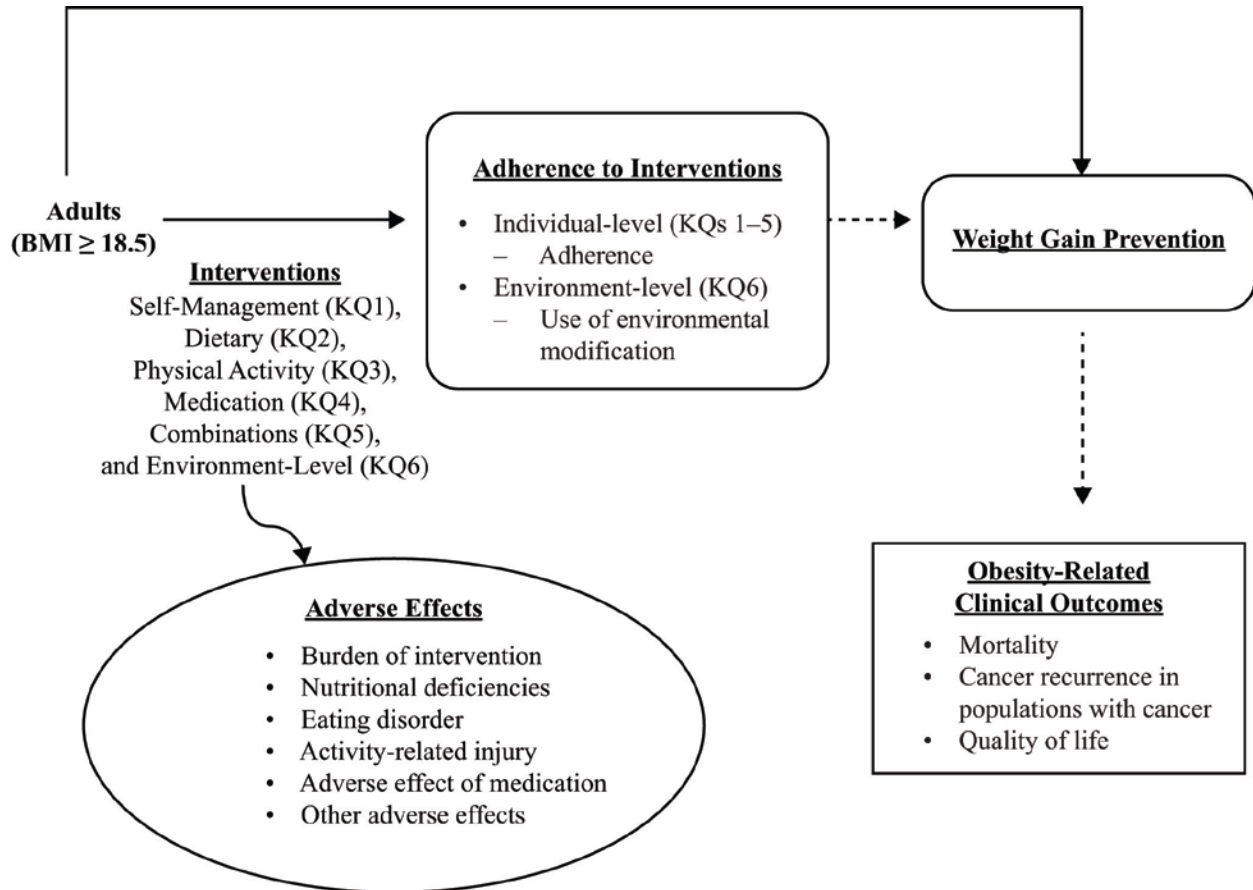
Table 1. Characteristics of the target studies according to the PICOTS framework

Population	<ul style="list-style-type: none"> Adults (18 years and older). Sub groups at greatest risk for weight gain including by: baseline weight (healthy weight/overweight); age groups; life events (college, menopause, retirement); race, ethnicity or cultural group; gender; income, socioeconomic status, or educational attainment; family history of obesity; people with mental illness; cancer patients or survivors not at risk of weight loss; and people with diabetes or cardiovascular disease or those at high risk of these conditions.
Interventions and approaches	<ul style="list-style-type: none"> Self management, dietary, physical activity, medication, or a combination of these strategies. Studies that <i>educate</i> the participants about a strategy will be reported in the section about that strategy. Behavior change about a strategy is reported with the strategy and not with the self-management strategies.
Comparisons	<ul style="list-style-type: none"> No intervention, usual care, information packet, or comparison with other self management, dietary, physical activity, medication, or combination of strategies.
Outcomes	<ul style="list-style-type: none"> Intermediate outcomes of interest include: adherence to the intervention at the individual level for Key Questions 1 through 5, and use of environmental modification for Key Question 6. Prevention of obesity related outcomes including mortality cancer recurrence* and quality of life. Adverse effects of strategies included burden of intervention, nutritional deficiencies, eating disorders, activity related injuries including fracture, and adverse events of orlistat (e.g., diarrhea or leakage). Weight gain prevention outcomes include: Percent or mean change from baseline weight, BMI or waist circumference. Maintenance of weight within same BMI category as the baseline measure.
Timing	<ul style="list-style-type: none"> The strategy of interest must be measured after age 18. The study must report the change in weight over at least 1 year during adulthood. Followup duration will be considered in the analysis. In addition to 1 year, specific timepoints of interest include 2, 5, and the last reported timepoints after 5 years, when available.
Setting	<ul style="list-style-type: none"> Any setting. Studies conducted in educational settings or workplaces will be reported with other studies conducted in the same setting regardless of the strategy.

BMI = body mass index

*In populations with cancer only.

Figure 1. Analytic framework for comparative effectiveness of strategies to prevent weight gain among adults



BMI = body mass index; KQ = Key Question

Methods

The methods for this comparative effectiveness review (CER) follow the methods suggested in the AHRQ “Methods Guide for Effectiveness and Comparative Effectiveness Reviews” (available at www.effectivehealthcare.ahrq.gov/methods_guide.cfm). The main sections of this chapter reflect the elements of the protocol established for the CER. Certain methods map to the PRISMA checklist.⁴⁴

Our Evidence based Practice Center (EPC) established a team and a work plan to develop this evidence report. The project involved recruiting key informants and technical experts, formulating and refining the questions, performing a comprehensive literature search, summarizing the state of the literature, constructing evidence tables, synthesizing the evidence, and submitting the report for peer review and public comment.

Topic Refinement and Review Protocol

The topic for this report was nominated in a public process. A physician and nurse suggested the topic based on the lack of evidence that they could identify in the literature to inform their practice.

At the beginning of the project, we recruited a panel of key informants to give input on key steps including the selection and refinement of the questions to be examined. The panel included experts in adult obesity, weight maintenance, prevention of weight gain, environmental interventions and individuals with perspectives from payors and companies that sell weight related products.

In preparation for this report, we reviewed existing systematic reviews on this topic as well as guidelines prepared by key professional societies. With input from the key informants, staff of AHRQ, and the Scientific Resource Center, we developed the key questions. Our draft key questions were posted on AHRQ’s Web site for public comment in November 2011. We then refined the key questions based on the feedback received.

The final key questions focus on the comparisons of interventions and approaches that prevent weight gain among adults. The key questions focus on the effectiveness of these interventions and approaches as well as harms. We drafted a protocol to address these key questions and then recruited a panel of technical experts, including experts on weight maintenance and weight gain prevention. With input from the technical expert panel and representatives from AHRQ, we finalized the protocol.

Amendments to the protocol were submitted to AHRQ and posted publicly on the Effective Healthcare website in November 2011 and March 2012. These amendments were added to focus the project’s scope to weight and clinical outcomes, and to include high quality observational studies in addition to trials.

Search Strategy

We searched the following databases for primary studies: MEDLINE®, Embase®, and the Cochrane Central Register of Controlled Trials through June 2012. We developed a search strategy for MEDLINE, accessed via PubMed®, based on an analysis of the medical subject headings (MeSH), terms, and text words of key articles identified (Appendix B). We also reviewed the reference lists of each included article, relevant review articles and studies identified in clinicaltrials.gov.

The results of the searches were downloaded and imported into ProCite[®] version 5 (ISI Research Soft, Carlsbad, CA). We scanned for exact article duplicates; author/title duplicates, and title duplicates using the duplication check feature in ProCite. From ProCite, the articles were uploaded to DistillerSR (Evidence Partners, Ottawa, Ontario, Canada), a Web based software package developed for systematic review and data management. This database was used to track the search results at the levels of title review, abstract review, article inclusion/exclusion, and data abstraction.

Gray Literature

We performed a gray literature search to identify complete and ongoing trials and studies related to our topic. We searched ClinicalTrials.gov on June 19, 2012 using the search string “adult AND weight AND (maintain OR maintenance OR "prevent weight gain").” Two reviewers then examined the titles of each trial to determine if it was related to the topic. For studies that were considered related to the topic, we then went to the webpage in ClinicalTrials.gov and identified if the trial met our inclusion criteria. If the trial met the inclusion criteria, we collected information on the status of the trial (ongoing, terminated, completed, not yet recruiting), start and stop dates, whether there were publications related to the trial and if results were available in tables within ClinicalTrials.gov. We retrieved publications related to the study to determine if they had been previously identified in our search.

Study Selection

We first screened titles for eligibility. All titles were screened by two screeners. This phase of screening was designed to be liberal. Only one screener needed to identify a title as potentially eligible for the associated publication to move to the next screening level (Appendix C). However, two screeners were required to agree that a title was not eligible for the publication to be removed from the potential pool of articles.

The abstract review phase was designed to identify trials or observational studies that addressed weight maintenance or prevention of weight gain among adults (Appendix C), and potentially applied to the inclusion criteria (Table 2). Abstracts were reviewed independently by two investigators and were excluded if both investigators agreed that the article met one or more of the exclusion criteria (see Table 1). Differences between investigators regarding abstract inclusion or exclusion were resolved through consensus adjudication.

Abstracts that were promoted to the next level, article screening, underwent another independent parallel review to determine if they should be included for data abstraction (Appendix C) (Table 2). Differences regarding article inclusion were resolved through consensus adjudication. We included only articles published in English due to volume of literature and lack of resources to translate all the languages encountered.

Inclusion of Observational Studies

Observational studies that have a high risk of bias add little value to a systematic review of effectiveness.⁴⁵ Therefore, only high quality observational studies were included. We used the Downs and Black tool to assess study quality with particular attention to control of confounding and losses to followup.⁴⁶ For inclusion, we required that studies adjusted for the following confounders in their analysis: age, sex, race or socioeconomic status, and diet (for physical activity studies) or physical activity (for dietary studies). Included observational studies were required to account for losses to follow up in the analysis, state that the losses to followup were less than 20 percent, or state that the individuals included in the analysis were similar to those lost to followup or the original cohort. If the study met both the confounding and losses to follow up criteria and most or all of the other Downs and Black internal validity criteria, the observational study was considered eligible for the review.

To distinguish between strategies examined in observational studies from those in trials, we refer to strategies examined in observational studies as approaches. Strategies examined trials are referred to as interventions.

Data Abstraction

Relevant data were abstracted from eligible articles with a focus on items related to the population, interventions and approaches, comparisons, outcomes, timing and setting. Each article was serially abstracted first by a junior reviewer then by a senior reviewer. Serial data abstraction involved a senior reviewer (faculty level project investigator) confirming the data abstracted by the first reviewer. Data were abstracted from the text, tables, figures, and supplemental materials. Differences in opinion were resolved through consensus adjudication and, in difficult cases, during team meetings.

The timepoints of interest for data abstraction of weight outcomes were 1 year, 2 years, 5 years and the last reported timepoint after 5 years. For the intermediate outcomes, safety and quality of life outcomes, we only abstracted data for the last reported timepoint after 1 year.

For each Key Question, we created a set of detailed evidence tables containing all information abstracted from eligible studies (Appendix C. Data Abstraction Forms). The text, tables, and figures in this report were based on the information in the evidence tables.

We reported on the effectiveness of interventions on populations with different risks of weight gain. These subgroups included baseline weight (healthy weight/overweight); age; life events (college, menopause, retirement); race, ethnicity or cultural group; gender; income, socioeconomic status or educational attainment; family history of obesity; persons with mental illness; cancer patients or survivors not at risk of weight loss; and persons with diabetes or cardiovascular disease or those at high risk of these conditions.

Data Synthesis

When there were three or more studies with comparable interventions and comparable outcome measures, we considered quantitative pooling of the results. We examined the studies' designs for qualitative similarities. Because we found that no groups of studies were amenable to pooling with meta analyses, we calculated and displayed the mean differences, risk differences or relative risks with 95% confidence intervals (CI) for the individual studies grouped by study

population and comparable interventions. Observational studies did not report categories of approaches consistently, prohibiting the use of summary figures.

We selected a meaningful between group difference threshold in addition to a statistically significant threshold ($p < 0.05$) for reporting on the outcomes. A meaningful difference threshold was defined as 0.5 kg of weight,^{5,47} 0.2 units of BMI (based on a 0.5 kg change for an individual with a BMI of 27), or 1 cm of waist circumference relative to the comparison group. The weight threshold was based on average annual weight gain in previous studies. The BMI threshold was set to correspond to a weight gain for the average baseline weight of individuals in many of the studies. For waist circumference, a threshold of 1 cm was chosen because measurement error seemed likely below this threshold. The meaningful threshold was annualized to account for the different durations of the studies. For example, the weight difference threshold was 1 kg for outcomes reported at 2 years and 2.5 kg at 5 years.

Quality Assessment

The risk of bias was assessed using the Downs and Black methodologic quality assessment checklist.⁴⁶ This checklist was developed to assess the quality of reporting, internal validity and external validity for individual randomized and observational studies. Two reviewers independently assessed the risk of bias of each article and came to consensus regarding the bias rating for each item on the checklist.

Data Entry and Quality Control

Each data element was reviewed by at least two reviewers. The second reviewers were generally more experienced members of the research team. In addition, at least one additional investigator audited a random sample of the reviews to identify any problems with data abstraction. If problems were recognized in a reviewer's data abstraction, the problems were discussed at a meeting with the reviewers. Throughout the review process we held weekly meetings to describe each phase of the review process, discuss identified discrepancies, and discuss any questions that arose about our process or specific content from the review. The goal of this part of the weekly meetings was to ensure consistency of article inclusion and data abstraction.

Rating the Body of Evidence

At the completion of our review, we graded the quantity, quality and consistency of the evidence addressing the Key Questions by adapting an evidence grading scheme recommended by the Methods Guide for Conducting Comparative Effectiveness Reviews.⁴⁸ We created evidence grades for each comparison and outcome. We used four domains to come up with a final evidence grade: Risk of Bias, Consistency, Directness and Precision.

Risk of bias in each individual study was assessed using the Downs and Black criteria focusing on reporting bias and internal validity.⁴⁶ Randomized controlled trials were initially assigned to a low risk of bias category which could be altered to moderate risk for not blinding the outcome assessor to the intervention assignment, or not reporting on blinding of the outcome assessor. If the entire set of randomized controlled trials for a given intervention and outcome were blinded, the set could be changed from low risk of bias to moderate risk of bias if there were internal validity concerns or poor reporting. If a set of trials was mostly not blinded, the risk of bias was changed to moderate. This set of trials could then be assigned to a high risk of

bias category if there were internal validity concerns or poor reporting. Observational studies were initially assigned a moderate risk of bias and could be changed to a high risk of bias if there were internal validity concerns or poor reporting. Because we had strict criteria and included only observational studies that minimized confounding and selection bias, the majority of studies were expected to have moderate risk of bias. When both trials and observational studies contributed to evidence, we weighted our assessment of the risk of bias towards the highest quality studies and sample size. Our strength of evidence tables include comments on the trials and observational studies to inform the final assessment (Appendix F).

Consistency was assessed based on the direction of the effect estimates. If all studies found no difference between the comparison groups, the body of evidence was graded as consistent. If the direction of effect was similar across studies, this was considered to be consistent evidence. If only one study was identified for a body of evidence, consistency was not graded.

Directness was assessed based on the design of the trial or original cohort study and generalizability to other populations. If most of the studies for a given comparison and outcome pair were not designed to measure weight maintenance, the evidence was considered indirect. If the studies were designed to measure weight maintenance, but the external validity criteria of Downs and Black were not met or poorly reported, the evidence was considered to be indirect.⁴⁶

Precision could only be measured if the variability for the measure of association was reported. If there was no variability reported for most articles in the set, we graded the evidence imprecise. Otherwise, precision was determined by statistical significance ($p < 0.05$ or confidence intervals [CI] excluding 0 for mean differences). For adherence outcomes, statistical comparisons of groups were infrequent, because adherence to a wait-list or information only control group is not possible. When grading precision for the outcome of adherence, if the total number of participant in all studies for a given comparison and outcome was fewer than 400, the set was considered to be imprecise. We chose 400 participants as the threshold with the idea that the evidence should contain at least 200 patients receiving an intervention, such as 2 trials of 100 participants receiving the intervention and 100 individuals receiving no intervention or an information packet.

We classified evidence pertaining to Key Questions 1 through 6 into four categories: (1) “high” grade (indicating high confidence that the evidence reflects the true effect and further research is very unlikely to change our confidence in the estimate of the effect); (2) “moderate” grade (indicating moderate confidence that the evidence reflects the true effect and further research may change our confidence in the estimate of the effect and may change the estimate); (3) “low” grade (indicating low confidence that the evidence reflects the true effect and further research is likely to change our confidence in the estimate of the effect and is likely to change the estimate); and (4) “insufficient” grade (no evidence identified). A comparison-outcome pair with high strength of evidence was one with low risk of bias, consistency (or not applicable if only one study contributed), directness and precision. Moderate strength of evidence indicated that *one* of the following was observed: a moderate risk of bias, inconsistency, indirectness or imprecision. Low strength of evidence indicated a high risk of bias or *two* or more of the following: a moderate risk of bias, inconsistency, indirectness and imprecision. Strength of evidence was graded by the senior reviewers and conflicts were resolved by discussion and consensus.

Definition of Effectiveness

For an intervention or approach to be considered effective, it had to meet the meaningful between group difference and statistical thresholds. We selected a meaningful between group difference threshold in addition to a statistically significant threshold ($p < 0.05$) for reporting on the outcomes. A meaningful difference threshold was defined as 0.5 kg of weight,^{5,47} 0.2 units of BMI (based on a 0.5 kg change for an individual with a BMI of 27), or 1 cm of waist circumference relative to the comparison group. The meaningful threshold was annualized to account for the different durations of the studies. For example, the weight difference threshold was 1 kg for outcomes reported at 2 years and 2.5 kg at 5 years.

Applicability

We describe the applicability of studies in terms of the degree to which the study population, interventions or approaches, outcomes, and settings were relevant to individuals at risk of weight gain and features that may affect the effectiveness of the strategy. The population that received the intervention or used the approach was the greatest driver of applicability. To clarify the population to whom the strategy was applicable, we describe strategies by select populations and settings in separate sections of the report.

Peer Review and Public Commentary

Experts in behavior, policy, medications, nutrition, physical activity and individuals representing stakeholder and user communities were invited to provide external peer review of this CER. AHRQ and an associate editor also provided comments. The draft report was posted on the AHRQ Web site for 4 weeks to elicit public comment. We addressed all reviewer comments, revising the text as appropriate, and documented everything in a disposition of comments report that will be made available three months after the agency posts the final CER on the AHRQ Web site.

Table 2. Study inclusion and exclusion criteria

Population and condition of interest	<p>Adult participants for KQ1-5. If a study includes some participants under age 18 years and results are not reported separately for adults, the study will be included as long as 90percent of the total population is 18 years and older.</p> <p>Studies of obese patients were included if the study did not describe the goal of the intervention to be weight loss or maintenance of weight after weight loss.</p> <p>All ages are included for KQ6; strategies are implemented at the community level.</p> <p><i>Excluded</i> studies if they included only pregnant women.</p> <p><i>Excluded</i> studies that included only patients at risk of weight loss (e.g., wasting disease, eating disorders), or with a BMI <18.5</p>
Interventions and approaches	<p>Studies must have evaluated a strategy of interest as defined by the Key Questions.</p> <p>Included studies of orlistat.</p> <p>Included studies of caloric substitutes, such as olestra or artificial sweeteners.</p> <p>Included studies of lifestyle interventions for KQ5.</p> <p>Included studies implemented at a community level for KQ6.</p> <p><i>Excluded</i> studies if the goal of the study was weight loss, a combination of weight loss and weight gain prevention (without a separate reporting of results), or weight maintenance after weight loss.</p> <p><i>Excluded</i> studies of biological determinants (such as genes) as the exposure.</p> <p><i>Excluded</i> studies of herbal supplements, vitamins, and minerals.</p> <p><i>Excluded</i> studies that included a smoking cessation intervention or approach.</p>
Comparisons of interest	<p>No intervention, usual care, or comparison with other self management, dietary, physical activity, device, pharmaceutical or combination of strategies will be included.</p> <p>Included studies comparing different intensities of the same strategy (e.g., low fat versus high fat diet)</p> <p><i>Excluded</i> studies if a study compares a strategy of interest with a strategy not of interest.</p> <p><i>Excluded</i> studies if there was no comparison.</p>
Outcomes and Timing	<p>One year of observation of weight during adulthood was required.</p> <p>Weight change must have been reported relative to a strategy of interest. Measures of weight change included weight, BMI or waist circumference.</p> <p>Obesity related adverse effects, quality of life, cancer recurrence*, mortality and study adherence were abstracted only if the study also reported a qualifying measure of weight.</p>
Type of study	<p>Accepted studies with any sample size from any year that met all other criteria.</p> <p>Included all studies designs including prospective (randomized and nonrandomized), retrospective, crossover, and case control studies. Serial cross sectional studies of the same population were also eligible for KQ6.</p> <p>Observational studies had to account for confounding and losses to followup in the design or analysis to be eligible.</p> <p>Crossover studies must have reported at least 1 year of weight change in each phase of the crossover to be included.</p> <p>For KQ1-5 inclusion, the participants measured at the first time point must have been the same participants measured at the later time points.</p> <p>For KQ6 inclusion, the participants measured at the first time point were not required to be the same participants as those measured at the later time points.</p> <p><i>Excluded</i> studies with no original data (reviews, editorials, comments, letters, modeling only studies).</p> <p><i>Excluded</i> studies published only as abstracts.</p> <p><i>Excluded</i> qualitative studies that did not provide quantitative information on a strategy of interest and weight, such as focus groups or directed interviews.</p>

KQ = Key Question; RCT = randomized controlled trial

*In populations with cancer only.

Results

Results of the Literature Search

The literature search identified 24,870 unique citations. During the title screening, we excluded 15,829 citations. During the abstract screening, we excluded 7,615 citations that met at least one of the exclusion criteria (see Chapter 2 for details). During article screening, we excluded an additional 1,368 articles that did not meet one or more of the inclusion criteria (see Appendix D). Fifty-eight articles describing data from 51 studies were included in the review (Figure 2).

We reviewed 3,027 studies registered in ClinicalTrials.gov. No new study met our inclusion criteria for the full text review. No relevant study had results available on ClinicalTrials.gov.

Description of Types of Studies Retrieved

Six studies addressed Key Question 1 (self-management strategies), 14 studies addressed Key Question 2 (dietary strategies), 15 studies addressed Key Question 3 (physical activity strategies), no studies addressed Key Question 4 (orlistat), 21 studies addressed Key Question 5 (combination strategies), and 1 study addressed Key Question 6 (built environment or community level strategies).

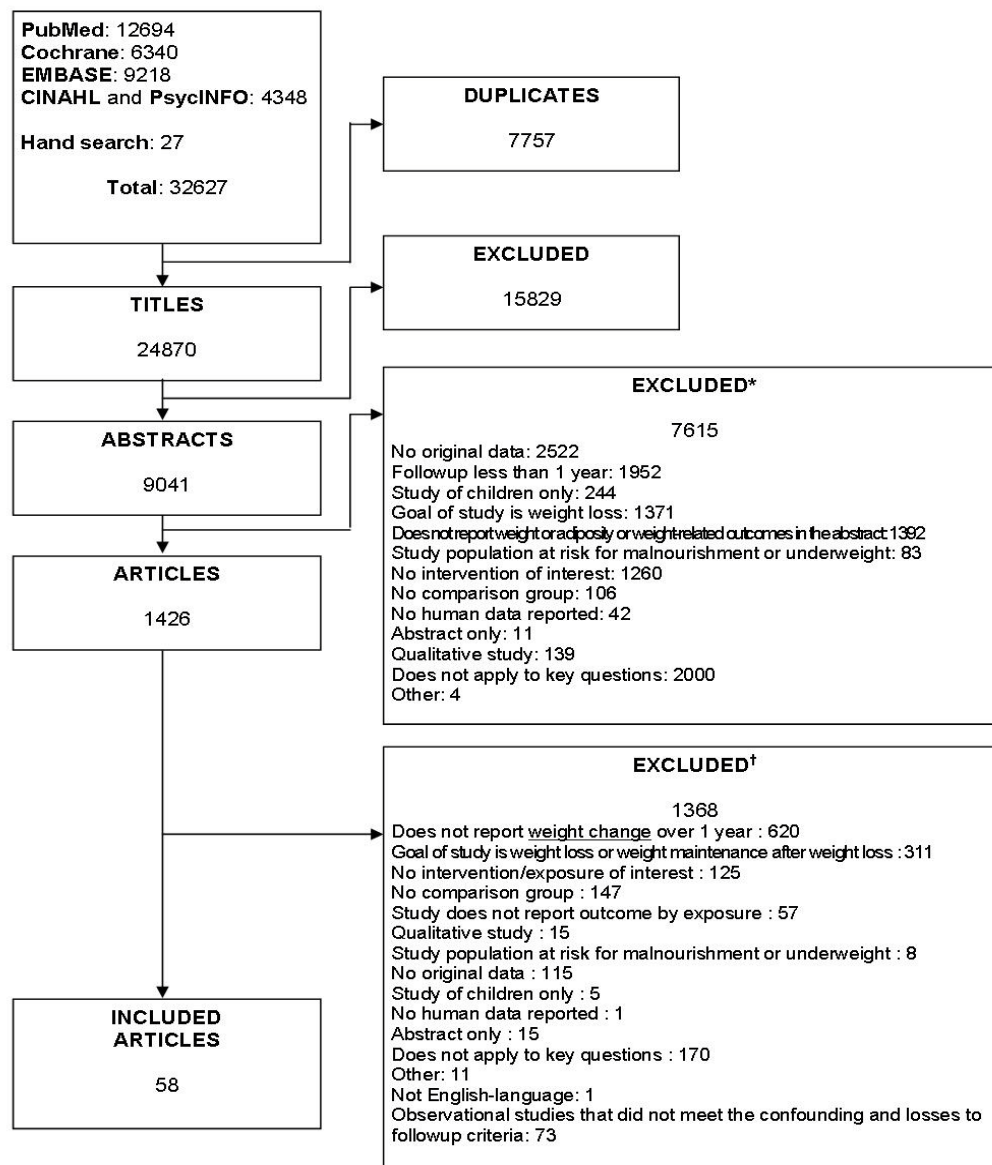
Eleven trials and 12 observational studies addressed in 25 articles reported on adults in the general population. A single trial addressed weight maintenance in an obese population. Seven trials reported in 8 articles took place in the workplace, and 2 trials addressed in 2 articles took place in a college setting. Twelve trials reported in 15 articles addressed adult weight maintenance in populations at risk for or with cardiovascular disease or diabetes mellitus. Three trials reported in four articles, and one observational study looked at adult weight maintenance among adults with cancer. Two trials looked at weight maintenance among adults with psychiatric disorders.

We did not identify any study that included exclusively individuals with healthy weight at baseline that met our inclusion criteria. We did not identify any studies addressing prevention of weight gain among socioeconomically disadvantaged individuals that met our inclusion criteria.

Order of the Results

The populations included in the studies and the settings which the strategies occur can affect the generalizability of the results. For this reason, we report the results by population and setting. The most inclusive population (adults in the general population) is reported first, followed by strategies that occur in a specific setting (work based and college based) and finally specific groups with a disease or at risk of a disease (cardiovascular disease, cancer and mental health).

Figure 2. Results of the literature search



Weight Gain Prevention Among Adults in the General Population

Study Characteristics

Eleven trials (65,562 baseline participants) reported on in 12 articles⁴⁹⁻⁶⁰ and 12 observational studies (414,880 baseline participants)^{49,56,61-70} were included. The duration of the trials ranged from one 30 minute session⁵⁶ with followup mailings and phone calls to 144 months of structured visits (Appendix E, Evidence Table 1).⁵¹

Most of the trials did not follow participants after the cessation of the intervention.^{49,51,53-55,57,60} In the three studies that did follow participants after the intervention, the followup after the intervention ranged from 10 to 12 months.^{56,58,59}

The observational studies were sub analyses of participants with available information on weight, diet or physical activity measures from existing cohorts. The maximum duration of followup in the observational studies ranged from 48 to 276 months.^{63,68,69}

Study Characteristics of the Interventional Studies

Ten of the interventional studies were randomized trials of individual participants. One trial compared a media campaign among three communities.⁵⁰ The stated goal of the intervention in three trials was to prevent weight gain,^{57,58,60} prevent increase in percent body and abdominal fat in one trial,⁵³ change diet or physical activity patterns in five trials,^{49,51,54,56,59} improve a cognition score among elderly patients in one trial,⁵⁵ and reduce the risk of cardiovascular disease in the community wide trial.⁵⁰

Five trials took place in the United States,^{49,50,53,57,58} one in Canada,⁵⁴ two in Europe,^{55,56} and two in Australia.^{59,60} In seven trials, participants were recruited from the local community^{49-51,53,57-59} and from primary care clinics in two trials.^{54,56} The recruitment source for one trial was the school where the women had children enrolled.⁶⁰ The recruitment source was not reported in one trial.⁵⁵

The calendar years of recruitment were reported in six trials. The earliest recruitment year was 1972⁵⁰ and the last recruitment year was 2006.⁶⁰

Interventions were administered at one location in four trials,⁵⁵⁻⁵⁸ multiple sites in five trials,^{49,51,53,54,60} by mail in one trial,⁵⁹ and by a local media campaign combined with mailings in one trial (Appendix E, Evidence Table 1).⁵⁰

Study Characteristics of the Observational Studies

The 12 observational studies were reported in 10 publications.⁶¹⁻⁷⁰ One publication reported on three studies.⁶¹ One study reported different approaches in two publications,^{64,65} and two sub cohorts were reported on in separate publications.^{68,69}

The observational studies included a sub analysis from a randomized trial,⁷⁰ seven prospective cohorts,^{6,63-65,67-69} and two studies followed participants who had participated in a previous cross sectional survey.^{62,66}

Only one prospective study specifically stated that obesity prevention was a goal during the design of the original cohort study.⁶⁷ Five studies took place in the United States,^{61,64,65,70} one occurred in Canada,⁶² three occurred in Europe,⁶⁶⁻⁶⁹ and one took place in the Philippines.⁶³

The earliest recruitment year was 1976⁶¹ and the most recent recruitment year was 2002 (Appendix E, Evidence Table 1).⁶²

Population Characteristics

Interventional Studies

Sixty nine percent of the randomized participants were included in the analyses relevant to change in BMI, weight, or waist circumference. Inclusion criteria for the trials commonly included household structure, sex, age, or life stage as well as race or ethnicity group (Appendix E, Evidence Table 2).

One trial included only heterosexual couples who began cohabitating within two years of recruitment⁵⁹ and another trial included households with at least two adults.⁵⁷ Five trials included only women.^{49,51,53,58,60} Among the trials that included both sexes, the percent of women ranged from 46 to 57 percent. Age restrictions were present in seven trials.^{49,51,53-56,58} The observed ages at recruitment ranged from 25 to 79 years. The two trials that targeted patients over 65 years old did not report the age of the oldest participants included. The mean ages at recruitment were 70 and 74 years in these two trials.^{54,55} Two trials included post menopausal women exclusively.^{49,51} One trial included only women with children aged 5 to 12 years.⁶⁰ No trial included only participants of a particular race or ethnicity background, but three trials specifically targeted recruitment to include an ethnically diverse population.^{49,51,53} No trial that occurred outside of the United States reported on race or ethnicity. All of the trials from the United States reported on race. The range of patients of each race or ethnicity group included 50 to 87 percent White, 11 to 28 percent Black, 4 to 16 percent Hispanic, and 0.4 to 12 percent Asian, Native American or Pacific Islander. Educational status was not a requirement for inclusion in any trial, but was reported in eight of the trials.^{49,51,53-55,57,58,60} The percent of participants with a college degree ranged from 28 to 84 percent (Appendix E, Evidence Table 2).

Trials frequently included participants based on weight. Four trials restricted patients based on weight or BMI,^{49,53,55,58} of which three trials included only women (Appendix E, Evidence Table 2).^{49,53,58}

The trials restricted to women included one study each of women who were no more than 165 percent of ideal body weight,⁴⁹ women with a BMI between 21 and 30 kg/m²,⁵⁸ women with a BMI between 25 and 35 kg/m²,⁵³ and all women that were not underweight.⁶⁰ Another trial included men and women participants older than 65 years with a BMI between 18 and 32 kg/m².⁵⁵ No trial was restricted to participants with a healthy BMI (19 to 24 kg/m²). In the trial that randomized couples, the women had a mean baseline BMI in the healthy range, but the mean BMI of the men was overweight.⁵⁹ One trial that included participants greater than 65 years of age did not report a baseline value of weight or BMI.⁵⁵ All other trials reported a mean or median baseline BMI in the overweight (BMI 25 to 29 kg/m²) range.^{49,51,53,54,56-58} Two trials explicitly excluded participants who had recently used a weight loss program.^{53,58} Another trial required patients to have had a stable body weight over the past year (<10 percent change in weight) (Appendix E, Evidence Table 2).⁵³

Other common inclusion criteria included activity pattern,^{53,54,56-58} dietary pattern,^{49,51} health,^{49,51,53-59} and the likelihood of being adherent to the intervention.^{49,51,53,57-59} One trial excluded patients who smoked (Appendix E, Evidence Table 2).⁵³

Observational Studies

Forty nine percent of the baseline participants were included in the weight related analyses. Studies were included only if they accounted for losses to followup in analysis, if they had less than 20 percent attrition from baseline or if the study stated that the analyzed participants were similar to those people recruited at baseline. The majority of studies excluded participants at baseline or for the weight analyses if they had cardiovascular disease, cancer, or other chronic diseases. Four studies required participants to work in healthcare,^{61,70} one study recruited from graduates of a university,⁶⁷ one recruited women while they were pregnant,⁶³ and three studies were generally inclusive of the source population.^{66,68,69} Four studies included only women,^{61,63-65,70} one study included only men,⁶¹ and four studies included both men and women.⁶⁴⁻⁶⁹ No other study reported weight based exclusions (Appendix E, Evidence Table 2).

Interventions

No self-management or orlistat interventions were included, while two dietary, four physical activity, and four combination, and one environment level interventions were included. Ten of the 11 studies included a comparison with a one time session, information booklet or no intervention. Three studies compared interventions head to head. The specifics of each intervention are described prior to the results of the appropriate Key Question (Appendix E, Evidence Table 3 and 4).

Approaches

Observational studies did not implement interventions, instead they investigated the impact of lifestyle behaviors performed by individuals as part of their normal routines. To differentiate the behaviors examined in observational studies from those performed among the randomized interventions, we refer to the factors examined in observational studies as *approaches*.

Six observational studies (5 publications) reported on more than one approach.⁶¹⁻⁶⁵ The results of these six studies are reported in the relevant Key Questions (1 through 3) as the studies did not pool the effects of combined self-management, diet, or physical activity behaviors on weight outcomes. Three studies reported on a self-management approach, nine studies reported on a dietary approach, and seven studies reported on a physical activity approach. No observational study reported on the effect of orlistat on a weight outcome. One study reported on the environment level approaches of walkability and traffic in neighborhoods (Appendix E, Evidence Table 3 and 4).

Descriptions of the self-management, dietary, and physical activities that were associated with a weight related outcome from observational studies are reported in Table 3.

Outcomes

Key Points

- **BMI.** There is low strength of evidence that:
 - A low fat diet intervention was statistically associated with less BMI gain (0.3 units) over 7.5 years, but the difference did not meet the meaningful between group difference threshold.

- Participants who were taught by their primary care provider to monitor their heart rate during exercise had a greater decrease in BMI than the controls.
- Household level and couples combination interventions met the meaningful between group differences between the intervention groups and the controls at one year, but neither was statistically significant.
- Neighborhood walkability did not affect BMI change over 6 years. Traffic was associated with statistically significant weight gain, but the between group difference did not meet the meaningful threshold.
- There is insufficient strength of evidence for self-management strategies, because no self-management studies were identified.
- **Weight.** There is low strength of evidence that:
 - Television viewing of 5 or more hours per day and sleeping fewer than 6 hours per night were statistically associated with weight gain, but did not meet the meaningful between group difference threshold.
 - Two low fat diet interventions resulted in statistically significant differences in weight loss that met meaningful between group difference at 1 year. The difference remained statistically significant but not meaningful at 7.5 years.
 - Food prepared outside of the home was statistically and meaningfully associated with greater weight gain compared with home cooked meals. However, fast food meals were not associated with weight gain prevention in another study.
 - A healthy eating pattern, a high fiber, low fat eating pattern, percent of calories consumed at breakfast, calories from fat, calories from protein and total calories were statistically associated with less weight gain and at the borderline of a meaningful between group difference.
 - Increasing physical activity over time was meaningfully but not statistically associated with less weight gain through 4 years of followup, but not afterwards. Five other physical activity patterns were associated with statistically significant prevention of weight gain, but none met the meaningful between group difference threshold.
 - A combination intervention to prevent weight gain among mothers with young children had a meaningful between group difference and was statistically significant compared with no intervention.
 - A community level media campaign combined with mailed cookbooks and educational pamphlets had a statistically significant difference compared with no community intervention, but did not meet the between group meaningful threshold to prevent weight gain.
- **Waist circumference.** There is low strength of evidence that:
 - A low fat diet intervention resulted in statistically significant decrease in waist circumference that met meaningful between group difference at 1 year. The difference was statistically significant but not meaningful at 7.5 years in another study.
 - Neither intervention was favored between the gym based exercise group and the control group in waist circumference among the elderly.
 - There was a meaningful between group difference but not a statistically significant difference between the combination intervention for the mothers of young children and the controls.

- There is insufficient strength of evidence for self-management strategies, because no self-management studies were identified.
- **Progression to overweight or obesity.** There is low strength of evidence that:
 - Eating food outside the home one or more times per week was associated with a 20 to 30 percent increased risk of progressing to overweight or obesity.
 - There is insufficient strength of evidence for self-management, physical activity or built environment strategies, because no studies were identified.
- **Adherence**
 - There is low strength of evidence that adherence is poor. Adherence was less than 80 percent in all intervention trials that reported on an adherence outcome.
- **Obesity related clinical outcomes**
 - There is insufficient strength of evidence for mortality and quality of life because no studies met our criteria.
- **Adverse effects**
 - There is low strength of evidence for mortality outcomes in dietary trials. The intervention group had 0.1 percent less mortality than the controls in a dietary trial.
 - There is low strength of evidence for adverse events in physical activity trials. A physical activity trial reported no difference in adverse events.
 - The strength of evidence is insufficient for all other adverse effect outcomes.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

No trial reported on a self-management intervention. Three trials included a self-management approach as part of a combination intervention as reported with Key Question 5.⁵⁷⁻⁵⁹

Three observational studies, described in one article (289,916 baseline; 120,877 analyzed) reported on daily hours of sleep and television watching in a single publication.⁶¹ The results were pooled in the publication's analysis so a meta-analysis was not performed. Weight change was the only outcome of interest reported. The study adjusted for age, baseline BMI, diet, physical activity, alcohol consumption, and cigarette smoking.

BMI Change

No study on self-management strategies and BMI change met our inclusion criteria.

Weight Change

The mean weight gain was 7.6 kg over 20 years of followup. Sleeping 6 to 8 hours per night was statistically associated with less weight gain compared with sleeping less than 6 hours per night, but no sleep duration met the threshold for a meaningful between group difference in weight gain.⁶¹ Each hour of television watching was associated with a 0.1 kg increase in weight per 4 year interval of followup. Television viewing did not meet the meaningful between group difference threshold for weight gain, although the finding was statistically significant. Five hours of television viewing per day were required for a 2.5 kg increase in weight over 20 years (Appendix E, Evidence Table 5).⁶¹

Waist Circumference Change

No study on self-management strategies and waist circumference change met our inclusion criteria.

Progression to Overweight or Obesity

No study on self-management strategies and progression to overweight or obesity met our inclusion criteria.

Other Outcomes

No adherence, mortality, health related quality of life or adverse effect outcomes were reported in studies of self-management strategies.

Subgroups

The duration of sleep and television viewing findings were similar when the results were examined separately by age, baseline BMI and cohorts of men and women (Appendix E, Evidence Table 5).⁶¹ No other subgroups were reported.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

Two trials (51,043 randomized; 42,279 analyzed) reported on dietary interventions,^{49,51} and eight observational studies (369,191 participants at baseline; 160,878 analyzed)^{61-66,68,69,71} reported on dietary approaches for preventing weight gain among adults. Three trials included a dietary component as part of a combination intervention as reported with Key Question 5.⁵⁷⁻⁵⁹ The two dietary trials included women exclusively (Table 4).^{49,51} Both interventions used group sessions to change consumption of fats, fruits, vegetables, and grains. The comparison groups received printed information on nutritional guidelines in both trials. Neither trial's primary goal was weight maintenance or the prevention of weight gain. Because fewer than three trials were identified, meta analyses were not conducted.

The observational studies reported on individual foods, energy intake, and eating patterns. No dietary approach was included in a meta-analysis because studies did not report on similar dietary exposures. Only one observational study stated that a weight related outcome was a primary goal of the original cohort.⁶⁷

BMI Change

One dietary trial (48,835 randomized; 41,173 analyzed) reported on BMI change.⁵¹ BMI remained within 0.1 units of the baseline in the intervention and control groups at an average of 7.5 years of followup. The BMI increased by 0.3 fewer units (95% CI, 0.5 to 0.1) in the low-fat intervention group compared with the group that received nutritional guidelines after adjustment for age, race/ethnicity, baseline BMI, and changes in dietary and physical activity patterns over time. This finding did not meet the threshold for the between group difference at 7.5 years of followup, despite being statistically significant.

Two observational studies (22,669 baseline; 9,683 analyzed) reported on BMI change.^{62,67} Eating food prepared outside of the home two or more times per week did not have a meaningful between group difference in BMI (0.1 increase per year; 95% CI 0.4 to 0.1, p<0.001) compared with eating out less often than once per month over 7 years of followup.⁶⁷ Eating fewer than five servings of fruits and vegetables per day was not statically associated with smaller BMI change

over six years (ordinal regression estimate -0.1; 95% CI -0.4 to 0.3) and the between group difference was not reported (Figure 3; Appendix E, Evidence Table 5).⁶⁷

Weight Change

Two dietary interventions (51,043 randomized; 42,279 analyzed) reported on weight change (Figure 3).^{49,51} Weight decreased in the intervention and nutritional guidelines groups in both trials. The low-fat diet combined with increased fruits, vegetables and grains intervention met the between group difference threshold at 1 year. The intervention group lost 2.2 kg compared with a 0.3 kg increase in weight among the nutritional guidelines group ($p < 0.05$).⁴⁹ In another study, at 1 year, the low-fat diet group lost 2.2 kg compared with no weight change among the nutritional guidelines group ($p < 0.001$).⁵¹ However, the meaningful between group difference was not maintained beyond one year. After a mean of 7.5 years of following the diet, the intervention group weighed 0.7 kg (95% CI 0.5 to 0.9, $p < 0.01$) less than the nutrition guidelines group after adjustment for age, race/ethnicity, baseline BMI, and changes in dietary and physical activity patterns over time.⁵¹

Eight observational studies (369,191 participants at baseline; 160,878 analyzed) reported on weight change over 4 to 23 years of followup.^{61,63-69} Weight increased by around 0.5 kg per year in most studies. The longest study reported a 10 kg increase over 23 years of followup.⁶³ A variety of dietary approaches were reported on including number of meals eaten outside the home,⁶⁷ fast food eaten outside the home,⁶⁵ percent of total calories from fat,⁶⁴ percent of calories from protein,⁶³ percent of intake consumed at breakfast,⁶⁹ high fiber/low fat dietary pattern,⁶⁸ healthy eating pattern based on specific foods consumed⁶¹ and fruit and vegetable intake.⁶⁶

The publication that pooled the results of the three largest studies reported a statistically significant and borderline meaningful between group finding for absolute weight gain.⁶¹ The least healthy eaters (those in the bottom quintile) gained 1.8 more kilograms per 4 year period (95% CI, 1.3 to 2.3 kg) than the healthiest eaters (those in the top quintile) after accounting for confounders.⁶¹ The second through fourth quintiles also gained more weight than the healthiest eaters. All dietary factors examined, except cheese, whole fat milk and low fat or skim milk, were statistically associated with weight change gain after adjustment for age, baseline BMI, and sleep.⁶¹ No individual food was associated with a meaningful between group increase in weight. The foods associated with at least 0.5 kg change in weight over 4 years included French fried potatoes (1.52 kg increase per 4 years; 95% CI 1.0 to 2.0 kg) and potato chips (0.8 kg increase per 4 years; 95% CI 0.6 to 1.0 kg).

Two observational studies (20,293 baseline; 9,388 analyzed) reported weight gain according to a threshold.^{66,67} One study reported on fruit and vegetable consumption and the other reported on eating meals prepared outside the home. Eating more than 698g/day of fruits and vegetables compared with eating less than 362g/day was associated with 74 percent decreased odds of gaining the mean gain of 3.4 kg or more over a 10 year period (OR 0.26, 95% CI, 0.07 to 0.97).⁶⁶ Greater vegetable consumption had a stronger association (OR 0.18, 95% CI, 0.05 to 0.3; highest compared with the lowest quintile of vegetable consumption) than fruit consumption (OR 0.62, 95% CI, 0.18 to 2.10; highest compared with the lowest quintile of fruit consumption) (Appendix E, Evidence Table 5). Eating meals outside the home was associated with a 10 to 40 percent increased odds of gaining 2 kg or more per year after adjustment for confounders (OR eating out 1 time per week 1.1; 95% CI 0.9 to 1.4; OR eating out 2 or more times per week 1.4; 95% CI 1.1 to 1.6, p for trend=0.001), although those who ate out 2 or more times per week gained only 0.1

kg per year on average (95% CI 0.06 to 0.2) compared with those who rarely ate food outside the home.⁶⁷

Protein intake, as a percent of total energy consumption, was associated with a statistically significant difference in weight gain over 8 years, but the 0.04 kg weight gained (95% CI 0.03 to 0.06 kg) per percent of energy from protein did not meet the threshold for the between group difference.⁶³ The analysis of total energy intake was also statistically significant but did not meet the threshold for a meaningful difference (1.8 kg gain over 8 years per kilojoule per day; 95% CI 1.3 to 2.3 kg).⁶³ Similarly, calories from fat were associated with a statistically significant weight gain over 7 years (0.02 kg gain per percent; 95% CI 0.001 to 0.05) but did not meet the meaningful threshold.⁶⁴ Another publication from this cohort reported a statistically significant association between eating fast food three times per week (2.2 kg gained over 15 years among blacks $p=0.001$, 1.6 kg gained among whites $p=0.006$), but the difference did not meet the meaningful between group difference threshold.⁶⁵

Participants at different sites of the same cohort were reported in two studies. Persons in the highest quintile of high fiber/low fat dietary pattern had less weight gain (0.01 kg/year) compared with individuals in the lowest quintile (0.12 kg/year gain).⁶⁸ This finding was statistically significant ($p<0.0001$ for trend), but did not meet the meaningful threshold.⁶⁸ Another site of the cohort reported on the percentage of daily energy consumed at breakfast.⁶⁹ For each percentage of daily energy intake consumed at breakfast, there was 0.02 kg less gain over the 3.7 mean years of followup (95% CI 0.007 to 0.04 kg less gain). The finding was statistically significant, but did not meet the meaningful threshold.⁶⁹

Waist Circumference Change

Two dietary interventions (51,043 randomized; 16,597 analyzed) reported on waist circumference change (Figure 3).^{49,51} The low fat combined with increasing fruits, vegetables and grains diet met meaningful between group difference threshold at one year.⁴⁹ The intervention group had a 2 cm decrease in waist circumference compared with no change in the nutrition guidelines group ($p<0.05$).⁴⁹ In the study with 7.5 years of followup, the low fat diet group had a waist circumference 0.3 cm smaller (95% CI 0.1 to 0.5 cm less) than the nutritional guidelines group at the end of the study.⁵¹ The 7.5 year study was statistically significant, but did not meet the meaningful between group difference threshold.

Progression to Overweight or Obesity

No dietary interventions and one observational study (18,494 baseline; 6,574 analyzed) reported on this outcome.⁶⁷ The percent of the population with a healthy weight (BMI 19 to 24 kg/m²) at baseline was 72 percent of those analyzed. The study of university graduates reported that eating one meal a week outside the home was associated with a 22 percent increased risk of overweight or obesity compared with eating 3 or fewer meals per month outside the home (Hazard Ratio [HR] 1.2, 95% CI, 1.0 to 1.5) after adjustment for age, sex, baseline BMI, education, physical activity, snacking, fiber, alcohol, total energy intake, specialty diets, and smoking.⁶⁷ The risk increased to 33 percent when two or more meals were consumed outside the home per week (HR 1.3, 95% CI, 1.1 to 1.6, p for trend <0.001) (Appendix E, Evidence Table 5).

Mortality

One dietary intervention (48,835 randomized; 46,856 analyzed) reported on mortality.⁵¹ There was no meaningful difference in mortality between the intervention and nutrition guidelines groups (4.5 percent compared with 4.4 percent). (Appendix E, Evidence Table 5).

Subgroups Reported in Interventional Studies

One dietary trial reported on subgroups of interest.^{49,51} Similar patterns to the main weight change results were observed when women were stratified by age, baseline BMI, malignancy and diabetes at baseline (Appendix E, Evidence Table 5).⁵¹

Sex Subgroups in Observational Studies

Six observational studies (366,704 baseline; 165,687 analyzed)^{61,64,65,67-69} reported on the relationship between diet and weight measures by sex. The results were similar to the main analyses (Appendix E, Evidence Table 5).

Age Subgroups in Observational Studies

Five observational studies (320,791 baseline; 148,863 analyzed)^{61,63,68} reported on the relationship between diet and weight measures by age. The results were similar to the main analyses (Appendix E, Evidence Table 5).

Ethnicity Subgroups in Observational Studies

One observational study (5,115 baseline; 3,906 analyzed) reported no diet by ethnicity interactions.^{64,65}

Baseline Weight Subgroups in Observational Studies

Five observational studies (348,210 baseline; 156,505 analyzed) reported on the effects of dietary approaches on change in weight by baseline weight.^{61,64,65,68,69} The results were similar to the main analyses in three of the studies. Two studies noted that among those individuals who were overweight at baseline, there was a stronger relationship between dietary choices and weight gain than among the individuals who were a healthy weight at baseline. (Appendix E, Evidence Table 5).^{61,64}

Socioeconomic Status Subgroups in Observational Studies

One observational study (25,631 baseline; 6,764 analyzed) reported on the percent of daily energy intake consumed at breakfast by social class.⁶⁹ No differences were reported.

Chronic Disease Subgroups in Observational Studies

One observational study (18,494 baseline; 9,182 analyzed)⁶⁷ reported on the relationship between diet and weight measures by chronic disease. No differences from the main analyses were observed (Appendix E, Evidence Table 5).

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

Four trials (828 randomized; 730 analyzed) reported on physical activity interventions⁵³⁻⁵⁶ and seven observational studies (342,409 baseline; 162,390 analyzed) reported on physical

activity approaches to prevent weight gain among adults.^{61-64,70} Three trials included a physical activity component as part of a combination intervention as reported with Key Question 5.⁵⁷⁻⁵⁹

Two physical activity interventions randomized patients to a supervised exercise program in a community gym compared with educational materials (Table 5).^{53,55} The other two studies took place within primary care practices.^{54,56} One study trained physicians to educate their patients about an ideal heart rate and evaluated that heart rate at followup visits compared with no heart rate assessment.⁵⁴ The other primary care based study randomized patients to a healthy walking program compared with a single educational session.⁵⁶ Three of the four studies specifically excluded patients who regularly participated in an exercise program.^{53,54,56}

Observational study approaches included the change in duration of a treadmill test at baseline and 7 years of followup,⁶⁴ categories of physical activity in MET hours per week,^{61,62,70} and occupational physical activity.⁶³

No study's primary goal was weight maintenance. Because fewer than three studies were identified with a common intervention, meta analyses were not conducted.

BMI Change

Four physical activity interventions (828 randomized; 687 analyzed) and one observational study (4,175 at baseline; 500 analyzed) reported on BMI change (Figure 4).⁵³⁻⁵⁶ Most participants lost or maintained weight over the 1 to 2 years of followup.

One trial found a meaningful and statistically significant effect of the intervention among a population of individuals older than 65 years of age who did not already follow an exercise training program and attended a primary care clinic in Canada. The heart rate training program group lost 1.5 units of BMI more than the physician advice only group, although both groups had a reduction in BMI during the 1 year study period (Appendix E, Evidence Table 5).⁵⁴

Three trials found no meaningful between group differences or statistically significant differences in BMI change in the gym based or health walks group compared with the educational materials or no intervention control group.^{53,55,56} The observational study found no statistical difference in activity levels with change in BMI in ordinal regression estimates.⁶² The between group differences were not reported in the observational study.⁶²

Weight Change

One physical activity intervention (164 randomized; 138 analyzed) reported on weight change.⁵³ There was no statistical or meaningful between group difference at year 1 or year 2 between the strength training and brochure groups.⁵³

Six observational studies (338,234 baseline; 161,890 analyzed) reported on physical activity approaches and weight change.^{61,63,64,70} In the followup study of one trial, participants maintained weight within 3 kg over 13 years.⁷⁰ In the other observational studies, about 0.5 kg per year was gained over the course of followup. Physical activity was associated with a meaningful (but not statistically significant) decrease in weight gain in one of the six studies,⁷⁰ although the difference was statistically significant (but did not meet the meaningful between group difference) in five.^{61,63,64}

Participants who were not able to perform a treadmill test for the same duration as baseline had a 2 kg increase in weight over seven years for each minute of decrease in exercise test duration.⁶⁴ In the publication reporting on three studies, people who increased their physical activity over time (increased activity 23.2 MET hours/week over 4 years) had less weight gain (0.8 fewer kilograms gained over 4 years, 95% CI, 0.6 to less than 1 kg) than those who

decreased their activity over time (decrease of 16.3 MET hours/week).⁶¹ Although the change in physical activity was statistically associated with weight gain, the change did not meet the between group difference threshold for 4 years of followup.

One of the studies that did not report a meaningful between group finding and had insufficient information to identify statistically significant findings in absolute weight change characterized the physical activity pattern of the women who successfully maintained healthy weight.⁷⁰ Women who had a healthy BMI at baseline and gained fewer than 2.3 kg at any time point increased their MET hours per week from 17.6 at baseline to 26.1 MET hours per week at 12 years (Figure 4; Appendix E, Evidence Table 5).⁷⁰ This finding met the between group threshold through 4 years of followup, but not thereafter.⁷⁰

Women who performed moderate or heavy work had statistically significant weight loss compared with an unknown reference group (moderate work 1.2 kg weight loss over 8 survey years; 95% CI 0.8 to 1.6 kg loss; heavy work 0.8 kg weight loss; 95% CI 0.4 to 1.3 kg loss), but the findings did not meet the 8 year threshold for a meaningful between group difference.⁶³

Waist Circumference Change

One physical activity intervention (120 randomized; 120 analyzed) reported on waist circumference change.⁵⁵ Three times weekly endurance exercise training among the elderly produced no significant changes in waist circumference compared with the control (Figure 4; Appendix E, Evidence Table 5).⁵⁵ Quantitative results of means or statistical significance were not reported.

Progression to Overweight or Obesity

No study on physical activity interventions and progression to overweight or obesity met our inclusion criteria.

Other Outcomes

Four physical activity interventions (828 randomized; 687 analyzed) reported on at least one other outcome. One trial reported that no serious adverse events occurred during the trial, although they do not mention what events would have been considered serious.⁵⁴ Adherence or compliance with the intervention was reported in all four trials. Adherence with the interventions ranged from 33 percent (participated in at least one heart walk)⁵⁶ to 71 percent in two interventions (three or more exercise sessions per week with heart monitoring⁵⁴ and performing strength training at least twice weekly⁵³) (Appendix E, Evidence Table 5).

Subgroups

No subgroups were reported in the interventional studies. Five of the six observational studies (334,907 baseline; 158,862 analyzed) reported on subgroups (Appendix E, Evidence Table 5).

Sex Subgroups in Observational Studies

Sex did not modify the main findings in three studies (Appendix E, Evidence Table 5).⁶¹

Age Subgroups in Observational Studies

In one study, pre menopausal women and those under age 65 had greater absolute weight gain with decreased physical activity compared with menopausal and older women.⁷⁰ The

publication reporting three studies reported no difference from the main analyses in the physical activity weight gain relationship when stratified by age (Appendix E, Evidence Table 5).⁶¹

Ethnicity Subgroups in Observational Studies

No study on race or ethnicity subgroups and physical activity met our inclusion criteria.

Baseline Weight Subgroups in Observational Studies

In four studies, participants who were overweight at baseline had a greater increase in weight with decreased fitness than people who were healthy weight at baseline.^{61,64} Another study found that healthy weight individuals had greater weight gain with decreased physical activity than the overweight and obese women (Appendix E, Evidence Table 5).⁷⁰

Smoking Subgroups in Observational Studies

One study reported no physical activity by smoking interaction (Appendix E, Evidence Table 5).⁷⁰

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among a general population of adults met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?

Four trials (988 randomized; 750 analyzed) reported on a combination of self-management, dietary, and physical activity interventions.⁵⁷⁻⁶⁰

The four randomized combination interventions differed in their target populations and interventions (Table 6). One study which aimed to prevent weight gain randomized healthy weight and overweight women of childbearing age. Another study randomized healthy weight, overweight and obese women with a young children to prevent weight gain.⁶⁰ In another trial, the intervention groups received self monitoring, dietary, and physical activity strategies over the phone and in group sessions or through the mail and were compared with a control group that received an informational booklet.⁵⁸ Another study randomized couples who had lived together for two years or less to in person and mail, mail only, or no intervention to promote healthy diet and physical activity behaviors.⁵⁸ A third study randomized households that included at least two adults and a child to a control group or group sessions, phone calls, and a newsletter to change individual and household self monitoring (daily weighing and television viewing), as well as dietary and physical activity behaviors. Information on children is not included in the results below.⁵⁷ Two studies' goals included the prevention of weight gain.^{57,58} The differences in study populations prevented meta analyses.

BMI Change

Three combination interventions (738 randomized; 535 analyzed) reported on BMI change.⁵⁷⁻⁵⁹ The couples⁵⁹ and households⁵⁷ interventions met the between group difference at one year, but were not statistically significant. There was no statistical or meaningful between group

difference in the trial designed to prevent weight gain among women ($p=0.39$) (Figure 5; Appendix E, Evidence Table 5).

Weight Change

Two combination interventions (534 randomized; 420 analyzed) reported on weight change.^{58,60} Among the trial designed to prevent weight gain among 25 to 45 year olds, there was no statistical or meaningful difference between groups at one year (Figure 5; Appendix E, Evidence Table 5).⁵⁸ In the trial that recruited mothers with young children, those in the lifestyle intervention group lost 0.2 kg at one year, compared with a 0.8 kg gain in the control group (1.1 kg; 95% CI 0.2 to 2.0 less weight gain).⁶⁰

Waist Circumference Change

Two combination interventions (524 randomized; 370 analyzed) reported on waist circumference change.^{59,60} The mothers with young children who received the intervention lost 1.3 cm in waist circumference compared with a 0.1 cm gain in the control group over one year, although the baseline weight adjusted decrease was not statistically significant (-1.5 cm; 95% CI -4.0 to 1.0).⁶⁰ There was no statistical or between group difference in the couples intervention.⁵⁹ (Figure 5; Appendix E, Evidence Table 5).

Progression to Overweight or Obesity

Two combination interventions (558 randomized; 361 analyzed) reported on progression to overweight or obesity.^{58,59} In the couple study, compared with the prevalence of overweight or obesity at baseline (61 percent of men and 28 percent of women), the respective percent increases in overweight and obesity at 16 months were 8 percent and 3 percent in the controls, 7 percent and 2 percent in the group that received mailings, and 2 percent and 2 percent in those who received mailings and participated in contact sessions.⁵⁹ In the trial of women aged 25 to 45 years old, 40 percent of women remained within 2 kg of their baseline body weight, while 60 percent gained 2 kg or more during the 3 year study period. There was no statistical difference by intervention group ($p=0.26$) (Appendix E, Evidence Table 5).⁵⁸

Adherence

Two combination interventions (464 randomized; 379 analyzed) reported on adherence. The study of 25 to 45 year old women reported 50 percent attendance across 15 sessions over 24 months.⁵⁸ In the household study, 73 percent of households attended at least four of five group sessions and completed at least half of the home based activities over 1 year. Twenty percent attended all group sessions and completed 100 percent of the household activities (Appendix E, Evidence Table 5).⁵⁷

Other Outcomes

No studies reported on mortality, health related quality of life or adverse effect outcomes.

Subgroups

The study of couples reported no differences in the effect of the intervention by sex.⁵⁹ The study of 25 to 45 year old women reported no differences in weight gain by intervention when they stratified by women who were healthy weight versus overweight at baseline.⁵⁸ The study of women with young children reported that women under 40 with a BMI of 18 to 24 kg/m² at

baseline who received the intervention lost 0.7 kg compared with a weight gain of 1.7 kg in the control group. This 2.4 kg difference is over one kilogram greater than the weight difference observed in the analysis including individuals with any baseline BMI (Appendix E, Evidence Table 5).

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

One interventional study (41,958 individuals in the community; 2,151 recruited at baseline; 1,294 analyzed)⁵⁰ and one observational study (3,174 at baseline; 500 analyzed)⁶² were included (Appendix E, Evidence Table 5). The interventional study included three demographically similar communities in Northern California. A multi stage random sample of the communities were recruited in 1972 and followed through 1975. Two communities received interventions and another community did not.⁵⁰

The two intervention communities had billboard, newspaper, radio, and television advertising with information on cardiovascular disease risk factors and how to reduce them (Table 7).⁵⁰ The individuals recruited for outcome assessment also received pamphlets, cookbooks and other information through the mail (Table 7; Appendix E, Evidence Table 7). The comparison community did not receive a mass media campaign. The goal of the study was to reduce the risk of cardiovascular disease (Appendix E, Evidence Table 5).⁵⁰

The observational study was a six year longitudinal assessment of neighborhood walkability in Canada (Appendix E, Evidence Table 5).⁶² Neighborhood walkability was measured using Geographic Information Systems (GIS) data from the 2001 and 2006 censuses.⁶² This index incorporated assessments of the density of dwellings, land use mix, and intersections. The index was categorized as lowest, low, mid, high, and highest walkability. Traffic was measured by survey responses from a question assessing whether traffic decreased walkability (Appendix E, Evidence Table 5).

BMI Change

The interventional study did not report on BMI change. The between group differences in BMI change by neighborhood walkability or traffic perception were not reported (Appendix E, Evidence Table 8).⁶² The ordinal regression estimate for traffic was statistically significant for an increase in BMI (ordinal regression estimate 0.2; 95% CI 0.1 to 0.4). The estimates for walkability were not statistically significant.⁶²

Weight Change

The community based study calculated “relative weight,” defined as actual weight divided by ideal weight, and evaluated percent change in relative weight as their outcome.⁵⁰ The control community demonstrated a slight increase in relative weight (0.3 percent) versus no change in relative weight among both intervention communities. The baseline weight was not reported per group, so we cannot determine if the between group difference was met. The difference between the two intervention communities and the control was statistically significant ($p=0.04$).

The observational study did not report on weight change (Appendix E, Evidence Table 8).

Waist Circumference Change

No study on environmental level strategies and their impact on waist circumference change met our inclusion criteria.

Progression to Overweight or Obesity

No study on environmental level strategies and their impact on the progression to overweight or obesity met our inclusion criteria.

Other Outcomes

No studies reported on adherence, mortality, health related quality of life or adverse effects.

Subgroups

The community based study examined subgroups of patients at high risk for cardiovascular disease.⁵⁰ This subgroup analysis contained four groups: community 1 received no intervention (group 1; n=95), community 2 received the mass media campaign (group 2; n=94), community 3 received the mass media campaign (group 3; n=40), and community 4 received the mass media campaign and individual level counseling (group 4; n=77). Communities 1 to 3 had a 1 percent decrease in relative weight at 2 years, while Community 4 had a 1.5 percent decrease. There was no clinically or statistically significant difference between groups (Appendix E, Evidence Table 8). No other subgroups were reported.

Table 3. Description of observational exposures studies reporting on the relationship between strategies of interest and weight change

Author Year	Study Name*	Primary Aim of Original Cohort	Self-Management Measures	Dietary Measures	Physical Activity Measures
Mean Duration of Followup					
Studies Reporting on More Than 1 Approach					
Mozaffarian 2011 ⁶¹	Prospective study of cancer and cardiovascular disease risk factors among married female nurses.	Daily hours of sleep, Television watching in hours per day.	Fruits, Vegetables, Nuts, Whole fat dairy foods, Lowfat dairy foods, Potato chips, Potatoes, Whole grains, Refined grains, 100percent fruit juice,	Metabolic equivalent of task (MET) hours per week, Quintiles of physical activity.	
Nurses' Health Study Nurses' Health Study II Health Professionals' Follow-up Study	Prospective study of modifiable risk factors for health problems affecting younger women among female nurses.		Sugar sweetened beverages, Diet soda, Sweets and desserts, Processed meats, Unprocessed red meats, Trans fat, Fried foods, Quintiles of eating pattern.		
Mean duration not reported	Prospective study of nutritional factors and serious illnesses including cancer and cardiovascular disease among male health professionals.				
Adair 2011 ⁶³	Cebu Longitudinal Health and Nutrition Survey 24 months median duration	Prospective study of infant feeding patterns among Filipino women.	None reported.	Energy intake in kilojoules per day, Protein intake as a percent of energy.	Occupational physical activity.
Berry, 2010 ⁶² Population surveys in 2002 and 2008	Survey purpose to monitor selected population health issues, health determinants, risk factors and priorities in Edmonton and surrounding areas.	None reported.	Fruits and vegetables (5 or more servings per day).	Physical activity level (METs during past 7 days), Neighborhood walkability index and traffic index.	

Table 3. Description of observational exposures studies reporting on the relationship between strategies of interest and weight change (continued)

Author Year Study Name* Mean Duration of Followup	Primary Aim of Original Cohort	Self-Management Measures	Dietary Measures	Physical Activity Measures
<i>Studies Reporting on More Than 1 Approach (continued)</i>				
Lewis 1997 ⁶⁴ Pereira 2005 ⁶⁵ Coronary Artery Risk Development in Young Adults Mean duration not reported	Prospective study of cardiovascular risk factors in young adults.	None reported.	Percent calories from fat ⁶⁴ , Fast food consumption per week. ⁶⁵	Exercise duration in seconds from a treadmill test. ⁶⁴
<i>Studies Reporting on a Dietary Approach</i>				
Vioque 2008 ⁶⁶ 2 surveys 10 years apart	Followup study of responders to a cross sectional health and nutrition survey in Valencia and Alicante, Spain.	None reported.	Fruits, Vegetables.	None reported.
Bes Rastrollo 2009 ⁶⁷ Seguimiento Universidad de Navarra Duration 4.4 years	Prospective study of diet and chronic diseases, including obesity among graduates of a Spanish university.	None reported.	Eating away from home meals.	None reported.
Schulz 2005 ⁶⁸ European Prospective Investigation into Cancer and Nutrition Duration 4.4 years	Prospective study of nutrition and cancer in 10 European countries, Potsdam cohort.	None reported.	Quintiles of high fiber/ low fat food pattern score.	None reported.

Table 3. Description of observational exposures studies reporting on the relationship between strategies of interest and weight change (continued)

Author Year	Study Name*	Mean Duration of Followup	Primary Aim of Original Cohort	Self-Management Measures	Dietary Measures	Physical Activity Measures
<i>Studies Reporting on a Dietary Approach (continued)</i>						
Purslow 2008 ⁶⁹	European Prospective Investigation into Cancer and Nutrition	Duration 3.7 years	Prospective study of nutrition and cancer in 10 European countries, Norfolk cohort.	None reported.	Percent of daily energy intake consumed during breakfast.	None reported.
<i>Study Reporting on a Physical Activity Approach</i>						
Lee 2010 ⁷⁰	Women's Health Study	Duration 13.1 years Mean duration weight assessed was 2.9 years	Trial of low dose aspirin and vitamin E to prevent cardiovascular disease and cancer in female health professionals.	None reported	None reported.	Metabolic equivalent of task (MET) hours per week.

*Study name listed only if applicable.

Table 4. Description of dietary interventions in studies among adults in the general population

Author, Year Study Name Duration of Intervention*	Primary Aim	Group 1	Group 2
Bhargava 2002 ⁴⁹ Women's Health Trial Feasibility Study in Minority Populations (WHTFSMP) Duration 1 year	Reduce energy intake from fat, especially saturated fat, to 20 percent of caloric intake. Increase consumption of fruits, vegetables and grains.	Maintained usual diet. Received information on nutrition guidelines.	18 group sessions with a dietitian over 1 year. During the sessions, the participants performed role playing activities, provided support and reinforcement and solved problems.
Howard 2006 ⁵¹ Women's Health Initiative (WHI) Duration 8 – 12 years	Study the effect of a low fat, high fruit, vegetable and grain diet on breast cancer, colorectal cancer and heart disease.	Received information on nutrition guidelines.	18 group sessions with a dietitian during the first year. Four group sessions per year for remaining years. Sessions promoted dietary and behavioral changes to reduce total dietary fat to 20 percent of caloric intake, increase fruit and vegetable intake to 5 or more servings per day, increase grains, preferably whole grains, to 6 or more servings daily. Encouraged to maintain usual energy intake by replacing calories from fat with other sources, like carbohydrates.

*Neither study included additional followup after the intervention period.

Table 5. Description of physical activity interventions in studies among adults in the general population

Author, Year Study Name* Duration of Intervention	Primary Aim	Group 1	Group 2
Schmitz 2007 ⁵³ Strong, Health and Empowered (SHE) Duration 2 years [†]	Assess efficacy of twice weekly strength training to prevent increases in body fat percentage and intraabdominal fat.	Maintained usual diet. Received information on physical activity guidelines, with a focus on starting a walking program.	Maintained usual diet. Received a 2 year membership to a fitness center. Twice weekly 1 hour group sessions with a fitness professional for the first 4 months. Group sessions every 3 months for the remaining 20 months. During sessions, participants taught how to stretch, warm up, cool down, abdominal and low back strengthening exercises and strength training using machines and free weights. Fitness trainers made reminder calls if participants missed a week of sessions. Fitness trainers were available by phone, email or at the gym. Other components included social gatherings, a study website, a monthly newsletter and free childcare for 2 hours per session.
Petrella 2003 ⁵⁴ Step Test Exercise Prescription (STEP) Project Duration 1 year	Compare the effect of an exercise prescription intervention on fitness.	Physician provided exercise counseling at baseline 3, 6 and 12 months including examples and benefits of exercises.	Physician provided exercise counseling at baseline 3, 6 and 12 months including examples and benefits of exercises. Physician administered a stepping test and recorded stepping time and heart rate at the visits. Patients received a target exercise heart rate based on the results of the step test.
Muscari 2010 ⁵⁵ Pianoro Study Duration 1 year	Study physical activity and cardiovascular risk.	Educational materials to improve lifestyle including physical activity.	Three hourly group sessions per week of endurance exercise training supervised by Exercise and Sports Sciences researchers.

Table 5. Description of physical activity interventions in studies among adults in the general population (continued)

Author, Year Study Name* Duration of Intervention	Primary Aim	Group 1	Group 2
Lamb 2002 ⁵⁶ Duration 1 year	Study walking program on physical activity levels, physiological and behavioral consequences.	Single 30 minute group session with physiotherapist. The session included benefits of exercise, recommended levels of exercise for adults based on published guidelines, tips to start and maintain an exercise program. Participants were encouraged to take at least 120 minutes of moderate intensity activity per week using an activity enjoyable and convenient to them.	Same 30 minute session as Group 1. Participants were also provided with oral and written information on local walking programs. A local walking coordinator also called each person after the session to further explain the program and invite them to join. Group and individual walking programs were offered over the phone and in the mail. Up to three phone calls were made during year to encourage people to join the program. Family and friends were encouraged to participate in the walks.

*Study name listed only if applicable.

[†]Duration of followup after the intervention = 1 year.

Table 6. Description of combination interventions in studies among adults in the general population

Author Year	Unit of intervention	Primary Aim	Group 1	Group 2	Group 3
Study Name* Duration of Intervention					
French 2011 ⁵⁷ Take Action Duration 1 year	Household	Prevent weight gain over 1 year.	None	Household and individual interventions to decrease television viewing, increase physical activity to at least 30 minutes daily, decrease high calorie snacks and meals, limit sweetened beverages, increase availability of fruits and vegetables, serve smaller portions, limit fast food, and make healthy choices when eating out. Intervention was delivered by trained staff during a home visit, 6 group sessions, home activities and monthly newsletters. The group sessions included behavioral strategies (goal setting, self monitoring, positive reinforcement), interactive activities 20 30 minutes of physical activity and a healthy snack. A scale for home weighing, a TV limiting device and telephone support calls were also used. Gift cards to a grocery store were provided for attending group sessions or completing home activities.	None

Table 6. Description of combination interventions in studies among adults in the general population (continued)

Author Year Study Name* Duration of Intervention	Unit of Intervention	Primary Aim	Group 1	Group 2	Group 3
Lombard 2010 ⁶⁰	School attended by participant's child	Prevent weight gain over 1 year.	Thirty-minute information session and brochure on diet and physical activity guidelines for Australia.	Four one hour group sessions over 1 month on goal setting, self monitoring, social support, problem solving, training to prevent weight relapse, diet and physical activity. Pedometers distributed with goal of 10,000 steps per day. Individuals set their own goals. Text messages were sent by mobile phone once a month during months 2 through 11.	None.

Table 6. Description of combination interventions in studies among adults in the general population (continued)

Author Year Study Name* Duration of Intervention	Unit of Intervention	Primary Aim	Group 1	Group 2	Group 3
Levine 2007 ⁵⁸ Duration 2 years [†]	Individual.	Efficacy of a clinic based treatment and correspondence course to prevent weight gain.	Information session to describe control, clinic based and correspondence interventions. Received a booklet with information about benefits of weight maintenance, low fat eating and regular physical activity.	Information session to describe control, clinic based and correspondence interventions. 15 group sessions with a nutritionist or behavioral interventionist over 2 years. Sessions focused on making dietary and activity changes and monitoring those changes. Lessons during sessions provided on cognitive change strategies, stimulus control techniques, problem solving, goal setting, stress, time management and relapse preventions. Directed to set activity and intake goals to decrease sedentary behavior and increase activity. Written materials on nutrition and physical activity were provided. Homework assignment to practice weight control strategies assigned at each sessions and due at next session. If weight gain of more than 2 pounds occurred over 2 consecutive weeks, given activity and calorie goals to help them return to their baseline weight.	Information session to describe control, clinic based and correspondence interventions. Same information and homework assignments as group 2 except delivered by mail instead of group sessions.

Table 6. Description of combination interventions in studies among adults in the general population (continued)

Author Year Study Name* Duration of Intervention	Unit of Intervention	Primary Aim	Group 1	Group 2	Group 3
Burke 2003 ⁵⁹ Duration 4 months [‡]	Couples.	Encourage adoption or maintenance of physical activity and a healthy diet.	None.	One group sessions and five mailed modules aimed to increase moderate physical activity to at least 30 minutes most days, increase incidental activities (<i>i.e.</i> , taking stairs instead of elevator, walking instead of driving), eat low fat (no more than 10percent of energy as saturated fat), high fiber (30g daily from grains, fruits and vegetables), low sat foods and increase fruit and vegetable intake. Modules included information on benefits of exercise and nutrition, how to start an exercise program, injury prevention, types and sources of dietary fat, budgeting for healthy foods, choosing meals when eating out, overcoming barriers to change, costs and benefits of a healthy lifestyle, goal setting, time management, stress management, and exercise and diet information relevant to pregnancy. Alcohol consumption and cigarette smoking were mentioned but not focus of intervention.	Three group sessions and three mailed modules aimed to increase moderate physical activity to at least 30 minutes most days, increase incidental activities (<i>i.e.</i> , taking stairs instead of elevator, walking instead of driving), eat low fat (no more than 10percent of energy as saturated fat), high fiber (30g daily from grains, fruits and vegetables), low sat foods and increase fruit and vegetable intake.

*Study name listed only if applicable.

[†]Duration of followup after the intervention = 1 year.

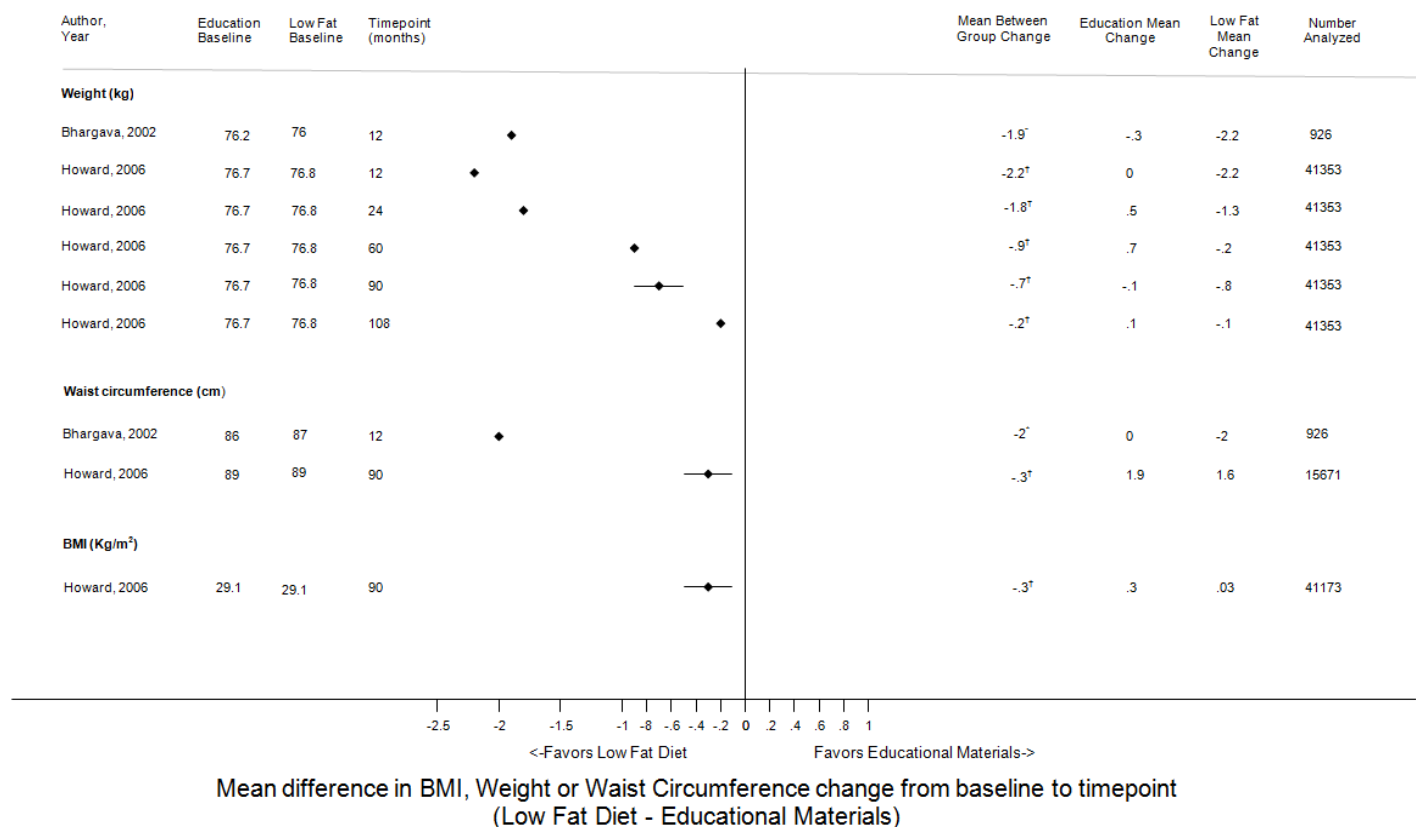
[‡]Duration of followup after the intervention = 8 months.

Table 7. Description of interventions in studies among adult populations using environmental strategies

Author, Year Duration	Primary Aim	Control	Active Combination Intervention
Fortmann, 1981 ⁵⁰ 30 months	Reduce CVD risk.	No intervention.	<p>Self management</p> <ul style="list-style-type: none"> • 10 week counseling program for participant +/- spouse delivered in small groups and individual home sessions focused on personal analysis of behavior, modeling new healthy behaviors, and skills building (high risk subgroup of group 3). <p>Diet</p> <ul style="list-style-type: none"> • Direct mailing of dietary educational information including pamphlets and cookbooks focused on reducing saturated fat, cholesterol, salt, sugar, and alcohol intake, and calorie restriction (groups 2 & 3). <p>Physical Activity</p> <ul style="list-style-type: none"> • Direct mailing of exercise educational information focused on increasing physical activity (groups 2 & 3). <p>Environmental</p> <ul style="list-style-type: none"> • Mass media campaign on CVD risk factors that used TV, radio, newspaper, and billboards (groups 2 & 3).

CVD = cardiovascular disease

Figure 3. Differences in weight change, waist circumference change, and BMI change for dietary interventions compared with nutritional information among adults from the general population



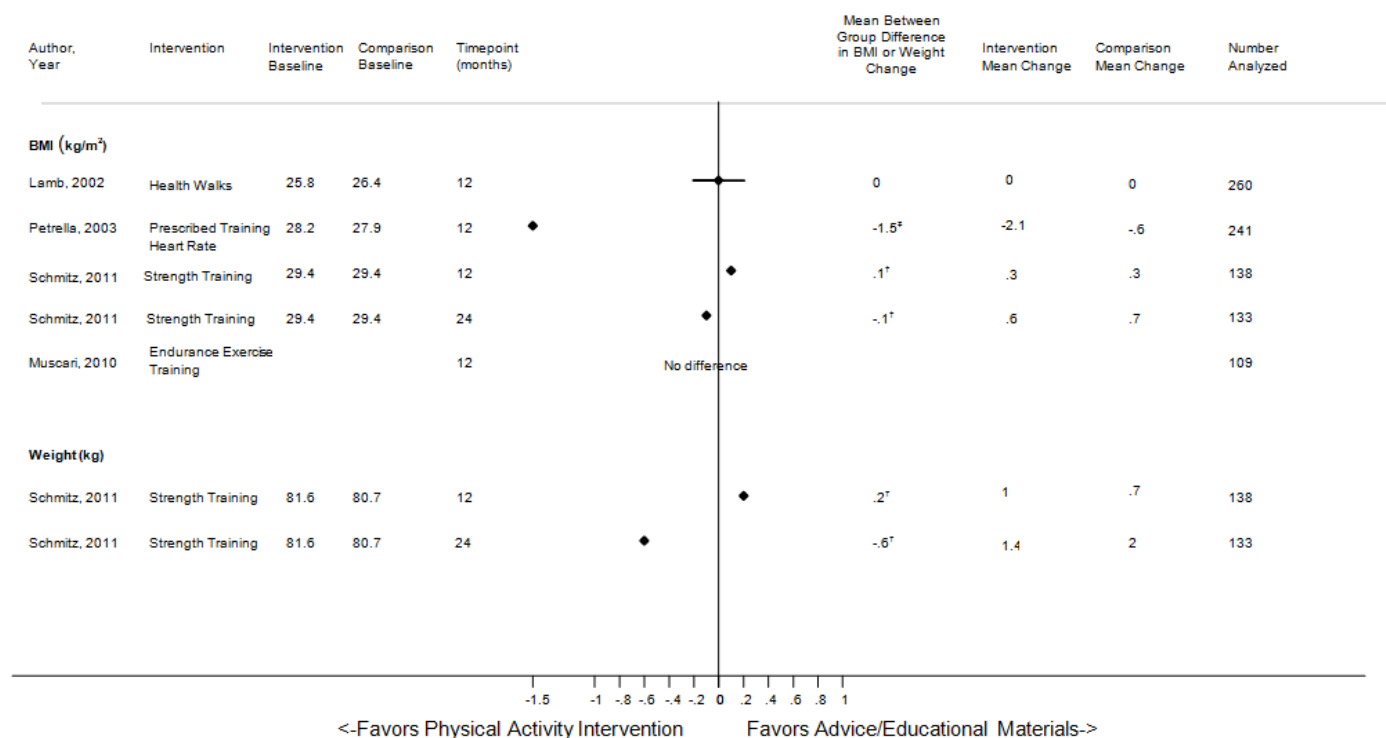
BMI = body mass index; cm = centimeter; kg/m² = kilogram/meter²; Kg = kilogram

*Unadjusted.

†Adjusted for age, race/ethnicity, baseline BMI, and change in physical activity patterns over time.

If the study did not report an estimate of variability, no confidence intervals were generated.

Figure 4. Differences in weight change, waist circumference change, and BMI change for physical activity interventions among adults from the general population



**Mean difference in BMI or Weight change from baseline to time point
(Physical Activity Intervention-Advice/Educational Materials)**

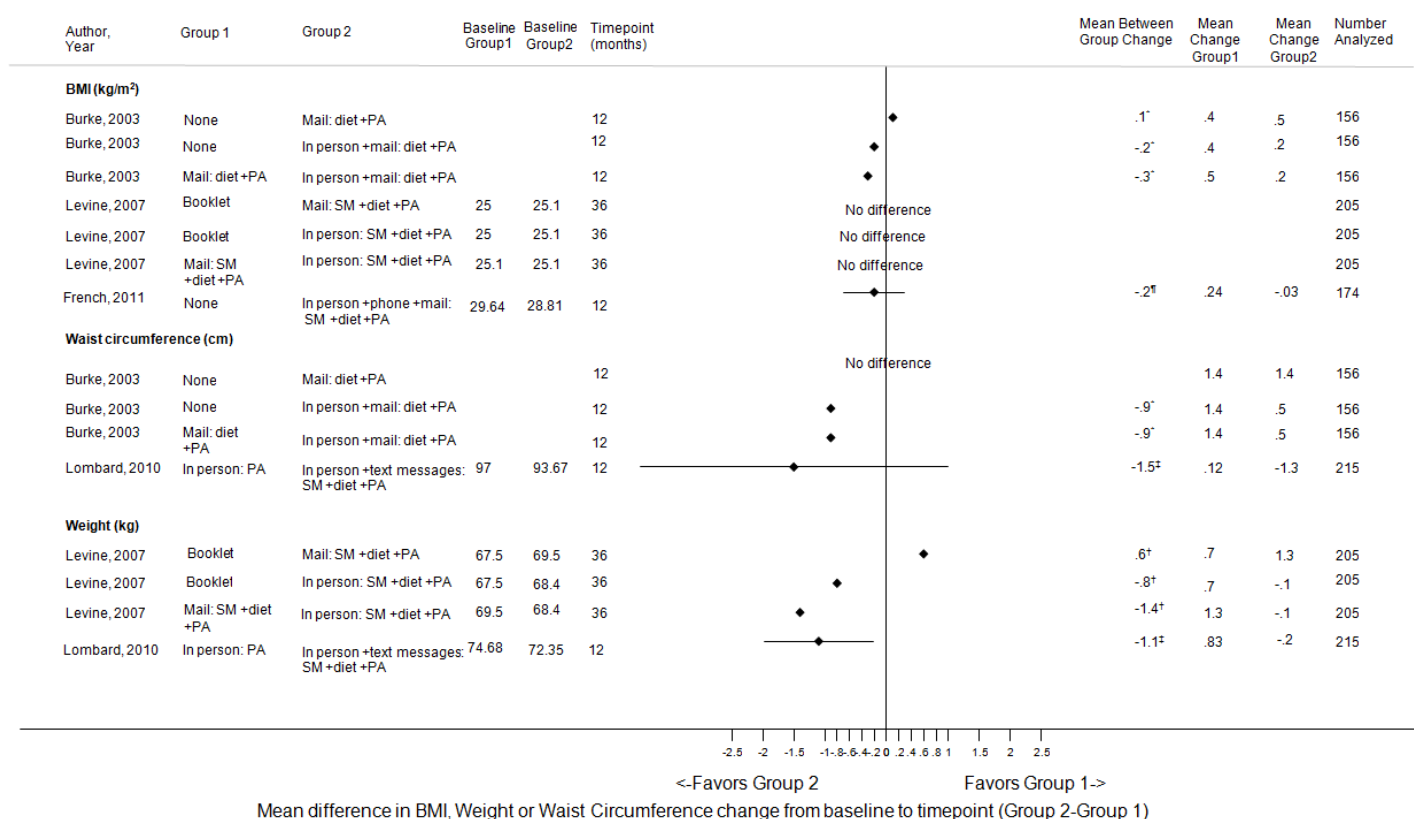
BMI = body mass index; kg/m² = kilogram/meter²; Kg = kilogram; No difference = reported no difference between groups without providing values

[†]Adjusted for race/ethnicity, baseline activity, marital status and kilocalorie intake.

[‡]Adjusted for prerandomization levels of undefined baseline factors.

If the study did not report an estimate of variability, no confidence intervals were generated.

Figure 5. Differences in weight change, waist circumference change, and BMI change for combination interventions among adults from the general population



BMI = body mass index; cm = centimeter; kg/m² = kilogram/meter²; Kg: kilogram; PA = Physical activity; SM = Self-management; No difference = reported no difference between groups without providing values

*Unit of randomization; couples and adjusted for age, sex and correlation within couples.

†Unit of randomization; individual women and adjusted for education and employment level.

‡Unit of randomization; schools and adjusted for baseline weight and school cluster.

¶Unit of randomization; households and adjusted for age, gender, smoking, household configuration, income, education, race and correlation within household.

If the study did not report an estimate of variability, no confidence intervals were generated.

Weight Gain Prevention Among Obese Adults

Study Characteristics

One trial was identified (124 randomized; 120 analyzed).⁷² Abdominally obese women were recruited from a Swedish newspaper in 2005. The goal of the study was to increase bicycling as a mode of commuting to work. Additionally, the study aimed to increase the average kilometers biked per day and steps walked. The study stated that anthropometric measures were not a goal of the study and that the study was not powered to detect differences between groups over the 18 month intervention period (Appendix E, Evidence Table 6).

Population Characteristics

Abdominally obese women (waist circumference 88 to 120 cm) aged 30 to 60 years old who worked at least 3 days per week outside the home were included after passing a health exam by a physician to identify contraindications to physical activity. Only women who were receptive to behavior change were included (Appendix E, Evidence Table 7).⁷²

Interventions

Participants in the bicycling and walking group were randomized to individual group sessions with a physician to increase physical activity with an emphasis on bicycling and walking (baseline, 6 and 12 months), 2 group sessions (2 and 14 months), and given a new bicycle. The walking group was given a pedometer, encouraged to increase walking and participated in 2 group sessions (baseline and 6 months).⁷² All participants were followed for 18 months after baseline (Appendix E, Evidence Table 8).

Outcomes

Key Points

- **BMI change**
 - There is insufficient strength of evidence because no studies were identified.
- **Weight change**
 - There is low strength of evidence that neither behavior was favored to prevent weight gain between bicycle riding to work among women compared with increasing walking to work.
- **Waist circumference change**
 - There is low strength of evidence that neither behavior was favored to prevent waist circumference increases between bicycle riding to work among women compared with increasing walking to work.
- **Adherence**
 - There is insufficient strength of evidence because no studies were identified.
- **Mortality, health related quality of life and adverse events**
 - There is insufficient strength of evidence because no studies were identified.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of self-management strategies and weight maintenance of obese adults met our inclusion criteria.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of dietary strategies and weight maintenance among obese adults met our inclusion criteria.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

One trial (124 randomized; 120 analyzed) reported on two physical activity interventions to prevent weight gain.⁷²

BMI Change

The study did not report on physical activity and BMI change.

Weight Change

There was no meaningful between group or statistical difference in weight change between the bicycling combined with walking group (0.4 kg lost from baseline; 95% CI -1.6 to 0.7 kg) compared with the walking group (0.3 kg lost from baseline; 95% CI -1.2 to 0.7 kg) at 18 months (Appendix E, Evidence Table 9).⁷²

Waist Circumference Change

There was no meaningful between group difference in waist circumference change between the bicycling combined with walking group (-2.1 cm decrease from baseline; 95% CI -3.4 to -0.8 cm) compared with the walking group (-2.6 cm decrease from baseline; 95% CI -4.0 to -1.2 cm) at 18 months.⁷² The study did not report the statistical significance for the difference between the groups, but stated that there was a similar reduction in both groups (Appendix E, Evidence Table 9).

Progression to Overweight or Obesity

All women were abdominally obese at baseline. Further progression of obesity was not reported.

Other Outcomes

The study did not report on physical activity and adherence, mortality, health related quality of life or adverse effects.

Subgroups

The study did not report on physical activity and subgroups.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among obese adults met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of combination strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of combination strategies and weight maintenance among obese adults met our inclusion criteria.

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of environment level strategies and weight maintenance among obese adults met our inclusion criteria.

Weight Gain Prevention Among Adults in Work-Based Settings

Study Characteristics

Seven trials (76,310 participants) took place in work settings. The results from these trials were reported in eight articles. Both recruitment and the intervention occurred in the workplace.⁷³⁻⁷⁹ One trial occurred in the military (124,367 eligible active duty air force members; 68,591 members analyzed), which we considered a workplace.⁷³ One trial occurred at sites within a chemical company (10,281 eligible employees; 3,152 employees recruited at baseline; 3,119 analyzed);^{75,80} another occurred in hospitals (1,983 employees randomly selected; 806 recruited at baseline; 731 analyzed),⁷⁶ and the other trials occurred at a variety of work sites.^{74,77-79} All seven of the work based interventional studies were multicenter trials. Four trials were randomized,⁷⁶⁻⁷⁹ the other three used non randomized, quasi experimental designs or randomized by site rather than by individual (Appendix E, Evidence Table 10).⁷³⁻⁷⁵

The duration of the interventions ranged from 12 to 24 months. The earliest year of recruitment was 2002,⁷³ and the latest year of recruitment was 2008 (Appendix E, Evidence Table 10).⁷⁸

Four studies were done in the United States^{73,75-77} and three in Europe (Appendix E, Evidence Table 10).^{74,78,79}

Four studies stated their goals were to prevent or reduce weight gain.^{73,74,76,77} while the other studies' goals were to increase physical activity,⁷⁸ to improve cardiovascular risk factors,⁷⁹ and to prevent obesity (Appendix E, Evidence Table 10).^{75,80}

Population Characteristics

Inclusion criteria varied between the seven work based trials. The number of women that were included in each study varied considerably between studies depending on the workplace. Women were less than 15 percent of the military study population and 30 percent of the chemical company study population.^{73,75} A population of hospital workers was more than 75 percent women (Appendix E, Evidence Table 11).⁷⁶

The mean age of participants that were included in each study also reflected the age distribution of that worksite. For example, mean age was in the early thirties for the military population⁷³ and in the mid forties for the chemical company population.⁷⁵ In a sample of employees from a variety of worksites in the Netherlands, the mean age was in the upper thirties.⁷⁴ Race/ethnicity, education, and smoking status were not consistently reported across studies (Appendix E, Evidence Table 11).

Interventions

All work based trials used a combination of strategies including self management (n=4)^{73,74,77,78}, diet (n=5)^{73,75,76,79-81}, and physical activity (n=6)^{73,75-80}. Five of the work based interventions also included specific environmental changes as a part of their combination strategy.⁷⁴⁻⁷⁸ The specifics of each intervention are described prior to the results by Key Question (Table 8; Appendix E, Evidence Table 12).

Outcomes

Key Points

- **BMI**
 - The strength of evidence is low that work based combination interventions that use diet, physical activity, and environmental components prevent adult BMI gain. A single work based intervention that combined diet, physical activity and environmental components resulted in meaningful and statistically significant prevention of BMI change at 12 months; however, four other work based combination interventions resulted in BMI gain or no difference in BMI as compared with control.
 - No studies evaluated self-management, diet, physical activity, medication, or environmental interventions alone in the work setting.
- **Weight**
 - The strength of evidence is moderate that work based combination interventions that use either diet, physical activity, and environmental components or internet-based diet and physical activity counseling prevent adult weight gain. One work based intervention that combined diet, physical activity and environmental components resulted in meaningful and statistically significant prevention of BMI change at 12 months and another work based intervention that combined internet-based diet and physical activity counseling results in meaningful and statistically significant weight gain prevention at 24 months. However, one other work based combination intervention resulted in no difference in weight as compared with control.
 - There is insufficient evidence that self-management, diet, physical activity, medication, or environmental interventions alone in the work setting prevent weight gain in adults.
- **Waist circumference**
 - The strength of evidence is low that work based combination interventions that use self-management and environmental components prevent adult waist circumference increase. A single work based intervention that combined self-management and environmental components resulted in meaningful and

statistically significant prevention of waist circumference increase at 12 months; however, another work based combination intervention resulted in no difference in waist circumference as compared with control.

- There is insufficient evidence that self-management, diet, physical activity, medication, or environmental interventions alone in the work setting prevent waist circumference increase in adults.
- **Adherence**
 - There is low strength of evidence that participants have poor adherence to work based combination interventions. We identified few studies that assessed adherence among work based combination interventions, and those studies that did assess adherence did not evaluate similar outcomes. Two studies assessed participation in the intervention, which was variable and low overall. Another study evaluated awareness of and adherence to environmental components of the intervention, which was variable and poor for some aspects of the environmental component.
- **Other outcomes**
 - There is insufficient evidence on the influence of work based combination interventions on other outcomes, because no studies met our inclusion criteria.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of self-management strategies and weight maintenance among adults in a work based setting met our inclusion criteria.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of dietary strategies and weight maintenance among adults in a work based setting met our inclusion criteria.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of physical activity strategies and weight maintenance among adults in a work based setting met our inclusion criteria.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among adults in a work based setting met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity and medication strategies for the prevention of weight gain among adults?

All work based strategies for weight management used a combination of strategies, including self-management, diet, and physical activity. In addition to these individual level interventions, the majority of work-based combination strategies also included environment level interventions.

The work based trial in the setting of a U.S. chemical company evaluated the effectiveness of site specific environmental changes to promote healthy eating and physical activity in combination with a workplace health promotion program that provided individually tailored programming on self management, diet, and exercise.^{75,80} The study considered this worksite health promotion program as usual care, as it was in place at both the control and intervention sites. The environmental changes were considered the intervention.

The work based trial in U.S. hospitals evaluated the effects of a combined individual and environment level program.⁷⁶ Environment level changes included promotional materials and group events to promote healthy eating and physical activity, along with individual level education on diet and exercise through displays, workshops, and newsletters. The control group for this study received no intervention.

Another work based trial in the U.S. occurred in a variety of workplaces.⁷⁷ This intervention used a combination of self-management, diet, and physical activity interventions, as well as environmental level interventions. Participants were encouraged to self-weigh, received healthy eating newsletters, and received pedometers. Environment level strategies focused on modifying the food and physical activity environments, which included increased availability and decreased price of healthy foods, formation of walking groups, and motivational materials to promote stair use.

There were two work based trials that were implemented in a variety of worksites in the Netherlands.^{74,79} One combined individual level self-management interventions with environmental level changes.⁷⁴ The self-management intervention emphasized education, skills training, goal setting, and self monitoring with respect to energy balance, which was supported via a web based tool. The environmental changes implemented varied between worksites. Each intervention was selected and implemented by key personnel at each site. The control group received no intervention. The other work based intervention in the Netherlands combined individual diet and exercise counseling.⁷⁹ This study did not include an environmental component. The counseling was provided either by telephone or Internet by four trained counselors.

The work based trial based in the United Kingdom was also implemented in a variety of work settings.⁷⁸ This intervention combined individual level and environment level approaches. On the individual level, the intervention focused on self-management and physical activity education. The environmental changes include posters and team challenges targeting exercise.

The work based trial in the military evaluated the effects of a self-management intervention that included completion of two personal energy plan workbooks supplemented with weekly educational emails on healthy eating habits and physical activity.⁷³ This study did not include an environmental component. The control group in this study received no intervention.

BMI Change

Five trials evaluated change in BMI at 12 and 24 months.^{74-78,80} Using our predefined criteria for BMI change of 0.2 kg/m² over 12 months, one study met our between group difference

threshold and was statistically significant⁸⁰. This intervention included individual level diet and physical activity along with an environmental component. This study also resulted in statistically significant prevention of BMI gain at 24 months.⁷⁵ Three other interventions demonstrated no significant difference between intervention and control,^{74,76,77} and one intervention resulted in a statistically significant and meaningful BMI increase of 0.2 kg/m² over 12 months.⁷⁸ (Figure 6; Appendix E, Evidence Table 13).

Weight Change

Four trials reported on weight change.^{73-75,79,80} Using our predefined criteria for weight change of 0.5 kg over 12 months, one study met our between group difference threshold and was statistically significant.⁸⁰ This intervention included individual level diet and physical activity along with an environmental component. This study also resulted in statistically significant prevention of weight gain at 24 months.⁷⁵ In another study, one group that used Internet-based diet and physical activity counseling resulted in statistically significant weight gain prevention as compared with control at 24 months (-2.1 kg difference).⁷⁹ The other group in this study used phone-based diet and physical activity counseling which did not result in meaningful, statistically significant weight gain prevention at 24 months.⁷⁹ Another study demonstrated no meaningful or statistically significant difference between intervention and control at 12 months.⁷⁴ Finally, the military based study only provided results among subgroups,⁷³ which are presented in the section below (Figure 7; Appendix E, Evidence Table 13).

Waist Circumference Change

Two trials evaluated waist circumference as an outcome.^{74,79} Using our predefined criteria for waist circumference change of 1.0 cm over 12 months, one study met our between group difference threshold and was statistically significant.⁷⁴ This intervention combined a self-management intervention with an environmental intervention. This study also resulted in statistically significant prevention of waist circumference increase at 24 months.⁷⁴ The other study found no statistically significant differences between intervention and control groups with respect to prevention of waist circumference increase.⁷⁹ (Figure 8, Appendix E, Evidence Table 13).

Adherence

Three trials reported an assessment of participation in or adherence to the intervention.^{76,77,79} One study created a participation score (with a range of zero to 100, where higher scores indicate greater participation) that was based on survey responses to questions regarding awareness and use of the environmental interventions.⁷⁶ The 12 month mean participation score was 15.8 and the 24 month mean participation score was 18.1 among intervention sites. The other two studies examined several process measures related to individual participation in the intervention⁷⁹ and implementation of environment level changes.⁷⁷ One of these studies compared participation in the intervention groups (telephone-based vs. Internet-based counseling). In this study, 64 percent of those randomized to telephone intervention completed all counseling modules versus 17 percent randomized to Internet intervention.⁷⁹ The other study focused heavily on environment level changes.⁷⁷ No worksites met the goal of reducing the price of healthy foods, while a majority of sites enhanced their stairwells and stocked their local food sources with healthier foods. (Appendix E, Evidence Table 13)

Clinical Outcomes

No studies reported on mortality or quality of life.

Adverse Events

No studies reported on adverse effects such as burden of intervention, nutritional deficiencies, eating disorders, or activity related injury.

Subgroups

The trial in the military setting reported the 12 month mean change in weight among subgroups of men and women.⁷³ Women in the intervention group lost a mean of 0.1 kg, whereas women in the control group gained 0.4 kg. This 0.5 kg difference met our predefined criteria for weight maintenance and was statistically significant. (Appendix E, Evidence Table 9). The study in the chemical company setting performed a stratified analysis by gender, which did not reveal any significant interaction between the intervention and gender.⁸⁰ No other subgroup analyses were performed in the other studies.

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

All work-based environmental level interventions were used in combination with other interventions, and are reported under Key Question 5.^{75-78,82}

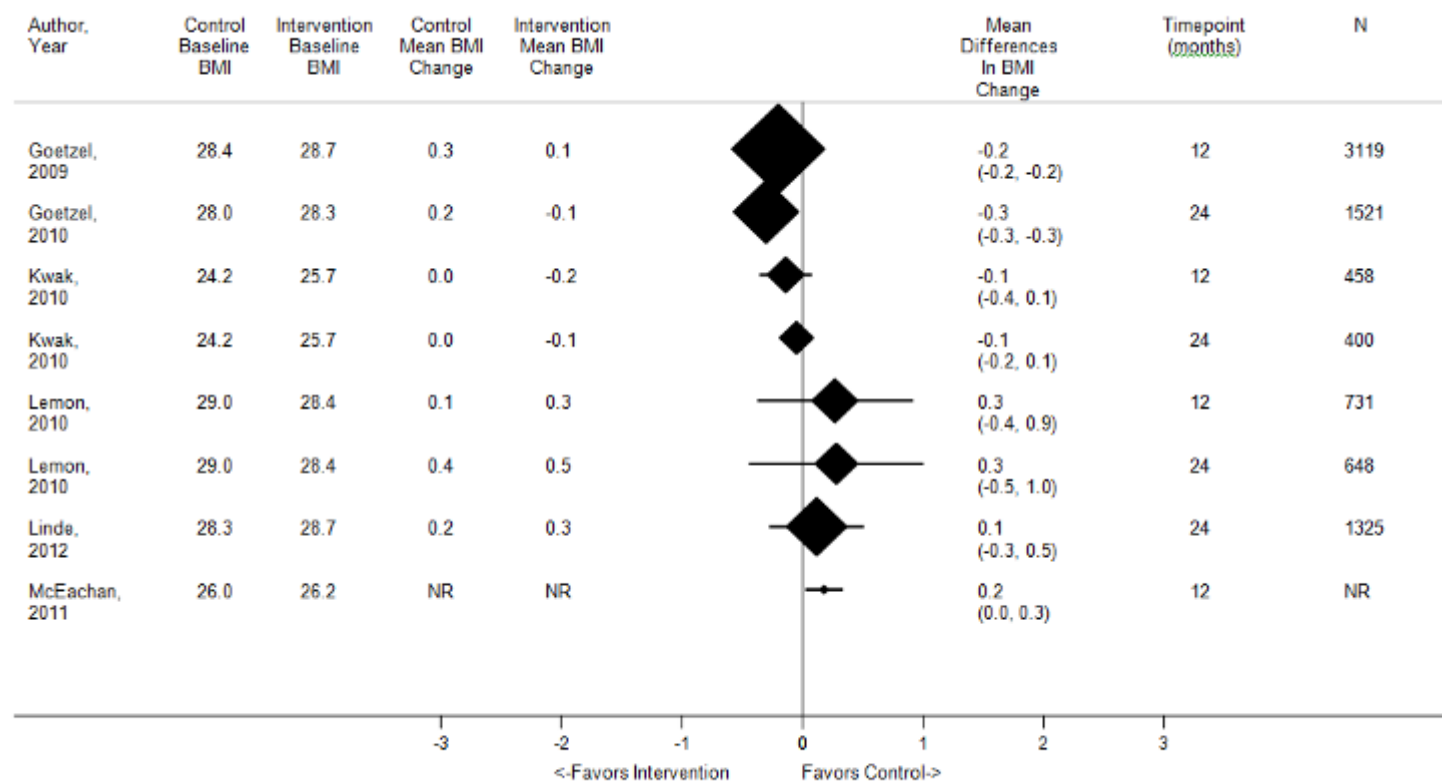
Table 8. Description of interventions in studies among adult populations in work settings

Author, Year Duration	Primary Aim	Control	Active Combination Intervention
Dekkers, 2011 ⁷⁹ 6 months	Improve cardiovascular risk factors	Printed materials	Diet <ul style="list-style-type: none"> • Nutritional counseling via phone or Internet • Encouraged reduce fat, sugar, and alcohol while increasing intake of fruits and vegetables Physical Activity <ul style="list-style-type: none"> • Exercise counseling via phone or Internet • Encouraged walking at lunch and active commuting
Goetzel, 2009 ⁸⁰ Goetzel, 2010 ⁷⁵ 24 months	Prevent obesity and reduce and the prevalence of obesity among workers	Usual care with individually focused health promotion programs	Diet <ul style="list-style-type: none"> • Usual care for individual dietary counseling Physical Activity <ul style="list-style-type: none"> • Usual care physical activity programs Environment <ul style="list-style-type: none"> • Environmental changes to support an increase in employees' physical activity, improve their eating habits, and manage their weight through environmental prompts and point of choice messaging • Key personnel recruited to set worksite health goals and train worksite leaders on health promotion
Kwak, 2010 ⁷⁴ 12 months	Prevent weight gain	No intervention	Self management <ul style="list-style-type: none"> • Receipt of In Balance box with pedometer, measuring tape, calorie guide, and instructions for food and exercise diaries • Access to In Balance website including Weight Coach instrument that provides personalized advice to maintain weight • CD ROM based training including education on energy balance behaviors, skills training, goal setting • Self monitoring Environment <ul style="list-style-type: none"> • Key worksite personnel selected and implemented different environmental interventions at each site such as changing food products available at the cafeteria, workshops, signs promoting healthy eating and physical activity, forming lunchtime walking or cycling groups

Table 8. Description of interventions in studies among adult populations in work settings (continued)

Author, Year Duration	Primary Aim	Control	Active Combination Intervention
Lemon, 2010 ⁷⁶ 24 months	Prevent weight gain	Usual care/no intervention	<p>Diet</p> <ul style="list-style-type: none"> Weekly displays on nutrition education Weekly newsletter via email that included education on a healthy weight topic, a recipe, and quick tip <p>Physical Activity</p> <ul style="list-style-type: none"> Weekly displays on exercise education Monthly strength training workshop where individuals were given a simple routine and a resistance band <p>Environment</p> <ul style="list-style-type: none"> Promotional signs to encourage healthy eating included nutritional information for food and beverages in the cafeteria, new healthy menu options, special cafeteria events, onsite farmer's market, healthy potlucks Promotional signs to encourage physical activity included stairway signs, indoor and outdoor walking routes, and walking groups Periodic campaigns and challenges targeting physical activity, healthy eating, and weight with group and individual prizes
Linde, 2012 ⁷⁷ 24 Months	Reduce weight gain	No intervention	<p>Self-management</p> <ul style="list-style-type: none"> Weight self-monitoring <p>Diet</p> <ul style="list-style-type: none"> Healthy eating newsletter <p>Physical activity</p> <ul style="list-style-type: none"> Participants were given pedometers Promote the formation of walking groups and exercise challenges <p>Environment</p> <ul style="list-style-type: none"> Increase the availability and decrease the price of calorie-smart foods in the cafeteria and vending machines Use point-of-purchase promotional materials for calorie-smart foods Motivational materials placed to encourage use of stairs
McEachan, 2011 ⁷⁸ 3 months	Increase physical activity	Usual care	<p>Self management</p> <ul style="list-style-type: none"> Individual reminders and fridge magnets to track physical activity. <p>Physical activity</p> <ul style="list-style-type: none"> Knowledge quiz and educational messages about the benefits of physical activity including health, mental health and social benefits <p>Environmental</p> <ul style="list-style-type: none"> Leaflets and posters distributed throughout worksite Team challenges targeting physical activity

Figure 6. Differences in BMI change for combination interventions among adults in a work setting



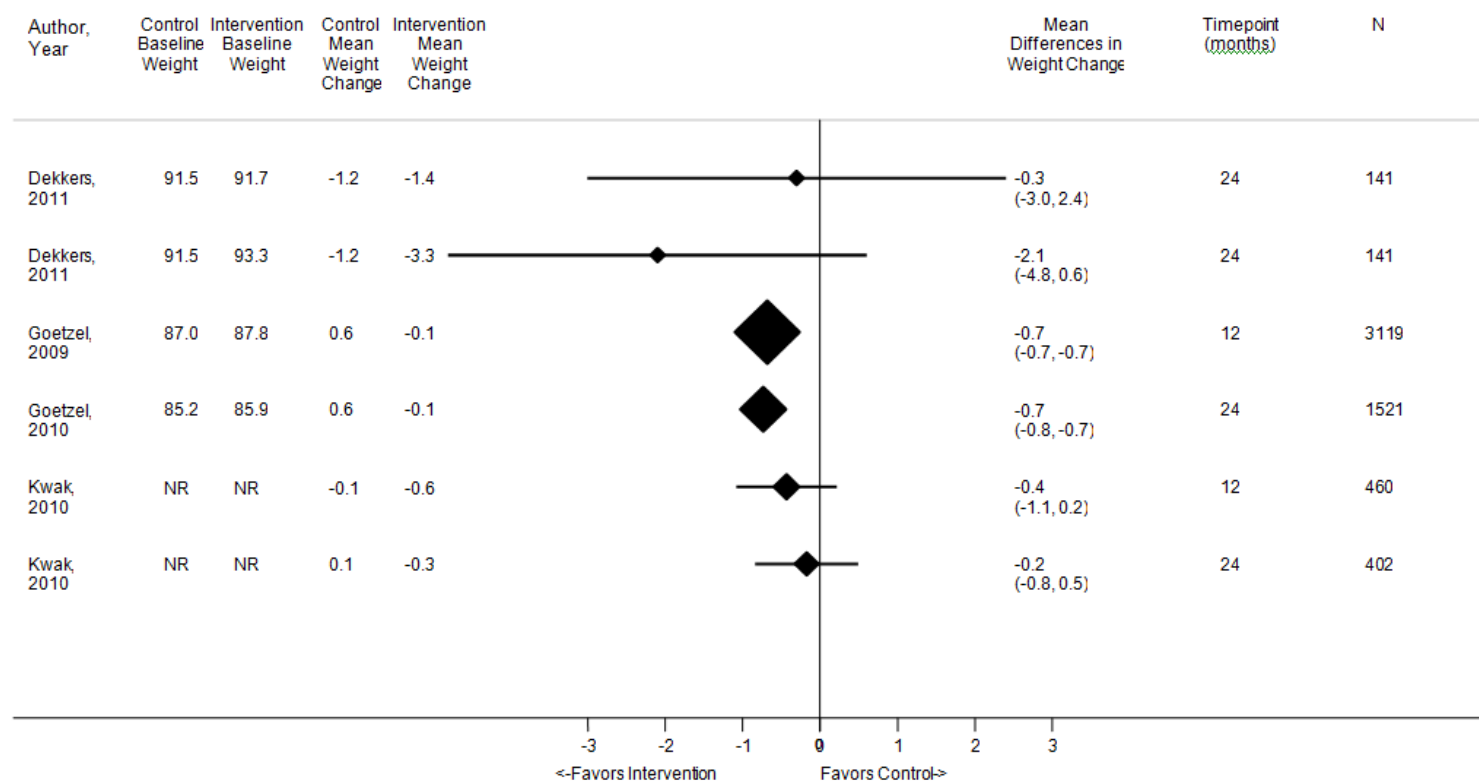
Mean difference in BMI (kg/m²) change from baseline to timepoint for work based combination interventions

BMI = body mass index; kg/m² = kilogram/meter²; NR = not reported

If the study did not report an estimate of variability, no confidence intervals were generated.

Size of the effect symbol reflects the sample size.

Figure 7. Differences in weight change for combination interventions among adults in a work setting



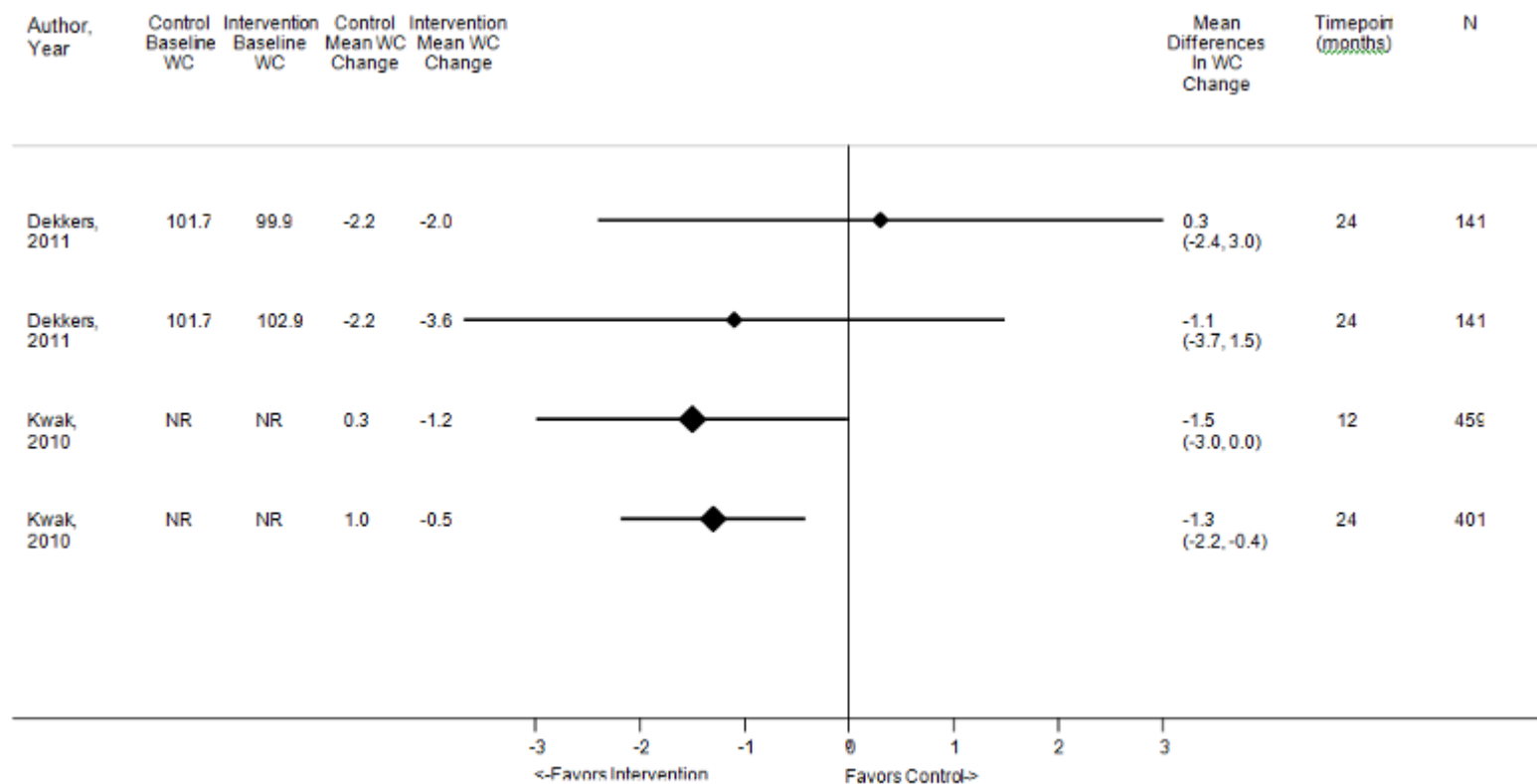
Mean difference in weight (kg) change from baseline to timepoint for work based combination interventions

Kg = kilogram; NR = not reported

If the study did not report an estimate of variability, no confidence intervals were generated.

Size of the effect symbol reflects the sample size.

Figure 8. Differences in waist circumference for combination interventions among adults in a work setting



Mean difference in waist circumference (cm) change from baseline to timepoint in work based combination interventions

cm = centimeter; NR = not reported; WC = waist circumference
 Size of the effect symbol reflects the sample size.

Weight Gain Prevention Among Adults in College-Based Settings

Study Characteristics

Two trials (155 participants) took place in a college setting.^{83,84} Both interventions were randomized trials at a single school. The duration of the interventions ranged from 16 to 24 months. The earliest year of recruitment was 1997⁸⁴ and the latest year of recruitment was 2002.⁸³ One trial occurred in the United States⁸⁴ (40 students randomized; 34 analyzed) and the other trial took place in Canada (115 students randomized; 105 analyzed).⁸³

The stated study goal for both of the studies was the prevention of weight gain (Appendix E, Evidence Table 14).

Population Characteristics

The trials had similar populations.^{83,84} The mean age was 19 years and the majority of participants were White. Both studies included only freshman and sophomore college students. One study examined only women,⁸⁴ while the other study included both women and men (Table 9; Appendix E, Evidence Table 15).⁸³

Interventions

Both college based trials used a combined strategy to target weight maintenance in the intervention group including diet and exercise education. One study also included education on self management (Appendix E, Evidence Table 16).

Outcomes

Key Points

- **BMI**
 - The strength of evidence is low that college based combination interventions that use self-management, dietary, and physical activity components prevent BMI gain. One college based intervention that combined self-management, diet, and physical activity components resulted in meaningful and statistically significant prevention of BMI change at 12 months. The other college based combination intervention demonstrated meaningful prevention of BMI gain; however, these results were not statistically significant.
 - There is insufficient evidence that self-management, diet, physical activity, medication, or environmental interventions alone in the college setting prevent BMI gain in adults.
- **Weight**
 - The strength of evidence is low that college based combination interventions that use self-management, dietary, and physical activity components prevent weight gain. One college based intervention that combined self-management, diet, and physical activity components resulted in meaningful and statistically significant prevention of weight gain at 12 months. The other college based combination intervention demonstrated meaningful prevention of weight gain; however, these

results were not statistically significant. In subgroups analysis, this intervention did show a meaningful and statistically significant effect among students whose baseline BMI greater than 24 kg/m².

- There is insufficient evidence that self-management, diet, physical activity, medication, or environmental interventions alone in the college setting prevent weight gain in adults.
- **Waist circumference**
 - Neither intervention was favored to prevent waist circumference increases between a combination of self-management, dietary, and physical activity interventions and the comparison groups in the college setting (low strength of evidence).
 - There is insufficient evidence that self-management, diet, or physical activity interventions alone in the college setting prevent increase in waist circumference in adults.
- **Adherence**
 - The strength of evidence for adherence is low. We identified only one study that assessed adherence among college based combination interventions. Adherence to the intervention was low during the first year, and declined further during the second year to less than 30 percent of participants.
- **Other outcomes**
 - There is insufficient strength of evidence on the influence of college based combination interventions on other outcomes, because no studies met our inclusion criteria.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of self-management strategies and weight maintenance among adults in a college based setting met our inclusion criteria.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of dietary strategies and weight maintenance among adults in a college based setting met our inclusion criteria.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of physical activity strategies and weight maintenance among adults in a college based setting met our inclusion criteria.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among adults in a college based setting met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?

Both trials targeted freshman or sophomore students to provide them education on diet and exercise. One trial evaluated the effects of a 4 month college course on the science of nutrition, exercise, physiology, and metabolism on weight gain prevention.⁸⁴ The course included both lectures and laboratory exercises on these topics. The other trial evaluated the effects of a 24 month weight gain prevention program using small groups to increase knowledge on diet and exercise, as well as self-management principles including problem solving, goal setting, and monitoring strategies.⁸³ The control group participants for both of these trials received no information or intervention (Appendix E, Evidence Table 17).^{83,84}

BMI Change

Both trials evaluated change in BMI.^{83,84} Using our predefined criteria for BMI change of 0.2 kg/m² over 12 months, both studies met our between group difference threshold^{83,84}. However, only one trial achieved a statistically significant effect on prevention of BMI gain⁸³. This intervention used small group sessions to promote self-management, diet and physical activity in order to prevent weight gain. (Figure 9; Appendix E, Evidence Table 17).

Weight Change

Both trials reported on weight change^{83,84}. Using our predefined criteria for weight change of 0.5 kg over 12 months, both studies met our between group difference threshold^{83,84}. However, only one trial achieved a statistically significant effect on prevention of weight gain⁸³. This intervention used small group sessions to promote self-management, diet and physical activity in order to prevent weight gain. The college course intervention had a between group difference of 3.2 kg at 16 months; however, this result was not statistically significant (Figure 10)⁸⁴.

Waist Circumference Change

One trial reported on waist circumference.⁸³ There was no difference in waist circumference change between the intervention and the control groups at 12 or 24 months (Appendix E, Evidence Table 17).

Adherence

Adherence to the intervention was reported in one trial.⁸³ This study defined adherence as attending more than 60 percent of seminars during a 12 month period. During year 1, adherence was 53 percent and fell to 26 percent during year 2 (Appendix E, Evidence Table 17).

Clinical Outcomes

No studies reported on mortality or quality of life.

Adverse Events

No studies reported on adverse effects such as burden of intervention, nutritional deficiencies, eating disorders, or activity related injury.

Subgroups

One trial evaluated the effects of the intervention on subgroups based on BMI: BMI less than or equal to 24 kg/m^2 and BMIs $> 24 \text{ kg/m}^2$ at baseline.⁸⁴ There were no differences in 16 month BMI change between intervention and control participants who had lower BMIs at baseline. However, the higher BMI intervention group (n=11) lost 1.4 kg as compared with higher BMI controls (n=6) who gained 9.2 kg. This difference met the between group difference threshold and was statistically significant (Appendix E, Evidence Table 17).

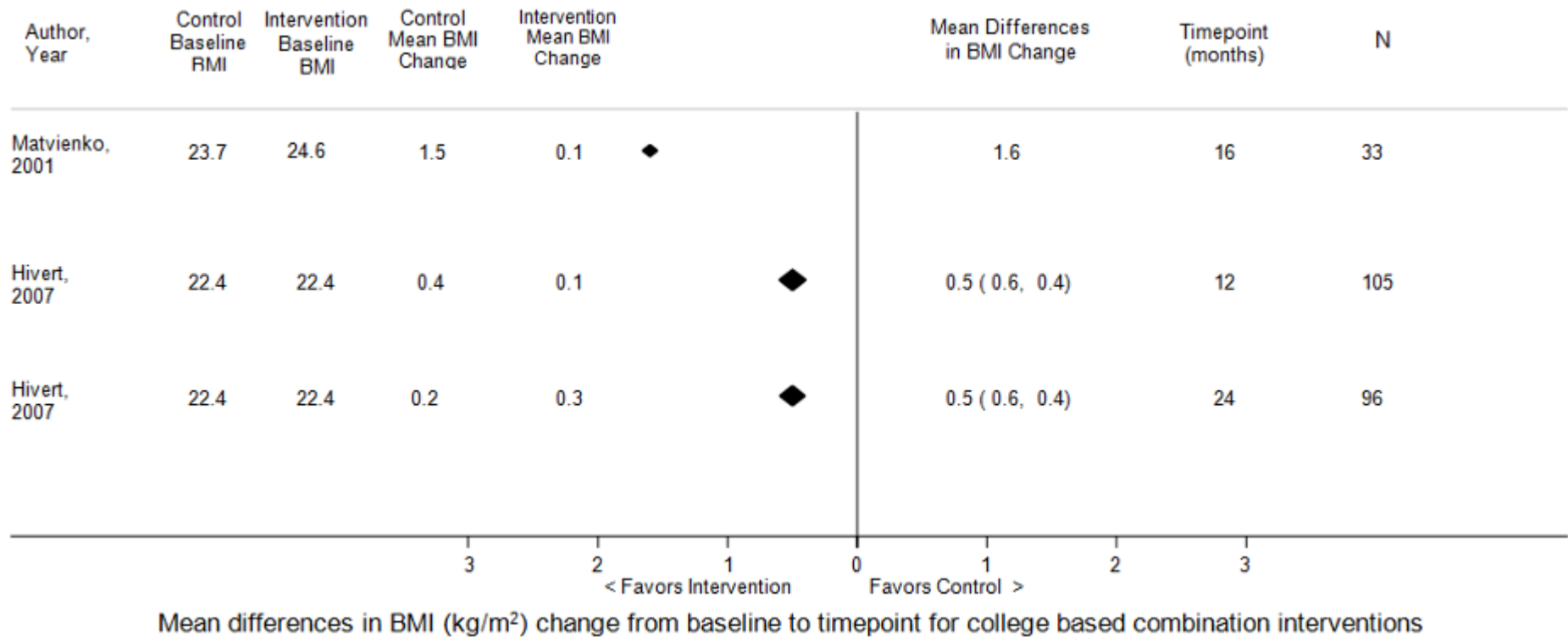
Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

No college based studies reported on environmental strategies.

Table 9. Description of interventions in studies among adult populations in college-based settings

Author, Year Duration	Primary Aim	Control	Active Combination Intervention
Hivert, 2007 ⁸³ 24 months	Prevent weight gain	No intervention	<p>Small group sessions</p> <p>Self management</p> <ul style="list-style-type: none"> • Increasing knowledge on weight gain • Problem solving • Goal setting • Monitoring strategies <p>Diet</p> <ul style="list-style-type: none"> • Increasing knowledge on national recommendations on diet <p>Physical Activity</p> <ul style="list-style-type: none"> • Increasing knowledge on national recommendations on exercise
Matvienko 2001 ⁸⁴ 4 months	Prevent weight gain	No intervention	<p>College course</p> <p>Diet</p> <ul style="list-style-type: none"> • Lectures to increase knowledge of nutrition science including physiology and metabolism • Laboratory exercises including body composition measurements, serving sizes, food sensory exercises, and food preparation methods <p>Physical Activity</p> <ul style="list-style-type: none"> • Lectures to increase knowledge of exercise science including physiology and metabolism

Figure 9. Differences in BMI change for combination interventions among adults in a college setting

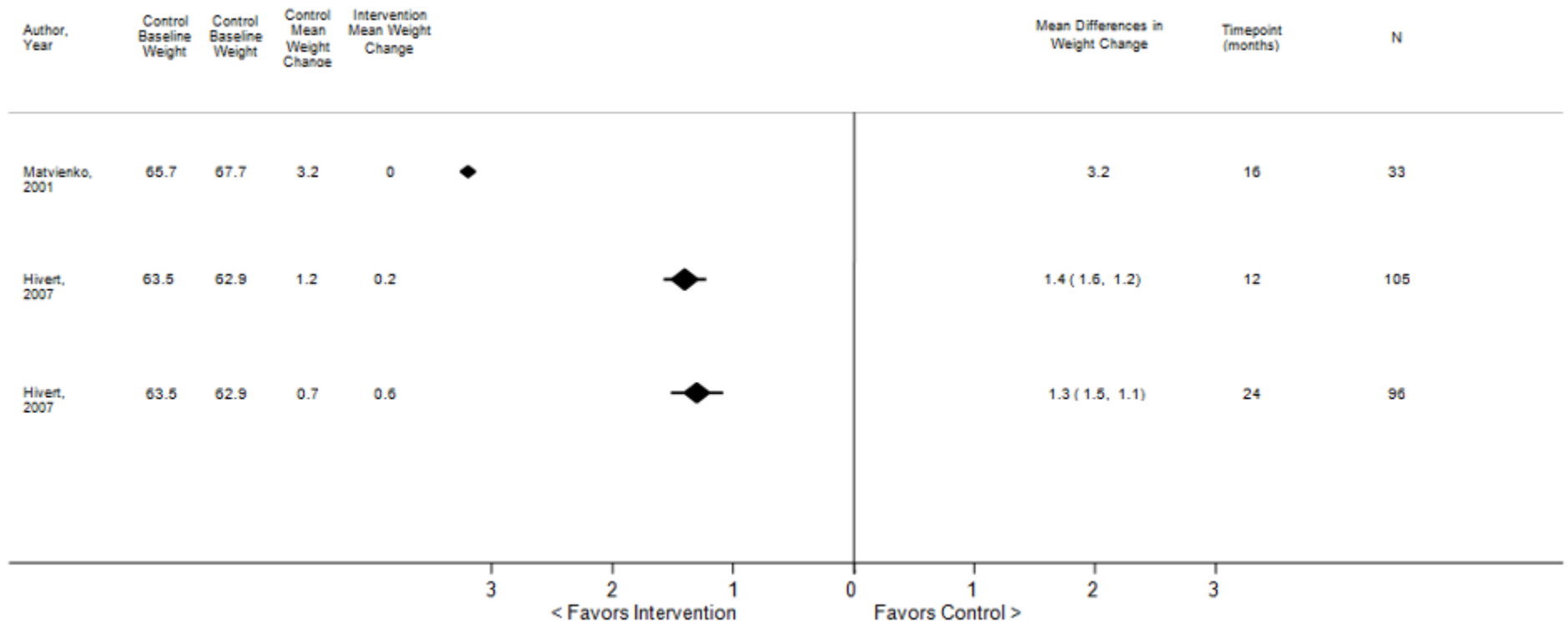


BMI = body mass index; kg/m² = kilogram/meter²

If the study did not report an estimate of variability, no confidence intervals were generated.

Size of the effect symbol reflects the sample size

Figure 10. Differences in weight change for combination interventions among adults in a college setting



Mean differences in weight (kg) change from baseline to timepoint for college based combination interventions

Kg = kilogram

If the study did not report an estimate of variability, no confidence intervals were generated.

Size of the effect symbol reflects the sample size.

Weight Gain Prevention Among Adults at Risk for or With Cardiovascular Disease or Diabetes Mellitus

Study Characteristics

Eleven randomized clinical trials⁸⁵⁻⁹⁸ and one non randomized clinical trial⁹⁹ evaluated the effect of self-management, dietary, and/or physical activity interventions on weight maintenance among adults at risk for or with established cardiovascular disease or diabetes mellitus. One of the included trials, the Oslo Diet and Exercise Study (ODES), reported relevant results in two published articles,^{85,86} and another, The PREDIMED (Prevencion con Dieta Mediterranea) Study, reported relevant results in three published articles (Appendix E, Evidence Table 18).^{91,92,94}

One trial was conducted in Australia,⁹³ one in Asia,⁸⁷ four in the United States,^{90,97-99} and five in Europe.^{85,86,88,89,91,92,96} Seven of the 12 trials did not report years of recruitment.^{88,89,93,95,97-99} Of those reporting on time of recruitment, three recruited between 2001 and 2007^{87,94,96} and two recruited between 1990 and 1992.^{85,86,90} Three trials were conducted at more than one site,^{90-92,94,98} and with the exception of a single study that did not report on the number of sites,⁹⁷ the others were conducted at a single study site.^{85-89,93,95,96,99} Seven trials recruited participants from a clinical setting.^{88,89,91-95,98,99} Other settings for recruitment included a cohort study,^{85,86} insurance plan,⁸⁷ and diabetes screening program.^{96,97} Two trials did not report on the recruitment setting (Appendix E, Evidence Table 18).^{90,95}

Six trials restricted inclusion exclusively to those with diabetes mellitus.^{88,89,93,97-99} Of these studies, one excluded patients not on insulin,⁹⁹ and one excluded those without a stable diabetes medication regimen.⁸⁹

Six trials were conducted in participants with risk factors for cardiovascular disease or diabetes mellitus such as dyslipidemia, elevated blood pressure, elevated BMI, or elevated hemoglobin A_{1c} (HbA_{1c}).^{85-87,90-92,94-96} Of these six trials, four excluded participants with known cardiovascular disease,^{85,86,90-92,94,95} and three excluded participants with diabetes.^{85,86,90,95} One trial required all participants to have impaired glucose tolerance (Appendix E, Evidence Table 18).⁹⁶

Most articles did not report on total followup period;^{87-92,94-96} when reported, followup periods ranged from 1 to 2 years.^{85,86,93,97-99}

Weight maintenance was a stated goal in a single article (Appendix E, Evidence Table 18).⁹⁹

Population Characteristics

The 12 trials enrolled or randomized 4,206 participants.^{85-90,93-99} Two trials did not report the sex of the study population.^{85,86,99} Women comprised 31 to 100 percent of the study population in the other studies.⁸⁷⁻⁹⁹ Three trials did not report on the age of participants.^{85,86,90,99} In another trial, the reported mean age by sex was 57 years for women and 48 years for men.⁹⁵ Mean age ranged from 57 to 68 years in the other trials.^{87-89,91-94,96-98} Only three trials reported on race and ethnicity; black participants comprised 17 percent of the study population in one trial,⁹⁰ and 26 percent of participants in another trial were Asian or Pacific Islander (Appendix E, Evidence Table 19).⁹⁶ All participants were Latina in a third trial.⁹⁸

Education was reported qualitatively in a one trial in which roughly one half of participants were college graduates.⁹⁰ In the PREDIMED Study, 73 to 76 percent of participants had less than a high school education in the control and two active diet intervention groups.⁹⁴ In a trial

conducted among Latinas with diabetes, less than one-third of participants reported post-secondary education,⁹⁸ and another trial reported that 65 percent of participants had some post-secondary education.⁹⁷ Smoking was reported in three trials with roughly 10 to 20 percent of participants reporting current smoking.^{85,96,98} One study excluded current smokers (Appendix E, Evidence Table 19).⁹³

Roughly half of the participants in the PREDIMED Study had diabetes,⁹⁴ and in another study, 14 to 20 percent of participants had diabetes.⁸⁷ All participants were on insulin in one study of patients with diabetes (Appendix E, Evidence Table 19).⁹⁹

Interventions

We did not identify any trials evaluating the effect of orlistat on weight maintenance among adults. Two trials compared a self-management intervention with a control group,^{88,98} two trials evaluated dietary interventions,^{91,92,94,99} two evaluated physical activity interventions,^{91,92,94,95,99} and six trials evaluated a combination of a self-management, dietary, or physical activity interventions (Tables 10-13; Appendix E, Evidence Table 20).^{87,89,90,93,95,97}

Outcomes

Key Points

- **BMI.** There is low strength of evidence that:
 - Goal setting to improve dietary and physical activity patterns results in a meaningful favorable BMI change at one year compared with no intervention.
 - Goal setting to improve physical activity decreases BMI meaningfully at one year.
 - Dietary interventions decrease BMI similarly compared with control at one year.
 - Physical activity interventions decrease BMI meaningfully at one year relative to no intervention.
 - A self-management intervention combined with physical activity results in a meaningful BMI change relative to control at one year.
 - A combination of self-management, physical activity, and diet results in a meaningful BMI change at one but not two years.
- **Weight.** There is low strength of evidence that:
 - Dietary interventions do not prevent meaningful weight gain.
 - Physical activity interventions prevent meaningful weight gain compared with no intervention at one year.
 - A combination of physical activity and self management prevented weight gain meaningfully compared with usual care at one year.
 - A combination of diet, physical activity, and self management prevented weight gain meaningfully at one year compared with no intervention.
 - There is insufficient strength of evidence for self-management strategies, because no studies were identified.
- **Waist circumference.** There is low strength of evidence that:
 - Goal setting to improve dietary and physical activity patterns meaningfully decreases waist circumference at one year compared with no intervention.
 - Endurance exercise decreases waist circumference meaningfully and statistically significantly compared with no intervention.

- A combination of self management, aerobic activity and strength training resulted in meaningfully and statistically significantly less of an increase in waist circumference compared with control.
- There is insufficient evidence on the effect of dietary interventions on waist circumference.
- **Adherence.** There is low strength of evidence that:
 - Adherence to endurance exercise three times per week was 57 percent over one year.
 - Adherence to a combination of self-management and physical activity interventions ranged from 64 to 100 percent.
 - Adherence to a combination of self-management, dietary, and physical activity interventions was 46 percent.
 - There is insufficient strength of evidence for self-management and dietary strategies, because no studies met our inclusion criteria.
- **Quality of life**
 - There is low strength of evidence that no strategy results in improved quality of life between an intervention that included a combination of self management and physical activity compared with control.
 - There is insufficient strength of evidence for self-management, dietary and physical activity interventions, because no studies met our inclusion criteria.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

Two randomized controlled trials (N=196 enrolled and analyzed) evaluated the effects of a self-management interventions on BMI and waist circumference maintenance among adults with diabetes.^{88,97} In one study, the self-management intervention focused on goal setting to improve dietary and physical activity patterns using motivational interviewing (Table 1); assessment of diet and physical activity was used to identify and address barriers to meeting lifestyle goals.⁸⁸ Participants in this self-management intervention attended three in person sessions and had three telephone contacts.⁸⁸ The comparison group received usual care.

In the other trial, the self-management interventions focused on physical activity goals using a teaching method grounded in Social-Cognitive Theory (Table 1).⁹⁷ Participants in this study were randomized to either an intensive Diabetes Education Program (DEP) with 11 group, in-person contacts and telephone support over 12 months or to the DEP with Physical Activity Supplement (DEP + PAS) which offered an individualized exercise prescription and telephone support provided by a certified personal trainer in addition to the DEP (Table 1).⁹⁷

Four other trials included self management as a component of the active intervention strategy and are described below in the section on studies evaluating a combination of intervention types (Table 10; Appendix E, Evidence Table 21).^{87,89,90,93}

BMI Change

In the study comparing a self-management intervention with usual care, at 12 months, mean BMI had increased by 1.42 kg/m² in the usual care group and remained stable (mean change from baseline, 0.34 kg/m²) in the self-management intervention group; while it met our predefined threshold for significance, the statistical significance of this 1.76 kg/m² between-

group change in BMI was not provided (Appendix E, Evidence Table 21).⁸⁸ All randomized participants were presumed to be included in the analysis (N=100), but this was not reported.⁸⁸ In the study comparing two self-management interventions, at 12 months, BMI decreased by 1.2 kg/m² in the DEP group and by 0.8 kg/m² in the DEP + PAS group (between group difference 0.4 kg/m² (p<0.1 for adjusted between-group difference); this difference met our predefined threshold for significance, but its statistical significance was unclear.⁹⁷ The authors carried the last observation forward for missing data in this study.⁹⁷

Weight Change

There were no self-management interventions in this population that measured weight change as an outcome.

Waist Circumference Change

In the study comparing a self-management intervention with usual care, at 12 months, mean waist circumference had increased by 2.4 cm in the usual care group and decreased by 1.5 cm in the self-management intervention group.⁸⁸ This difference in mean change in waist circumference from baseline between the groups did not reach statistical significance (3.9 cm, (Figure 11; Appendix E, Evidence Table 21).⁸⁸ All randomized participants were presumed to be included in the analysis (N=100), but this was not reported.⁸⁸ In the study comparing two self-management interventions, at 12 months, waist circumference decreased by 3.2 cm in the DEP group and by 5.2 cm in the DEP + PAS group (between group difference 2 cm (95% CI, -4.1 to 0.08; p>0.1 for adjusted between-group difference).⁹⁷ The authors carried the last observation for missing data in this study.⁹⁷ The between-group changes in waist circumference in both studies met our pre-defined threshold for significance but were not statistically significant.^{88,97}

Adherence

There were no self-management interventions in this population that measured adherence as an outcome.

Clinical Outcomes

The included studies did not report on mortality or quality of life.

Adverse Events

The included studies did not report on burden of the intervention, nutritional deficiencies, eating disorders, activity related injury, or other adverse events.

Subgroups

The included studies did not report results by baseline weight, gender, age, life events, race, ethnicity, cultural group, income, socioeconomic status, educational attainment, or family history of obesity.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

Two intervention studies (enrolled/randomized N=1806) evaluated the effects of a dietary intervention compared with another dietary intervention or to a control group on weight

maintenance among adults at risk for or with established cardiovascular disease or diabetes.^{94,99} In a non randomized trial conducted at a single Veterans Administration (VA) outpatient diabetes clinic in the 1970s, patients with diabetes who were on insulin therapy were assigned to either 1) the American Diabetes Association (ADA) exchange diet which specified a daily caloric goal and carbohydrate distribution or 2) the standard “diabetic maintenance diet” which emphasized avoidance of simple sugars but set no specific daily caloric goal or pattern of carbohydrate intake.⁹⁹

Patients in both groups received education about their assigned diet over 24 months during regularly scheduled quarterly clinic visits with a dietician.⁹⁹ In The PREDIMED Study, participants with diabetes or at least three cardiovascular disease risk factors were randomized to 1) a Mediterranean diet with virgin olive oil, 2) a Mediterranean diet with mixed nuts, or 3) a control group in which they received printed materials and met with a dietician once for recommendations on following an American Heart Association diet.⁹⁴

Participants randomized to the Mediterranean diet groups met individually once a quarter with study dietitians for motivational interviews and in group education sessions on the Mediterranean diet.⁹⁴ Participants also received either free virgin olive oil or mixed nuts based on their study group.⁹⁴

Three additional studies included a dietary component in their active intervention and are described below in the section on studies studying a combination of intervention types (Table 11).^{87,90,95}

BMI Change

Similar proportions of participants the two dietary interventions and usual care groups (approximately 40 percent) experienced a decrease in BMI during the first 12 months of the PREDIMED Study (1,551 analyzed of 1,776 randomized participants; Appendix E, Evidence Table 21) ($p=0.464$).⁹⁴

Weight Change

In the VA based study (enrolled and analyzed $N=30$), weight increased with both diets but less so in the ADA diet group at 12 months.⁹⁹ The mean between group difference in weight for the ADA versus standard diet group was 0.8 kg at 12 months and met our predefined threshold for significance but was not statistically significant.⁹⁹ By 24 months both groups had gained nearly 1 kg (Figure 12).⁹⁹ In a sub analysis of 737 participants from the PREDIMED Study, compared with the control group, participants in the olive oil based group lost an average of 0.1 (95% CI, 0.1 to 0.2), $p<0.0001$ for weight loss) kg and the nut based group had gained 0.03 kg at 36 months (Figure 12).⁹² The average weight loss at 36 months was 0.1 kg less in the nut based compared with olive oil based intervention group (Appendix E, Evidence Table 21).⁹² The between-group differences in weight change in PREDIMED did not meet our predefined threshold for significance nor were they statistically significant.⁹²

Waist Circumference Change

In another PREDIMED Study sub analysis, which included a random sample of participants completing the study ($N=187$), baseline waist circumference was significantly higher in the olive oil based Mediterranean diet group compared with the control group (98.8 cm vs. 93.8 cm, $p=0.005$); baseline waist circumference was 96.7 cm in the nut based Mediterranean diet group.⁹¹ Waist circumference increased by 0.1 cm in the control group and decreased by 0.6 in the olive

oil based and 0.2 cm in the nut based groups by 36 months (Figure 13).⁹¹ Compared with the control group, participants in the olive oil based group and the nut based group experienced an average decrease in waist circumference of 0.7 (95% CI, 2.4 to 0.9 cm, $p=0.38$) and 0.3 (95% CI, 1.8 to 1.1 cm, $p=0.65$) cm at 36 months, and the average decrease in waist circumference was 0.4 (95% CI, 1.1 to 1.9 cm, $p=0.59$) cm less in the nut based compared with olive oil based intervention group (Appendix E, Evidence Table 21).⁹¹ The between-group differences in weight change in this study did not meet our predefined threshold for significance nor were they statistically significant.⁹¹

Adherence

There were no dietary interventions in this population that measured adherence as an outcome.

Clinical Outcomes

The included studies did not report on mortality or quality of life.

Adverse Events

The included studies did not report on burden of the interventions, nutritional deficiencies, eating disorders, activity related injury, or other adverse events.

Subgroups

The included studies did not report results by baseline weight, gender, age, life events, race, ethnicity, cultural group, income, socioeconomic status, educational attainment, or family history of obesity.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

Two trials evaluated the effect of a physical activity intervention relative to a control intervention on weight maintenance among adults at risk for cardiovascular disease or diabetes.^{85,86,96} These trials randomized 195 participants, and provided results for 166 participants.^{85,86,96} In the Pre diabetes Risk Education and Physical Activity Recommendation (PREPARE) trial, participants in the active interventions attended a 180 minute group informational session about exercise, which addressed barriers to walking at baseline. Participants were subsequently followed up for 10 minute visits at 3 and 6 months to review their progress.⁹⁶ In one of the two active intervention groups, participants also received a pedometer to help them meet the recommended number of steps per day.⁹⁶ In the Oslo Diet and Exercise Study (ODES), participants in the active intervention group attended supervised endurance exercise sessions three times per week.⁸⁵

Four additional trials included a physical activity component in their active interventions and are discussed below in the section on studies evaluating a combination of intervention types (Table 12).^{87,89,93,95}

BMI Change

Studies provided results on 166 of 195 randomized participants for analyses of BMI change.^{86,96} In the ODES, the physical activity intervention resulted in a slight decrease in BMI, whereas the usual care group experienced a slight increase in BMI.⁸⁶ The mean between group

difference in BMI at 12 months with usual care group as reference was 0.7 (95% CI 0.8 to 0.6, $p < 0.001$) kg/m^2 and thus met our predefined threshold for significance in addition to being statistically significant (Figure 14).⁸⁶ Compared with usual care, between group differences (95% CI) in BMI for the PREPARE and PREPARE and pedometer active interventions were 0.2 (0.5 to 0.9, $p = 0.575$) kg/m^2 and 0.5 kg/m^2 (0.3 to 1.2, $p = 0.212$) at 12 months (Figure 14; Appendix E, Evidence Table 21); these between-group differences met our predefined threshold for significance but were not statistically significant.⁹⁶

Weight Change

Studies provided results on 166 of 195 randomized participants for analyses of weight change.^{86,96} In the ODES, weight increased by 1.1 kg in the usual care group and decreased by 0.9 kg in the physical activity intervention group. The between group mean difference in weight was 2.0 kg (95% CI, 3.4 to -0.6, $p = 0.007$) over 12 months for the active group compared with the control and thus both met our predefined threshold for significance and was statistically significant (Figure 15).⁸⁵ Compared with usual care, between group differences in weight for the PREPARE and PREPARE plus pedometer active interventions were 0.3 (95% CI, 1.8 to 2.5, $p = 0.749$) kg and 1.4 (95% CI 0.8 to 3.5, $p = 0.199$) kg at 12 months with the comparison including PREPARE plus pedometer meeting our predefined threshold for significance (Figure 15; Appendix E, Evidence Table 21).⁹⁶ The between-group differences in weight change in PREPARE were not statistically significant.⁹⁶

Waist Circumference Change

In the ODES, waist circumference increased by 0.9 cm in the usual care group and decreased by 1.9 cm in physical activity intervention group. The between group mean difference in waist circumference at 12 months was 2.8 (95% CI 4.3 to 1.3, $p = 0.0003$) cm for the active compared with the control group (Appendix E, Evidence Table 21) and thus met our predefined threshold for significance and was statistically significant..⁸⁵ Results on waist circumference were provided for 92 of 97 randomized participants.⁸⁵

Adherence

Exercise adherence (attendance at exercise sessions) was 57 percent in the physical activity intervention group of the ODES (Appendix E, Evidence Table 21).⁸⁵ Results on adherence were provided for 49 of 54 participants randomized to the active exercise intervention group of the ODES.⁸⁵

Clinical Outcomes

The included studies did not report on mortality or quality of life.

Adverse Events

The included studies did not report on burden of the interventions, nutritional deficiencies, eating disorders, activity related injury, or other adverse events. Subgroups

The included studies did not report results by baseline weight, gender, age, life events, race, ethnicity, cultural group, income, socioeconomic status, educational attainment, or family history of obesity.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among adults at risk for cardiovascular disease or type 2 diabetes mellitus met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?

Six trials (N=1984 randomized) evaluated the effect of a combination of a self-management, dietary, or physical activity interventions on weight maintenance among adults with or at risk for cardiovascular disease or diabetes.^{87,89,90,93,95,98} Two trials evaluated the effect of a self-management intervention combined with physical activity in patients with diabetes, and both trials emphasized increasing physical activity and goal setting.^{89,93} The trials of Hypertension Prevention Phase II (TOHP II) evaluated the effect of a sodium reduction strategy employing dietary and self management in overweight people with suboptimal blood pressure (Table 4).⁹⁰ The Diet and Exercise for Elevated Risk (DEER) trial compared the effects of a dietary intervention, physical activity intervention, and a combination diet and physical activity intervention in men and women with elevated LDL and low HDL.⁹⁵ This trial provided results stratified by sex.⁹⁵ Two trials compared the effect of the combination of a dietary, physical activity, and a self-management intervention compared with a control intervention in people with diabetes or elevated blood pressure or elevated HbA_{1c} (Table 13).^{87,98} One of these trials limited enrollment to Latina women with type 2 diabetes and evaluated an intensive, culturally-adapted combination intervention relative to enhanced usual care (Table 13).⁹⁸

BMI Change

Studies provided results on 384 of 473 randomized participants for analyses of BMI change at 12 months.^{87,89,93,98} Relative to control, the combination of physical activity with self-management strategies in two studies resulted in decreases in BMI ranging from 0.4 to 0.7 kg/m² at 12 months (Figure 16).^{89,93} While these between-group changes met our predefined threshold for significance, they were not statistically significant. For the intervention that emphasized both aerobic activity and strength training, compared with the control, the between group difference in BMI was neared statistical significance: 0.7 (-1.4 to 0.0, p=0.049) kg/m².⁸⁹

In the trials comparing the combination of self management, physical activity, and diet with control, at 12 months, both control groups experienced a small decrease in BMI, and both active intervention group's experienced larger decreases in BMI.^{87,98} Compared with the control group, BMI decreased 0.4 kg/m² more in the active intervention group in one study (statistical significance of the between group change not reported)⁸⁷ and 0.7 kg/m² more in the active intervention group of the other study⁹⁸; (Figure 15; Appendix E, Evidence Table 21) and thus met our predefined threshold for significance. By 24 months (N=190 for analysis), BMI decreases from baseline were similar for the intervention and control groups (between-group difference in BMI, -0.1 kg/m² for the active intervention vs. control; p<0.05 for effect of intervention over time including all follow up time points (6, 12, and 24 months)); this between-group change at 24 months did not meet our predefined threshold for significance.⁹⁸

Weight Change

Studies provided results on 1,337 of 1,352 randomized participants for analyses of weight change.^{87,89,90,93} Relative to the control, the combination of physical activity with self-management strategies resulted in decreases in weight ranging from 0.7 to 1.3 kg at 12 months which met our predefined threshold for significance but were not statistically significant (Figure 17).^{89,93} In the randomized trial comparing the combination of self management, physical activity, and diet with control, both groups experienced a small decrease in weight at 12 months, but this decrease was 0.9 kg more in the active intervention group and thus met our predefined threshold for significance (statistical significance of the between group change not reported (Figure 17)).⁸⁷ Mean weight increased slightly in the control and sodium reduction group of TOHP II at 36 months, but this difference was not significant statistically or by our predefined threshold for significance. The between group difference in weight was 0.1 kg (95% CI 0.7 to 0.5), $p=0.75$ (Figure 17; Appendix E, Evidence Table 21).⁹⁰

Waist Circumference Change

Relative to the control, the combination of physical activity with self-management strategies resulted in a decrease in waist circumference at 12 months in one trial.⁸⁹ In the intervention that emphasized both aerobic activity and strength training, compared with the control the between group difference in waist circumference was statistically significant and met our predefined threshold for significance: 2.4 (95% CI, 4.7 to 0.0 cm, $p=0.047$) (Appendix E, Evidence Table 17).⁸⁹ This study provided results on 65 of 68 randomized participants.⁸⁹

Adherence

Two trials combining self-management and physical activity interventions reported on adherence.^{89,93} Attendance at intervention sessions was 63.5 percent and 64.6 percent in the active intervention groups for one trial⁸⁹ and 100 percent in the other trial (Appendix E, Evidence Table 17).⁹³ Studies provided results on 58 of 59 randomized to an active intervention for analyses of adherence.^{89,93} Mean attendance at sessions for a study incorporating self-management, diet, and physical activity interventions was 46 percent between 12 and 24 months of follow up; this study provided information on 97 of 142 randomized participants.⁹⁸

Quality of Life

The authors reported no significant differences in SF 36 results between groups in one study (Appendix E, Evidence Table 21).⁸⁹ This study provided results on 65 of 68 randomized participants for this analysis.⁸⁹

Other Clinical Outcomes

The included studies did not report on mortality.

Adverse Events

The included studies did not report on burden of the interventions, nutritional deficiencies, eating disorders, activity related injury, or other adverse events.

Subgroups

In the DEER Trial, both men and women experienced small increases in weight in the control group and decreases in weight in the three active intervention group's (exercise alone, diet alone,

or diet and exercise); these changes in weight by treatment group met our predefined threshold for significance and were also statistically significant ($p < 0.001$).⁹⁵ Both the diet intervention and the combination of diet and exercise intervention modestly decreased weight relative to the control and exercise alone groups for both men and women.⁹⁵ In the TOHP II, race and sex stratified analyses showed that changes in weight were smaller in the sodium reduction group for men and larger for women, but these weight change differences were not statistically significant; numeric results were not provided (Appendix E, Evidence Table 21).⁹⁰ One trial of a self-management plus diet and physical activity intervention restricted enrollment to Latina women with type 2 diabetes; results are reported above.⁹⁸

The included studies did not report results by baseline weight, age, life events, income, socioeconomic status, educational attainment, or family history of obesity.

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of environment level strategies and weight maintenance among adults among adults in a at risk for cardiovascular disease or type 2 diabetes mellitus met our inclusion criteria.

Table 10. Description of self-management interventions among adult patients with or at risk for cardiovascular disease and diabetes

Author, Year Duration of Intervention	Primary Aim	Control Group	Self-Management Intervention 1	Self Management-Intervention 2
Clark, 2004 ⁸⁸ 6 months	Set and attain individualized diet and physical activity goals using motivational interviewing	Usual care/no intervention	<ul style="list-style-type: none"> • 30 minute in person session at baseline to set lifestyle goals and address barriers to meeting goals • 10-minute in person session at 3 and 6 months to problem solve and set additional goals if initial goals met • 3 telephone contacts at 1, 3, and 7 weeks after initial assessment 	
Plotnikoff, 2011 ⁹⁷ 12 months	Goal-setting to achieve physical activity and/or dietary goals using social-cognitive teaching method	None	<ul style="list-style-type: none"> • Diabetes Education Program (DEP) offered as standard care from local health authority • Social-cognitive approach to encouraging patients • 8 group sessions over 4 weeks (12 hours) • Covered self-care topics including diet • Follow up group sessions at 3, 6, and 12 months • Access to telephone support by diabetes educator throughout study • Goal to increase physical activity to meet Canadian Diabetes Association recommendations 	<ul style="list-style-type: none"> • DEP + Physical Activity Supplement • Supplemental 8-week program • Certified personal trainer <ul style="list-style-type: none"> ◦ Individualized PA counseling and prescription tailored to fitness level and stage of change (Transtheoretical Model) and grounded in Social Cognitive Theory • 2-month membership to a community recreational facility or an "at-home" program <ul style="list-style-type: none"> ◦ Costs covered by study ◦ Personal trainer facilitated relationship between the participants and physical activity program • Telephone support provided by personal trainer: weekly x 2 mo, biweekly x 2.5 mo, then monthly • Goal to increase physical activity to meet Canadian Diabetes Association recommendations

Table 11. Description of diet interventions among adult patients with or at risk for cardiovascular disease and diabetes

Author, Year Name of Study Duration of Intervention	Primary Aim	Control Group	Diet Intervention 1	Diet Intervention 2
Zazpe, 2008 ⁹⁴ Razquin, 2010 ⁹² Razquin, 2010 ⁹¹ PREDIMED Duration 36 months	Change dietary composition to Mediterranean diet	Received leaflet about the American Heart Association dietary recommendations and single meeting with a dietician about this diet	<ul style="list-style-type: none"> • Mediterranean diet composition with emphasis on virgin olive oil • Quarterly individual sessions with dietician with personalized motivational interviewing • Group educational sessions • Free access to study center dietician • Free provision of olive oil 	<ul style="list-style-type: none"> • Same as Diet Intervention 1 but with free provision of mixed nuts instead of olive oil
Abaira, 1980 ⁹⁹ Duration 24 months	Increase peak oxygen consumption through endurance exercise	None	Standard diabetic diet: <ul style="list-style-type: none"> • Three meals + bedtime snack • Strict avoidance of refined sugars • Consumption of starches • Avoidance of saturated fat • No exchange system • No caloric goal • No specific carbohydrate distribution • Quarterly visits with dietician 	American Diabetes Association Diet: <ul style="list-style-type: none"> • Daily caloric goal • Daily meal pattern planned and distributed through a food exchange • Three meals + bedtime snack • Carbohydrate distribution: breakfast (30 percent), lunch (30 percent), dinner (30 percent), and snack (10percent). • Moderate restriction of both refined sugars and carbohydrates • Quarterly visits with dietician

*Study name listed only if applicable.

Table 12. Description of physical activity interventions among adult patients at risk for cardiovascular disease and diabetes

Author, Year Name of Study Duration of Intervention	Primary Aim	Control Group	Physical Intervention 1	Physical Activity Intervention 2
Yates, 2010 ⁹⁶ PREPARE Duration 6 months	Increase physical activity through walking	Printed information about impaired glucose tolerance and physical activity by mail	<ul style="list-style-type: none"> • Single in person, 180 min group, session at baseline consisting of information about impaired glucose tolerance and counseling about perceived effectiveness of exercise, walking self efficacy beliefs, barriers to walking, and self regulatory strategies • 10 minute review of progress in person at 3 and 6 months • Received steps per day goal and pedometer 	<ul style="list-style-type: none"> • Same as Physical Activity 1 but no pedometer given
Anderssen, 1995 ⁸⁵ Torjesen, 1997 ⁸⁶ ODES Duration 12 months	Increase peak oxygen consumption through endurance exercise	Usual care/no intervention	<ul style="list-style-type: none"> • Supervised exercise sessions lasting 60 minutes three times per week • Goal to attain improve peak $\dot{V}O_2$ by targeting 60-80 percent of peak heart rate 	

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes

Author, Year Duration of Intervention	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
Samaras, 1997 ⁹³ Duration 6 months	Increase physical activity	Usual care/no intervention	<ul style="list-style-type: none"> Physical Activity Component: Monthly in person aerobic exercise session with exercise physiologist Goal to achieve 50 percent of VO_{2max} (by perceived exertion) Exercise sessions available to intervention subjects after initial 6 month intervention period Self-Management Component: Monthly in person session with staff for education; coping skills; improving confidence, self esteem, decision making; and goal setting Received handouts, videos, activity meters, and log books for goal setting and review of progress 	Not applicable	Not applicable

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes (continued)

Author, Year Duration of Intervention	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
Gram, 2010 ⁸⁹ Duration 4 months	Increase physical activity in daily life	Received standard written information on exercise and advice to be physically active upon enrollment	<p>Physical Activity Component:</p> <ul style="list-style-type: none"> • In person exercise sessions lasting 45 minutes supervised by physiotherapist • Focus on strength training and aerobic exercise • Access to exercise equipment • Goal to achieve more than 40 percent of VO_{2max} (by perceived exertion) • Encouraged to increase activity outside of training sessions • Received information on physical training in their neighborhoods at end of intervention period <p>Self-Management Component:</p> <ul style="list-style-type: none"> • Received tailored advice In person interviews at 0, 8, 16, and 24 weeks to assist with goal setting 	<p>Physical Activity Component:</p> <ul style="list-style-type: none"> • In person exercise sessions lasting 45 minutes supervised by physiotherapist which occurred outdoors on forest paths • Focused on Nordic walking • Received walking sticks with individualized stick length • Goal to achieve more than 40 percent of VO_{2max} (by perceived exertion) with Nordic walking • Encouraged to increase activity outside of training sessions • Received information on physical training in their neighborhoods at end of intervention period <p>Self-Management Component:</p> <ul style="list-style-type: none"> • Same as Active Intervention 1 	<ul style="list-style-type: none"> • Not applicable

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes (continued)

Author, Year	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
<p>Babazono, 2007⁸⁷</p> <p>Duration 12 months</p>	<p>Increase fruits/vegetables and physical activity</p>	<p>Received result of health exam; leaflet about exercise; and had conventional health center visits (3) without additional services</p>	<p>Diet Component:</p> <ul style="list-style-type: none"> Increased fruits/vegetables Decreased salt, oil, sugar, and alcohol Increased time for meals and eat more slowly <p>Physical Activity Component:</p> <ul style="list-style-type: none"> Challenge cards to increase activity <p>Self-Management Component:</p> <ul style="list-style-type: none"> Received results about health exam 5 in person sessions at health center to set personal diet and physical activity goals; problem solve; and receive advice 3 health center visits 2 home visits 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Not applicable
<p>Stefanick, 1998⁹⁵</p> <p>Duration 9-11 months</p>	<p>Follow NCEP diet and/or increase aerobic exercise</p>	<p>Usual care/no intervention: asked to maintain usual diet and exercise</p>	<ul style="list-style-type: none"> Diet: Follow NCEP Step 2 diet 12 week adoption phase One individualized counseling session 8 one hour group lessons Maintenance phase Monthly contact with dietician by mail, telephone, or in person individual or group meetings 	<p>Physical Activity:</p> <ul style="list-style-type: none"> Aerobic exercise <p>6 week adoption phase</p> <ul style="list-style-type: none"> Single private meeting with exercise staff In person, supervised, one hour exercise session 3 times per week <p>Maintenance phase</p> <ul style="list-style-type: none"> 10 miles of walking/jogging each week Option to continue supervised exercise sessions Required monthly group session Optional Home based activities 	<ul style="list-style-type: none"> Active Intervention 1 + Active Intervention 2 (Diet + Physical Activity)

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes (continued)

Author, Year Duration of Intervention	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
Kumanyika, 2005 ⁹⁰ Duration 36-48 months	Consume <1800 mg of sodium per day	Usual care/no intervention	<p>Diet Component</p> <ul style="list-style-type: none"> • Consume <1800 mg Na+/day • No change in caloric or other dietary intake <p>Self-Management Component</p> <ul style="list-style-type: none"> • Intensive phase • Initial individual counseling session • 10 weekly group 60- to 90-minute sessions <p>Transitional phase</p> <ul style="list-style-type: none"> • 4 monthly group sessions • Additional intervention sessions as needed • Individual in person, telephone and mail contacts as needed • Relapse prevention techniques • Feedback on changes in urine sodium • Self monitoring • Counselor and peer support 	Not applicable	Not applicable

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes (continued)

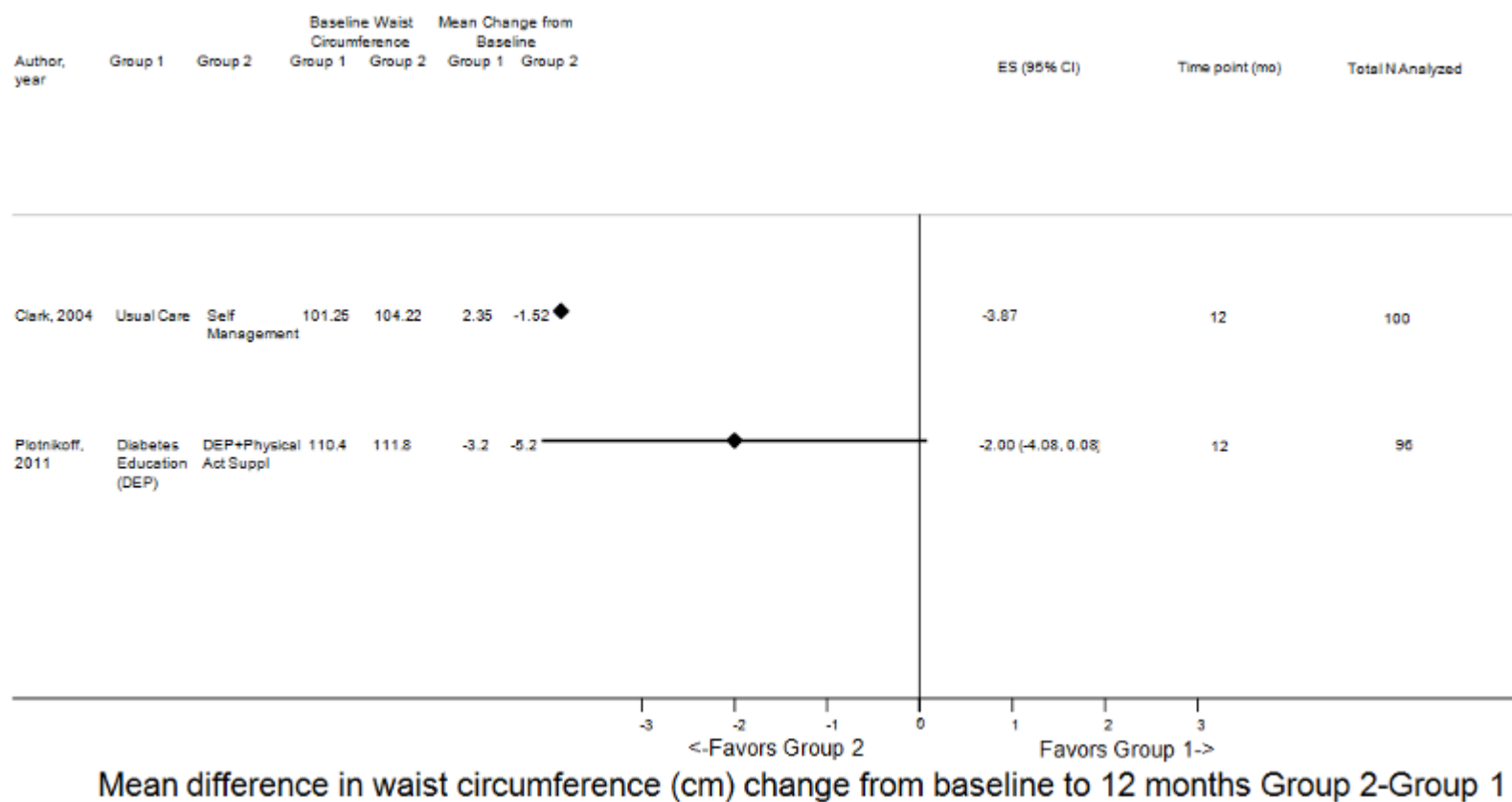
Author, Year Duration of Intervention	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
Toobert, 2011 ⁹⁸ 24 months	Follow Mediterranean diet exercise 30 min/day, stop smoking, and practice stress management daily	Usual diabetes care + one free Kaiser-Permanente Denver, CO, class targeting the goals of the active intervention	<ul style="list-style-type: none"> • Culturally adapted for Latinas Study Contacts • 2.5-day retreat <ul style="list-style-type: none"> ○ Catered Mediterranean meals ○ Physical activity ○ Stress management ○ Social support groups ○ Smoking cessation • In-person meetings <ul style="list-style-type: none"> ○ Weekly x 6 mo, every 2 wks for months 6-12, monthly for months 12-18, and every other mo for months 18-24 ○ Mediterranean meal potluck ○ Physical activity ○ Stress management ○ Social support groups 	Not applicable	Not applicable

Table 13. Description of combination interventions among adult patients at risk for cardiovascular disease and diabetes (continued)

Author, Year Duration of Intervention	Primary Aim	Control Group	Active Intervention 1	Active Intervention 2	Active Intervention 3
Toobert, 2011 ⁹⁸ 24 months (continued)			<p>Self-Management Component</p> <ul style="list-style-type: none"> Practice stress-management techniques for at least 1 h per day <ul style="list-style-type: none"> 20 min of yoga stretches, 15 min of progressive deep relaxation, 15 min of meditation, and 5 min of directed or receptive imagery cognitive behavioral therapy Group support for 1 h at each meeting Structured and unstructured mini-units on goal setting, social support, problem solving, negative thoughts, barriers, successes Smoking cessation <p>Mediterranean Diet</p> <ul style="list-style-type: none"> Emphasized vegetables, fruits, legumes, nuts, cereals, olive oil, limited animal fat, and portion control adapted for Latino nationality subgroups. Catered events, potlucks, cooking demonstrations, and pamphlets Culturally adapted <ul style="list-style-type: none"> Latin American recipes altered Presentations in English and Spanish <p>Exercise</p> <ul style="list-style-type: none"> 30 min of moderate aerobic activity most days of the week 10 strength-training exercises two times per week 		

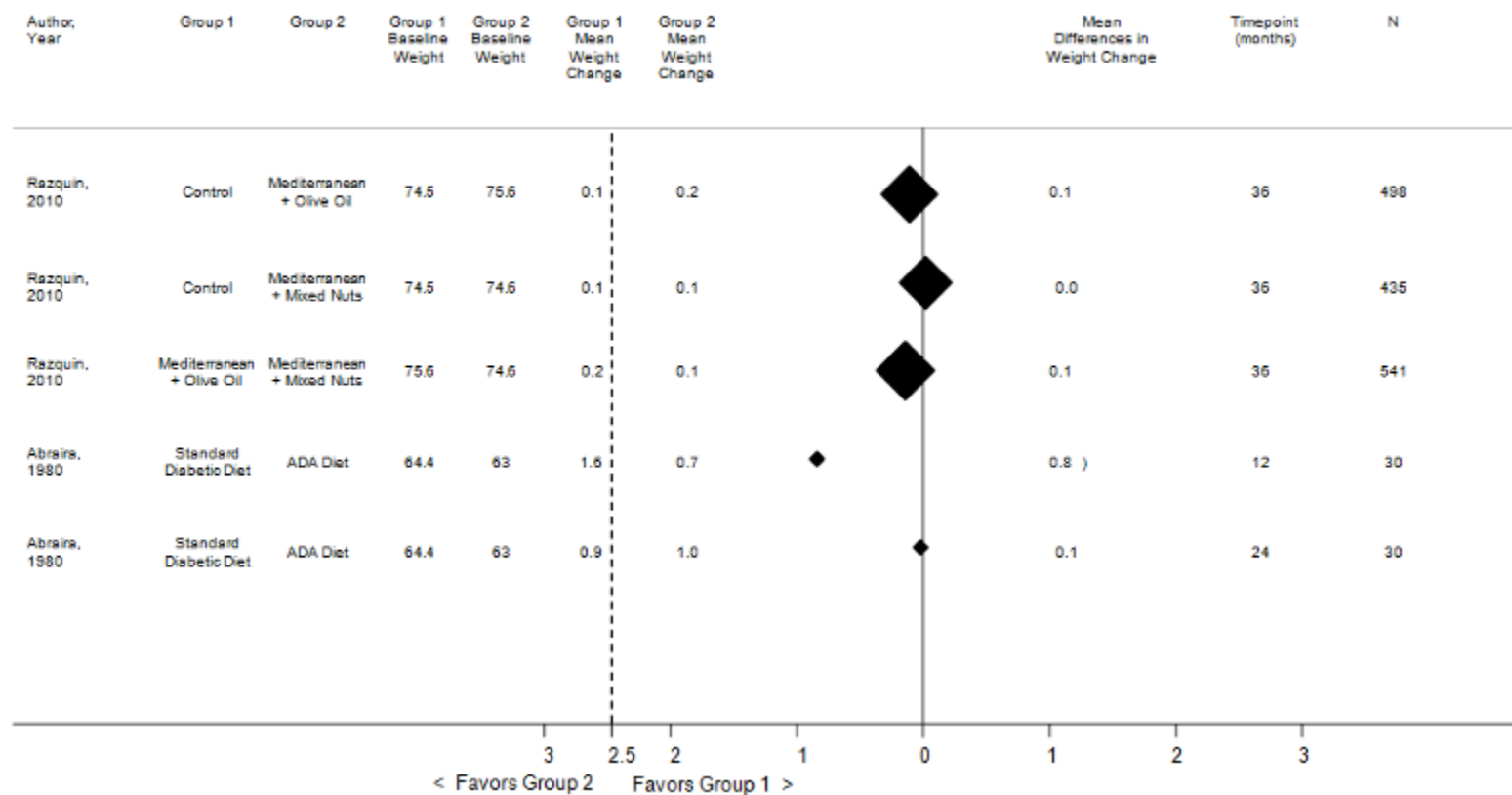
NCEP = National Cholesterol Education Program; VO_{2max} = maximal oxygen consumption

Figure 11. Differences in waist circumference change for self-management interventions among adults with diabetes mellitus



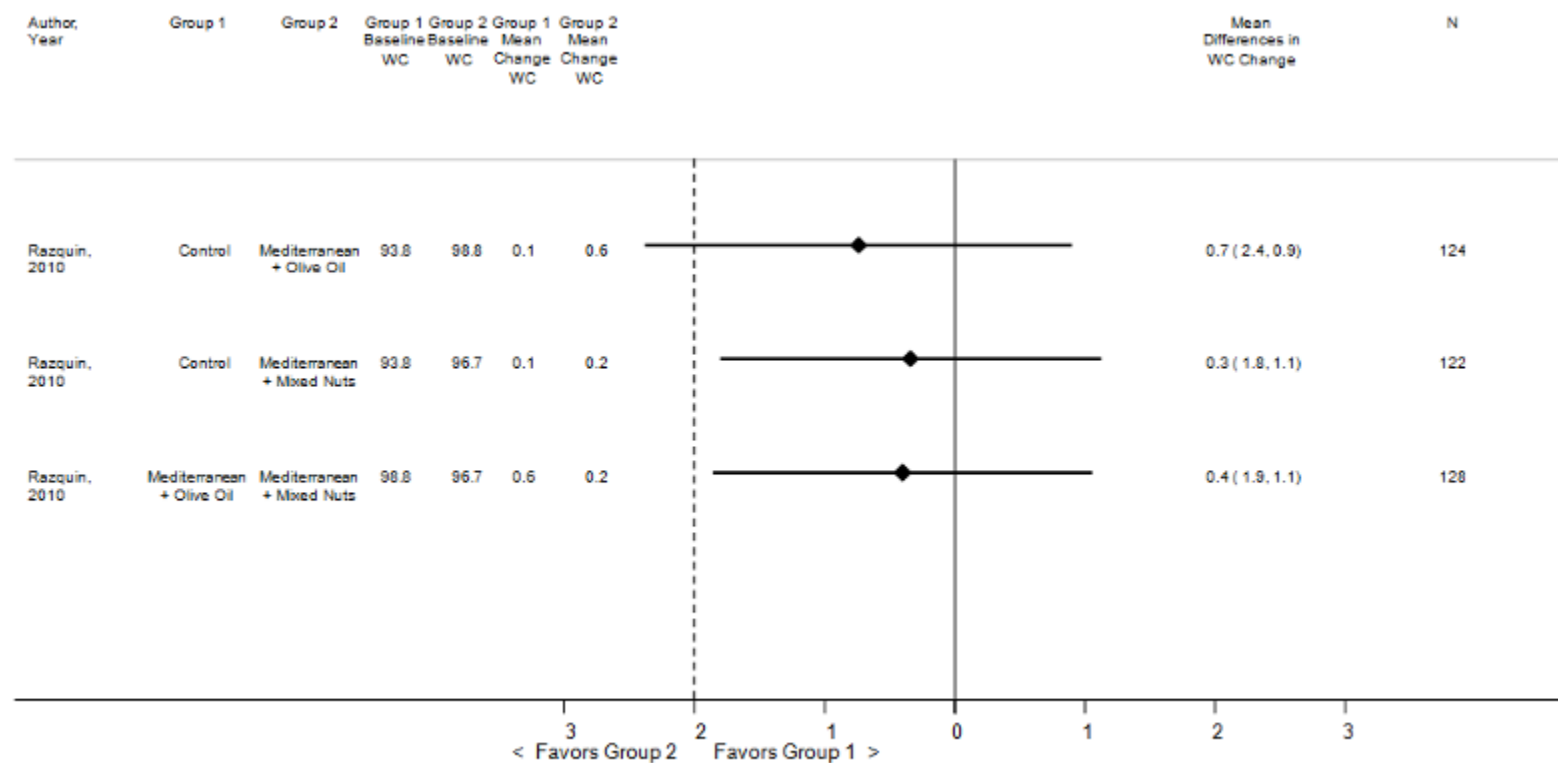
Size of the effect symbol reflects the sample size. Confidence interval provided only if available from the article.

Figure 12. Differences in weight change for diet interventions among adults at risk for or with cardiovascular disease or diabetes mellitus



ADA = American Diabetic Association; kg = kilogram
 Dotted line indicates a meaningful between group change of 2.5kg.
 Size of the effect symbol reflects the sample size.

Figure 13. Differences in waist circumference change for diet interventions among adults at risk for or with cardiovascular disease or diabetes mellitus



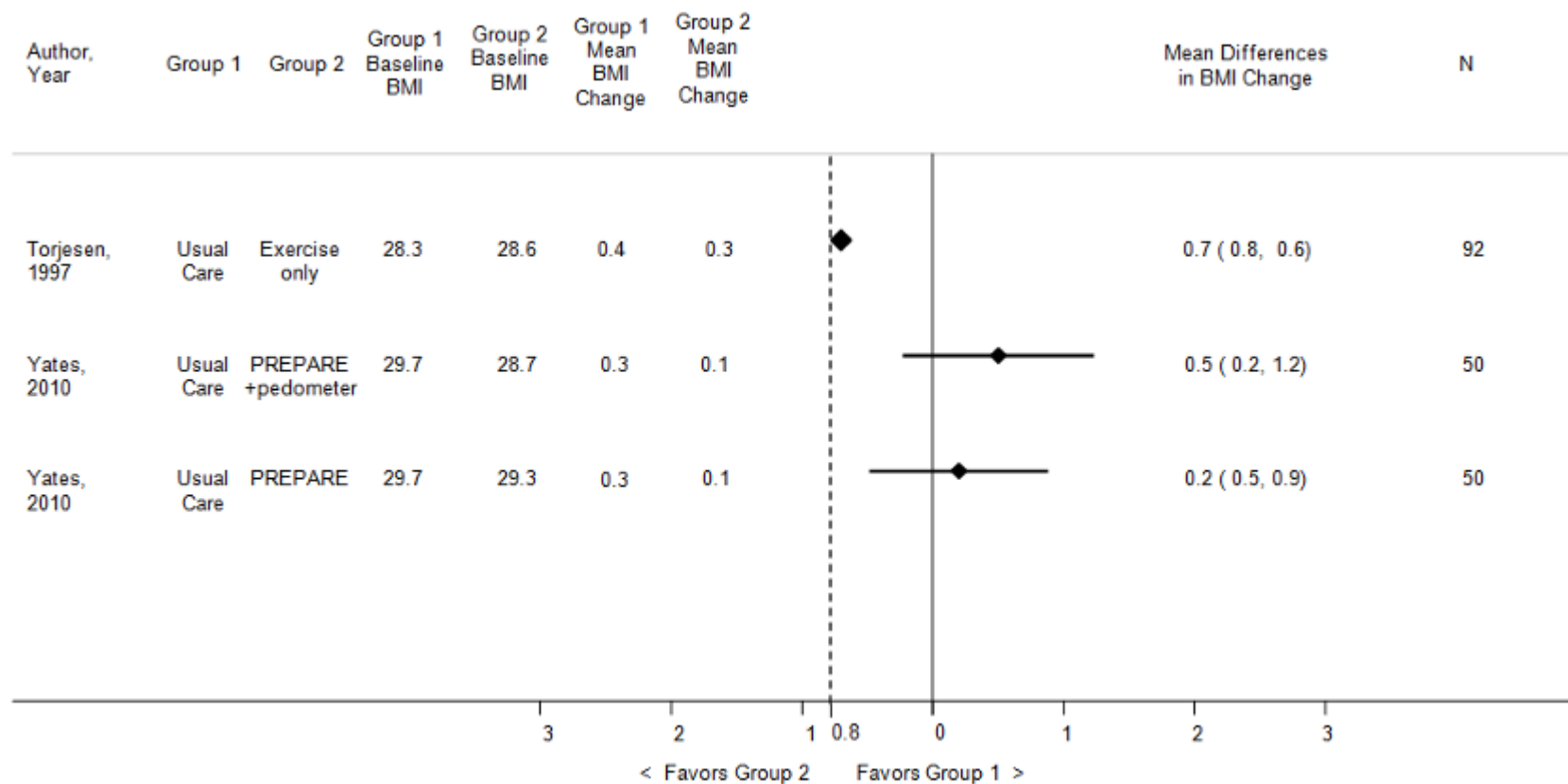
Mean differences in waist circumference (cm) change from baseline to 36 months for cardiovascular disease populations (Group 2 Group 1)

Cm = centimeter; WC = waist circumference

Dotted line indicates a meaningful between-group change of 2 cm.

Size of the effect symbol reflects the sample size.

Figure 14. Differences in BMI change for physical activity interventions among adults at risk for or with cardiovascular disease or diabetes mellitus



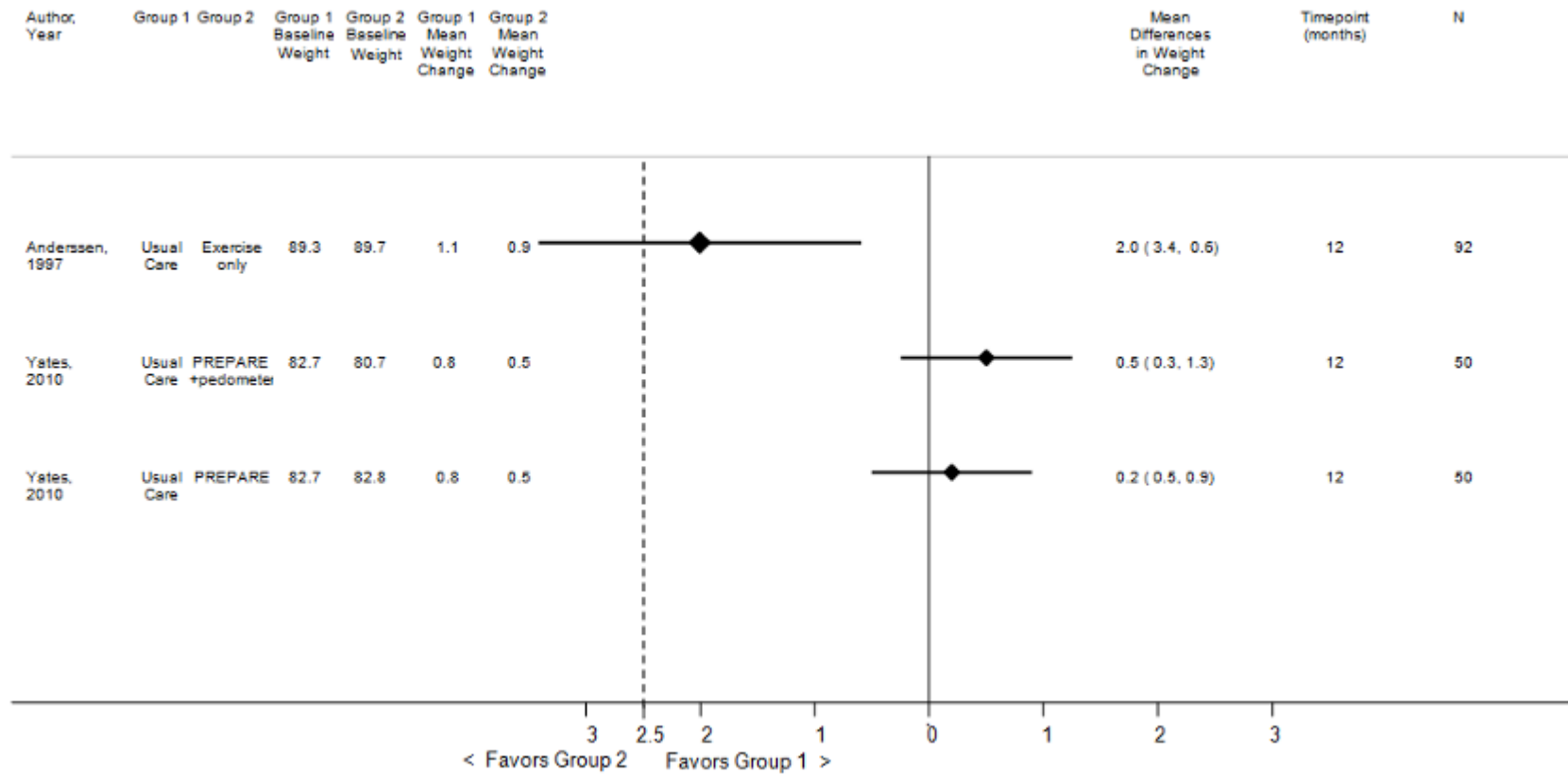
BMI = body mass index; kg/m^2 = kilogram/meter²

If the study did not report an estimate of variability, no confidence intervals were generated.

Dotted line indicates a meaningful between group change of 0.8 BMI units.

Size of the effect symbol reflects the sample size.

Figure 15. Differences in weight change for physical activity interventions among adults at risk for or with cardiovascular disease or diabetes mellitus



kg = kilogram

Dotted line indicates a meaningful between group change of 2.5kg.

Size of the effect symbol reflects the sample size.

Figure 16. Differences in BMI change for combination interventions among adults at risk for or with cardiovascular disease or diabetes mellitus

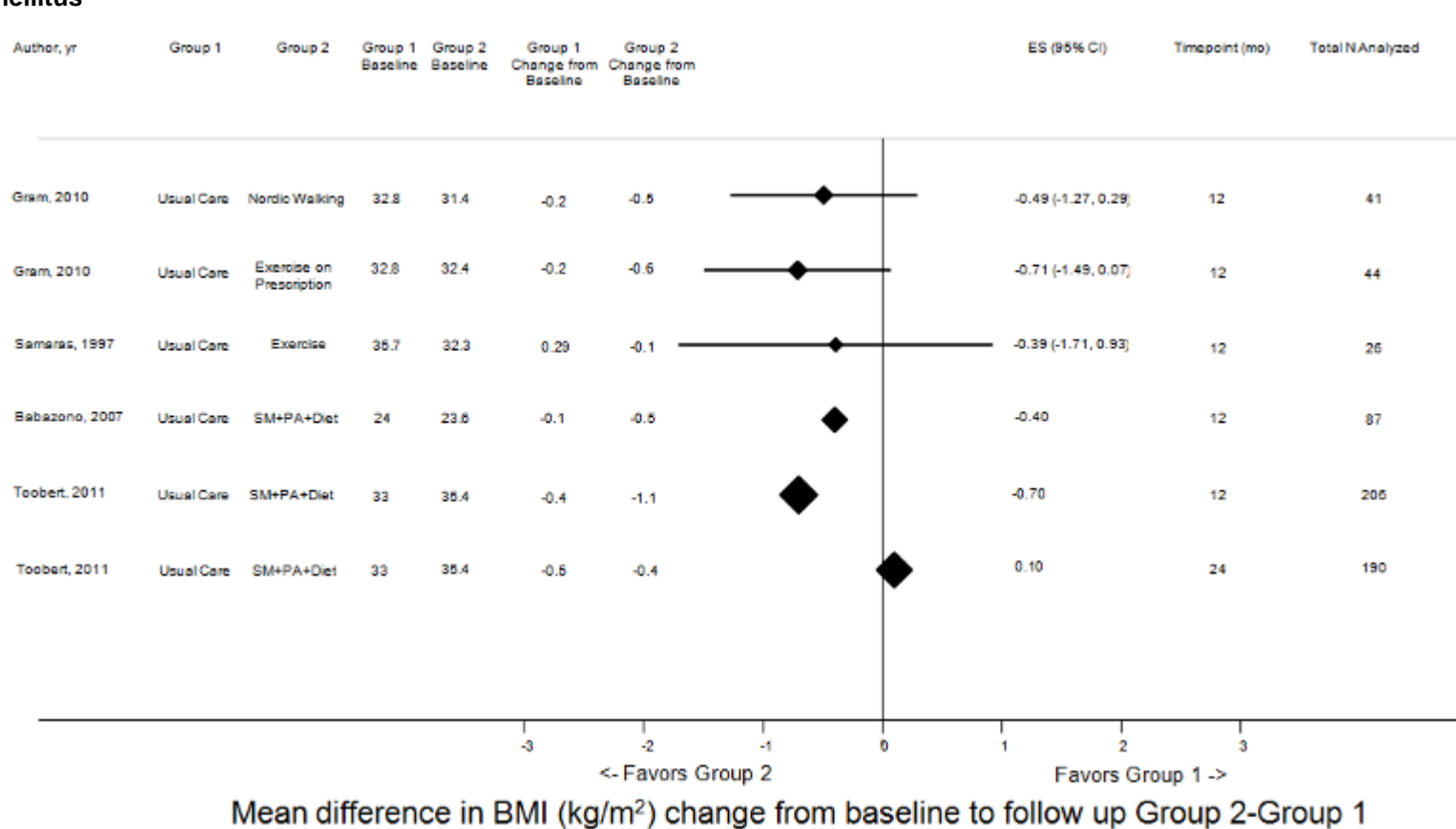
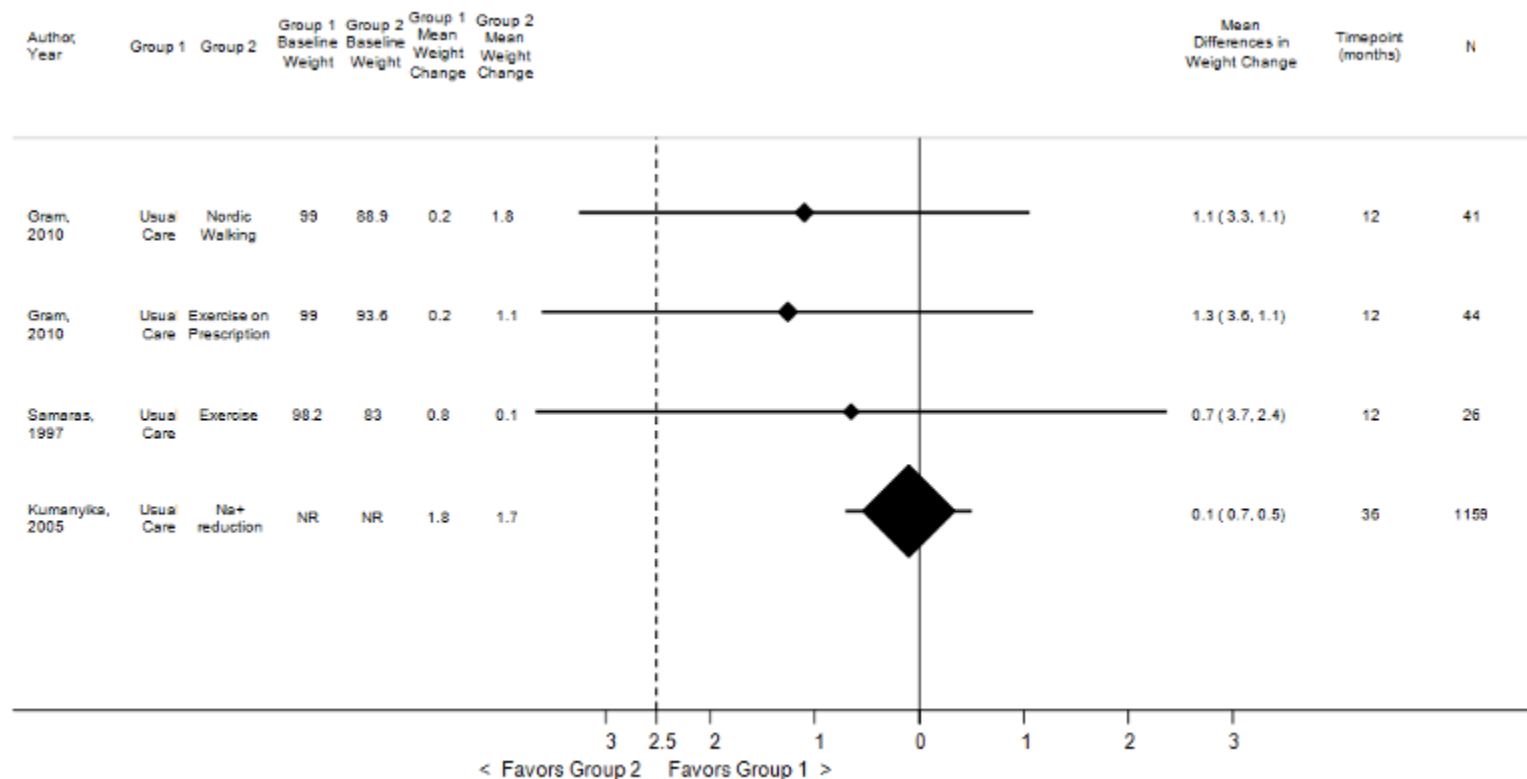


Figure 17. Differences in weight change for combination interventions among adults at risk for or with cardiovascular disease or diabetes mellitus



Mean differences in weight (kg) change from baseline to follow up for cardiovascular disease populations (Group 2 Group 1)

Kg = kilogram; Na+ = sodium; NR = not reported

Dotted line indicates a meaningful between group change of 2.5kg.

Size of the effect symbol reflects the sample size.

Weight Gain Prevention Among Adults With Cancer

Study Characteristics

Data on prevention of weight gain among adults with cancer were reported in three trials (reported in 4 articles) (baseline n=2,671; 2,362 analyzed)¹⁰⁰⁻¹⁰³ and one observational study (baseline n=1,966; 1,657 analyzed) (Appendix F, Evidence Table 22).¹⁰⁴

Interventional Studies

All three of the interventional studies were randomized trials.¹⁰⁰⁻¹⁰³ One trial was reported in two publications.^{102,103} The duration of the interventions was 12 months in two studies^{100,103} and 36 months in another.¹⁰¹ One trial followed participants for an additional 24 months after the 36 month intervention.¹⁰¹ Two trials were conducted at multiple sites,^{100,101} one at a single site,^{100,103} and all were in the United States.^{100,101,103} Participants were recruited from clinical settings in two trials,^{100,101} and from the community in one trial.¹⁰³ The first years of recruitment were 1994,¹⁰¹ 1999,¹⁰³ and unreported.¹⁰⁰ One trial stated the specific goal of preventing weight gain (Appendix F, Evidence Table 22).¹⁰⁰

Observational Study

One observational study was included.¹⁰⁴ Patients were recruited at five months after cancer diagnosis and followed through 36 months after diagnosis (31 months of total followup).¹⁰⁴ The study was a subanalysis of an Australian study to identify predictors of colorectal cancer before and after a screening program. Participants with histologically confirmed colorectal cancer that was reported to a citywide cancer registry during 2003 and 2004 were recruited (Appendix F, Evidence Table 22).¹⁰⁴

Population Characteristics

Interventional Studies

Inclusion criteria based on age, timing of cancer diagnosis, and previous treatment for cancer were common. One trial included women with a first degree relative with breast cancer.^{102,103} The other trials recruited women with newly diagnosed cancer.^{100,101} One trial recruited women within 365 days of surgery for breast cancer.¹⁰¹ The other trial included women who had not yet received chemotherapy or radiation treatment for breast cancer, colon cancer, or lymphoma and whose treatment plan would include chemotherapy and a steroid.¹⁰⁰ One trial included all adult women,¹⁰⁰ another women aged 48 through 79 years,¹⁰¹ and another included only premenopausal, healthy women between 21 and 50 years of age.^{102,103} Two trials had ethnically diverse populations,¹⁰¹⁻¹⁰³ and one trial reported that 90% of participants were white without referencing the background population racial diversity.¹⁰⁰ White participants accounted for 75 and 90 percent of the participants in the trials.¹⁰¹⁻¹⁰³ The percentage of participants with a college degree or at least some college ranged from 49 to 80 percent and was reported in all trials (Appendix F, Evidence Table 23).

No trial restricted inclusion of participants based on weight or BMI. One trial required that participants were consuming at least 20 percent of their calories from fat,¹⁰¹ one required that fat intake was greater than 25 percent of calories and that fruit and vegetable intake was less than or equal to 5 servings per day,¹⁰³ and one required baseline exercise of under 120 minutes per

week.¹⁰⁰ One trial reported smoking status; 50 percent of women were never smokers (Appendix F, Evidence Table 23).¹⁰¹

Observational Study

The observational study had very few exclusion criteria.¹⁰⁴ All English speaking individuals who could respond to a phone interview aged 20 to 80 years old at the time of cancer diagnosis were included. Underweight women were excluded. Sixty one percent of participants were male. Seventy two percent of participants were 60 years or older. Forty six percent had a technical college or university degree. Forty percent were never smokers and seven percent were current smokers at five months after cancer diagnosis.¹⁰⁴

At baseline, five months after cancer diagnosis, 45 percent of participants were a healthy weight, 37 percent were overweight and 18 percent were obese (Appendix F, Evidence Table 23).

Interventions

Two trials focused on dietary changes (one including a self-management strategy) and the other trial focused on physical activity. The goal of one trial was to reduce percentage calories from fat to 15 percent while otherwise maintaining a nutritionally adequate diet and maintaining baseline weight.¹⁰¹ Participants were randomized to receive counseling with a dietician every three months with specific emphasis on fat reduction (intervention group) or a goal of achieving adequate vitamin and mineral intake (comparison group) trials (Appendix F, Evidence Table 21).¹⁰¹ The intervention group's contact with dieticians focused on self-management strategies to achieve their fat reduction goals as well as group counseling sessions, quarterly mailing and more frequent assessments of weight and dietary adherence.¹⁰¹

Another trial randomized participants to one of four diet groups: control (asked to follow their usual diet), low fat diet (<15 percent of calories from fat), high fruits and vegetables diet (9 servings/day), or a combination of low fat and high fruits and vegetables diet.¹⁰³

Another trial randomized women to home based endurance exercise, resistance exercise or no exercise recommendation (Appendix F, Evidence Table 24).¹⁰⁰

Approach

One observational study measured television viewing among individuals with primary colorectal cancer.¹⁰⁴ Participants were asked how often they spent watching television during the previous month (Table 14).

Outcomes

Key Points

- **BMI.** There is low strength of evidence that:
 - Television viewing results in meaningfully and statistically less BMI gain three years after cancer diagnosis among individuals with colorectal cancer.
 - Dietary interventions aimed at decreasing the percentage of calories from fat decrease BMI for up to 5 years, but are not statistically significant.
 - A dietary intervention aimed at decreasing the percentage of calories from fat combined with self-management counseling on monitoring fat intake, goal

setting, social support and relapse prevention and management among women with newly diagnosed cancer decreased BMI at 1 year compared with women who received counseling on maintaining nutritional adequacy that did not include the self-management components. The BMI change met the meaningful between group threshold but statistical significance was not calculable.

There is insufficient strength of evidence for physical activity interventions because no studies met our inclusion criteria.

- **Weight.** There is moderate strength of evidence that:
 - Home based aerobic and resistance exercise prevents weight gain. Women with cancer who participated in home based aerobic or resistance exercise lost weight over one year compared with controls that gained weight. The findings were statistically significant and met the meaningful between group threshold.

There is low strength of evidence that:

- A low fat diet meaningfully reduces weight gain at 1 year compared with a dietary brochure, a high fruits and vegetables diet and a combination of a low-fat and high fruits and vegetables diet among premenopausal women with a family history of breast cancer. The statistical significance is unknown.
- A dietary intervention aimed at decreasing the percentage of calories from fat combined with self-management counseling on monitoring fat intake, goal setting, social support and relapse prevention and management among women with newly diagnosed cancer decreased weight at 1 year compared with women who received counseling on maintaining nutritional adequacy that did not include the self-management components. The weight change met the meaningful between group threshold but statistical significance was not calculable.
- **Adherence.** There is low strength of evidence that:
 - Adherence to low fat diets, high fruits and vegetable diets and exercise is possible in women with cancer. Continued adherence to a high fruits and vegetables diet is greater than to a low fat diet.
 - Adherence to aerobic and resistance exercise is possible for up to 1 year among women with cancer.

There is low strength of evidence that adherence to the combination of a diet and self-management intervention is possible for 5 years, including 2 years after the cessation of the intervention. The fat consumption of the diet combined with self-management group was less than the consumption among those who received counseling related to maintaining nutritional adequacy and this difference was maintained for 5 years.

- **Adverse effects**
 - There is low strength of evidence that the combination of a diet and self-management intervention had no adverse effects.
 - There is insufficient strength of evidence for adverse effects for self-management, dietary and physical activity interventions, because no studies met our inclusion criteria.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

One observational study measured television viewing among individuals with primary colorectal cancer five months after cancer diagnosis.¹⁰⁴ Participants were asked how often they spent watching television during the previous month (Table 14).

BMI Change

The study enrolled 1,966 people at baseline (5 months after diagnosis) with information available for 1,657 people at 12 months, 1,202 people at 24 months and 1,028 at 36 months.¹⁰⁴ BMI change from baseline was 0.7 kg/m² (95% CI, 0.3 to 1.1) greater at 24 months among individuals reporting five or more hours of television per day compared with less than three hours per day of baseline television viewing after adjustment for baseline BMI, sex, age, education, smoking, cancer stage, mode of treatment, co morbidities and physical activity level. At 36 months, those individuals with more than five hours per day had an adjusted BMI change from baseline 0.6 kg/m² greater (95% CI, 0.1 to 1.1) than the less than 3 hours of television per day group. These findings were statistically significant (p<0.001 at 24 months and p=0.01 at 36 months) and represent a meaningful between group difference (Appendix E, Evidence Table 25).

Weight Change

No study on self management and weight change met our inclusion criteria.

Waist Circumference Change

No study on self management and waist circumference change met our inclusion criteria.

Adherence

No study on self management and adherence met our inclusion criteria.

Clinical Outcomes

No study on self management and mortality, cancer, or quality of life met our inclusion criteria.

Adverse Events

No study on self management and burden of intervention, nutritional deficiencies, eating disorder, activity related injury, adverse effect of medication, or other adverse events met our inclusion criteria.

Subgroups

Those with no baseline physical activity (0 minutes per week) and 5 hours or more of television at baseline had the greatest increases in BMI at 24 (p for interaction=0.09) and 36 months (p for interaction not reported). The gender by baseline television interaction was not statistically significant at 24 months (p=0.95) or at 36 months (p=0.13). The effect estimates associated with the gender interaction models were not reported. No study on self management and results by baseline weight, age, life events, race, ethnicity, or cultural group met our inclusion criteria.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

One trial randomized premenopausal women with a family history of breast cancer to one of four diet groups for one year: brochure (asked to follow their usual diet and given brochures from the Daily Food Guide Pyramid and the National Dairy Council), low fat diet (<15 percent of calories from fat), high fruits and vegetables diet (9 servings/day), or a combination of low fat and high fruits and vegetables diet (Table 15).^{102,103}

BMI Change

No study on dietary strategies and BMI change met our inclusion criteria.

Weight Change

Baseline and 12 month weights were reported for women who completed the full 12 month intervention. Over the 12-month intervention period, the brochure group lost 0.4 kg, the low-fat diet group lost 5.0 kg, the high fruits and vegetables group gained 1.8 kg and the combination group had no change in weight. Compared with the brochure group, the low-fat and combination groups had meaningful changes in weight over the intervention period. Weight change from baseline decreased with the low-fat diet (-4.6 kg) and increased with the high fruits and vegetables diet (2.2 kg) compared with the change from baseline in the brochure group. Weight change from baseline also met the between group difference with a preference for the low-fat diet over the high fruits and vegetables diet (-6.8 kg difference) and combination diet (-5.0 kg). The study did not provide enough information to calculate statistical significance for any between group difference comparison. (Figure 18; Appendix E, Evidence Table 25).

Waist Circumference Change

No study on dietary strategies and waist circumference change met our inclusion criteria.

Adherence

Adherence to the fruits and vegetables, dietary fat consumption and study participation were reported. All groups, including the brochure group, increased their fruit and vegetable intake at one year.¹⁰³ The groups assigned to increase fruit and vegetable consumption had the greatest increases in consumption of seven additional servings per day compared with less than 1 additional serving in the brochure and low fat groups. The decrease in calories from fat was 16 percent in the low fat group, two percent in the high fruits and vegetables group and 15 percent in the combination group. The percentage of calories from fat increased in the control group by one percent. Forty percent of women in the low fat group and 20 percent of women in the combination group dropped out of the study. Retention through the end of the one year intervention period was greater than 90 percent in the high fruits and vegetables and control groups (Appendix E, Evidence Table 25).¹⁰³

Clinical Outcomes

No study on dietary strategies and mortality, cancer, or quality of life met our inclusion criteria.

Adverse Events

No study on diet and burden of intervention, nutritional deficiencies, eating disorder, activity related injury, adverse effect of medication, or other adverse event met our inclusion criteria.

Subgroups

No study on dietary interventions by baseline weight, gender, age, life events, race, ethnicity, or cultural group met our inclusion criteria.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

One trial compared the effect of a home based exercise intervention on weight gain, body fat, and aerobic capacity.¹⁰⁰ The study included women with a diagnosis of breast cancer, lymphoma, or colon cancer who exercised fewer than 120 minutes per week and who were chemotherapy naïve, but were planning to begin chemotherapy including a steroid as a part of the treatment. Participants were randomized to aerobic exercise, resistance exercise, or usual care control (Table 16). Only participants who completed the study (101 of 112 randomized) were reported on.

BMI Change

No study on physical activity strategies and BMI change met our inclusion criteria.

Weight Change

The control group gained 5.9 kg during the one year intervention period, whereas women in both exercise groups lost weight.¹⁰⁰ The prevention of weight gain in the exercise groups met the meaningful threshold for change in weight from baseline compared with the control group. The finding was stated as statistically significant but the weight gain in the text does not match the numbers in the table reported in the following sentences (3.1 kg difference in mean weight change reported in text for the comparison of control to the combined value of the exercise groups). The aerobic exercise group gained 8.4 kg less than the control group. The difference in weight gain was 6.3 kg less for the resistance exercise group (Appendix E, Evidence Table 25).

Waist Circumference Change

No study on physical activity strategies and waist circumference change met our inclusion criteria.

Adherence

The trial reported on adherence to the intervention overall.¹⁰⁰ Seventy nine percent of women assigned to the aerobic exercise group adhered to the assigned level of intervention, compared with 65 percent of resistance exercise participants at one year. All of the control group participants maintained inactive (Appendix E, Evidence Table 25). Many of the resistance exercise participants added a self-initiated aerobic exercise program. No mention is made of aerobic exercise participants adding a resistance exercise program.

Clinical Outcomes

No study on physical activity strategies and mortality, cancer, or quality of life met our inclusion criteria.

Adverse Events

No study on physical activity strategies and burden of intervention, nutritional deficiencies, eating disorder, activity related injury, adverse effect of medication, or other adverse event met our inclusion criteria.

Subgroups

No study on physical activity strategies by baseline weight, gender, age, life events, race, ethnicity, or cultural group met our inclusion criteria.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No studies on the impact of orlistat on weight maintenance in populations with cancer met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?

One trial (2,437 baseline; 2,164 analyzed) compared a combination of self-management and a low fat diet (15 percent reduction in fat) with no change in fat consumption.¹⁰¹ All participants received dietary counseling. The dietary counseling included individual sessions for both groups and optional group counseling for the low fat diet group. The low fat diet group's counseling included information on monitoring fat intake, goal setting, social support and relapse prevention and management to reduce dietary fat to 15 percent of caloric consumption (Table 17).

BMI Change

BMI decreased in the low-fat diet group (-0.8 kg/m^2) and did not change in the comparison group (0.1 kg/m^2) at 1 year. BMI change from baseline between groups met the threshold for clinical and statistical significance at 1 year. BMI change from baseline was 0.9 units lower in the low-fat diet group with self-management counseling compared with the group without a dietary change goal and no self-management counseling at 1 year, which met the threshold for a meaningful difference (insufficient information to calculate the statistical significance; Appendix E, Evidence Table 25).¹⁰¹ Although the intervention continued for 3 years and participants were followed for 5 years after randomization, the between group difference in the change from baseline could not be calculated after 1 year.

Weight Change

The low-fat diet group lost weight at 1 year (-2.1 kg) compared with a 0.2 kg increase in weight among the comparison group. The difference in weight from baseline to year 1 between groups met the meaningful difference threshold (-2.3 kg), but insufficient information was reported to assess the statistical difference (Appendix E, Evidence Table 25).¹⁰¹ Insufficient information was reported after 1 year to identify the difference in weight change from baseline between groups.

Waist Circumference Change

No study on combination strategies and waist circumference change met our inclusion criteria.

Adherence

The study reported that 80 percent of participants provided dietary data for at least three time periods after the baseline assessment. At year five, 40 percent of the intervention group and 68 percent of the control group reported dietary intake. Among the subset that reported dietary intake at year five, the total fat (in grams), percentage of calories from fat, saturated fat, polyunsaturated fat, monounsaturated fat, and total energy (in kilocalories) were lower in the low-fat diet group than the comparison group ($p < 0.0001$ for all) and the fiber intake (in grams per day) was increased ($p < 0.01$; Appendix E, Evidence Table 25).¹⁰¹

Cancer Recurrence

The low-fat diet combined with self-management intervention group was less like to experience cancer recurrence and had greater cancer-free survival compared with the comparison group (Appendix E, Evidence Table 25).¹⁰¹ There was a modest increase in overall survival (HR 0.89; 95% CI 0.65 – 1.21), but the finding was not statistically significant.

Adverse Events

The study specifically stated that no adverse events were associated with the low-fat dietary intervention but did not specify which adverse events were of interest or how adverse events were collected. It is unclear if adverse events were collected among the group without the low-fat diet goal (Appendix E, Evidence Table 25).¹⁰¹

Subgroups

The study reported that there was no interaction of the intervention by baseline BMI in an adjusted Cox regression model of cancer recurrence (p for interaction not reported). No study on combination strategies by baseline weight, gender, age, life events, race, ethnicity, or cultural group met our inclusion criteria.

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of environment level strategies and weight maintenance among adults with cancer met our inclusion criteria.

Table 14. Description of self-management approach among adults with cancer

Author Year	Primary Aim	Group 1	Group 2	Group 3
Wijndaele, 2009 ¹⁰⁴	Study the effect of TV watching hours on change in BMI in patients with colo-rectal cancer	Self-reported television viewing time < 3 h/day	Self-reported television viewing time 3-4.9 h/day	Self-reported television viewing time 5 or more h/day

BMI = body mass index

Table 15. Description of dietary intervention among adults with cancer

Author Year Study Name Duration of Intervention*	Primary Aim	Group 1	Group 2	Group 3	Group 4
Djuric 2002 ¹⁰³ The Nutrition and Breast Health Study Duration 12 months	Study the effect of a dietary fat and fruit/vegetable intake on biomarkers of cancer risk	Received information on Food Guide Pyramid from national Dairy Council	Low fat, One on one counseling with dietitians, monthly group meetings, written materials	High fruits/vegetables, One on one counseling with dietitians, monthly group meetings, written materials	Combination low fat high fruits/vegetables. One on one counseling with dietitians, monthly group meetings, written materials

*Study name listed only if applicable.

Table 16. Description of physical activity intervention among adults with cancer

Author Year Study Name* Duration of Intervention*	Primary Aim	Group 1	Group 2	Group 3
Schwartz 2009 ¹⁰⁰ Duration 12 months	Compare differences in body composition changes among women newly diagnosed with cancer beginning chemotherapy and receiving a steroid.	Usual Care control group No information about exercise was provided.	Aerobic exercise Assigned home-based moderate intensity exercise 4x per week for 20-30 minutes. Assigned exercises differed throughout the study period. Participants were encouraged to pursue weight-bearing aerobic activities that they liked such as walking, jogging or dancing.	Resistance exercise Assigned home-based resistance exercise 4x per week. Assigned exercises differed throughout the study period. Exercises were performed using Thera-Bands or weight equipment. Participants increased their resistance or weights once they could lift the prescribed amount (based on baseline capacity) through the complete range of motion for the prescribed number of sets and repetitions.

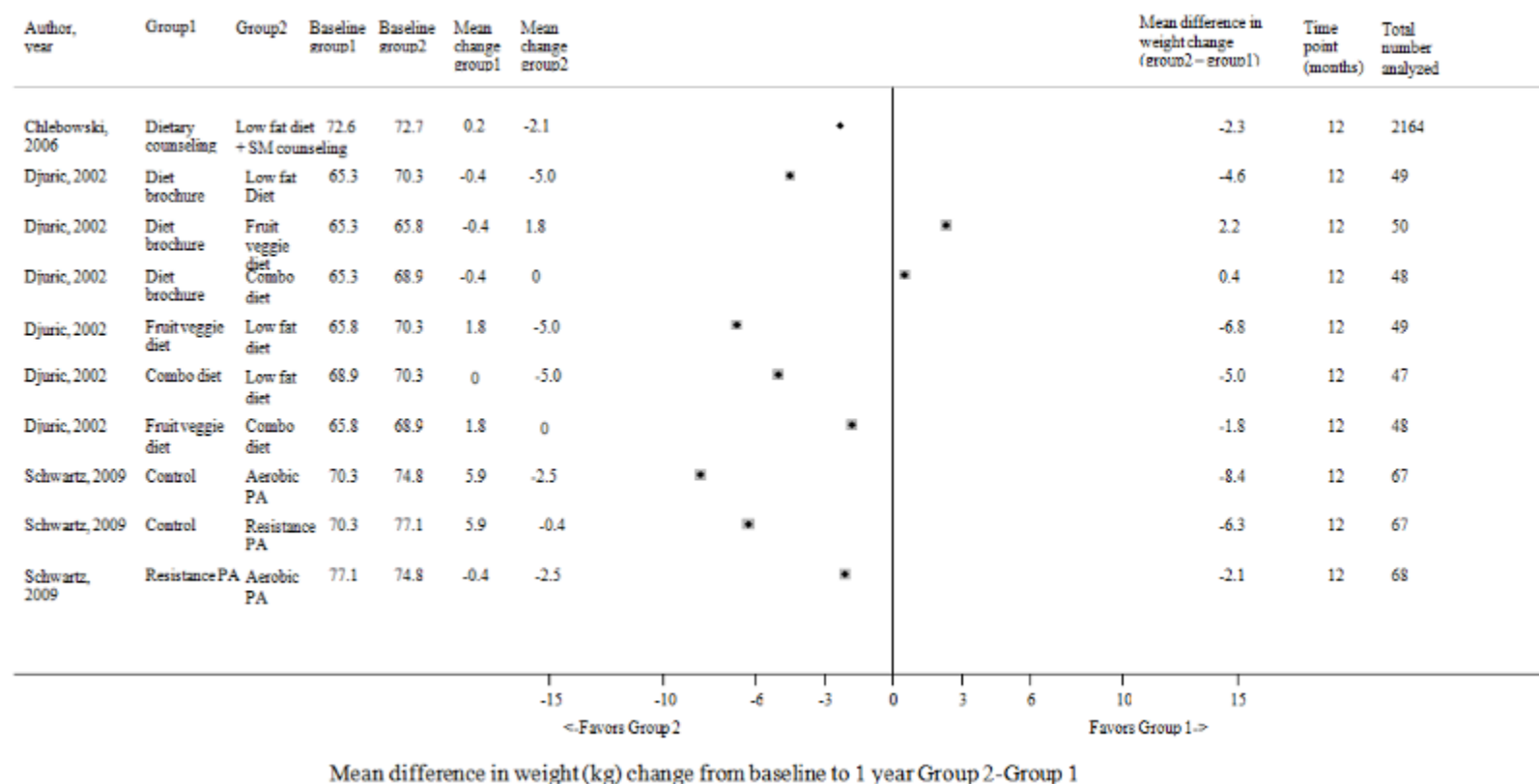
*Study name listed only if applicable.

Table 17. Description of combination intervention among adults with cancer

Author Year Study Name Duration of Intervention*	Primary Aim	Group 1	Group 2
Chlebowski 2006 ¹⁰¹ The Women's Intervention Nutrition Study (WINS) Duration 36 months with 48 months of additional follow up	Reduce fat intake in women with resected, early stage breast cancer receiving conventional cancer management to prevent breast cancer recurrence.	Maintained usual diet. Had contact with dietician at baseline and every 3 months with emphasis on maintaining nutritional adequacy.	Reduction of fat intake to 15 percent of calories while maintaining nutritional adequacy and baseline weight. Individual in person counseling sessions every 3 months as well as group sessions both of which focused on self-management techniques to achieve fat reduction goal.

*Study name listed only if applicable.

Figure 18. Differences in weight change from baseline to 1 year measured in kilograms among women with cancer



Kg = kilogram; PA = physical activity; SM = self-management

Combo Diet = low fat + high fruits & vegetables.

If the study did not report an estimate of variability, no confidence intervals were generated.

Weight Gain Prevention Among Adults With Mental Illness

Study Characteristics

Data on prevention of weight gain among adults with mental illness were reported in two trials (163 randomized; 150 analyzed).^{105,106} The interventions occurred for 3 months¹⁰⁶ and 6 months.¹⁰⁵ The studies assessed patients 18 months¹⁰⁵ and 21 months¹⁰⁶ after the intervention ended (Appendix E. Evidence Table 26). A specific weight maintenance goal was reported in one trial.¹⁰⁶ One trial occurred at multiple group homes in Scotland.¹⁰⁵ The Spanish trial was clinic based and did not report the number of clinics involved.¹⁰⁶ The starting year of enrollment was 2002 in the one study that reported enrollment period (Appendix E. Evidence Table 26).¹⁰⁶

Population Characteristics

The Spanish study aimed to prevent weight gain among individuals taking medications for their first treated episode of psychosis.¹⁰⁶ The Scottish study provided fruits and vegetables to group homes with schizophrenic residents.¹⁰⁵ The majority of patients were men (71 to 75 percent) and under 50 years old (mean age 27 and 45 years). Neither study made restrictions on weight for eligibility (Appendix E. Evidence Table 27).

Interventions

The Scottish study provided fruits and vegetables (5 servings per household member per day), fruits and vegetables plus lessons on preparing food, or no intervention to group homes.¹⁰⁵ The Spanish study provided individual sessions on behavior management and education on diet and exercise (Appendix E. Evidence Table 28).

Outcomes

Key Points

- There is low strength of evidence that:
 - Providing fruits and vegetables to households of people with schizophrenia does not prevent weight gain.
 - A behavioral intervention combined with education on diet and exercise prevents anti-psychotic medication associated weight gain through 2 years of followup, although the finding was not statistically significant. The intervention group gained 1.5 kg less (0.5 units of BMI) compared with the usual care group.

There is insufficient strength of evidence for all other strategies and outcomes because no studies met our inclusion criteria.

Key Question 1: What is the comparative effectiveness of self-management strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of self management and weight maintenance among adults with mental illness met our inclusion criteria.

Key Question 2: What is the comparative effectiveness of dietary strategies for the prevention of weight gain among adults?

An trial of individuals with schizophrenia examined the impact of provision of free fruits and vegetables with and without instruction in meal planning and food preparation compared with no intervention on eating habits.¹⁰⁵

BMI Change

The trial (102 randomized; 91 analyzed) stated that there were no significant differences in BMI between groups at 18 months from the start of the intervention. Quantitative results were not provided (Appendix E, Evidence Table 29).¹⁰⁵

Weight Change

No study on dietary strategies and on weight change met our inclusion criteria.

Waist Circumference Change

No study on dietary strategies and waist circumference change met our inclusion criteria.

Clinical Outcomes

No study on dietary strategies and mortality or QOL met our inclusion criteria.

Adherence

No study on dietary strategies and adherence in populations with mental illness met our inclusion criteria.

Adverse Events

No study on diet and burden of intervention, nutritional deficiencies, eating disorder, activity related injury, adverse effect of medication, or other adverse events met our inclusion criteria.

Subgroups

No study on dietary strategies by baseline weight, gender, age, life events, race, ethnicity, cultural group met our inclusion criteria.

Key Question 3: What is the comparative effectiveness of physical activity strategies for the prevention of weight gain among adults?

No study on the comparative effectiveness of physical activity and weight maintenance among with. mental illness met our inclusion criteria.

Key Question 4: What is the comparative effectiveness of orlistat for the prevention of weight gain among adults?

No study on the use of orlistat and weight maintenance among with mental illness met our inclusion criteria.

Key Question 5: What is the comparative effectiveness of a combination of self-management, dietary, physical activity, and medication strategies for the prevention of weight gain among adults?

One trial (61 randomized, 59 analyzed) of individuals within 6 weeks of the first treatment for a psychotic episode used a combination of self-management, diet, and physical activity strategies for weight gain prevention.¹⁰⁶ Subjects were randomized to one of three antipsychotic medications (5 to 20 mg/day olanzapine, 3 to 6 mg/day risperidone, or 3 to 9 mg/day haloperidol) then randomized to either a 3 month behavioral intervention or usual care. The behavioral intervention included individual sessions addressing energy intake and activity behaviors. Subjects received dietary counseling and counseling on an exercise program over 10 to 14 individual sessions, and body weight was measured at baseline, weekly for three months, and at four, six, 12, and 24 months of followup (Appendix E, Evidence Table 29).

BMI Change

Individuals in both the intervention and control groups gained 3.7 kg/m² during 12 months of followup.¹⁰⁶ At 24 months, the intervention group gained 0.5 kg/m² less than the control group (3.5 kg/m² gained in the intervention group), although the finding was not statistically significant (Appendix E, Evidence Table 29).

Weight Change

At 12 and 24 months, individuals in the behavioral intervention group gained 10.2 kg and 10.0 kg compared with 11.8 and 11.5 kg in the control group.¹⁰⁶ The difference in weight gain met the meaningful between group difference at both time points, but was not statistically significant (Appendix E, Evidence Table 29).

Waist Circumference Change

No study on combination strategies and waist circumference change met our inclusion criteria.

Clinical oOutcomes

The trial did not report on mortality or quality of life.

Adherence

The trial did not report on adherence.

Adverse eEvents

The trial did not report on burden of intervention, nutritional deficiencies, eating disorder, activity related injury, adverse effect of medication, or other adverse events.

Subgroups

The trial did not report results by baseline weight, gender, age, life events, race, ethnicity, or cultural group.

Key Question 6: What is the comparative effectiveness of environment level strategies for the prevention of weight gain among adults

No study on environment level strategies and weight maintenance among persons with mental illness met our inclusion criteria.

Discussion

Key Findings and Implications

The evidence supports that prevention of weight gain among adults is challenging. Very few interventions or approaches led to meaningful between group changes in BMI, weight or waist circumference. When adherence was reported, it tended to be poor (less than 80 percent adherence). Poor adherence may have been one reason for the lack of effectiveness observed across interventions and populations. The strategies that prevented weight gain, or when no strategy was effective in a population the strategies that were examined, are described by population below.¹⁰⁷ The strength of evidence for all observed comparisons is provided in Table 18. No comparison was graded as having a high strength of evidence. Two comparisons were graded as having a moderate strength of evidence. All others have low or insufficient evidence. The strength of evidence is low for many comparisons because the studies were not designed to measure weight maintenance and the study staff that measured weight in the intervention studies may have been aware of the participants' exposure groups.

The interventions and approaches that prevented weight gain are described by population or setting below. In a population, if none of the strategies prevented weight gain, we describe all of the strategies that we identified. The strength of evidence for the body of evidence is provided in Table 18 which also includes the evidence about secondary outcomes.

Evidence

Evidence Among Adults From a General Population

Eleven randomized trials (65,562 participants) and 12 prospective cohorts (418,520 participants) were identified. The strength of evidence is low but indicates that the following may prevent weight gain: low fat diets (effective for one year but not longer) compared with nutrition guideline handouts, monitoring heart rate during exercise after being instructed how to perform the monitoring during a routine clinic visit compared with physician advice, group lifestyle sessions and text messages sent to mothers of young children compared with diet and physical activity guidelines handouts, and eating fewer meals prepared outside of the home compared with eating more meals prepared outside of the home.

Evidence Among Obese Adults From a General Population

One randomized trial (124 participants) was identified. The strength of evidence is low that neither behavior was favored to prevent weight or waist circumference change over 18 months between women who were encouraged to walk or bicycle to work compared with those only encouraged to walk to work.

Evidence for Work-Based Strategies

Seven randomized trials (73,012 participants) were identified. The strength of evidence is moderate for workplace based combination strategies for the prevention of weight gain compared with no intervention. A single work based intervention that combined diet, physical activity and environmental components resulted in meaningful and statistically significant prevention of BMI and waist circumference change at 12 months compared with no intervention. The same work based intervention that combined diet, physical activity and environmental components prevented BMI change at 12 months compared with no intervention and another work based intervention that combined internet-based diet and physical activity counseling prevented weight gain at 24 months compared with no intervention.

Evidence for College-Based Strategies

Two randomized trials (155 participants) were identified. The strength of evidence is low that small group sessions about healthy lifestyle strategies, not taken for credit, prevented weight gain compared with no intervention.

Evidence Among Adults at Risk for or With Cardiovascular Disease or Diabetes Mellitus

Eleven randomized trials and one non randomized trial (4,206 participants) were identified. The strength of evidence is low that physical activity interventions prevent weight gain and waist circumference increase in this population compared with no intervention.

Evidence Among Adults With Cancer

Three randomized trials (2,671 participants) and one prospective cohort based on a cancer registry (1,966 participants) were identified. The strength of evidence is moderate that aerobic and resistance exercise performed at home prevent weight gain among women with cancer compared with no intervention. The strength of evidence is low that decreasing television viewing prevents weight gain among people with cancer compared with increasing or no change in television viewing.

Evidence Among Adults With Mental Illness

Two trials were identified (163 participants). A randomized trial provided fruits and vegetables to group homes of people with schizophrenia compared with providing fruits and vegetables with education on how to prepare meals. A non randomized trial combined a behavioral intervention with education on diet and exercise among patients initiating anti-psychotic medications compared with no intervention. There is low strength of evidence that no intervention was favored to prevent weight gain.

Populations Without Evidence

No study included only individuals with healthy weight at baseline; individuals with a family history of obesity; or socioeconomically disadvantaged individuals.

Despite the attention on primary prevention of obesity,^{108-111,112,113-115} this report provides little evidence for policymakers to use to make recommendations on specific strategies that will

prevent weight gain. Existing recommendations are frequently based on intermediate measures of changes in diet or physical activity. For example, the recommendations by the Centers for Disease Control and Prevention for community interventions to prevent obesity acknowledge that the evidence to support the recommendations were not based on studies of at least one year duration that measured weight as an outcome, but on short term changes in food choices or use of environmental modifications to facilitate physical activity.¹⁰⁸

The World Health Organization European Ministerial Conference on Counteracting Obesity recommended that primary care providers play a more active role in preventing obesity.¹¹¹ Although the American Medical Association recommends the prevention of inappropriate weight gain,¹¹⁶ but reimbursement for the time required to provide weight maintenance counseling for the non obese is not supported by Medicare.^{116,117} The lack of reimbursement may at least partly explain the low adherence with these recommendations by providers. An analysis of the Behavioral Risk Factor Surveillance Survey data in 2003 indicated that only 2.6 percent of individuals with a BMI between 18 and 25 received advice to maintain their current weight by a healthcare provider.

Although evidence is limited to support factors associated with weight gain prevention, the rationale to prevent weight gain is sound given the robust evidence that obesity is associated with poor health outcomes,^{9,10-16} is costly,²² and is difficult to reverse.¹¹⁸

Identifying the best time to implement an intervention and the population that will be willing to utilize the interventions are areas for prioritization. Three of the interventions targeted populations experiencing life changes such as attending college⁸³ or beginning to cohabitate with a partner.⁵⁹ During these periods of change, individuals may be more likely to be open to lifestyle modification or more likely to be adherent to the changes. Although these interventions did not uniformly result in weight maintenance compared with control or result in higher levels of adherence, designing interventions to be implemented during these and other life changes (e.g., postpartum, retirement, relocating to a new region) may be considered in future research.

Identifying an individual's interest level in an intervention prior to recommending a weight maintenance strategy may also be of interest. Many studies randomized participants to an intervention followed by multiple in person visits, phone calls and mailings. One trial opted to provide patients with up to three phone invitations to participate in a walking program compared with an information session. Only 33 percent of those invited to walk took part in a walk.⁵⁶ Allowing the option of participating in an intervention (rather than required visits, phone calls, etc.) demonstrates that individuals who consent to participate in a weight related study may not have the motivation to participate in the particular intervention of interest. Combining a time when a person is already in a period of change with an intervention that an individual is motivated to participate in may be an area for future research.

Table 18. Summary of the strength of evidence*

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
General Population								
Self-management	Insufficient	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No diet favored	Low A healthy eating pattern was associated with less weight gain than an unhealthy eating pattern. Eating outside the home was associated with greater weight gain than consuming almost all meals at home.	Low Healthy eating scores 2 z-scores above the mean associated with 2 to 3cm smaller waistlines in Whites and Hispanics.	Low Eating food outside the home one or more times per week associated with a 20-30% increased risk of overweight or obesity compared with eating no meals outside the home. Healthy eating scores associated with a decreased odds of obesity.	Insufficient	Insufficient	Low Low-fat group had 0.1% less mortality than nutrition guidelines group.	Insufficient
Physical activity	Low Participants who were taught to monitor their heart rate by their primary care provider during exercise along with advice had a greater decrease in BMI than participants given advice by their doctor without being taught to monitor their heart rate.	Low Increasing physical activity over time is associated with less weight gain than maintaining or decreasing physical activity over time.	Low No strategy favored	Insufficient	Low Adherence with the interventions ranged from 33% to 71%.	Insufficient	Insufficient	Low No serious adverse events occurred.

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
General Population (continued)								
Combination	Low No strategy favored	Low No strategy favored	Low No strategy favored	Low No strategy favored	Low Adherence ranged from 50% to 73%.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Low No strategy favored	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Obese Only								
Self management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Low Cycling group had 0.1 unit greater decrease in BMI than walking group.	Low Cycling group had 0.5 cm greater decrease in waist circumference than walking group.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Work-Based								
Self management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>Work-Based (continued)</i>								
Combination	Low Individual level diet and physical activity interventions along with an environmental component prevented BMI increases compared with no intervention.	Moderate Individual level diet and physical activity interventions along with an environmental component prevented weight gain compared with no intervention. Internet-based diet and physical activity counseling prevented weight gain compared with telephone based diet and physical activity counseling. Women in the military who received emails on diet and physical activity lost weight compared with women who received no intervention.	Low Individual level information on diet, physical activity, goal setting instructions and provision of a pedometer and measuring tape prevented waist circumference increases compared with no intervention.	Insufficient	Low Adherence ranged from 17 % to 64%.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
College-Based								
Self management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Low Small group, non-credit sessions with information on goal-setting, diet and physical activity prevented an increase in BMI compared with no intervention.	Low Small group, non-credit sessions with information on goal-setting, diet and physical activity prevented an increase in weight compared with no intervention.	Low No strategy favored.	Insufficient	Low 53% of students attended at least 60% of the sessions during year 1; 26% of students attended at least 60% of the sessions during year 2.	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
With or at Risk For Type 2 Diabetes Mellitus or Cardiovascular Disease								
Self management	Low Goal setting results in a meaningful BMI change at one year compared with no intervention.	Insufficient	Low No strategy favored.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No strategy favored.	Low No strategy favored.	Low No strategy favored.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>With or at Risk For Type 2 Diabetes Mellitus or Cardiovascular Disease (continued)</i>								
Physical activity	Low Endurance exercise training prevented BMI gain compared with no intervention.	Low Endurance exercise training prevented BMI gain compared with no intervention.	Low Endurance exercise training prevented BMI gain compared with no intervention.	Insufficient	Low Adherence to endurance exercise training was 57%.	Insufficient	Insufficient	Insufficient
Combination	Low No strategy favored.	Low No strategy favored.	Low Aerobic activity and strength training resulted in greater waist circumference decrease compared with no intervention.	Insufficient	Low Adherence ranged from 65% to 100%.	Low No strategy favored.	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
<i>Cancer</i>								
Self management	Low Less than 3 hours per day television viewing associated with less BMI gain after colorectal cancer diagnosis compared with viewing more than 5 hours of television per day.	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
Cancer (continued)								
Diet	Insufficient	Low No strategy favored.	Insufficient	Insufficient	Low Adherence ranged from 60% to 90%.	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Moderate Aerobic and resistance exercise performed at home prevented weight gain at 1 year compared with no intervention.	Insufficient	Insufficient	Low Adherence ranged from 65% to 79% in the exercise groups and was 100% among controls.	Insufficient	Insufficient	Insufficient
Combination	Low A reduced fat diet with self-management counseling among women with newly diagnosed cancer decreased BMI at 1 year compared with counseling on nutritional adequacy that did not teach self-management techniques.	Low A reduced fat diet with self-management counseling among women with newly diagnosed cancer decreased BMI at 1 year compared with counseling on nutritional adequacy that did not teach self-management techniques.	Insufficient	Insufficient	Low Intervention group reduced calories from fat through 5 years of followup.	Insufficient	Insufficient	Low No adverse events occurred.
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

Table 18. Summary of the strength of evidence* (continued)

Intervention	BMI [†]	Weight Change [†]	Waist Circumference [†]	Progression to Overweight or Obese	Adherence	Quality of Life	Mortality	Adverse Events
<i>Mental Illness</i>								
Self management	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Diet	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Physical activity	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Combination	Low No strategy favored	Low No strategy favored	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
Built environment or community-level	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient

*No studies identified orlistat as a strategy to prevent weight gain.

[†]For BMI, weight change, and waist circumference the direction of effect is provided for strategies that met the between group difference threshold.

Important Unanswered Questions

Which of the Key Questions Remain Unanswered?

We had a particular interest in identifying evidence about preventing weight gain among individuals with healthy weight at baseline, but found no relevant studies. Similarly, we identified no studies addressing prevention of weight gain among socioeconomically disadvantaged individuals that met our inclusion criteria. Only one intervention was applied at a community level and this trial is more than 20 years old. Only three studies used a cell phone or web based technology as part of a combination intervention.^{60,73,74} No comparisons involved orlistat, which is available over the counter, and may be used for weight maintenance despite having only a weight loss indication.

Is Weight Maintenance Relevant if the Majority of the Population Is Overweight or Obese?

One study specifically stated that participants would have preferred assistance losing weight rather than maintaining weight.⁵⁸ The investigators conducting that study stated that they had a difficult time recruiting women in the healthy weight range and had to expand the study to include overweight women. Presently, the majority of the U.S. population is overweight or obese, so weight loss strategies may be more appropriate than weight gain prevention strategies for most of the population. However, changes that prevent weight gain may be more effective in the healthy weight population than encouraging weight loss in the overweight and obese population. This, however, remains unknown. Environment level interventions can benefit people of all weights. The CDC and WHO recommend environment level interventions, despite the limited availability of long-term data, for this reason.¹⁰⁸

What Are the Motivators To Maintain Weight Among Those Who Are Not Overweight?

In this review, we did not review attitudes about weight change. However, understanding what motivates individuals to maintain a healthy weight may inform strategies. Identifying these motives will be particularly important for individuals who are not overweight. Targeting weight maintenance advice based on one's motives may help increase adherence to modify behaviors and prevent weight gain.¹¹⁹

Findings in Relationship to What Is Already Known

One previous systematic review has addressed weight gain prevention among adults.³⁶ The authors included randomized trials that had a stated goal of primary prevention of obesity among those with BMI under 30 kg/m² at baseline (or mean BMI less than 30 kg/m² at baseline) or weight loss among those with a BMI of 25 to 30 kg/m² at baseline, had at least three months of followup after the start of the intervention, reported on weight or BMI change and were published between 1996 and 2006. Nine trials were included. Only two of those trials were included in the current review. The other trials did not have followup of at least one year or they allowed participants to have a weight loss goal. The conclusion from that review was that the

body of evidence is too small to compare the effectiveness of interventions for obesity prevention.

Despite the interest to prevent weight gain and obesity, there is little evidence to support long term strategies. Previous reviews on physical activity,¹²⁰ fruit and vegetable consumption,¹²¹ and psychological models and behavior change methods¹²² have come to similar conclusions. A workshop on food technology to prevent obesity also commented that long term studies to support eating behaviors and interventions are lacking.¹²³

Applicability

Studies that met our inclusion criteria have been implemented in a variety of populations and settings, although very few were designed to prevent weight gain. Observational studies to identify predictors of weight gain have focused on the general population and individuals with cancer. The interventions and approaches described in this review apply to a variety of populations. The settings of the intervention were much more limited. We had hoped to identify more environment level interventions. Unfortunately, many studies about environment level interventions were cross sectional designs and did not meet the criteria for our review.

Although we included studies of individuals with a baseline weight in the healthy, overweight and obese range, these findings apply primarily to overweight individuals. No study included healthy weight individuals exclusively. The one study of obese individuals included abdominally obese individuals.

Because adherence was poor in many interventions, the results may have been more useful if they had been reported by adherence status in addition to the intent-to treat analyses. For example, if participants who adhered to an intervention were more likely to maintain weight than the nonadherent participants, we may have been able to evaluate the evidence based on adherence status and provide more detailed information about the effectiveness of the interventions.

Implications for Clinical and Policy Decisionmaking

These results may help provide an evidence base for future practice guidelines to influence individual decision making, patient management, and policy decisions. However, we suspect that the strength of evidence for most comparisons is too low to support guidelines.

Behavior change is difficult for individuals whose goal is to prevent weight gain, just as behavior change is difficult for those attempting to lose weight. Eating meals prepared at home is a simple, low cost intervention that prevented weight gain in the included trial. College coursework on healthy diets and physical activity also prevented weight gain. The more intensive interventions, such as endurance exercise performed three times per week, reported few adverse events. Although intensive interventions did not result in strong evidence to promote their adoption, there is no evidence that *not* adopting a strategy to prevent weight gain is preferable.

Limitations of the Comparative Effectiveness Review Process

The strength of evidence was low or insufficient for almost all comparison outcome relationships. There are several reasons for these low evidence grades based on how we assessed each study's quality and graded the strength of evidence. We feel, however, that this is a fair appraisal of the risk of bias in these studies.

Trials were frequently downgraded for lack of blinding, for not reporting the blinding of outcome assessors, or for not accounting for losses to followup. We included in this review only observational studies that accounted well for confounding and for losses to followup to ensure that we included only the highest quality observational studies.

Very few studies had a stated goal of weight maintenance or weight gain prevention. Goals to change dietary intake and physical activity commonly reported on weight without a weight-related goal. We excluded studies that explicitly mentioned that at least some of the patients had a goal of weight loss. The best known weight gain prevention trial was excluded for this reason, the Pound of Prevention trial.¹⁰⁷ Only one of the included observational studies was nested within a cohort whose original design had a weight related outcome of interest.⁶⁷

Very few studies reported standard errors or confidence intervals for the between group differences in change in a weight related outcome over time. When the majority of studies did not report a measure of variability, we graded the body of evidence as imprecise. In some instances, the studies did not report a mean difference or point estimate stating *there was no significant difference in weight change between the groups*.

The heterogeneity of the included interventions and variety of categories of exposures studied among the observational studies prevented meta-analysis. Had the interventions been more homogenous, the lack of reporting on variability would have still prohibited meta-analyses.

Studying weight gain prevention has particular challenges because the expected annual weight gain is small (0.5 kg/year). Measurement error can influence inference based on the small expected difference between groups. A poorly calibrated scale could lead to spurious findings. Even day to day variations in weight could affect the results. Studying weight gain prevention strategies for longer periods of time can help to decrease the noise introduced by these measurement errors. However, with longer followup, the financial resources and motivation of the participants to strictly adhere to an intervention may not be possible. In addition, the randomized trial that is the mainstay of pharmaceutical research is impossible for weight gain prevention strategies because the participants are aware of the strategies that they are following. Long-term observational studies with adequate control for confounding and selection bias may be able to produce evidence equivalent to that from a long-term trial because confounding and selection bias will need to be accounted for in both designs. If a smaller weight gain effect is of interest, such as 0.1 kg/year, the large number of patients needed may make an observational study more feasible than a randomized trial.

Strengths and Limitations of the Evidence Base

The greatest strength of the evidence base was the variety of populations included. In addition to including populations with very few exclusion criteria representative of the general population, we also observed a variety of studies targeted at individuals that are known to be more likely to gain weight.

Many studies did not report a weight related goal and were included. We may have inadvertently included some trials that had a goal of weight loss but that did not say so explicitly in the published paper; that is, studies labeled as weight maintenance among overweight and obese individuals may not have been solely targeting weight maintenance. We excluded studies that included specific aims of “weight change” associated with power calculations for an expected decrease in weight among the intervention group. However, some studies did not report power calculations or an expected direction of weight change. These studies were necessarily included. All observational studies included individuals with unknown weight related goals.

Controls had better weight maintenance than we expected. In many studies, the weight maintenance was better in the control groups than is expected in a general population. Many control groups had no increase in weight over time. In the general United States population, adults typically gain about 0.5 kg per year.⁵ It is possible that the knowledge that one will be evaluated on weight regularly may help individuals to maintain weight without an intensive intervention. This may support the use of weight surveillance interventions in a workplace or primary care setting.

Concern exists that encouraging healthy weight individuals to focus on weight may lead to body image issues or eating disorders.¹²⁴ The frequency of this adverse event was not estimable, as none of the included trials reported on this outcome. However, some believe that there is a spectrum of eating behaviors, including disorders such as anorexia nervosa and bulimia nervosa that may be triggered by weight gain prevention interventions. It is possible that interventions to promote healthful eating, physical activity and weight gain prevention may decrease disordered eating but this is not known.¹²⁵ The evidence provides no support presently.

Future Research Needs

We suggest that most comparisons and outcomes that have low or insufficient evidence are future research needs. In particular, we recommend future research to examine strategies to prevent weight gain among healthy weight individuals and, separately, overweight and obese individuals. Interventions for individuals taking anti-psychotic medications are also a high priority given that participants in one trial gained 10 kg in the first year of medication use. Diabetes medications are also associated with weight gain. Interventions for patients initiating diabetes medications are also a high priority subpopulation, although weight loss goals may be more relevant for many of these patients.

Different degrees of intensity of the interventions in varied populations should be compared. Less intensive interventions may be possible given that control groups responded nearly as well as intervention groups in most of the studies that we included.

There are design and reporting considerations that should be considered for future studies. Observational cohorts should make measuring weight a stated goal in their protocols. Studies designed to measure weight over time are more likely to collect high quality weight measurements and have adequate power to study weight gain prevention. Intervention trials should be of sufficient duration to assess the efficacy of interventions for preventing weight gain. We suggest that one year should be a minimum duration of follow up for these trials. Longer follow up will make it easier to identify true effectiveness if individuals typically gain 0.5 kg per year.

Identifying evidence grading criteria for complex, multifactorial, long-term exposures and outcomes such as the influences of habitual diet, activity, and environmental exposures and interventions on long-term weight gain is needed. An alternative method to grade evidence to allow high strength of evidence from observational studies may be worth pursuing for behavioral strategies.

Conclusions

The evidence provides some, although limited, support for strategies to prevent weight gain. Potentially effective strategies included both those that involved modest behavior change (e.g., preparing meals at home) and more major changes (e.g., endurance exercise training in a gym at least three times per week). Despite the weak evidence for strategies to prevent long-term weight gain, there is no evidence that *not* adopting a strategy to prevent weight gain is preferable.

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Appendix A. List of Acronyms

Acronym	Definition
ADA	American Diabetes Association
ANOVA	Analysis of variance
BMI	Body mass index
DBP	Diastolic blood pressure
DEER	Diet and Exercise for Elevated Risk
GIS	Geographic Information Systems
HbA _{1c}	hemoglobin A _{1c}
ODES	Oslo Diet and Exercise Study
PICOTS	Population, intervention, comparators, outcomes, timing, and setting
PREDIMED	Prevencion con Dieta Mediterranea
PREPARE	Pre-diabetes Risk Education and Physical Activity Recommendation
RCT	Randomized clinical trial
SBP	Systolic blood pressure
TOHPH	Trials of Hypertension Prevention Phase II
VA	Veterans Administration
ADA:	American Diabetic Association; kg: kilogram
PA	Physical Activity
SM	Self management
NR	Not Reported
WC	Waist Circumference
CM	Centimeter
ND	Reported no difference between groups without providing values
RCT	Randomized controlled trial
KQ	Key Question

Appendix B. Detailed Search Strategies

PubMed

KQ 1-5

((("ideal body weight"[mh] OR "normal weight"[tiab] OR overweight[mh] OR overweight[tiab] OR "body mass index"[mh] OR "body mass index"[tiab] OR BMI[tiab] OR "healthy weight"[tiab] OR obesity[mh] OR obesity[tiab] OR obese[tiab]) AND (maintenance[tiab] OR maintain[tiab] OR management[tiab] OR manage[tiab] OR "weight gain"[tiab] AND prevent*[tiab])) AND (diets[tiab] OR diet[mh] OR diet[tiab] OR "energy intake"[tiab] OR nutrition[tiab] OR exercise[mh] OR exercise[tiab] OR walking[mh] OR walking[tiab] OR walk[tiab] OR running[mh] OR running[tiab] OR run[tiab] OR jogging[tiab] OR jog[tiab] OR biking[tiab] OR bike[tiab] OR aerobics[tiab] OR "resistance training"[mh] OR training[tiab] OR "physical activity"[tiab] OR pharmaceutical[tiab] OR drug[tiab] OR medication[tiab] OR prescription[tiab] OR "orlistat"[Supplementary Concept] OR "orlistat"[tiab] OR behavior[tiab] OR behavioral[tiab])) NOT ("anorexia nervosa"[mh] OR anorexia[mh] OR anorexia[tiab] OR anorectic[tiab] OR "bulimia nervosa"[mh] OR bulimia[mh] OR bulimia[tiab] OR bulimic[tiab] OR cachexia[mh] OR cachexia[tiab] OR fragility[tiab] OR "gestational weight gain"[tiab])) NOT ((infant[mh] OR infant[tiab] OR child[mh] OR child[tiab] OR children[tiab] OR adolescent[mh] OR adolescent[tiab] OR "teen-age"[tiab] OR pediatric[tiab] OR perinatal[tiab]) NOT (adult[tiab] OR adults[tiab] OR Mother[tiab] OR father[tiab] OR family[tiab] OR parent[tiab] OR men[mh] OR men[tiab] OR women[mh] OR women[tiab])) NOT (animal[mh] NOT human[mh]))

KQ 6

((("ideal body weight"[mh] OR "normal weight"[tiab] OR overweight[mh] OR overweight[tiab] OR "body mass index"[mh] OR "body mass index"[tiab] OR BMI[tiab] OR "healthy weight"[tiab] OR obesity[mh] OR obesity[tiab] OR obese[tiab] OR "body weight"[tiab]) AND ((("weight gain"[tiab] AND (prevent*[tiab] OR reduce[tiab])) OR "health Policy"[mh] OR "built environment"[tiab] OR "environment design"[mh] OR "purchasing behavior"[tiab] OR "purchasing behaviors"[tiab] OR "food labeling"[mh] OR "calorie information"[tiab] OR "calorie labeling"[tiab] OR campaign[tiab] OR Tax*[tiab] OR taxes[mh] OR "income inequality"[tiab])) NOT ("anorexia nervosa"[mh] OR anorexia[mh] OR anorexia[tiab] OR anorectic[tiab] OR "bulimia nervosa"[mh] OR bulimia[mh] OR bulimia[tiab] OR bulimic[tiab] OR cachexia[mh] OR cachexia[tiab] OR fragility[tiab] OR "gestational weight gain"[tiab])) NOT ((infant[mh] OR infant[tiab] OR child[mh] OR child[tiab] OR children[tiab] OR adolescent[mh] OR adolescent[tiab] OR "teen-age"[tiab] OR pediatric[tiab] OR perinatal[tiab]) NOT (adult[tiab] OR adults[tiab] OR Mother[tiab] OR father[tiab] OR family[tiab] OR parent[tiab] OR men[mh] OR men[tiab] OR women[mh] OR women[tiab])) NOT (animal[mh] NOT human[mh]))

Cochrane

#1	MeSH descriptor Overweight explode all trees	5928	edit	delete
#2	MeSH descriptor Body Mass Index explode all trees	4326	edit	delete
#3	MeSH descriptor Obesity explode all trees	5628	edit	delete
#4	"ideal body weight":ti,ab,kw	261	edit	delete
#5	"normal weight":ti,ab,kw	615	edit	delete
#6	(overweight):ti,ab,kw	2549	edit	delete
#7	"body mass index":ti,ab,kw	8472	edit	delete
#8	(BMI):ti,ab,kw	3931	edit	delete
#9	"healthy weight":ti,ab,kw	40	edit	delete
#10	(obesity):ti,ab,kw	7510	edit	delete
#11	(obese):ti,ab,kw	4650	edit	delete
#12	(#1 OR #2)	8660	edit	delete
#13	(#1 OR #2 OR #3)	8693	edit	delete
#14	(#1 OR #2 OR #3 OR #4)	8884	edit	delete
#15	(#1 OR #2 OR #3 OR #4 OR #5)	9219	edit	delete
#16	(#1 OR #2 OR #3 OR #4 OR #5 OR #6)	9888	edit	delete
#17	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7)	13041	edit	delete
#18	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8)	14024	edit	delete
#19	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9)	14035	edit	delete
#20	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10)	15214	edit	delete
#21	(#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11)	15838	edit	delete
#22	(maintenance):ti,ab,kw	14312	edit	delete
#23	(maintain):ti,ab,kw	20748	edit	delete
#24	(management):ti,ab,kw	29637	edit	delete
#25	(manage):ti,ab,kw	5874	edit	delete
#26	"weight gain":ti,ab,kw and (prevent*):ti,ab,kw	733	edit	delete
#27	(#22 OR #23)	32861	edit	delete
#28	(#22 OR #23 OR #24)	60432	edit	delete
#29	(#22 OR #23 OR #24 OR #25)	64014	edit	delete

#30	(#22 OR #23 OR #24 OR #25 OR #26)	64598	edit	delete
#31	(#21 AND #30)	2583	edit	delete
#32	MeSH descriptor Diet explode tree 2	7951	edit	delete
#33	(diet):ti,ab,kw	18724	edit	delete
#34	MeSH descriptor Exercise explode all trees	8013	edit	delete
#35	(exercise):ti,ab,kw	30192	edit	delete
#36	MeSH descriptor Walking explode all trees	1801	edit	delete
#37	(walking):ti,ab,kw	6274	edit	delete
#38	MeSH descriptor Running explode all trees	952	edit	delete
#39	(running):ti,ab,kw	6902	edit	delete
#40	"energy intake":ti,ab,kw	3319	edit	delete
#41	(nutrition):ti,ab,kw	7755	edit	delete
#42	(jogging):ti,ab,kw	194	edit	delete
#43	(biking):ti,ab,kw	65	edit	delete
#44	(aerobics):ti,ab,kw	72	edit	delete
#45	"resistance training":ti,ab,kw	1239	edit	delete
#46	(training):ti,ab,kw	23079	edit	delete
#47	"physical activity":ti,ab,kw	3847	edit	delete
#48	(pharmaceutical):ti,ab,kw	4832	edit	delete
#49	(drug):ti,ab,kw	278919	edit	delete
#50	(medication):ti,ab,kw	26504	edit	delete
#51	(prescription):ti,ab,kw	3404	edit	delete
#52	(behavior):ti,ab,kw	26437	edit	delete
#53	(behavioral):ti,ab,kw	12644	edit	delete
#54	(#32 OR #33)	19829	edit	delete
#55	(#32 OR #33 OR #34)	26398	edit	delete
#56	(#32 OR #33 OR #34 OR #35)	47458	edit	delete
#57	(#32 OR #33 OR #34 OR #35 OR #36)	48275	edit	delete
#58	(#32 OR #33 OR #34 OR #35 OR #36 OR #37)	50561	edit	delete
#59	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38)	50769	edit	delete
#60	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39)	55262	edit	delete
#61	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40)	55513	edit	delete

#62	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41)	60671	edit	delete
#63	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42)	60688	edit	delete
#64	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43)	60707	edit	delete
#65	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44)	60714	edit	delete
#66	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45)	60857	edit	delete
#67	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46)	75226	edit	delete
#68	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47)	76076	edit	delete
#69	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48)	80637	edit	delete
#70	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49)	332153	edit	delete
#71	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50)	337997	edit	delete
#72	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51)	338669	edit	delete
#73	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52)	351638	edit	delete
#74	(#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53)	355196	edit	delete
#75	(#21 AND #30 AND #74)	2215	edit	delete
#76	MeSH descriptor Anorexia Nervosa explode all trees	259	edit	delete
#77	MeSH descriptor Anorexia explode all trees	182	edit	delete
#78	MeSH descriptor Bulimia Nervosa explode all trees	114	edit	delete
#79	MeSH descriptor Bulimia explode all trees	329	edit	delete
#80	MeSH descriptor Cachexia explode all trees	112	edit	delete

#81	(anorexia):ti,ab,kw	1475	edit	delete
#82	(anorectic):ti,ab,kw	127	edit	delete
#83	(bulimia):ti,ab,kw	719	edit	delete
#84	(bulimic):ti,ab,kw	203	edit	delete
#85	(cachexia):ti,ab,kw	198	edit	delete
#86	(fragility):ti,ab,kw	190	edit	delete
#87	"gestational weight gain":ti,ab,kw	18	edit	delete
#88	(#76 OR #77)	441	edit	delete
#89	(#76 OR #77 OR #81)	1475	edit	delete
#90	(#76 OR #77 OR #81 OR #82)	1571	edit	delete
#91	(#76 OR #77 OR #81 OR #82 OR #78)	1666	edit	delete
#92	(#76 OR #77 OR #81 OR #82 OR #78 OR #79)	1928	edit	delete
#93	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83)	2160	edit	delete
#94	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83 OR #84)	2175	edit	delete
#95	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83 OR #84 OR #80)	2248	edit	delete
#96	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83 OR #84 OR #80 OR #85)	2306	edit	delete
#97	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83 OR #84 OR #80 OR #85 OR #86)	2496	edit	delete
#98	(#76 OR #77 OR #81 OR #82 OR #78 OR #79 OR #83 OR #84 OR #80 OR #85 OR #86 OR #87)	2514	edit	delete
#99	((#21 AND #30 AND #74) AND NOT #98)	2139	edit	delete
#100	(infant):ti,ab,kw	29797	edit	delete
#101	(child):ti,ab,kw	59501	edit	delete
#102	(adolescent):ti,ab,kw	75425	edit	delete
#103	(pediatric):ti,ab,kw	8793	edit	delete
#104	(perinatal):ti,ab,kw	1683	edit	delete
#105	(#100 OR #101 OR #102)	124337	edit	delete
#106	(#100 OR #101 OR #102 OR #103)	125798	edit	delete
#107	(#100 OR #101 OR #102 OR #103 OR #104)	126500	edit	delete
#108	(adult):ti,ab,kw	273098	edit	delete
#109	(mother):ti,ab,kw	5065	edit	delete

#110	(father):ti,ab,kw	339	edit	delete
#111	(family):ti,ab,kw	11368	edit	delete
#112	(parent):ti,ab,kw	6961	edit	delete
#113	(men):ti,ab,kw	31326	edit	delete
#114	(women):ti,ab,kw	50133	edit	delete
#115	(#108 OR #109)	276145	edit	delete
#116	(#108 OR #109 OR #110)	276202	edit	delete
#117	(#108 OR #109 OR #110 OR #111)	282178	edit	delete
#118	(#108 OR #109 OR #110 OR #111 OR #112)	285730	edit	delete
#119	(#108 OR #109 OR #110 OR #111 OR #112 OR #113)	296642	edit	delete
#120	(#108 OR #109 OR #110 OR #111 OR #112 OR #113 OR #114)	312971	edit	delete
#121	(#107 AND NOT #120)	49769	edit	delete
#122	(#99 AND NOT #121)	2006	edit	delete
#123	(prevent):ti,ab,kw	25951	edit	delete
#124	(reduce):ti,ab,kw	97122	edit	delete
#125	"weight gain":ti,ab,kw	3595	edit	delete
#126	(#124 AND (#123 OR #124))	97122	edit	delete
#127	"health policy":ti,ab,kw	678	edit	delete
#128	" built environment":ti,ab,kw	6	edit	delete
#129	MeSH descriptor Environment Design explode all trees	45	edit	delete
#130	"food labeling":ti,ab,kw	29	edit	delete
#131	(campaign):ti,ab,kw	611	edit	delete
#132	MeSH descriptor Taxes explode all trees	30	edit	delete
#133	(tax*):ti,ab,kw	1545	edit	delete
#134	(#126 OR #127)	97738	edit	delete
#135	(#126 OR #127 OR #128)	97744	edit	delete
#136	(#126 OR #127 OR #128 OR #129)	97772	edit	delete
#137	(#126 OR #127 OR #128 OR #129 OR #130)	97793	edit	delete
#138	(#126 OR #127 OR #128 OR #129 OR #130 OR #131)	98256	edit	delete
#139	(#126 OR #127 OR #128 OR #129 OR #130 OR #131 OR #132)	98280	edit	delete
#140	(#126 OR #127 OR #128 OR #129 OR #130 OR #131 OR #132 OR #133)	99645	edit	delete
#141	(((#21 AND #140) AND NOT #98) AND NOT #121)	4632	edit	delete


#142 [\(#122 OR #141\)](#)

5806 [edit](#) [delete](#)

EMBASE:

'body weight'/exp OR 'body weight':ab,ti OR 'normal weight':ab,ti OR 'overweight':ab,ti OR 'over weight':ab,ti OR 'body mass index':ab,ti OR 'body mass'/exp OR 'bmi':ab,ti OR 'healthy weight':ab,ti OR 'obesity'/exp OR obesity:ab,ti OR obese:ab,ti AND ('weight gain':ab,ti AND (prevent*:ab,ti OR reduc*:ab,ti) OR 'built environment':ab,ti OR 'healthcare policy'/exp OR 'health care policy':ab,ti OR 'health policy':ab,ti OR 'environmental planning'/exp OR 'environmental planning':ab,ti OR 'environment design':ab,ti OR 'purchasing behavior':ab,ti OR 'purchasing behaviors':ab,ti OR 'food labeling':ab,ti OR 'calorie information':ab,ti OR 'calorie labeling':ab,ti OR campaign:ab,ti OR 'tax'/exp OR tax*:ab,ti OR 'income inequality':ab,ti) NOT ('anorexia nervosa'/exp OR 'anorexia nervosa':ab,ti OR 'anorexia'/exp OR anorexia:ab,ti OR anorectic:ab,ti OR 'bulimia'/exp OR bulimia:ab,ti OR bulimic:ab,ti OR 'cachexia'/exp OR cachexia:ab,ti OR fragility:ab,ti OR 'gestational weight gain':ab,ti) NOT ('infant'/exp OR infant:ab,ti OR 'child'/exp OR child:ab,ti OR children:ab,ti OR 'adolescent'/exp OR adolescent:ab,ti OR 'teen-age':ab,ti OR pediatric:ab,ti OR perinatal:ab,ti NOT (adult:ab,ti OR adults:ab,ti OR mother:ab,ti OR father:ab,ti OR family:ab,ti OR parent:ab,ti OR 'men'/exp OR men:ab,ti OR 'women'/exp OR women:ab,ti)) NOT ('animal'/exp OR animal:ab,ti NOT ('human'/exp OR human:ab,ti)) OR (maintenance:ab,ti OR maintain:ab,ti OR management:ab,ti OR ('weight gain':ab,ti AND prevent*:ab,ti) AND ('body weight'/exp OR 'body weight':ab,ti OR 'normal weight':ab,ti OR 'overweight':ab,ti OR 'over weight':ab,ti OR 'body mass index':ab,ti OR 'body mass'/exp OR 'bmi':ab,ti OR 'healthy weight':ab,ti OR 'obesity'/exp OR obesity:ab,ti OR obese:ab,ti) AND ('diet'/exp OR diet:ab,ti OR diets:ab,ti OR 'energy intake':ab,ti OR nutrition:ab,ti OR 'exercise'/exp OR exercise:ab,ti OR 'walking'/exp OR walking:ab,ti OR walk:ab,ti OR running:ab,ti OR run:ab,ti OR jogging:ab,ti OR jog:ab,ti OR biking:ab,ti OR bike:ab,ti OR aerobics:ab,ti OR 'resistance training'/exp OR 'resistance training':ab,ti OR training:ab,ti OR 'physical activity':ab,ti OR pharmaceutical:ab,ti OR drug:ab,ti OR medication:ab,ti OR prescription:ab,ti OR 'tetrahydrolipstatin'/exp OR tetrahydrolipstatin:ab,ti OR orlistat:ab,ti OR behavior:ab,ti OR behavioral:ab,ti) NOT ('anorexia nervosa'/exp OR 'anorexia nervosa':ab,ti OR 'anorexia'/exp OR anorexia:ab,ti OR anorectic:ab,ti OR 'bulimia'/exp OR bulimia:ab,ti OR bulimic:ab,ti OR 'cachexia'/exp OR cachexia:ab,ti OR fragility:ab,ti OR 'gestational weight gain':ab,ti) NOT ('infant'/exp OR infant:ab,ti OR 'child'/exp OR child:ab,ti OR children:ab,ti OR 'adolescent'/exp OR adolescent:ab,ti OR 'teen-age':ab,ti OR pediatric:ab,ti OR perinatal:ab,ti NOT (adult:ab,ti OR adults:ab,ti OR mother:ab,ti OR father:ab,ti OR family:ab,ti OR parent:ab,ti OR 'men'/exp OR men:ab,ti OR 'women'/exp OR women:ab,ti)) NOT ('animal'/exp OR animal:ab,ti NOT ('human'/exp OR human:ab,ti)))

Appendix C. Screening and Data Abstraction Forms



Carmelasophia

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renee.wilson (My Settings)

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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.

Rethnam U, Yesupalan RS, Sinha A.

Submit Form

 and go to or [Skip to Next](#)

1. Does this title/abstract apply to any of the above Key questions (Key Questions)?

☐ No

☐ Yes

[Clear Response](#)

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1 of 1

4/2/2012 9:43 PM

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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.
Rethnam U, Yesupalan RS, Sinha A.

[Submit Form](#) and go to or [Skip to Next](#)

KEY QUESTIONS

KQ1: Which [self-management](#) approaches are effective for prevention of weight gain in adults?
KQ2: Which [dietary](#) approaches are effective for prevention of weight gain in adults?
KQ3: Which [physical activity](#) approaches are effective for prevention of weight gain in adults?
KQ4: Which [medications](#) are effective for prevention of weight gain in adults?
KQ5: Which [combination of behavioral, dietary, physical activity, educational, and/or medication](#) approaches are effective for prevention of weight gain in adults?
KQ6: Which [environment-level](#) approaches are effective for prevention of weight gain in adults?

1. ☐ non-English abstract

2. **Does this title/abstract apply to any of the above Key questions? (see [PICOTS](#))**

☐ No (answer reasons for exclusion)
☒ Yes (identify KQ)

Include article for review

☐ KQ 1-5
☐ KQ 6
[Clear Response](#)

☐ Unclear (screen article)
[Clear Response](#)

8. Comment

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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.

Rethnam U, Yesupalan RS, Sinha A.

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KEY QUESTIONS

KQ1: Which self-management approaches are effective for prevention of weight gain in adults?

KQ2: Which dietary approaches are effective for prevention of weight gain in adults?

KQ3: Which physical activity approaches are effective for prevention of weight gain in adults?

KQ4: Which medications are effective for prevention of weight gain in adults?

KQ5: Which combination of behavioral, dietary, physical activity, educational, and/or medication approaches are effective for prevention of weight gain in adults?

KQ6: Which environment-level approaches are effective for prevention of weight gain in adults?

1.

☐ non-English abstract

2. Does this title/abstract apply to any of the above Key questions? (see PICOTS)

☒ No (answer reasons for exclusion)

Exclude article from review

☐ No original data
 ☐ Followup < 1 year
 ☐ Study of children only
 ☐ Goal of study is weight loss
 ☐ Does not report weight or adiposity or weight-related outcomes in the abstract
 ☐ Study population at risk for malnourishment or underweight (e.g., dialysis patients; anorexia)
 ☐ No intervention of interest
 ☐ No comparison group
 ☐ No human data reported
 ☐ Abstract only
 ☐ Qualitative study (focus group, directed interviews)
 ☐ Does not apply to key questions

Clear Response

☐ Yes (identify KQ)
 ☐ Unclear (screen article)

Clear Response

8. Comment


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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.

Rethnam U, Yesupalan RS, Sinha A.

and go to [Skip to Next](#)

KEY QUESTIONS

KQ1: Which [self-management](#) approaches are effective for prevention of weight gain in adults?

KQ2: Which [dietary](#) approaches are effective for prevention of weight gain in adults?

KQ3: Which [physical activity](#) approaches are effective for prevention of weight gain in adults?

KQ4: Which [medications](#) are effective for prevention of weight gain in adults?

KQ5: Which [combination of behavioral, dietary, physical activity, educational, and/or medication](#) approaches are effective for prevention of weight gain in adults?

KQ6: Which [environment-level](#) approaches are effective for prevention of weight gain in adults?

1.

☐ non-English abstract

2. **Does this title/abstract apply to any of the above Key questions? (see [PICOTS](#))**

☐ No (answer reasons for exclusion)
☐ Yes (identify KQ)
☒ Unclear (screen article)

[Clear Response](#)

☐ No abstract available
☐ Other reason

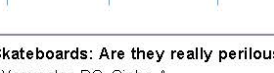
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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.
Rethnam U, Yesupalan RS, Sinha A.

and go to
or [Skip to Next](#)

KEY QUESTIONS

KQ1: Which [self-management](#) approaches are effective for prevention of weight gain in adults?
KQ2: Which [dietary](#) approaches are effective for prevention of weight gain in adults?
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KQ4: Which [medications](#) are effective for prevention of weight gain in adults?
KQ5: Which [combination of behavioral, dietary, physical activity, educational, and/or medication](#) approaches are effective for prevention of weight gain in adults?
KQ6: Which [environment-level](#) approaches are effective for prevention of weight gain in adults?

- ☐ non-English article (ID language)
- Does this title/abstract apply to any of the above Key questions? (see [PICOTS](#))**

☐ No (answer reasons for exclusion)
☒ Yes (identify KQ)

Include article for review
(if the article appears to apply to
KQs 1-5 AND KQ6, mark as applicable to KQ6).

☐ KQ 1: self-management
☐ KQ 2: diet
☐ KQ 3: physical activity
☐ KQ 4: medications
☐ KQ 5: combination (of above therapies or head to head comparisons)
☐ KQ 6: environment-level

[Clear Response](#)
- Exposure type

☐ Interventional
☒ Observational

[Clear Response](#)
- Comment

and go to
or [Skip to Next](#)

 Carmelasophia Project Adult Weight KQ1_5 (Switch) User renee.wilson (My Settings)
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KEY QUESTIONS

QK1: Which self-management approaches are effective for prevention of weight gain in adults?
QK2: Which dietary approaches are effective for prevention of weight gain in adults?
QK3: Which physical activity approaches are effective for prevention of weight gain in adults?
QK4: Which medications are effective for prevention of weight gain in adults?
QK5: Which combination of behavioral, dietary, physical activity, educational, and/or medication approaches are effective for prevention of weight gain in adults?
QK6: Which environment-level approaches are effective for prevention of weight gain in adults?

1.

☐ non-English article (ID language)

2. Does this title/abstract apply to any of the above Key questions? (see PICOTS)

- No (answer reasons for exclusion)

☐ Exclude article from review

- ☐ Does not report weight change over 1 year
- ☐ Goal of study is weight loss or weight maintenance after weight loss
- ☐ No intervention/exposure of interest
- ☐ No comparison group (e.g., case report, case series, all arms exposed to intervention)
- ☐ Study does not report outcome by exposure
- ☐ Qualitative study (focus group, directed interviews)
- ☐ Study population at risk for malnourishment or underweight (e.g., dialysis patients; anorexia)
- ☐ No original data
- ☐ Study of children only
- ☐ No human data reported
- ☐ Abstract only
- ☐ Does not apply to key questions

Clear Response

☐ Yes (identify KQ)
Clear Response

3. Exposure type

- ☐ Interventional
- ☒ Observational


Clear Response

8. Comment

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Study characteristics

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Yohs Chellakura

Reviewer10

Camellacisla

Margaret Petersen

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RefId: U2, Subheadings: Are they really perineous? A retrospective study from a district hospital.

RefName:U, Refs:U, Refs:U, Refs:U

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Study Characteristics

1. Should this study be included?

Yes

No

3. Is the study's stated goal weight maintenance/prevention of weight gain?

Yes

No/not reported

6. Does this study have a name?

Yes

No

Clear Response

9. Years of recruitment or calendar year

Start year

End Year

Not reported

10. Study Location (choose all that apply)

United States

Canada

Australia

Europe

Asia

Africa

Not reported

Other

11. Recruitment setting (choose all that apply)

Clinical (inpatient or outpatient)

Work place

Community/geographic (e.g., health fair, church, TV, newspaper, etc)

School

Membership (society, organization, etc)

Not reported

Other

12. Was the intervention, exposure or outcome collected at more than one site?

Yes

No

Unclear/not reported

13. Study Design

Randomized intervention

Non-randomized intervention

Cohort prospective

Cohort retrospective

Cross sectional

Ecological (population changes over time)

14. Duration of intervention (ONLY for interventional studies)

Participant characteristics

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ritu.sharma

Yoha.Chelladurai

Reviewer10

Carmela.sophia

Margaret.Peterson

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Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.
Rethnam U, Yesupalan R.S, Sinha A.

Submit Form and go to or Skip to Next

Participant Characteristics at Baseline

1. Total N at baseline

- ☐ N
- ☐ Not reported

INSTRUCTIONS:
If information is available for the total populations at baseline, complete the first column and ONLY the first column.
If information is only available by intervention/exposure groups, complete the Groups columns.
If information is not available by intervention/exposure groups, select *other* and briefly describe group.
If the Group Ns at baseline do not add up to the Total Population N at baseline, please contact the 2nd reviewer before abstracting.

Be consistent in Arm designations. This should match the Arm/Group you described in the Interventions form.
If the study is reported not only by intervention arm, but also by subgroup use the "other" option for the arm and describe.

Overall group	2. Arm 1 (always use for control) Leave blank if there is no control group	3. Arm 2	4. Arm 3	5. Arm 4	6. Arm 5
	Select an Answer	Select an Answer	Select an Answer	Select an Answer	Select an Answer
7. <input type="checkbox"/> N	8. <input type="checkbox"/> n	9. <input type="checkbox"/> n	10. <input type="checkbox"/> n	11. <input type="checkbox"/> n	12. <input type="checkbox"/> n

13. Follow-up time in months from the beginning of the intervention/exposure

- ☐ Mean
- ☐ Median
- ☐ Maximum

☐ Minimum

☐ Not reported

14. If follow-up time differs across groups, please comment

15. Sex

☒ reported

Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
16. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>	17. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>	18. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>	19. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>	20. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>	21. <div><div><input type="checkbox"/> women, n <input type="text"/></div><div><input type="checkbox"/> women, % <input type="text"/></div></div>

22. If sex differs by group, please describe

☐ not reported

23. Age

☒ reported

Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
24. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> Median <input type="text"/></div><div><input type="checkbox"/> Range <input type="text"/></div></div>	25. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> Median <input type="text"/></div><div><input type="checkbox"/> Range <input type="text"/></div></div>	26. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> Median <input type="text"/></div><div><input type="checkbox"/> Range <input type="text"/></div></div>	27. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> Median <input type="text"/></div><div><input type="checkbox"/> Range <input type="text"/></div></div>	28. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> Median <input type="text"/></div><div><input type="checkbox"/> Range <input type="text"/></div></div>	29. <div><div><input type="checkbox"/> mean <input type="text"/></div><div><input type="checkbox"/> median <input type="text"/></div><div><input type="checkbox"/> range <input type="text"/></div></div>

30. If age differs by group, please describe

☐ not reported

31. Race/ethnicity

☒ Reported

	Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
White, non-Hispanic	32. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	33. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	34. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	35. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	36. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	37. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
Black, non-Hispanic	38. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	39. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	40. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	41. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	42. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	43. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
Latino/Hispanic	44. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	45. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	46. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	47. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	48. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	49. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
Asian/Pacific Islander	50. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	51. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	52. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	53. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	54. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	55. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
American Indian/Alaska Native	56. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	57. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	58. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	59. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	60. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	61. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
62. Other <div><input type="text"/></div>	63. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	64. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	65. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	66. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	67. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	68. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
69. Other <div><input type="text"/></div>	70. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	71. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	72. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	73. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	74. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	75. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>
76. Other <div><input type="text"/></div>	77. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	78. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	79. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	80. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	81. <div><input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>	82. <div><input type="checkbox"/> 2n <input type="text"/> <input type="checkbox"/> % <input type="text"/></div>

83. If race/ethnicity differs by group, please describe

☐ not reported

84. Education

☒ Reported

	Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
< High School	85. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	86. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	87. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	88. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	89. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	90. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>
Completed High School	91. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	92. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	93. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	94. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	95. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	96. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>
College Degree	97. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	98. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	99. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	100. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	101. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	102. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>
Post-graduate Degree	103. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	104. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	105. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	106. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	107. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	108. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>
Years of education	109. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>	110. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>	111. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>	112. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>	113. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>	114. <input type="checkbox"/> mean <input type="text"/> <input type="checkbox"/> median <input type="text"/> <input type="checkbox"/> min <input type="text"/> <input type="checkbox"/> max <input type="text"/>
115. Other <input type="text"/>	116. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	117. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	118. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	119. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	120. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>	121. <input type="checkbox"/> n <input type="text"/> <input type="checkbox"/> % <input type="text"/>

122. Other <div></div>	123. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	124. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	125. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	126. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	127. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	128. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>
129. Other <div></div>	130. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	131. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	132. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	133. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	134. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	135. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>

136. If education differs by group, please describe

☐ not reported

137. Smoking

☒ reported

	Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
Current	138. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	139. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	140. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	141. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	142. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	143. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>
	144. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	145. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	146. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	147. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	148. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	149. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>
Ever	150. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	151. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	152. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	153. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	154. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	155. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>
	156. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	157. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	158. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	159. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	160. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>	161. <div><input type="checkbox"/> n <div></div><input type="checkbox"/> % <div></div></div>
Never						

162. If smoking status differs by group, please describe

☐ not reported

163. Duration of diabetes (years)

☒ reported

Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
164. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> Median</div><div><input type="checkbox"/> Range</div></div>	165. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> Median</div><div><input type="checkbox"/> Range</div></div>	166. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> Median</div><div><input type="checkbox"/> Range</div></div>	167. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> Median</div><div><input type="checkbox"/> Range</div></div>	168. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> Median</div><div><input type="checkbox"/> Range</div></div>	169. <div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div>

170. If duration of diabetes differs by group, please describe

☐ not reported

171. Diabetic medication use

☒ reported

Overall Group	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5
172. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>	173. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>	174. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>	175. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>	176. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>	177. <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> %</div></div>

178. If diabetes medication use differs by group, please describe


☐ not reported

179. Other Comments

180. **R2 only: If you are reviewing R1 data entry, enter your initials when you have completed the audit**

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 and go to or [Skip to Next](#)



ritu.sharma
Yoha.Chelladurai

Reviewer10
Carmelasophia

Margaret.Peterson

ProjectAdult Weight KO1_5 (Switch)Userrenee.wilson (My Settings)

Messages5 new

Live SupportUser Guide

ReviewDataramaReportsReferencesFormsManage LevelsUsersProjectLogout

Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.
Rethnam U, Yesupalan RS, Sinha A.

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ARM 1--always use for control group

1. Control (Arm 1)

☐ No control/all arms were active

☐ Usual care/no intervention

☐ Printed Materials

☐ Advice/counseling

☐ Delivery

☐ Other

5. Comment

6. Arm 2
(brief description or nickname: e.g., "ADA diet")

7. Duration of intervention, months

8. Interventions/Exposure

☒ Self-management

Self-management

CounselingFrequencyDelivery

1 of 7

4/3/2012 2:09 PM

C-17

9. <div></div>	10. <div><div><input type="radio"/> One time</div><div><input type="radio"/> One time/week</div><div><input type="radio"/> One time/month</div><div><input type="radio"/> Number of sessions <div></div></div><div><input type="radio"/> Other <div></div></div><div>Clear Response</div></div>	11. <div><div><input type="checkbox"/> In person</div><div><input type="checkbox"/> By Phone (do not use for text messages) <div></div></div><div><input type="checkbox"/> Other</div><div><input type="checkbox"/> Not reported</div></div>
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Use below to describe the self-management intervention

Intervention	Describe
Goal setting	12. <div></div>
Stress management	13. <div></div>
Cognitive behavioral therapy	14. <div></div>
Pedometer	15. <div></div>
Daily weighing	16. <div></div>
Food diary	17. <div></div>

TV viewing	18. <div></div>
Sleep time	19. <div></div>
Other	20. <div></div>

☒ Diet

Diet Counseling/Education

Define		Frequency (if applicable)	Delivery
21. <div></div>	22. <div><div>Education</div><div>Counseling</div><div>Structured program (Jenny Craig, Weight Watchers)</div><div>Feeding study</div><div>Clear Response</div></div>	23. <div><div>One time session</div><div>One time/week</div><div>One time/month</div><div>Number of sessions <div></div></div><div>Not applicable</div><div>Other <div></div></div></div>	24. <div><div>In person</div><div>By Phone (do not use for text messages) <div></div></div><div>Other <div></div></div></div>

Use below to describe the dietary intervention

Intervention	Describe
25. Calorie control/portion control <div><div>Calorie control</div><div>Portion control</div><div>Other</div></div>	26. <div></div>

<div>27. Intake</div> <div><input type="checkbox"/> Eating frequency</div> <div><input type="checkbox"/> Fruit/Vegetable rich</div> <div><input type="checkbox"/> Fiber</div> <div><input type="checkbox"/> Calorie replacement</div> <div><input type="checkbox"/> Meal replacement</div> <div><input type="checkbox"/> Calcium rich diet</div> <div><input type="checkbox"/> Mediterranean</div> <div><input type="checkbox"/> Vegetarian</div> <div><input type="checkbox"/> Other <input type="text"/></div>	<div>28.</div>
<div>Other</div>	<div>29.</div>

☒ Physical Activity

Physical activity counseling/education

Define		Frequency (if applicable)	Delivery
30. <div></div>	31. <div><div><input type="radio"/> Education</div><div><input type="radio"/> Counseling</div><div>Clear Response</div></div>	32. <div><div><input type="checkbox"/> One time session</div><div><input type="checkbox"/> One time/week</div><div><input type="checkbox"/> One time/month</div><div><input type="checkbox"/> Number of sessions<div></div></div><div><input type="checkbox"/> Not applicable</div><div><input type="checkbox"/> Other<div></div></div></div>	33. <div><div><input type="checkbox"/> In person</div><div><input type="checkbox"/> By Phone (do not use for text messages)</div><div><input type="checkbox"/> Other<div></div></div></div>

Exercise

	Frequency of sessions	Duration of sessions	Intensity
34. <div><div><input type="checkbox"/> Individual (running, lifting, swimming)</div><div><input type="checkbox"/> Group (classes, organized sports)</div><div><input type="checkbox"/> Other<div></div></div></div>	35. <div><div><input type="checkbox"/> Times/sessions per week<div></div></div><div><input type="checkbox"/> Times/sessions per month<div></div></div><div><input type="checkbox"/> Minutes per week</div><div><input type="checkbox"/> Number of sessions<div></div></div><div><input type="checkbox"/> Not applicable</div><div><input type="checkbox"/> Other<div></div></div></div>	36. <div><div><input type="checkbox"/> Minutes<div></div></div><div><input type="checkbox"/> Hours<div></div></div><div><input type="checkbox"/> Other<div></div></div></div>	37. <div><div><input type="checkbox"/> MET/hr</div><div><input type="checkbox"/> Calories per hour</div><div><input type="checkbox"/> Other<div></div></div></div>

38. Additional comments about exercise interventions

☒ Orlistat

39. Orlistat (describe)

☒ KQ6-community-level

40. KQ6 (community-level)

41. Arm 3

(brief description or nickname: e.g., "ADA diet")

42. Duration of intervention, months

43. Interventions/Exposure

- ☐ Self-management
- ☐ Diet
- ☐ Physical Activity
- ☐ Orlistat
- ☐ KQ6 (community-level)

76. **Arm 4**
(brief description or nickname: e.g., "ADA diet")

77. Duration of intervention, months

78. Interventions/Exposure

- ☐ Self-management
- ☐ Diet
- ☐ Physical Activity
- ☐ Orlistat
- ☐ KQ6 (community-level)

111. **Arm 5**
(brief description or nickname: e.g., "ADA diet")

112. Duration of intervention, months

113. Interventions/Exposure

- ☐ Self-management
- ☐ Diet
- ☐ Physical Activity
- ☐ Orlistat

☐ KQ6 (community-level)

146.

GENERAL COMMENTS

147. **R2 only:** If you are reviewing R1 data entry, enter your initials when you have completed the audit

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 and go to or [Skip to Next](#)

Weight Outcomes 1 of 4

<div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	<div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	<div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	<div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	<div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>
26. 24 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	27. 24 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	28. 24 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	29. 24 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	30. 24 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>
31. 24 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	32. 24 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	33. 24 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	34. 24 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	35. 24 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>
36. 60 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	37. 60 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	38. 60 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	39. 60 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>	40. 60 months, n <div><div><input type="checkbox"/> n</div><div><input type="checkbox"/> check if this is the last reported timepoint</div></div>
41. 60 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	42. 60 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	43. 60 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	44. 60 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>	45. 60 month measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div><div><input type="checkbox"/> SD</div><div><input type="checkbox"/> se</div><div><input type="checkbox"/> CI_LL</div><div><input type="checkbox"/> CI_UL</div><div><input type="checkbox"/> Mean change</div><div><input type="checkbox"/> strata (e.g. n BMI<25, n BMI 25-30,n BMI>30)</div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div>
46. Last reported time point (in months) <div><div></div></div>	47. Last reported time point (in months) <div><div></div></div>	48. Last reported time point (in months) <div><div></div></div>	49. Last reported time point (in months) <div><div></div></div>	50. Last reported time point (in months) <div><div></div></div>
51. Last reported, n <div><div></div></div>	52. Last reported, n <div><div></div></div>	53. Last reported, n <div><div></div></div>	54. Last reported, n <div><div></div></div>	55. Last reported, n <div><div></div></div>
56. Last reported measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div><div><div></div><div></div><div></div></div></div>	57. Last reported measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div><div><div></div><div></div><div></div></div></div>	58. Last reported measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div><div><div></div><div></div><div></div></div></div>	59. Last reported measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div><div><div></div><div></div><div></div></div></div>	60. Last reported measure <div><div><div><input type="checkbox"/> mean</div><div><input type="checkbox"/> median</div><div><input type="checkbox"/> range</div></div><div><div></div><div></div><div></div></div></div>

☐ SD
☐ SE
☐ CI_LL
☐ CI_UL
☐ mean change
☐ strata (e.g. n BMI<25, n BMI 25-30, n BMI>30)

☐ SD
☐ SE
☐ CI_LL
☐ CI_UL
☐ mean change
☐ strata (e.g. n BMI<25, n BMI 25-30, n BMI>30)

☐ SD
☐ SE
☐ CI_LL
☐ CI_UL
☐ mean change
☐ strata (e.g. n BMI<25, n BMI 25-30, n BMI>30)

☐ SD
☐ SE
☐ CI_LL
☐ CI_UL
☐ mean change
☐ strata (e.g. n BMI<25, n BMI 25-30, n BMI>30)

61. Describe test for trend or other comments

Measure of Association/Counts/Percentages/Events/Rate

62. Did study report a measure of association (between group difference)?

☒ Yes

63.

☒ 12 months

64. Define if measure of association is different from above.
(e.g., risk of obesity (BMI > 29.9), risk of + 3kg increase in weight)

Arm	N for analysis	Outcome measure	Denominator	Point estimate (Select one response)	Measure of variability (Select one response)	95% CI	P-value	Reference group
				Select an Answer	Select an Answer			
Arm 1 (control group) if no control group, leave this blank		<input type="checkbox"/> # patients w/ one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other	69. Select an Answer		71. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer
Arm 2		<input type="checkbox"/> # patients w/ one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> Other	77. Select an Answer		79. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer
Arm 3		<input type="checkbox"/> # patients w/ one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other	85. Select an Answer		87. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer

Arm 4	<input type="text"/>	<input type="checkbox"/> # patients w/ one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other	<div><div></div><div></div><div></div><div></div></div>	93. Select an Answer	<input type="text"/>	95.	<input type="text"/>	<input type="checkbox"/> LL <input type="text"/> <input type="checkbox"/> UL <input type="text"/>	<input type="text"/>	Select an Answer
Arm 5	<input type="text"/>	<input type="checkbox"/> # patients w/ one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other	<div><div></div><div></div><div></div><div></div></div>	101. Select an Answer	<input type="text"/>	103.	<input type="text"/>	<input type="checkbox"/> LL <input type="text"/> <input type="checkbox"/> UL <input type="text"/>	<input type="text"/>	Select an Answer

107. Were variables adjusted for?

☐ Yes
☐ No
[Clear Response](#)

☐ 24 months
☐ 60 months
☐ Other (in months)

☐ No
[Clear Response](#)

241. GENERAL COMMENTS

242. R2 only: if you are reviewing R1 data entry, enter your initials when you have completed the audit

Submit Form and go to or Skip to Next

Project Adult Weight KQ1_5 (Switch) User renee.wilson (My Settings)
Messages 5 new
[Live Support](#) [User Guide](#)

23. Last reported measure

☐ mean

☐ median

☐ range

☐ SD

☐ se

☐ CI_LL

☐ CI_UL

24. Last reported measure

☐ mean

☐ median

☐ range

☐ SD

☐ se

☐ CI_LL

☐ CI_UL

25. Last reported measure

☐ mean

☐ median

☐ range

☐ SD

☐ se

☐ CI_LL

☐ CI_UL

26. Last reported measure

☐ mean

☐ median

☐ range

☐ SD

☐ se

☐ CI_LL

☐ CI_UL

27. Last reported measure

☐ mean

☐ median

☐ range

☐ SD

☐ se

☐ CI_LL

☐ CI_UL

28. Describe between group differences

Measure of Association/Counts/Percentages/Events/Rate

29. Did study report a measure of association?

☒ Yes

30.

☒ 12 months

31. Define if measure of association is different from above.
(e.g., risk of obesity (BMI >29.9), risk of > 3kg increase in weight)

Arm	N for analysis	Outcome measure	Denominator	Point estimate (Select one response)	Measure of variability (Select one response)	95% CI	P-value	Reference group
				Select an Answer	Select an Answer			
Arm 1 (control group) If no control group,		<div><input type="checkbox"/> # patients with one or more events</div> <div><input type="checkbox"/> % patients with one or more events</div> <div><input type="checkbox"/> # events</div>	36. Select an Answer		38. <div></div>	<div><input type="checkbox"/> LL</div> <div><input type="checkbox"/> UL</div>		Select an Answer

leave this blank		<input type="checkbox"/> other							
Arm 2		<input type="checkbox"/> # patients wit one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other		44. Select an Answer		46. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer
Arm 3		<input type="checkbox"/> # patients wit one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other		52. Select an Answer		54. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer
Arm 4		<input type="checkbox"/> # patients wit one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other		60. Select an Answer		62. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer
Arm 5		<input type="checkbox"/> # patients wit one or more events <input type="checkbox"/> % patients with one or more events <input type="checkbox"/> # events <input type="checkbox"/> other		68. Select an Answer		70. 	<input type="checkbox"/> LL <input type="checkbox"/> UL		Select an Answer

74. Were variables adjusted for?

☐ Yes
☐ No
[Clear Response](#)

☐ 24 months
☐ 60 months
☐ Other (in months)

☐ No
[Clear Response](#)

208. GENERAL COMMENTS

209. R2 only: If you are reviewing R1 data entry, enter your initials when you have completed the audit

Submit Form

 and go to or [Skip to Next](#)



ritu.sharma
Yoha.Chelladurai

Reviewer10
Carmelasophia

Margaret.Peterson

ProjectAdult Weight KO1_5 (Switch)

Userrenee.wilson (My Settings)

Messages5 new

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Project

Logout

Refid: 12, Skateboards: Are they really perilous? A retrospective study from a district hospital.
Rethnam U, Yesupalan RS, Sinha A.

Submit Form

 and go to or [Skip to Next](#)

Checklist for measuring study quality

Reporting

Question	Description	Answer
1. Is the hypothesis/aim/objective of the study clearly described?		1. <div><input type="radio"/> Yes</div> <div><input type="radio"/> No</div>
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?	<i>If the main outcomes are first mentioned in the Results section, the question should be answered 'no.'</i>	2. <div><input type="radio"/> Yes</div> <div><input type="radio"/> No</div>
3. Are the characteristics of the patients included in the study clearly described?	<i>In cohort studies and trials, inclusion and/or exclusion criteria should be given. In case-control studies, a case-definition and the source for controls should be given.</i>	3. <div><input type="radio"/> Yes</div> <div><input type="radio"/> No</div>
4. Are the interventions of interest clearly described?	<i>Treatments and placebo (where relevant) that are to be compared should be clearly described.</i>	4. <div><input type="radio"/> Yes</div> <div><input type="radio"/> No</div>
5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?	<i>A list of principal confounders is provided.</i>	5. <div><input type="radio"/> Yes</div> <div><input type="radio"/> Partially</div> <div><input type="radio"/> No</div>

6. Are the main findings of the study clearly described?	Simple outcome data (including denominators and numerators) should be reported for all major findings so that the reader can check the major analyses and conclusions. (This question does not cover statistical tests which are considered below).	6. <input type="radio"/> Yes <input type="radio"/> No
7. Does the study provide estimates of the random variability in the data for the main outcomes?	In non-normally distributed data the inter-quartile range of results should be reported. In normally distributed data the standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered 'yes.'	7. <input type="radio"/> Yes <input type="radio"/> No
8. Have all important adverse events that may be a consequence of the intervention been reported?	This should be answered 'yes' if the study demonstrates that there was a comprehensive attempt to measure adverse events. (A list of possible adverse events is provided).	8. <input type="radio"/> Yes <input type="radio"/> No
9. Have the characteristics of patients lost to follow-up been described?	This should be answered 'yes' where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered 'no' where a study does not report the number of patients lost to follow-up.	9. <input type="radio"/> Yes <input type="radio"/> No
10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?		10. <input type="radio"/> Yes <input type="radio"/> No

External Validity

Question	Description	Answer
11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?	The study must identify the source population for patients and describe how the patients were selected. Patients would be representative if they comprised the entire source population, an unselected sample of consecutive patients, or a random sample. Random sampling is only feasible where a list of all members of the relevant population exists. Where a study does not report the proportion of the source population from which the patients are derived, the question should be answered 'unable to determine.'	11. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?	The proportion of those asked who agreed should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population.	12. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority	For the question to be answered 'yes' the study should demonstrate that the intervention was representative of that in use in the source population. The question should be answered 'no' if, for example, the intervention was undertaken in a specialist center unrepresentative of the hospital's most of the source population would attend.	13. <input type="radio"/> Yes

of patients receive?

- ☐ No
- ☐ unable to determine

Internal Validity-bias

Question	Description	Answer
14. Was an attempt made to blind study subjects to the intervention they have received?	<i>For studies where the patients would have no way of knowing which intervention they received, this should be answered 'yes.'</i>	14. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine
15. Was an attempt made to blind those measuring the main outcomes of the intervention?		15. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine
16. If any of the results of the study were based on "data dredging", was this made clear?	<i>Any analyses that had not been planned at the outset of the study should be clearly indicated. If no retrospective unplanned subgroup analyses were reported, then answer 'yes.'</i>	16. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine
17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?	<i>Where follow-up was the same for all study patients the answer should be 'yes.' If different lengths of follow-up were adjusted, for example, by survival analysis, the answer should be 'yes.' Studies where differences in follow-up are ignored should be answered 'no.'</i>	17. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine
18. Were the statistical tests used to assess the main outcomes appropriate?	<i>The statistical techniques used must be appropriate to the data. For example nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered 'yes.' If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered 'yes.'</i>	18. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine
19. Was compliance with the intervention/s reliable?	<i>Where there was non-compliance with the allocated treatment or where there was contamination of one group, the question should be answered 'no.' For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered 'yes.'</i>	19. <ul style="list-style-type: none"><input type="radio"/> Yes<input type="radio"/> No<input type="radio"/> unable to determine

20. Were the main outcome measures used accurate (valid and reliable)?	For studies where the outcome measures are clearly described, the question should be answered 'yes.' For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered 'yes.'	20. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
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Internal Validity-confounding and selection bias

Question	Description	Answer
21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?	For example, patients for all comparison groups should be selected from the same hospital. The question should be answered unable to determine for cohort and case-control studies where there is no information concerning the source of patients included in the study.	21. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?	For a study which does not specify the time period over which patients were recruited, the question should be answered as unable to determine.	22. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
23. Were study subjects randomized to intervention groups?	Studies which state that subjects were randomized should be answered yes except where method of randomization would not ensure random allocation. For example alternate allocation would score no because it is predictable.	23. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?	All non-randomized studies should be answered 'no.' If assignment was concealed from patients but not from staff, it should be answered 'no.'	24. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?	This question should be answered 'no' for trials if: the main conclusions of the study were based on analyses of treatment rather than intention to treat; the distribution of known confounders in the different treatment groups was not described; or the distribution of known confounders differed between the treatment groups but was not taken into account in the analyses. In non-randomized studies, if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered 'no.'	25. <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> unable to determine
26. Were losses of patients to follow-up taken into account?	If the numbers of patients lost to follow-up are not reported, the question should be answered 'unable to determine.' If the proportion lost to follow-up was too small to affect the main findings, the question should be answered 'yes.'	26. <input type="radio"/> Yes

Power

Question	Description	Answer
27. Did they report a power calculation?		27. <div><div><input type="radio"/> Yes</div><div><input type="radio"/> No</div></div>

28. Comments

Submit Form

 and go to or [Skip to Next](#)

- ☐ No
- ☐ unable to determine

Appendix D. List of Excluded Articles

Does not report weight change over 1 year

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Appendix E. Evidence Tables

Table 1. Characteristics of studies on populations with no specific diseases or conditions

Author, year	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control
Study Location							Active Intervention
Trials							
Bhargava, 2002 ¹ United States	1991-Not reported	Multicenter	Community/geographic Clinical	Randomized intervention	Female only Age: 50-79 Not greater than 165% of ideal weight as judged by the 1983 Metropolitan Life Insurance Weights tables for a medium frame Post-menopausal Representative of 1990 Census for recruitment area Include if consume >36% of energy from fat as reported in food frequency questionnaire No history of any cancer other than effectively treated non melanoma skin cancer or carcinoma in-situ of the cervix No history of stroke or coronary artery disease No history of disease that might make two-year survival questionable No use of physician-prescribed drugs to alter blood lipids, including > 1 g per day of niacin No history of insulin-dependent diabetes mellitus or uncontrolled hyperglycemia No evidence of unstable mental disease, alcoholism, or substance abuse; No likelihood of being unavailable for a significant portion of the 2-year follow-up period; Not eating > 10 meals a week not prepared at home; Not greater than 165% of ideal weight as judged by the 1983 Metropolitan Life Insurance Weights tables for a medium frame; Able to provide reliable dietary information during the pre-randomization period or did not completed 4 day food recall during pre-randomization period; Ability or willingness to sign the Informed Consent Form.	No	Diet related education materials Diet

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Trials							
					Pass medical screening		
Burke, 2003 ² Australia	Not Reported	Unclear	Community/geographic	Randomized intervention	Couples in Perth, Western Australia, cohabiting for the first time, not living together for more than 2 years, intending to reside in Perth for the length of the study, and not planning a pregnancy during the time of the intervention. No illnesses such as heart disease, diabetes, or severe asthma.	No	No intervention Combination of Diet and Physical Activity (Two active arms with different levels of intensity)
Fortmann, 1981 ³ United States	1972	Multicenter	Community	Non- randomized intervention	Age 35-59 years Resident of Watsonville, Gilroy, or Tracey, CA English or Spanish speaking	No	No intervention Two combination interventions Mass media & direct mail educational campaigns on diet and physical activity Small group instruction + mass media & direct mail educational campaigns on diet and physical activity
French, 2011 ⁴ United States	Not Reported	Multicenter	School Community/geographic Clinical	Randomized intervention	Age: >12 At least one child ages ≥5 years and two household members ages ≥12 years Residence in a private house or apartment within 20 miles of the university Household TV viewing weekly average of ≥10 h per person No household members with dietary, medical, psychological, or physical limitations that would prevent their participation in intervention activities Willingness to be randomized to active intervention or control group.	Yes	No intervention Combination of Self-management, Diet, Physical Activity
Howard, 2006 ⁵ ⁶ United States	1993-1998	Multicenter	Community	Randomized intervention with self- selected control group	Female only Age: 50-79 Post-menopausal Fat intake of at least 32% of daily total calories Expectation of being resident in the study recruitment area for at least 3 years following enrollment	No	Diet and health related education materials Dietary pattern low in fat with increased fruits, vegetables and grain intake.

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Trials							
					<p>No competing risks (invasive cancer in the past 10 years; breast cancer at any time or suspicion of breast cancer at baseline screening; acute myocardial infarction, stroke, or transient ischemic attack in the previous 6 months; known chronic active hepatitis or severe cirrhosis)</p> <p>No safety concerns (blood counts indicative of disease; severe hypertension; or currently use of oral corticosteroids)</p> <p>No adherence or retention concerns (unwillingness or inability to complete baseline study requirements)</p> <p>Not found to have femoral neck bone mineral density of more than three standard deviations below the corresponding age-specific mean</p> <p>No medical conditions predictive of a survival time of less than 3 years</p> <p>Not known to have conditions or characteristics inconsistent with study participation and adherence (alcoholism, drug dependency, mental illness, dementia)</p> <p>Not active participants in another randomized controlled clinical trial</p> <p>No special dietary requirements that were incompatible with the intervention program</p> <p>Not eating 10 or more main meals per week that were prepared outside the home</p> <p>Not unable to complete satisfactorily a 4-day food record</p> <p>No having been diagnosed with colon cancer, type I diabetes mellitus, or gastrointestinal conditions that contraindicated a high-fiber diet</p> <p>No history of having a bilateral prophylactic mastectomy</p> <p>(some inclusion criteria abstracted from ⁶)</p>		
Lamb, 2002 ⁷ Europe	Not Reported	Single	Clinical	Randomized intervention	<p>Age: 40-70</p> <p>include if take less than 120 minutes of moderate intensity exercise per week</p> <p>Include if no serious medical problem</p> <p>No recent history of an illness likely to interfere with the ability to walk one mile safely, including serious</p>	No	<p>Advice on Physical Activity</p> <p>Group Physical Activity Sessions</p>

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Trials							
					cardiac or respiratory diagnoses, lower limb fractures in the last year, blindness, rheumatoid arthritis, chronic neurological, terminal or significant mental illness. No doctor's restrictions on exercise.		
Levine, 2007 ⁸ United States	Not Reported	Unclear	Work place Community/geographic	Randomized intervention	Female only Age: 25-44 BMI: 21-30 In good health according to a self-report questionnaire Not pregnant in past year Not in a weight loss program Not receiving treatment for a psychiatric disorder Not taking medication affecting body weight during past 3 months Not planning to relocate within next 36 months Able to engage in moderate physical activity or make change to diet	Yes	Printed materials Combination of Self-management, Diet, Physical Activity delivered in person Combination of Self-management, Diet, Physical Activity delivered by mail
Lombard, 2010 ⁹	2006	Multicenter	School of children	Randomized intervention	Female only BMI >18.4 Mothers of children 5-12 Not pregnant, Not breastfeeding infants under 6 months of age Not taking prescribed weight control medications No wish to gain weight No serious physical or psychological condition that might affect their ability to complete outcome measures or to participate fully	Yes	Single educational session Combination of Self-management, Diet and Physical Activity
Muscari, 2010 ¹⁰ Europe	2003	Single	Community/geographic	Randomized intervention	Age: >65 BMI: >18-32 Include if resident of Pianoro municipality (northern Italy) Include if Mini Mental State Examination (MMSE) score >24 Include if systolic blood pressure <180 or >110 mmHg Include if diastolic blood pressure <110 mmHg Include if resting heart rate >60/min Include if hemoglobin >11 g/dl No malignancy; No moderate or severe respiratory insufficiency;	No	Educational materials about suggestions to improve lifestyle, including individualized self-administered programs to increase physical activity Physical Activity

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Trials							
					No severe arthritis, No recent fractures, No palsy or relevant neuro-motor deficits; No use of beta-blockers, digitalis or other heart rate Limiting drugs. No Resting echocardiogram with ischemic changes, frequent premature beats, II or III degree atrioventricular block, left bundle branch block, atrial fibrillation or other tachyarrhythmia, artificial pacemaker, echocardiographic demonstration of moderate or severe valvular stenosis or regurgitation, aortic root dilatation, hypertrophic cardiomyopathy non-secondary to hypertension, left ventricular ejection fraction <50%, abdominal ultrasound demonstration of aortic aneurism >3.5 cm. No previous cardiovascular diseases		
Petrella, 2003 ¹¹ Europe	1998	Multicenter	Clinical	Randomized intervention	Age: >65 Include if healthy, community dwelling Include if no formal participation in a regular exercise training program Include if agreed to obtain their usual medical care at the clinic from which the intervention was delivered for the duration of the study (which may have been different than recruitment clinic). No presence of unstable medical conditions that would preclude safe participation in regular exercise, including myocardial infarction or stroke in the past 6 months, No evidence of ischemia during baseline exercise testing, New York Heart Association class 2 to 4 congestive heart failure, severe chronic obstructive pulmonary disease, active treatment of cancer, uncontrolled diabetes mellitus, severe systemic or musculoskeletal disease, or major psychiatric disease Ability to walk on a treadmill without assistance Not currently living in a long-term care facility.	Yes	Advice, Printed Materials, list of facilities Physical Activity
Schmitz, 2007 ¹² United States	2002-2003	Multicenter	Community/geographic	Randomized intervention	Female only Age: 25- 44 BMI: 25- 35 <10% change in body weight during past year	Yes	Printed Materials Physical Activity

Author, year	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control
Study Location							Active Intervention
Trials							
					Pre-menopausal Sedentary or only modestly physically active (<=3 weekly sessions of moderate aerobic physic activity) Non-smoker Not participating in a weight-loss program No physician-diagnosed menstrual irregularities or significant gynecologic conditions No positive response on the Physical Activity Readiness Questionnaire No history of strength training in the past 6 months No medical conditions or medications that could limit participation in the exercise program or affect study measurements (including cholesterol-lowering medications, psychiatric medications at dosages known to alter weight, appetite suppressants) Not currently or recently pregnant Not currently or recently lactating No uncontrolled hypertension (systolic > 160 or diastolic > 99) No history of cancer within the past 5 years No plans to be out of town for >3 consecutive weeks during the study		

Author, year Study Location	Years of recruitment	Single or Multicenter	Recruitment setting	Study Design	Inclusion criteria	Original cohort's stated goal is weight maintenance	Exposures of interest
Observational Studies							
Adair, 2011 ¹³ United States	1982-1984	Multicenter	Community	Prospective cohort	Women Pregnant when recruited Residing in metropolitan Cebu, Phillipines	No Original goal was regional health and nutrition monitoring	Diet Occupational physical activity
Berry, 2010 ¹⁴ Canada	2002	Multicenter	Community	Prospective longitudinal	Age: ≥18 years Living within Edmonton city limits Did not move between 2002 & 2008 Completed survey in 2002 & 2008	No Original goal to assess and monitor heath issues, health determinants, and risk factors	Neighborhood walkability Traffic Physical activity Fruits and vegetables
Bes-Rastrollo, 2008 ¹⁵ Spain	1999	Single center	Graduates of an university	Prospective cohort	Not on extreme low or high values for total energy intake Not with diagnosis of CVD, diabetes or cancer at baseline Not pregnant Weight not >170kg University graduate	Yes	Consumption of meals outside the home
Lee, 2011 ¹⁶ United States	1992	Multicenter	Subanalysis of trial among female health professionals	Subanalysis of RCT	Females only Healthcare professional No coronary heart disease, cerebrovascular disease, cancer (except nonmelanoma skin cancer), and other major chronic illnesses	No Trial of low-dose aspirin and vitamin E to prevent cardiovascular disease and cancer	MET hours per week
Lewis 1997 ¹⁷ United States	1985-1986	Multicenter	Community based or membership in a prepaid healthcare plan	Prospective cohort	18 to 30 years old	No Study the determinants and evolution of cardiovascular risk factors	Calories from fat Change in exercise duration during treadmill test

Author, year Study Location	Years of recruitment	Single or Multicenter	Recruitment setting	Study Design	Inclusion criteria	Original cohort's stated goal is weight maintenance	Exposures of interest
Observational Studies							
						among young adults	
Mozaffarian 2011 ¹⁸ United States	1976-1986	Multisite	Membership in health professionals organization	Prospective cohort	Age: ≤65 years No obesity, diabetes, cancer, cardiovascular, pulmonary, renal or liver disease at baseline No missing data on baseline lifestyle habits No implausible energy intake No more than nine missing responses on diet questionnaire Not pregnant during followup Female nurse or male health professional	No Original goals to study long-term effects of oral contraceptives; oral contraceptives, diet and lifestyle risk factors; and nutritional factors related to serious illnesses like cancer, heart disease and other vascular diseases	Consumption of fruits, vegetables, nuts, whole-fat dairy foods (butter, cheese, whole-fat milk), low-fat dairy foods (low-fat or skim milk, yogurt), potato chips, potatoes (French fried, boiled, baked or mashed), whole grains, refined grains, sugar- sweetened beverages, 100% fruit juice, diet soda, sweets or desserts, processed meats, unprocessed red meats, trans fat, fried foods (consumed at home, consumed away from home) Physical activity (MET hours/week) Total hours of daily sleep Total hours of daily television watching
Pereira 2005 ¹⁹ United States	1985-1986	Multicenter	Community based or membership in a prepaid healthcare plan	Prospective cohort	18 to 30 years old Attended examination at 15 years No missing data on fast food, bodyweight or important covariates at baseline or followup Not pregnant or breastfeeding at baseline or within 180 days of year 15 No suspected type 1 diabetes based on insulin treatment	No Original goal to study risk factors for cardiovascular disease	Number of times per week ate fast food Change in number of days per week at fast food between baseline and year 15
Purslow 2008 ²⁰ United Kingdom	1993-1997	Multisite	Community/geographic	Prospective cohort	Attended a health check Had a measure of weight change No history of stroke, cancer or heart attack at baseline Complete food diary data	No Original goal to study nutritional risk factors for cancer	Percent of daily energy intake consumed at breakfast
Schulz 2005 ²¹ Germany	1994-1998	Multisite	Community/geographic	Prospective cohort	No exclusions	No Original goal to	Quintile of high-fiber/low-fat eating pattern

Author, year	Years of recruitment	Single or Multicenter	Recruitment setting	Study Design	Inclusion criteria	Original cohort's stated goal is weight maintenance	Exposures of interest
Observational Studies							
						study nutritional risk factors for cancer	
Vioque, 2007 ²² Spain	1994	Multisite	Community/geographic	Cross-sectional	Alive during follow-up period Not pregnant	No Original goal was a cross-sectional health and nutrition survey	Quartiles of fruits and vegetable consumption based on responses to food frequency questionnaires

BMI = Body Mass Index; CVD = Cardiovascular Disease; g/dl = grams per decliter;Kg = kilogram; MET = Metabolic equivalent of task; mmHg = millitre of mercury (blood pressure measurement unit; MMSE = Mini Mental State Examination; RCT = Randomized Clinical Trials

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Table 2. Participant characteristics in studies reporting on groups without specific diseases or conditions

Author, year	Baseline N	Follow-up Period, months	% Women	Age, years	Race	Education	Smokers	Comments
Adair, 2011 ¹	3055	Maximum: 276	100	Mean 27.1	NR	NR	NR	
Berry, 2010 ²	4175, 2362 of whom consented to be contacted in future studies	72	50.0	19.6% 18-24 21.3% 25-34 21.3% 35-49 19.8% 50-64 18.1% 65 and older	NR	65.1% greater than high school	NR	Denominator based on 2,362 who approved to be contacted in the future
Bes-Rastrollo, 2008 ³	18, 494	Mean 52.8	64.7	Mean 37 years	NR	100% university graduates	22.8% current 29.2% former	Demographics based on the 9182 analyzed
Bhargava, 2002 ⁴	926	Maximum : 18-Not reported	100	Arm1: mean : 59.9 Arm2: mean : 60.1	White overall: % : 54 Black overall: % : 28 Hispanic overall: % : 16	Education levels were coded into four categories that increased with the years of education (1-4). Value reported is mean of 0-4 category: Arm1: N : 2.91 Arm2: N : 2.98	Current smoker, overall: % : 9.3	Only 12 months of follow-up included in 23667. 2,208 women randomized according to Bowen study—only those with complete info at 6 and 12 months included in 23667—baseline here are for those with complete data
Burke, 2003 ⁵	137	Maximum : 12	Sex reported differently by group: 137 couples were recruited. i.e. 137 females and 137 males.	Age reported differently by group: The mean age was 28.6 years in women (range 18–62) and 31.4 years in men (range 20–61).	NR	NR	Smoking reported differently by group: “Smokers”—assume current	
Fortmann, 1981 ⁶	2151 Arm1: n: 659 Arm2: n: 659 Arm3: n: 833	36	NR	Arm1: mean: 46.9 Arm2: mean: 45.8 Arm3: mean: 48.4	Spanish speaking or bilingual: Arm1, %: 9.0 Arm2, %: 26.2 Arm3, %: 17.8	NR	NR	
French, 2011 ⁷	90 households	Median : 12 Maximum : 12	93 Sex reported differently by	Median : 41	White overall: % : 79	College degree, overall: % : 63	NR	90 households. Average household included 4 people (2 adults, 2 kids). Demographics are for main responder of

Author, year	Baseline N	Follow-up Period, months	% Women	Age, years	Race	Education	Smokers	Comments
			group: main responder of household					the household.
Howard, 2006 ^{8 9}	48835	Mean : 90	100	Mean : 62.3	White: Arm1: N : 23890 Arm2: N : 15869 Black: Arm1: N : 3129 Arm2: N : 2137 Hispanic: Arm1: N : 1099 Arm2: N : 755 Asian/Pacific Islander: Arm1: N : 674 Arm2: N : 433 American Indian/Alaska Native: Arm1: N : 115 Arm2: N : 88 Unknown overall: Arm1: N : 387 Arm2: N : 259	Less than High school: Arm1: N : 1373 Arm2: N : 842 High school: Arm1: N : 5093 Arm2: N : 3425 College degree: Arm1: N : 7445 Arm2: N : 11042 School after high school: Arm1: N : 11597 Arm2: N : 7711	Current smoker,: Arm1: N : 1977 Arm2: N : 1273	History of diabetes: 1783 (Arm 1) vs. 1165 (Arm 2)
Lamb, 2002 ¹⁰	260	Maximum : 12	Arm1: 51.1 Arm2: 56.9 Arm3: 56.9 Arm4: 56.9	Arm1: mean : 50.2 Arm2: mean : 51.2	NR	NR	NR	
Lee, 2010 ¹¹	39876	Maximum: 144	100	54.2	94-95%	17-24% postgraduate education	8-16% current smokers	
Levine, 2007 ¹²	284	Maximum : 36	100	Overall: mean : 35.6	White overall: 86.8% White overall: Arm1: N : 78 % : 85.7	College degree, overall: % : 64.3	Current smoker, overall: Arm1: N : 5 % : 5.3 Arm2: N : 11	

Author, year	Baseline N	Follow-up Period, months	% Women	Age, years	Race	Education	Smokers	Comments
					Arm2: N : 82 % : 85.4 Arm3: n : 84 % : 89.4 Black overall: Arm1: N : 13 % : 14.3 Arm2: N : 14 % : 14.6 Arm3: n : 10 % : 10.6 Race reported differently by group: Race defined without information about Hispanic ethnicity		% : 11.8 Arm3: n : 8 % : 8.2	
Lewis, 1997 ¹³	5115	Maximum: 84	54	24-25	48% White 52% African American	13-15 years	26-37% current smokers 53-60% never smokers	
Lombard, 2010 ¹⁴	250	Maximum: 12	100	Mean: 40	NR	28-30% university or higher 20-28% trade or certificate 21-22% through year 12 21-30% through year 10	NR	
Mozaffarian 2011 ¹⁵	120877	Maximum: 240	81.3	Mean at baseline Nurses Health study 52.2 Nurses Health Study II 37.5 Health Professionals Follow-up Study 50.8	NR	100% nurses or health professionals	NR	
Muscari, 2010 ¹⁶	120	Maximum : 12	Overall: Arm1: 50	Arm1: mean : 69.6 Arm2: mean : 68.8	NR	Years of education,:	Former smoker, overall: % : 31.0	COPD, hypertension, hypercholesterolemia and statin treatment

Author, year	Baseline N	Follow-up Period, months	% Women	Age, years	Race	Education	Smokers	Comments
			Arm2: 46.7 Arm3: 46.7 Arm4: 46.7			Arm1: median : 5 Arm2: median : 8	Never smoker, overall: % : 59.6 Smoking reported differently by group: From Bowen (n=over 2,000 women)	also reported
Pereira, 2005 ¹⁷	5115	Maximum: 180	52	25.1 in 1985-1986	52% White 48% Black	NR	NR	
Petrella, 2003 ¹⁸	284	Maximum : 12	Arm1: 46 Arm2: 50 Arm3: 50 Arm4: 50	Arm1: mean : 73 Arm2: mean : 74	NR	Less than high school,: Arm1: N : 42 % : 38 Arm2: N : 59 % : 45 High school,: Arm1: N : 68 % : 62 Arm2: N : 72 % : 54	NR	Baseline characteristics for those who completed the study, not all randomized.
Purslow, 2008 ¹⁹	25631	Maximum: 60	NR	59-63	NR	NR	6-14% current 41-44% former 45-50% never	Demographics for 6,764 with complete data. They were comparable to entire cohort.
Schmitz, 2007 ²⁰	164	Maximum : 24	100	Arm1: mean : 36 Arm2: mean : 36	White: Arm1: N : 50 Arm2: N : 48 Black: Arm1: N : 22 Arm2: N : 24 Asian, native American, pacific islander overall: Arm1: N : 10 Arm2: N : 10	College degree,: Arm1: N : 65 Arm2: N : 73 Arm3:	NR	
Schulz, 2005 ²¹	27548	Mean: 52.8 Maximum: 90	60.5	50	NR	NR	NR	

Author, year	Baseline N	Follow-up Period, months	% Women	Age, years	Race	Education	Smokers	Comments
Vioque, 2007 ²²	1,799	Maximum:120	56.8	Mean 41.52	NR	38.8% Secondary school or higher	Current smokers: 33.0%	

COPD = Chronic obstructive pulmonary disease; N = Sample Size; NR = Not Reported

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Table 3. Description of observational exposures in studies among adults in the general population

Author, year				
Study name*				
Mean duration of followup	Primary aim of original cohort	Self-Management Measures	Dietary Measures	Physical Activity Measures
Studies reporting on more than 1 approach				
Adair 2011 ¹ Cebu Longitudinal Health and Nutrition Survey 24 months Median duration	Prospective study of infant feeding patterns among Filipino women	None reported	Energy intake in kilojoules per day, protein intake as a percent of energy	Occupational physical activity
Berry, 2011 ² Not reported; responders to two cross-sectional surveys	Survey the health of residents of Edmonton, Canada	None reported	Fruit and vegetable consumption, five servings per day threshold	Physical activity during last week (METs) Neighborhood walkability (measured on community level) Traffic (measured on community level)
Lewis 1997 ³ Pereira 2005 ⁴ Coronary Artery Risk Development in Young Adults Mean duration not reported	Prospective study of cardiovascular risk factors in young adults	None reported	Percent calories from fat ³ , Fast food consumption per week ⁴	Exercise duration in seconds from a treadmill test ³
Mozaffarian 2011 ⁵ Nurses' Health study Nurses' Health Study II Health Professionals' Follow-up Study Mean duration not reported	Prospective study of cancer and cardiovascular disease risk factors in married female nurses Prospective study of modifiable risk factors for health problems affecting younger women in female nurses Prospective study of nutritional factors and serious illnesses including cancer and cardiovascular disease in male health professionals	Daily hours of sleep, Television watching in hours per day	Fruits, Vegetables, Nuts, Whole-fat dairy foods, Low-fat dairy foods, Potato chips, Potatoes, Whole grains, Refined grains, 100% fruit juice, Sugar-sweetened beverages, Diet soda, Sweets and desserts, Processed meats, Unprocessed red meats, Trans fat, Fried foods, Quintiles of eating pattern	Metabolic equivalent of task (MET) hours per week, Quintiles of physical activity
Studies reporting on a dietary approach				

Author, year				
Study name*				
Mean duration of followup	Primary aim of original cohort	Self-Management Measures	Dietary Measures	Physical Activity Measures
Bes-Rastrollo 2009 ⁶ Seguimiento Universidad de Navarra Duration 4.4 years	Prospective study of diet and chronic diseases, including obesity among graduates of a Spanish university	None reported	Eating meals away from home	None reported
Purslow 2008 ⁷ European Prospective Investigation into Cancer and Nutrition Duration 3.7 years	Prospective study of nutrition and cancer in 10 European countries, Norfolk cohort	None reported	Percent of daily energy intake consumed during breakfast	None reported
Schulz 2005 ⁸ European Prospective Investigation into Cancer and Nutrition Duration 4.4 years	Prospective study of nutrition and cancer in 10 European countries, Potsdam cohort	None reported	Quintiles of high-fiber/ low fat food pattern score	None reported
Vioque 2008 ⁹ Duration not reported	Followup study of responders to a cross-sectional health and nutrition survey in Valencia and Alicante, Spain	None reported	Fruits, Vegetables	None reported
Study reporting on a physical activity approach				
Lee 2010 ¹⁰ Women's Health Study Duration 13.1 years	Trial of low dose aspirin and vitamin E to prevent cardiovascular disease and cancer in female health professionals	None reported	None reported	Metabolic equivalent of task (MET) hours per week

METs = Metabolic equivalent of task
839 Study name listed only if applicable

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Table 4. Description of interventions in studies among adults in the general population

Author, year Study name* Duration of Intervention	Primary Aim	Group 1	Group 2
Diet Interventions			
Bhargava 2002 ¹ Women's Health Trial Feasibility Study in Minority Populations (WHTFSMP) Duration 1 year [†]	Reduce energy intake from fat, especially saturated fat, to 20% of caloric intake. Increase consumption of fruits, vegetables and grains.	Maintained usual diet. Received information on nutrition guidelines.	18 group sessions with a dietician over 1 year. During the sessions, the participants performed role playing activities, provided support and reinforcement and solved problems.
Howard 2006 ^{2,3} Women's Health Initiative (WHI) Duration 8 – 12 years [†]	Study the effect of a low-fat, high fruit, vegetable and grain diet on breast cancer, colorectal cancer and heart disease.	Received information on nutrition guidelines.	18 group sessions with a dietician during the first year. Four group sessions per year for remaining years. Sessions promoted dietary and behavioral changes to reduce total dietary fat to 20% of caloric intake, increase fruit and vegetable intake to 5 or more servings per day, increase grains, preferably whole grains, to 6 or more servings daily. Encouraged to maintain usual energy intake by replacing calories from fat with other sources, like carbohydrates.
Physical Activity Interventions			
Lamb 2002 ⁴ Duration 1 year	Study walking program on physical activity levels, physiological and behavioral consequences.	Single 30-minute group session with physiotherapist. The session included benefits of exercise, recommended levels of exercise for adults based on published guidelines, tips to start and maintain an exercise program. Participants were encouraged to take at least 120 minutes of moderate intensity activity per week using an activity enjoyable and convenient to them.	Same 30-minute session as Group 1. Participants were also provided with oral and written information on local walking programs. A local walking coordinator also called each person after the session to further explain the program and invite them to join. Group and individual walking programs were offered over the phone and in the mail. Up to three phone calls were made during year to encourage people to join the program. Family and friends were encouraged to participate in the walks.
Muscari 2010 ⁵ Pianoro Study Duration 1 year	Study physical activity and cardiovascular risk.	Educational materials to improve lifestyle including physical activity	Three hourly group sessions per week of endurance exercise training supervised by Exercise and Sports Sciences researchers.
Petrella 2003 ⁶ Step Test Exercise	Compare the effect of an exercise prescription intervention on fitness.	Physician-provided exercise counseling at baseline 3, 6 and 12 months including examples and benefits of exercises.	Physician-provided exercise counseling at baseline 3, 6 and 12 months including examples and benefits of exercises. Physician administered a stepping test and recorded

Prescription (STEP) Project					stepping time and heart rate at the visits. Patients received a target exercise heart rate based on the results of the step test.
Duration1 year					
Schmitz 2007 ⁷ Strong, Health and Empowered (SHE) Duration 2 years [‡]	Assess efficacy of twice weekly strength training to prevent increases in body fat percentage and intra-abdominal fat.	Maintained usual diet. Received information on physical activity guidelines, with a focus on starting a walking program.			Maintained usual diet. Received a 2 year membership to a fitness center. Twice weekly 1-hour group sessions with a fitness professional for the first 4 months. Group sessions every 3 months for the remaining 20 months. During sessions, participants taught how to stretch, warm up, cool down, abdominal and low back strengthening exercises and strength training using machines and free weights. Fitness trainers made reminder calls if participants missed a week of sessions. Fitness trainers were available by phone, email or at the gym. Other components included social gatherings, a study website, a monthly newsletter and free childcare for 2 hours per session.
Combination interventions	Unit of intervention	Primary Aim	Group 1	Group 2	Group 3
Burke 2003 ⁸ Duration 4 months	Couples	Encourage adoption or maintenance of physical activity and a healthy diet.	None	One group sessions and five mailed modules aimed to increase moderate physical activity to at least 30 minutes most days, increase incidental activities (<i>i.e.</i> , taking stairs instead of elevator, walking instead of driving), eat low fat (no more than 10% of energy as saturated fat), high fiber (30g daily from grains, fruits and vegetables), low sat foods and increase fruit and vegetable intake. Modules included information on benefits of exercise and nutrition, how to start an exercise program, injury prevention, types and sources of dietary fat, budgeting for healthy foods, choosing meals when eating out, overcoming barriers to change, costs and benefits of a healthy lifestyle, goal setting, time management, stress management, and exercise and diet information relevant to pregnancy. Alcohol consumption and cigarette smoking were mentioned but not focus of	Three group sessions and three mailed modules aimed to increase moderate physical activity to at least 30 minutes most days, increase incidental activities (<i>i.e.</i> , taking stairs instead of elevator, walking instead of driving), eat low fat (no more than 10% of energy as saturated fat), high fiber (30g daily from grains, fruits and vegetables), low sat foods and increase fruit and vegetable intake.

				intervention.	
Fortmann, 1981 ⁹ Duration 2 years	Communities near Stanford, California	Prevent cardiovascular disease.	No intervention	<p>Mass media campaign on CVD risk factors that used TV, radio, newspaper, and billboards</p> <p>Direct mailing of dietary educational information including pamphlets and cookbooks focused on reducing saturated fat, cholesterol, salt, sugar, and alcohol intake, and calorie restriction</p> <p>Direct mailing of exercise educational information focused on increasing physical activity</p>	<p>Mass media campaign on CVD risk factors that used TV, radio, newspaper, and billboards</p> <p>Direct mailing of dietary educational information including pamphlets and cookbooks focused on reducing saturated fat, cholesterol, salt, sugar, and alcohol intake, and calorie restriction</p> <p>Direct mailing of exercise educational information focused on increasing physical activity</p> <p>10-week counseling program for participant +/- spouse delivered in small groups and individual home sessions focused on personal analysis of behavior, modeling new healthy behaviors, and skills building (high risk of cardiovascular disease group only).</p>
French 2011 ¹⁰ Take Action Duration 1 year	Household	Prevent weight gain over 1 year.	None	<p>Household and individual interventions to decrease television viewing, increase physical activity to at least 30 minutes daily, decrease high calorie snacks and meals, limit sweetened beverages, increase availability of fruits and vegetables, serve smaller portions, limit fast food, and make healthy choices when eating out. Intervention was delivered by trained staff during a home visit, 6 group sessions, home activities and monthly newsletters. The group sessions included behavioral strategies (goal setting, self-monitoring, positive reinforcement), interactive activities 20-30 minutes of physical activity and a healthy snack.</p> <p>A scale for home weighing, a TV limiting device and telephone support calls were also used.</p> <p>Gift cards to a grocery store were provided for attending group sessions or completing home activities.</p>	

<p>Levine 2007^{††}</p> <p>Duration 2 years[§]</p>	<p>Individual</p>	<p>Efficacy of a clinic-based treatment and correspondence course to prevent weight gain.</p>	<p>Information session to describe control, clinic-based and correspondence interventions. Received a booklet with information about benefits of weight maintenance, low-fat eating and regular physical activity.</p>	<p>Information session to describe control, clinic-based and correspondence interventions. 15 group sessions with a nutritionist or behavioral interventionist over 2 years. Sessions focused on making dietary and activity changes and monitoring those changes.</p> <p>Lessons during sessions provided on cognitive change strategies, stimulus control techniques, problem solving, goal setting, stress, time management and relapse preventions. Directed to set activity and intake goals to decrease sedentary behavior and increase activity. Written materials on nutrition and physical activity were provided.</p> <p>Homework assignment to practice weight control strategies assigned at each sessions and due at next session.</p> <p>If weight gain of more than 2 pounds occurred over 2 consecutive weeks, given activity and calorie goals to help them return to their baseline weight.</p>	<p>Information session to describe control, clinic-based and correspondence interventions. Same information and homework assignments as group 2 except delivered by mail instead of group sessions.</p>
<p>Lombard 2010[‡]</p> <p>Duration 1 year</p>	<p>School attended by participant's child</p>	<p>Prevent weight gain over 1 year.</p>	<p>Thirty minute information session and brochure on diet and physical activity guidelines for Australia.</p>	<p>Four one-hour group sessions over 1 month on goal-setting, self-monitoring, social support, problem solving, training to prevent weight relapse, diet and physical activity. Pedometers distributed with goal of 10,000 steps per day. Individuals set their own goals. Text messages were sent by mobile phone once a month during months 2 through 11.</p>	

STEP = Step Test Exercise Prescription; SHE = Strong, Health and Empowered; CVD = Cardiovascular Disease

839 Study name listed only if applicable

[†] Neither study included additional followup after the intervention period.

[‡] Duration of followup after the intervention = 1 year

[§] Duration of followup after the intervention = 1 year

^{||} Duration of followup after the intervention = 8 months

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Table 5a. BMI outcomes among intervention studies among adults in the general population

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
Dietary															
Howard, 2006 ¹	1	BMI (kg/m2)	29164	29.1 SD : 5.9				84	24943	Mean : 29.2 SD : 5.9 Mean change : 0.3 SD Mean change: 3.1		There was a significant difference (p<0.001) in the BMI values for Arm 2 (n = 16230) from baseline to a mean follow-up of 90 months For mean change (follow-up – baseline), there was a significant difference (p<0.001) between Arm 1 (n = 24943) and Arm 2 (n = 16230) All data were adjusted for energy intake		Difference in change between Group 2 and 1 Mean 0.3 SE 0.03	The last reported time-point is a mean follow-up of 7.5 years

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
	2		19457	29.1 SD : 5.9				84	16230	Mean : 29.0 SD : 6.1 Mean change : 0.03 SD Mean change: 3.2					
Physical Activity															
Schmitz, 2007 ²	1	BMI (kg/m2)	82	29.4 SD : 0.4	N: 67	0.85 SE : 0.86		24	N : 63 Check if this is the last time-point reported	Mean : 2.32 SE : 0.86		% change, not mean change p for change over time between groups p=0.74			
	2		82	29.4 SD : 0.4	N : 71	1.07 SE : 0.81			N : 70 check if this is the last reported time-point	Mean : 1.92 SE : 0.81					
Petrella, 2003 ³	1		110	27.9 SD : 1.1	N : 110 Check if this is the last time-point reported	27.3 SD : 0.9						Condition x time interaction p=0.39 for 3 groups. Also no differences post-intervention and 1yr fup between 3 groups for condition x time p=0.57 Non-stat sig			Intervention had no effect on weight over time.

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
												trend for women randomized to clinic to have decrease in BMI during 2yr intervention compared to correspondence or control p=0.10			
	2		131	28.2 SD : 0.8	N : 131 Check if this is the last reported time-point	26.1 SD : 1.2									
Lamb, 2002 ⁴	1	BMI (kg/m2)										This is ITT. They imputed last value carried forward for those missing BMI. As-treated analysis also provided (not abstracted).	Age Sex Other : Baseline moderate physical activity, aerobic capacity		
	2		129	26.4 SD : 4.02	N : 93 Check if this is the	26.3 SD : 3.97 Mean								N: 131	

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
					last reported time-point	change : - 0.01									
	3		131	25.8 SD : 3.91	N : 95 Check if this is the last reported time-point	25.8 SD : 3.94 Mean change : - 0.002								N: 129 -0.009 (95%CI, - 0.39 to 0.194) Comparison Arm1 and Arm3	
Muscari, 2010 ⁵	1	BMI (kg/m2)	60		N : 56 check if this is the last timepoint reported							No value was reported in this article, the result section on page 1061 only states no significant changes were detected concerning BMI in either group.			
	2		60		N : 53 check if this is the last reported time-point										
Schmitz, 2007 ²	1	% BMI change			N : 67	0.85		24	N : 63	Mean : 2.32			Other : Adjusted for	N (12 mo): 63	

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
		from baseline				SD : 0.86			Check if this is the last time-point reported	SD : 0.86			ethnicity and physical activity at baseline, and for kilocalorie intake and marital status at baseline and 2 yrs	P=0.74 N (24 mo): 70 P= 0.74	
	2				N : 71	1.07 SD : 0.81			N : 70 check if this is the last reported time-point	Mean : 1.92 SD : 0.81					
Petrella, 2003 ³	1	BMI change (define)	110	27.9 SD : 1.1	N: 110 check if this is the last time-point reported	27.3 SD : 0.9						Unclear if STEP 12 month outcome is correct. Number looks like - 2.226.1 7.4% reduction in BMI (p 0.05 in table p<0.05 in text) were observed in the STEP group compared to the control group at 12 months from adjusted repeated measures	Other : Not reported but says adjusted		

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
												analysis. Unclear what adjusted for.			
	2		131	28.2 SD : 0.8	N : 131 Check if this is the last reported time-point	26.1 SD : 1.2									
Combination interventions															
French, 2011 ⁶	1	BMI (kg/m2)	45 households	29.64	N : 44 HH	29.88						Means are adjusted for individual gender, smoking status, age, and HH configuration, income, education, and race of main HH adult contact person. BMI reported on individual level taking into account clustering within household.	Age Sex Race/ethnicity Baseline BMI Other : Smoking status, household configuration, income, education	BMI "intervention effect" SE: 0.25 p = 0.48	BMI reported for adults only. Don't know exact N.
	2		45 house-	28.81	N : 43	28.78									

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
			holds		HH Check if this is the last reported time-point										
Levine, 2007 ⁷	1	BMI (kg/m ²)	93	25.0 SD : 2.3								Condition x time interaction p=0.39 for 3 groups. Also no differences post-intervention and 1yr fup between 3 groups for condition x time p=0.57 Non-stat sig trend for women randomized to clinic to have decrease in BMI during 2yr intervention compared to correspondence or control p=0.10			Intervention had no effect on weight over time.
	2		97	25.1											

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
				SD : 2.3											
	3		94	25.1											
				SD : 2.4											
Burke, 2003 ⁸	1	BMI change (define)	43		N : 31 Check if this is the last timepoint reported	Mean change : 0.4						At follow-up, BMI increased in all groups with a trend to a smaller increase in the high-level group, but these differences were not significant(P = .28). Changes in BMI also showed no significant between-group differences when men and women were considered separately. Baseline BMI only reported by sex within each category. Adjusted for age, sex, 32ccounting for correlation			

Author, Year	Group	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Final measure (months)	N at final measure	BMI, final measure, mean	Change from BL	Test for trend	Variables adjusted for	Measure of association	Comment
												within couples			
	2		47		N : 20 Check if this is the last reported time-point	Mean change : 0.5									
	3		47		N : 27 Check if this is the last reported time-point	Mean change : 0.2									

BMI = Body Mass Index; HH; ITT = ; Kg/m² = kilogram per meter squared; N = Sample Size; SD = Standard Deviation; SE = Standard Error

Table 5b. Weight outcomes among intervention studies adults in the general population

Author, Year	Arm	Out-come defined	Base-line N	Base-line weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	N at 60 months	Weight, 60 months, mean	Change from BL	Final measure, months	N at final meas-ure	Weight, final measure, mean	Change from BL	Measure of Assoc-iation
Diet Interventions																		
Howard, 2006 ¹	1	Weight (kg)	29272	76.7 SD : 16.5		Mean change : 0			Mean change : 0.5			Mean change : 0.7		108	25056	SD : 10.1 Mean change : -0.1		
	2		19524	76.8 SD : 16.6		Mean change : -2.2			Mean change : -1.3			Mean change : -0.2		108	16297	SD : 10.1 Mean change : -0.8		
Bhargava 2002 ⁹	1	kg	351	76.2 SD : 12.5	N: 351 Check if this is the last time-point reported	75.9 SD : 12.7												
	2		575	76.0 SD : 12.7	N: 575 Check if this is the last reported time-point	75.9 SD : 12.7												
Physical activity																		
Schmitz, 2007 ²	1	Body mass (kg)	82	80.7 SD : 1.3	N : 67	0.88 se : 0.84		N : 63 Check if this is the last time-point reported	2.42 se : 0.84									

Author, Year	Arm	Out-come defined	Base-line N	Base-line weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	N at 60 months	Weight, 60 months, mean	Change from BL	Final measure, months	N at final meas-ure	Weight, final measure, mean	Change from BL	Measure of Assoc-iation
	2		82	81.6 SE : 1.3	N : 71	0.88 SE : 0.84		N : 70 Check if this is the last reported time-point	1.72 SE : 0.79									
Schmitz, , 2007 ²	1	% Change in body mass (kg) from baseline			N : 67	0.88 SD : 0.84		N : 63 Check if this is the last time-point reported	2.42 SD : 0.84									P=0.54
	2				N : 71	1.17 SD : 0.79		N : 70 Check if this is the last reported time-point	1.72 SD : 0.79									P=0.54
Combination Interventions																		
Levine, 2007 ⁷	1	In kg at 2 year and 3 year	93	67.5	N : 74	Mean change : 0.8 (+- 5.8)		36	70	36	70	Mean change : 0.7 (+- 4.8)						
	2		97	68.4				N : 71	Mean change : -0.6 (+- 4.7)	N : 71	Mean change : -0.6 (+- 4.7)				36	74	Mean change : -0.1 (+- 4.7)	
	3		94	69.5				N : 65	Mean change : 0.3 (+- 4.4)	N: 65	Mean change : 0.3 (+- 4.4)				36	61	Mean change : 1.3 (+- 5.4)	
Fortmann	1	Regress	365	1.23	N : 365	1.233		N: 365	1.236	N : 365	1.236				36	365	1.24	Regressi

Author, Year	Arm	Out-come defined	Base-line N	Base-line weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	N at 60 months	Weight, 60 months, mean	Change from BL	Final measure, months	N at final meas-ure	Weight, final measure, mean	Change from BL	Measure of Assoc-iation
, 81 ¹⁰		ion coefficie nts of relative weight change: relative weight was defined as actual weight divided by ideal weight determi ned accordin g to the mean of the weight- for- height ranges given in the Metropo litan Life Insuran ce Compan y Ideal Weight Table																on coefficien t of average annual percenta ge change in geometric mean N=363 P=0.06
	2		363	1.21	n : 363	1.21		n : 363	1.21	n : 363	1.21				36	363	1.21	N=385 P=0.07
	3		385	1.19	n : 385	1.19		n : 385	1.195	n : 385	1.195				36	385	1.20	

BL = Baseline; Kg = Kilogram; N = Sample Size; SD = Standard Deviation; SE = Standard Error

Table 5bi. Additional detail on weight outcomes among intervention studies among adults in the general population

Author, Year	Test for trend	Variables adjusted for	Comment
Diet interventions			
Weight			
Bhargava, 2002 ⁹	In the intervention group, there was a significant difference between baseline and 12 month weight measures (p<0.05). This effect was not observed in the control group.		For the control group, the results for models 1 and 2 showed that white women and women from better-off households were significantly lighter (P,0.05). The index of unhealthy eating was positively associated with weight, while the reported frequency of mild physical exercise was negatively associated. These results underscored the importance of behavioral factors such as craving for rich foods and physical exercise for body weight. In the intervention group, black women were heavier and white women were lighter than Hispanic women (P<0.05). The coefficient of education was statistically significant (P<0.05) in models 1 and 2, suggesting that highly educated women benefited more from the counseling. Since the coefficient of education was not statistically significant in the control group, awareness of the counseling program by itself was insufficient to induce behavioral changes leading to weight loss among the more educated women. The coefficients of the index of unhealthy eating and physical exercise patterns in models 1 and 2 were similar for the control and intervention groups and were statistically significant (P,0.05). However, only the intakes of monounsaturated fat were positively associated with weight in the intervention group.
Howard, 2006 ¹	For body weight change, there was a significant difference (P≤0.001) between Arm 1 and Arm 2 at months 12, 24, 48, 72, 96, 120, 144, 168, 192 and 210		
Bhargava, 2002 ⁹			Results suggested that weight changes might be better explained by the changes in the proportions of energy derived from carbohydrate and saturated,

			monounsaturated and polyunsaturated fats. In the control group, the % energy derived from carbohydrate and monounsaturated fat was positively associated with weight changes. By contrast, the % energy derived from polyunsaturated fat was positively associated in the intervention group. There were also positive associations between energy derived from monounsaturated fat and weight changes in the control group. By contrast, a greater proportion of energy from polyunsaturated fat was associated with weight gain in the intervention group.
Physical activity interventions			
Weight			
Schmitz, 2007 ²	% change from baseline p for change over time between groups p=0.54 adjusted fro ethnicity and physical activity		
Weight change			
Schmitz, 2007 ²		Other : Adjusted for ethnicity and physical activity at baseline, and for kilocalorie intake and marital status at baseline and 2 yrs	
Combination interventions			
Weight			
Fortmann, 81 ¹⁰			
Weight change			
Levine, 2007 ⁷			
Fortmann, 81 ¹⁰	Relative weight increased in control group but was stable in the two intervention towns (p=0.04).		<p>Participants in control group experienced average increase of 1% in relative weight, whereas the two intervention groups showed essentially no change in relative weight.</p> <p>Longitudinal correlation coefficients for individuals (not towns) provided for dietary cholesterol and fat by weight in Tables 4 and 5 of Fortmann.</p>

Yrs = Years

Table 5c Waist circumference outcomes among intervention studies among adults in the general population

Author, Year	Arm	Out-come defined	Base-line N	Baseline Waist circum-ference, mean	N at 12 months	Waist circum-ference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circum-ference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
Diet interventions															
Bhargava, 2002 ⁹	1	Meters	351	Mean : 0.86 SD : 0.11	N : 351 Check if this is the last time-point reported	Mean : 0.86 SD : 0.11						Reported separately for intervention and control. Looked at dietary components/phys activity that predicted waist circumference change	In the interventio n group, there was a significant difference between baseline and 12 month waist circumfere nce (p<0.05). This effect was not observed in the control group.		In the control group, household incomes and physical exercise patterns were negatively associated with waist circumference whereas the index of unhealthy eating habits was positively associated (P,0.05). The intakes of carbohydrate and saturated fat were significant (P,0.05) and positively associated with waist circumference in both model 1 and 2. In the intervention group, education was negatively

Author, Year	Arm	Out- come defined	Base- line N	Baseline Waist circum- ference, mean	N at 12 months	Waist circum- ference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circum- ference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
															associated with waist circumference . The index of unhealthy eating habits and physical exercise patterns were significantly associated with waist circumference of the women in the intervention group. Moreover, while the carbohydrate and saturated fat intakes were not significant predictors, the intake of monounsaturated fat was a significant predictor.
	2														
Physical activity interventions															
Muscari, 2010 ⁵	1		60		Check if this is the	60							No value was		

Author, Year	Arm	Out-come defined	Base-line N	Baseline Waist circumference, mean	N at 12 months	Waist circumference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circumference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
					last time-point reported								reported in this article, the result section on page 1061 only states no significant changes were detected concerning waist circumference in either group.		
	2		60		Check if this is the last reported time-point	60									
Combination intervention															
Howard, 2006 ¹	1		29216	Mean : 89.0 SD : 13.7	29216	Mean : 89.0 SD : 13.7			90	9517			At 90 months, the waist circumference was significantly different (p = 0.12) in Arm 1 (Control; n		The last-reported time point was a follow-up of 7.5 years

Author, Year	Arm	Out-come defined	Base-line N	Baseline Waist circum-ference, mean	N at 12 months	Waist circum-ference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circum-ference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
													= 9517) versus Arm 2 (N = 6154). The difference in mean change from baseline to 90 months was non-significant (p = 0.04) in Arm 1 (Control; N = 9157) versus Arm 2 (N = 6154)		
	2		19485	Mean : 89.0 SD : 13.9	19485	Mean : 89.0 SD : 13.9			90	6154	Mean : 90.1 SD : 14.4 Mean change : 1.6				
Burke, 2003 ⁸	1		43		N : 31 Check if this is the last time-point reported	Mean change : 1.4							There were greater changes in the control and low-		

Author, Year	Arm	Out-come defined	Base-line N	Baseline Waist circum-ference, mean	N at 12 months	Waist circum-ference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circum-ference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
													level groups, but between-group difference s were not significant (P=.31 and P=.30, respectivel y). Baseline waist circumfere nce reported by gender within group. mean change adjusted for age, sex and accounted for correlation within couples		
	2		47		N : 20 Check if this is the last	Mean change : 1.4									

Author, Year	Arm	Out- come defined	Base- line N	Baseline Waist circum- ference, mean	N at 12 months	Waist circum- ference, 12 months, mean	Change from BL	Final measure, months	N at final measure	Waist circum- ference, final measure, mean	Change from BL	Measure of association	Test for trend	Variables adjusted for	Comment
					reported time point										
	3		47		N : 27 Check if this is the last reported time point	Mean change : 0.5									

Mo = month; N = Sample Size; SD = Standard Deviation; Tx = Treatment

Table 5d Adherence outcomes among intervention studies among adults in the general population

Author, Year	Arm	Outcome defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Measure of association	Between group differences	Variables adjusted for	Comment
Physical activity intervention												
Schmitz, 2007 ²		Percentage adherence to the protocol of twice-weekly strength training (Only for Arm 2)								For arm 2, mean adherence in year 2 was significantly lower than in year 1, with a P < 0.0001 75% adherence in year 1, 61% in year 2, over 71%		Loss to follow-up 19% at 2 years. Greater in non treatment (23.2%) compared to tx (14.6%).
Petrella, 2003 ³	1	Compliance defined as number of exercise sessions at the prescribed training heart rate/total number of sessions possible over the time period at 3 or more sessions per week. Defined as 80% of prescribed sessions recorded in the diary. Never give N compliant, but							Adherence to walks # patients with one or more events : 129			

Author, Year	Arm	Outcome defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Measure of association	Between group differences	Variables adjusted for	Comment
		say more improvement in vo2max with increasing compliance.										
	2								# patients with one or more events : 43			
Lamb, 2002 ⁴		In the health walks group, participants were encourage and invited to the health walks program. All patients had to go to advice session before randomized.										
Combination intervention												
French, 2011 ⁶		Adherence to at least 4 of 6 group sessions and half of the home activities. In intervention group only.							Adherence to at least 4 of 6 group sessions and half of the home activities. In intervention group only. N=45 % patients with one or more events : 76			20% had perfect attendance and home goal completion rates.
Levine, 2007 ⁷	1	The proportion										Overall, 78%

Author, Year	Arm	Outcome defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Measure of association	Between group differences	Variables adjusted for	Comment
		of women completing the study across the three intervention approaches										completed a weight assessment at Year 1, 74% completed an assessment at Year 2, and 72% completed an assessment at Year 3.
	2	Clinic group ADHERENCE: attendance at the group meetings										Overall, 78% completed a weight assessment at Year 1, 74% completed an assessment at Year 2, and 72% completed an assessment at Year 3.
	3	Arm 3 Adherence: Returning homework assignments with self-reported weight										On average, attendance at the group meetings was 50.3% across the 15 sessions.
Burke, 2003 ^b	1	Adherence to physical activity.	43		12 mo	Only total was reported N=78						
	2		47		12 mo							
	3		47		12 mo							
Burke, 2003 ^b	1	Adherence to dietary interventions; nutrient intake	43		12 mo							
	2		47		12 mo							

Author, Year	Arm	Outcome defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Measure of association	Between group differences	Variables adjusted for	Comment
	3		47		12 mo							
Burke, 2003 ^b	1	Adherence to diet; fiber intake	43		12 mo							
	2		47		12 mo							
	3		47		12 mo							
Burke, 2003 ^b	1	Adherence to diet; consumption of high fat foods.	43		12 mo							
	2		47		12 mo							
	3		47		12 mo							
Burke, 2003 ^b	1	Adherence to diet; Fruit and vegetable consumption.	43		12 mo							
	2		47		12 mo							
	3		47		12 mo							

N = Sample Size; tx = treatment

Table 5e Mortality outcomes among intervention studies among adults in the general population.

Author, Year	Outcome Defined	Baseline N	Measure of Association
Mortality			
Howard, 2006 ¹	Number of individuals who died during the trial	48835	839 (4.3%) in intervention compared with 1253 (4.3%) in control

N = Sample Size

Table 5f. Activity related injury among intervention studies among adults in the general population

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Activity-related Injury , mean	Final Measure	N at Final Measure	Activity-related Injury , Final Measure, mean	Change from BL	Measure of Association
Physical activity interventions									
Petrella, 2003 ³		“No serious adverse events were reported during the trial”							

BL = Basline; N = Sample Size

Table 5g. Location of outcomes in the original publication for observational studies

Author, year	BMI Outcome Definition	BMI Outcome Reported Locations	Weight Outcome Definition	Weight Outcome Reported Locations	Waist Circumference Outcome Definition	Waist Circumference Outcome Reported Locations	Other Outcome Definition	Other Outcome Reported Locations
Adair, 2011 ¹¹	NR		Kg weight change across eight survey years with 98% of women contributing 3 measures over 24 months	Tables 2 and 3	NR		NR	
Berry, 2010 ¹²	Ordinal regression model predicting change in BMI. Estimate, significance and 95% CI provided. BMI categorized as 0.5 BMI decrease, stable (within 0.5 BMI), between 0.5 and 2.0 BMI units increase and greater than 2.0 BMI units increase. The reference group to interpret the ordinal regression model was not provided, but it appears from the text that negative values represent less weight gain.	Table 2	NR		NR		NR	
Bes-Rastrollo, 2009 ¹³	Unit change per year; gaining 2kg or more per year; incident overweight/obesity (BMI \geq 25) among those that were not overweight or obese at baseline	Tables, 2,3 and 4. Page 1358 for the sex and chronic disease subanalyses.	NR		NR		NR	
Lee, 2011 ¹⁴	NR		Kg gained over 13 years with mean contribution to the weight change outcomes of 2.9 years. Gaining fewer than 2.3 kg among those who were normal weight (BMI 18.5 to 24.9) at baseline.	Tables 2 and 3, Page 5	NR		NR	
Lewis, 1997 ¹⁵	NR		KG weight change over 7 years	Table 5, p639	NR		NR	
Mozaffarian, 2011 ¹⁶	NR		Pounds of weight change every 4 years; multivariable analysis	Table 3, page 2399. Subanalyses page 2396.	NR		NR	

Author, year	BMI Outcome Definition	BMI Outcome Reported Locations	Weight Outcome Definition	Weight Outcome Reported Locations	Waist Circumference Outcome Definition	Waist Circumference Outcome Reported Locations	Other Outcome Definition	Other Outcome Reported Locations
				Average weight gain over time, page 2395.				
Pereira, 2005 ¹⁷	NR		Kg gained over 15 years	Table 3. Subanalyses page 40.	NR		NR	
Purslow, 2008 ¹⁸	NR		Kg change across 3.7 mean years of followup	Table 2, page 190 for subgroups	NR		NR	
Schulz, 2005 ¹⁹	NR		Kg change per year	Table 3, page 1186 for subgroups	NR		NR	
Vioque, 2008 ²⁰	NR		Weight gain greater than or equal to the observed mean of 3.4 kg	Table 4	NR		NR	

NR = Not Reported; Kg = kilogram; CI = Confidence Interval; BMI = Body Mass Index

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Table 6. Characteristics of studies including only obese adults

Author, year	Years of Recruitment	Single or Multisite	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control
Study Location							Active Intervention
Trials							
Hemmingsson, 2009 ¹ Sweden	2005	Not reported	Newspaper	Randomized intervention	Female only Age: 30-60 Abdominally obese (waist circumference 88-120 cm) Work outside the home at least 3 days per week Passed physician physical that identified no contraindications to physical activity Receptive to intervention of changing commuting habits to work	No	Pedometer based walking program with group sessions to encourage walking to work Given a bicycle, individual cousenling with a physician about physical activity and group counseling to encourage bicycle riding to work

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Table 7. Participant characteristics of studies including only obese adults

Author, year	Baseline N	Follow-up period, months	% Women	Age, years	Race	Education	Smokers
Hemmingsson, 2009 ¹	124	Maximum: 18	100	Mean 47.8 in bicycling and walking group Mean 48.6 in the walking group	NR	NR	NR

N = Sample Size

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Table 8. Description of interventions in studies among studies including only obese adults in the general population

Author, year			
Duration of intervention	Primary Aim	Group 1	Group 2
Diet Interventions			
Hemmingsson, 2009 ¹ Duration 18 months, Lsat counseling session at 14 months	Increase bicycle riding and walking to work. Increase bicycle riding to at least 2 kilometers a day.	Pedometer based walking program with 2 group counseling sessions about walking.	Given a brand new bicycle. Individual counseling sessions with a physician to increase walking and bicycling. Group counseling sessions about physical activity.

Lsat =

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Table 9a. Weight outcomes among obese adults in the general population

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Weight, mean	N at 18 months	Weight, 18 months, mean	Change from BL	Measure of Association
Hemmingsson, 2009 ¹	1	Weight, kg	63	84.7 kg	60	84.4 kg	-0.3 (-1.2 to 0.7)	
	2		61	84.6 kg	60	84.2 kg	-0.4 (-1.6 to 0.7)	-0.1 less than group 1

Kg = kilogram; N = Sample Size

Table 9b. Waist circumference outcomes among obese adults in the general population

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Waist Circumference, mean	N at 18 months	Waist Circumference, 18 months, mean	Change from BL	Measure of Association
Hemmingsson, 2009 ¹	1	Waist circumference, cm	63	104.2 cm	60	101.6 cm	-2.6 (-4.0 to -1.2)	
	2		61	103.4 cm	60	101.3 cm	-2.1 (-3.4 to -0.8)	-0.5 less than group 1

Cm = centimeter; N = Sample Size

Table 9c. Adherence outcomes among obese adults in the general population

Author, Year	Arm	Outcome Defined	Baseline N	N at 18 months	Adherence, 18 months, %	Measure of Association
Hemmingsson, 2009 ¹	1	Ride bicycle at least 2 kilometers per day	63	60	38.7%	
	2		61	60	8.9%	Odds Ratio 7.8 (95% CI 4.0 to 15.0) p<0.001

N = Sample Size

References

1. Hemmingsson E, Uddén J, Neovius M, et al. Increased physical activity in abdominally obese women through support for changed commuting habits: a randomized clinical trial. Int J Obesity (2005) 2009; 33(6):645-52.

Table 10 Characteristics of studies on populations in work setting

Author, Year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Interventions
Dekkers, 2011 ¹ Europe	2004	Multicenter	Work place	Randomized intervention	Age≥18 years BMI≥25 kg/m ² Paid employment for at least 8 hours a week in a participating company Not pregnant Speak Dutch Access to Internet and knowledge how to use it Not diagnosed or treated for disorders that make physical activity difficult	No Improve cardiovascular risk factors	Printed materials Diet and exercise counseling
Goetzel, 2009 ² Goetzel, 2010 ³ United States	2006	Multicenter	Work place	Non-randomized intervention	Not pregnant Participated in concurrent annual health risk assessments	Yes Prevent obesity and reduce prevalence of obesity among workers	Usual care Usual care Environmental changes
Kwak, 2010 ⁴ Europe	2003-2004	Multicenter	Work place	Non-randomized intervention	Worksite with ≥100 employees Worksite with canteen facilities Age: <40 years BMI: >18.0 kg/m ² No medical restrictions regarding diet or physical activity	Yes Prevent weight gain	No intervention Self-management Environmental changes
Lemon, 2010 ⁵ United States	2005	Multicenter	Work place	Randomized intervention	Age:18-65 years Able to understand and communicate in English or Spanish Not planning on leaving employment in next 2 years Working at least 20 hours per week Not working in more than one of the participating hospitals No impediment to being weighed and measured Not pregnant Did not drop out after 6-month washout period Still eligible after 6-month washout period	Yes Prevent weight gain	No intervention Diet and exercise education Environmental changes

Author, Year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Interventions
Linde, 2012 ^b United States	2005-2006	Multicenter	Work place	Randomized intervention	Worksite with food service present Worksite with at least a two-story building Worksite with minimal seasonal fluctuation of employees Worksite with stabile location and workforce Worksite willing to provide employees' work contact information Employed at least 50% time on-site during a daytime shift at an eligible worksite	Yes Reduce weight gain	No intervention Diet and exercise education Self-management Environmental changes
McEachan, 2011 ^c Europe	2007-2008	Multicenter	Work place	Randomized intervention	No known heart disease requiring medication or pace maker No significant valvular heart disease Not on medication that alters heart rate No significant breathing problems including asthma of a level that makes it difficult to exercise or climb a flight of stairs No complaints of chest pain within the previous four weeks No history of heart attack, angina, or heart surgery within the previous three months Not pregnant	No Increase physical activity	Usual care Exercise education Self-management Environmental changes
Robbins, 2006 ⁸ United States	2002	Multicenter	Workplace (Military)	Non-randomized intervention	BMI: 24-29.9 kg/m ²	Yes Prevent weight gain	Usual care Self-management Diet and exercise education

BMI = Body Mass Index; Kg/m² = kilogram per meter squared

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Table 11. Participant characteristics in studies reporting on groups in work settings

Author, Year	Total N Study Arms N	Follow-up Period, months	% Women	Age	Race	Education	Smokers
Dekkers, 2011 ¹	276 Arm1: 92 Arm2: 91 Arm3: 93	24	Overall: women, : 30.8	Overall: age, mean: 44.0	Not reported	Overall: highly educated, %: 56.9	Overall: smoking, %: 13.8
Goetzel 2009 ² Goetzel, 2010 ³	3,152 Arm1: N: 634 Arm2: N: 2,518	12 24	Arm1: women, : 27.1 Arm2: women, : 26.7	Arm1: mean: 45.8 Arm2: mean: 43.8 *Age reported differently by group: p<0.0001	White, Arm1: %: 83.6 Arm2: %: 75.0 Hispanic, Arm1: %: 1.4 Arm2: %: 11.7 Black, Arm1: %: 9.9 Arm2: %: 9.4 Asian, Arm1: %: 4.3 Arm2: %: 3.4 American Indian/Alaska Native, Arm1: %: 0.8 Arm2: %: 0.2 *Race reported differently by group: p<0.0001	< Bachelor degree, Arm1: %: 8.5 Arm2: %: 28.1 Bachelor degree, Arm1: %: 27.0 Arm2: %: 35.7 Post-graduate degree, Arm1: %: 15.5 Arm2: %: 11.5 Not indicated, Arm1: %: 49.1 Arm2: %: 24.7 *Education reported differently by group: p<0.0001	Not reported
Kwak, 2010 ⁴	553 Arm1: N: 188 Arm2: N: 365	12 24	Arm1: women, : 48.2 Arm2: women, : 50.7	Arm1: mean: 35.0 Arm2: mean: 38.9 *Age reported differently by group: p<0.01	Not reported	High school or less, Arm1: %: 19.3 Arm2: %: 15.7 Some college/ vocational training, Arm1: %: 29.2 Arm2: %: 34.7 University, Arm1: %: 51.6 Arm2: %: 49.6	Current smoker, Arm1: %: 17.3 Arm2: %: 16.0
Lemon, 2010 ⁵	806 Arm1: N: 420 Arm2: N: 386	12 24	Overall: women, : 81 Arm1: women, : 84.2 Arm2: women, : 78.3	Overall: age groups: 18-40: 35.2% 41-50: 33.4% ≥51: 31.4%	Overall: white, %: 88.8 Overall: black, %: 4.7 Overall: Hispanic, %: 5.3 Overall: Asian/Other,	Overall: ≤high school, %: 13.0 Overall: 1-3 years post high school, %: 46.3 Overall: college degree, %: 26.6	Not reported

Author, Year	Total N Study Arms N	Follow-up Period, months	% Women	Age	Race	Education	Smokers
			*Sex reported differently by group: p<0.0001		%, 1.4	Overall: graduate degree, %: 14.1 Arm1: ≤high school, %: 15.6 Arm2: ≤high school, %: 10.8 Arm1: 1-3 years post high school, %: 47.4 Arm2: 1-3 years post high school, %: 45.5 Arm1: college degree, %: 27.5 Arm2: college degree, %: 25.8 Arm1: graduate degree, %: 9.5 Arm2: graduate degree, %: 17.9 *Education reported differently by group: p=0.04	
Linde, 2012 ⁶	1,672 Arm1: N: 949 Arm2: N: 723	24	Overall: women, : 60.7	Overall: age groups: Under 30: 16.8% 31-40: 25.3% 41-50: 31.5% 51-60: 23.1% Over 60: 3.3%	Overall: white, %: 86.8 Overall, black, %: 4.3 Overall, other, %: 4.4 Overall, multi-racial, %: 1.3 Overall, Hispanic, %: 2.2 Overall, refused, %: 1.0	Overall, less than high school/high school degree, %: 9.5 Overall, technical degree/some college, %: 30.2 Overall, college degree, %: 37.3 Overall, graduate degree, %: 23.0	Overall, current smoker, %: 14.2 Arm1, current smoker, %: 15.6 Arm2, current smoker, %: 12.3 *Smoking status reported differently by group: p<0.05.
McEachan, 2011 ⁷	1,260 Arm1: N: 598 Arm2: N: 662	12	Arm1, women, :: 53.2 Arm2: women, : 54.8	Arm1: mean: 42.46 Arm2: mean: 43.13	White-British Arm1: %: 90.5 Arm2: %: 88.9 White-other: Arm1: %: 4.2 Arm2: %: 4.6	School level: Arm1: %: 32.7 Arm2: %: 36.6 Vocational: Arm1: %: 20.9 Arm2: %: 21.7 Undergraduate or postgraduate: Arm1: %: 46.5 Arm2: %: 41.7	Not reported
Robbins, 2006 ⁸	68,591	Arm1: mean:	Arm1: women, : 13	Arm1: mean: 30.4	Not reported	Not reported	Current smoker,

Author, Year	Total N Study Arms N	Follow-up Period, months	% Women	Age	Race	Education	Smokers
	Arm1: N: 65,089 Arm2: N: 3,502	367.4 days Arm2: mean: 374.4 days *Follow up reported differently by group: p<0.0001	Arm2: women, : 11 *Sex reported differently by group: p<0.0001	Arm2: mean: 31.9 *Age reported differently by group: p<0.0001			Arm1: %: 24 Arm2: %: 20 *Smoking reported differently by group: p<0.0001

N = Sample Size

References

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Table 12. Description of interventions in studies on populations in work settings

Author, Year	Duration of Intervention	Control	Active intervention, Self-management	Active intervention, Diet	Active intervention, Physical Activity	Active Intervention, Environment
Dekkers, 2011 ¹ 6 months	6 months	Printed materials	N/A	Nutritional counseling via phone or Internet Encouraged reduce fat, sugar, and alcohol while increasing intake of fruits and vegetables	Exercise counseling via phone or Internet Encouraged walking at lunch and active commuting	N/A
Goetzel, 2009 ² Goetzel, 2010 ³	24 months	Usual care with individually-focused health promotion programs	N/A	Usual care for individual dietary counseling	Usual care physical activity programs	Environmental changes to support an increase in employees' physical activity, improve their eating habits, and manage their weight through environmental prompts and point-of-choice messaging Key personnel recruited to set worksite health goals and train worksite leaders on health promotion
Kwak, 2010 ⁴	12 months	No intervention	Receipt of In Balance box with pedometer, measuring tape, calorie guide, and instructions for food and exercise diaries Access to In Balance website including Weight Coach instrument that provides personalized advice to maintain weight CD-ROM based training including education on energy balance behaviors, skills training, goal setting Self monitoring	N/A	N/A	Key worksite personnel selected and implemented different environmental interventions at each site such as changing food products available at the cafeteria, workshops, signs promoting healthy eating and physical activity, forming lunchtime walking or cycling groups
Lemon, 2010 ⁵	24 months	Usual care/no intervention	N/A	Weekly displays on nutrition education Weekly newsletter via email that included education on a healthy weight topic, a recipe, and quick tip	Weekly displays on exercise education Monthly strength training workshop where individuals were given a simple routine and a resistance band	Promotional signs to encourage healthy eating included nutritional information for food and beverages in the cafeteria, new healthy menu options, special cafeteria events, onsite farmer's market, healthy potlucks Promotional signs to encourage physical activity included stairway

Author, Year	Duration of Intervention	Control	Active intervention, Self-management	Active intervention, Diet	Active intervention, Physical Activity	Active Intervention, Environment
						signs, indoor and outdoor walking routes, and walking groups Periodic campaigns and challenges targeting physical activity, healthy eating, and weight with group and individual prizes
Linde, 2012 ⁶ 24 Months	24 months	No intervention	Weight self-monitoring	Healthy eating newsletter	Participants were given pedometers Promote the formation of walking groups and exercise challenges	Increase the availability and decrease the price of calorie-smart foods in the cafeteria and vending machines Use point-of-purchase promotional materials for calorie-smart foods Motivational materials placed to encourage use of stairs
McEachan, 2011 ⁷ 3 months	3 months	Usual care	Individual reminders and fridge magnets to track physical activity		Knowledge quiz and educational messages about the benefits of physical activity including health, mental health and social benefits	Leaflets and posters distributed throughout worksite Team challenges targeting physical activity
Robbins, 2006 ⁸	12 months	Usual care	Completion of personal energy plan workbooks	Email on healthy eating habits every other week	Email on physical activity every other week	N/A

N/A = not applicable

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Table 13a. BMI outcome in studies in a work setting

Author, Year	Arm	Outcome Defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	N at 24 months	BMI, 24 months, mean	Change from BL	Variables Adjusted for	Subgroup Analyses	Comment
Combination interventions													
Goetzel, 2009 ¹ Goetzel, 2010 ²	1	kg/m2			633	28.7	Mean change: 0.3	382	28.2	Mean change: 0.2	Propensity score adjustment (age, gender, ethnicity, wage status, work status, education, and health risk status)	Subgroup analysis at 24 months with the following groups: arm 1 control; arm 2 moderate intensity environmental intervention; and arm 3 high intensity environmental intervention. N; baseline BMI, 24M BMI: change, p: Arm1: 382; 28.0, 28.2; 0.2, 0.0045 Arm2: 213; 28.3, 28.3; 0.0, 0.8326 Arm3: 926; 28.2, 28.2; 0.0, 0.5604 DID Arm 2 v Arm 1: BMI: -0.3; p=0.0341 DID Arm 3 v Arm 1: BMI: -0.2; p=0.0075	12-month group difference in BMI change: -0.2 (p=0.0006) 24-month group difference in BMI change: -0.3 (p=0.0027) The 1- and 2-year results only use data from participants who completed both the baseline and follow up assessments; therefore, the N and BMI at baseline are different for these two studies. Intervention group contains both moderate and high intensity groups.
	2	kg/m2			2486	28.8	Mean change: 0.1	1139	28.2	Mean change: -0.1			
Kwak, 2010 ³	1	kg/m2	188	24.2 SD: 3.1	164		Mean change: (-0.04) SD: 0.8	145		Mean change: 0.03 SD: 1.0	Adjusted for baseline age, gender, BMI, marital status, education, and smoking status.	No significant differences between control and intervention using multilevel linear regression.	
	2	kg/m2	365	25.7 SD: 4.0	294		Mean change:	255		Mean change:			

Author, Year	Arm	Outcome Defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	N at 24 months	BMI, 24 months, mean	Change from BL	Variables Adjusted for	Subgroup Analyses	Comment
							(-0.23) SD: 1.2			(-0.11) SD: 1.4			
Lemon, 2010 ⁴	1	kg/m2	420	29.0	387	29.1		349	29.4		Adjusted for education, job category, shift, and hours worked per week and weighted to represent the hospital workforce population.	12-month group difference in BMI change: 0.272 (95%CI -0.271-0.816; p=0.33) 24-month group difference in BMI change: 0.276 (95%CI -0.338-0.890; p=0.38)	
	2	kg/m2	386	28.4	344	28.7		299	28.9				
Linde, 2012 ⁵	1	kg/m2	949	28.3 SD: 6.1				795		0.19	Adjusted models include age, education, race, sex, and smoking status.		24-month unadjusted group difference in differences of BMI change: 0.12 (95%CI -0.27-0.51; p=0.46) 24-month adjusted group difference in differences of BMI change: 0.13 (95%CI -0.21-0.46; p=0.36)
	2	kg/m2	723	28.7 SD: 6.6				611		0.30			
McEachan, 2011 ⁶	1	kg/m2 OMRON BF306 body fat monitor	598	25.96 SD: 4.67							Adjusted models include: seasonality, social class, health score, gender, and baseline measures.		12-month group difference in BMI 0.18 (95% CI: 0.01-0.34)
	2	kg/m2	662	26.18 SD: 5.20									

BMI = Body Mass Index; CI = Confidence Interval; Cm = centimeter; DID = Difference inbetween the differences; Kg/m^2 = kilogram per meter squared; Lbs = pounds (weight unit); N = Sample Size;

Table 13b. Weight outcome in studies in a work setting, combination interventions

Author, Year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	Variables adjusted for	Subgroup Analyses	Comment
Combination interventions													
Dekkers, 2011 ⁷	1	kg	92	92.3 SD: 11.3				49	90.3 SD: 10.8				Mean change for arm2 (telephone) vs arm1 (control) at 24 months: -0.3 (95%CI -2.6-2.0) Mean change for arm2 (Internet) vs arm1 (control) at 24 months: -2.1 (95%CI -4.4-0.2)
	2	kg	91	94.4 SD: 15.6				44	90.3 SD: 14.8				
	3	kg	93	94.0 SD: 13.7				48	90.0 SD: 15.4				
Goetzel, 2009 ¹ Goetzel, 2010 ²	1	lbs			633	193.2	Mean change: 1.4	382	189.2	Mean change: 1.3	Propensity score adjustment (age, gender, ethnicity, wage status, work status, education, and health risk status)	Subgroup analysis at 24 months with the following groups: arm 1 control; arm 2 moderate intensity environmental intervention; and arm 3 high intensity environmental intervention. N; baseline wt, 24M wt; change, p: Arm1: 382; 188.0, 189.8; 1.3, 0.0071 Arm2: 213; 187.9, 187.9; 0.0, 0.9827 Arm3: 926; 188.9, 188.7; -0.2; 0.6399 DID Arm 2 v Arm 1: Wt: -2.1; p=0.0333 DID Arm 3 v Arm 1: Wt: -1.5; p=0.0148	12-month group difference in weight change: -1.5 (p=0.0007) 24-month group difference in weight change: -1.6 (p=0.0050) The 1- and 2-year results only use data from participants who completed both the baseline and follow up assessments; therefore, the N and weight at baseline are different for these two studies. Intervention group contains both moderate and high intensity groups.

Author, Year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	Variables adjusted for	Subgroup Analyses	Comment
	2	lbs			2486	193.6	Mean change: (-0.1)	1139	189.0	Mean change: (-0.3)			
Kwak, 2010 ³	1	kg	188		165		Mean change: (-0.13) SD: 2.29	146		Mean change: 0.08 SD: 3.16	Adjusted for baseline age, gender, BMI, marital status, education, and smoking status.		No significant differences between control and intervention using multilevel linear regression.
	2	kg	365		295		Mean change: (-0.64) SD: 3.32	256		Mean change: (-0.29) SD: 4.25			
Robbins, 2006 ⁸	1	lbs	65,089	+ 10.3 lbs							Control groups unadjusted results; while intervention groups adjusted for age, rank, smoking status, and proximity	Subgroup analysis stratified by sex. N, Control mean wt change; intervention mean wt change, difference, p for difference Women: 8771; 0.8; (-0.2); (-1.0), 0.031 Male senior airmen: 7518; 0.6; (-0.7); (-1.3); 0.016 All other men: 52,302; 2.5; 2.8; 0.3; NS	12-month results only in subgroups (senior rank men, all other men, women). No baseline characteristics reported by these groups.
	2	lbs	3,502	+ 11.7 lbs									

BL = Baseline; BMI = Body Mass Index; Kg = Kilogram; Lbs = Pounds (unit of weight); N = Sample Size; SD = Standard Deviation; Wt = Weight

Table 13c. Waist circumference outcome in studies in a work setting

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Waist Circumference, mean	N at 12 months	Waist circumference, 12 months, mean	Change from BL	N at 24 months	Waist circumference, 24 months, mean	Change from BL	Variables Adjusted for	Comment
Combination Intervention												
Dekkers, 2011 ⁷	1	cm	92	101.4				49	99.3 SD: 9.7			Mean change for arm2 (telephone) vs arm1 (control) at 24 months: 0.3 (95%CI -2.0-2.6) Mean change for arm3 (Internet) vs arm1 (control) at 24 months: -1.1 (95%CI -3.3-1.1)
	2	cm	91	102.1				44	97.9 SD: 11.0			
	3	cm	93	102.6				48	99.3 SD: 11.9			
Kwak, 2010 ³	1	cm	188		164		Mean change: 0.3 SD: 3.3	145		Mean change: 1.0 SD: 3.4	Adjusted for baseline age, gender, BMI, marital status, education, and smoking status.	12-month mean between group change -1.5 cm (95%CI -2.35-(-0.65)); p<0.001 24-month mean between group change -1.3 cm (95%CI -2.18-(-0.42)); p=0.005
	2	cm	365		295		Mean change: (-1.2) SD: 4.9	256		Mean change: (-0.5) SD: 5.6		

BL = Baseline; Cm = centimeter; N = Sample Size; SD = Standard Deviation

Table 13d. Adherence in studies in a work setting, combination interventions

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Comment
Work-based Combination Interventions									
Dekkers, 2011 ⁷	1	Participation in counseling modules	92						In arm 2, 6.8% of participants never started. 64% of this group completed all modules. Median number of counseled modules was 4 (IQR 2-4). In arm 3, 12.5% of participants never started. 17% of this group completed all modules. Median number of counseled modules was 2 (IQR 1.25-3). No significant interaction between number of counseled modules and study group.
	2		91						
	3		93						
Goetzel, 2009 ¹ Goetzel, 2010 ²		None							
Kwak, 2010 ³		None							
Lemon, 2010 ⁴	1	Participation score	420		24 months	249			
	2		386			299	Mean: 18.1 Median: 16 Range: 9-26 SE: 0.86		
Linde, 2012 ⁵		Multiple measures assessed the implementation of environmental							The goal of reducing the price of calorie

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Adherence, mean	Final measure	N at final measure	Adherence, final measure, mean	Change from BL	Comment
		changes							<p>smart items by 15% and increasing price of comparable non-calorie smart items by 15% was not met at any site.</p> <p>The goal of enhancing stairway attractiveness, and change vending food offerings to bring overall product mix to > 50% calorie smart foods and beverages was met in 2/3 sites.</p> <p>All other component goals were achieved at all sites.</p> <p>Intervention site participants increased self-weighing frequency over time relative to control site participants (p < 0.0001).</p>
McEachan, 2011 ⁶		None							
Robbins, 2006 ⁸		None							

BL = Baseline; BMI = Body Mass Index; DID = Difference between differences ; N = Sample Size; N/A = Not Applicable; SD = Standard Deviation

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Table 14. Characteristics of studies on populations in a college setting

Author, Year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Interventions
Hivert, 2007 ¹ Canada	2002-2003	Single	School	Randomized intervention	BMI: 18-30 kg/m ² Full-time, first- or second-year student Left parental home for <2 years No medical conditions No regular use of any medication except oral contraceptives Not pregnant or not planning a pregnancy during the 2 years of the study	Yes Prevent weight gain	No intervention Self-management Diet and exercise education
Matavienko, 2001 ² United States	1997	Single	School	Randomized intervention	Freshman or sophomore student Age: 18-26 years No previous nutrition class	Yes Prevent weight gain	No intervention Diet and exercise education

BMI = Body Mass Index

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1. Hivert MF, Langlois MF, Bérard P, et al. Prevention of weight gain in young adults through a seminar-based intervention program. Int J Obes (Lond) 2007; 31(8):1262-9.

2. Matvienko O, Lewis DS, Schafer E. A college nutrition science course as an intervention to prevent weight gain in female college freshmen. J Nutr Educ 2001; 33(2):95-101.

Table 15. Participant characteristics in studies reporting on groups in a college settings

Author, Year	Total N Study Arms N	Follow-up period, months	% Women	Age	Race	Education	Smokers
Hivert, 2007 ¹	115 Arm1: N: 57 Arm2: N: 58	24	Arm1: women, N: 47 Arm2: women, N: 47	Arm1: mean : 19.5 Arm2: mean : 19.9	Arm1: White, % : 93 Arm2: White, % : 93	Not reported	Not reported
Matavienko, 2001 ²	40 Arm1: N: 19 Arm2: N: 21	16	Overall: women, : 100	Arm 1: mean: 19.5 Arm 2: mean: 19.3	Overall: White, N: 35 Overall: Black, N: 2 Overall: Asian/PI, N: 1 Overall: No ID, N: 2	Not reported	Not reported

N = Sample Size

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1. Hivert MF, Langlois MF, Bérard P, et al. Prevention of weight gain in young adults through a seminar-based intervention program. Int J Obesity 2007; 31(8):1262-9.
2. Matvienko O, Lewis DS, Schafer E. A college nutrition science course as an intervention to prevent weight gain in female college freshmen. J Nutr Educ 2001; 33(2):95-101.

Table 16. Description of interventions in studies on populations in a college setting

Author, Year	Duration of Intervention	Control	Active intervention, Self-management	Active intervention, Diet	Active intervention, Physical Activity
Hivert, 2007 ¹	24 months	No intervention	Small group sessions focused on: -Increasing knowledge on weight gain -Problem solving -Goal setting -Monitoring strategies	Small group sessions focused on: -Increasing knowledge on national recommendations on diet	Small group sessions focused on: -Increasing knowledge on national recommendations on exercise
Matvienko 2001 ²	4 months	No intervention	N/A	College course focused on: -Lectures to increase knowledge of nutrition science including physiology and metabolism -Laboratory exercises including body composition measurements, serving sizes, food sensory exercises, and food preparation methods	College course focused on: -Lectures to increase knowledge of exercise science including physiology and metabolism

N/A = Not applicable

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Table 17a. BMI outcomes in studies in college-settings, combination interventions

Author, Year	Arm	Outcome Defined	Base-line N	Base-line BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	N at 24 months	BMI, 24 months, mean	Change from BL	Final mea-sure	N at final mea-sure	BMI, final mea-sure, mean	Change from BL	Vari-ables adjust-ed for	Sub-group Analyses	Comment
Hivert, 2007 ¹	1	kg/m2	57	22.4 SEM: 0.3	54		Mean change: 0.4 SEM: 0.2	48		Mean change: 0.2 SEM: 0.2						N/A	Repeat measures ANOVA p-value for group effect 0.01.
	2	kg/m2	58	22.4 SEM: 0.4	51		Mean change: (-0.1) SEM: 0.1	48		Mean change: (-0.3) SEM: 0.2							
Matvienko, 2001 ²	1	kg/m2	19	23.7 SD: 4.6							16 months	15	25.2 SD: 6.5			Subgroup analysis among desirable BMI (≤ 24 kg/m ²) and higher BMI (> 24 kg/m ²). No significant differences between intervention and controls within the desirable BMI group. There was a significant difference between controls (arm 1) and intervention (arm 2) within the	No significant differences between control and intervention using repeated measures ANOVA.

Author, Year	Arm	Outcome Defined	Base-line N	Base-line BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	N at 24 months	BMI, 24 months, mean	Change from BL	Final measure	N at final measure	BMI, final measure, mean	Change from BL	Variables adjusted for	Sub-group Analyses	Comment
																<p>higher BMI group.</p> <p>N; baseline BMI, baseline BMI SD; 16-month BMI, 16-month BMI SD: Arm 1: 6, 29.3, 5.4; 32.5, 6.1 Arm 2: 11; 27.5, 5.3; 26.9, 5.8</p> <p>DID p-value<0.05.</p>	
	2	kg/m2	21	24.6 SD: 4.7							16 months	18	24.5 SD: 4.8				

ANOVA = Analysis of Variance test; BMI = Body Mass Index; DID = Difference in between differences; Kg/m² = kilogram per meter squared; SD = Standard Deviation; SEM = Standard Error of the Mean

Table 17b. Weight outcomes in studies in college-settings, combination interventions

Author, Year	Arm	Out-come Defined	Base-line N	Base-line Weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	Final mea-sure, months	N at Final Mea-sure	Weight, final mea-sure, mean	Change from BL	Vari-ables adjust-ed for	Subgroup Analyses	Comment
Hivert, 2007 ¹	1	kg	57	63.5 SEM: 1.3	54		Mean change: 1.2 SEM: 0.5	48		Mean change: 0.7 SEM: 0.6							Repeated measures ANOVA p-value for group effect 0.04.
	2	kg	58	62.9 SEM: 1.4	51		Mean change: (-0.2) SEM: 0.4	48		Mean change: (-0.6) SEM: 0.5							
Matvienko, 2001 ²	1	kg	19	65.7 SD: 12.7							16 months	15	68.9 SD: 18.4			Subgroup analysis among desirable BMI (≤ 24 kg/m ²) and higher BMI (> 24 kg/m ²). No significant differences between intervention and controls within the desirable BMI group. There was a significant difference between controls (arm 1) and intervention (arm 2) within the higher BMI group. N; baseline wt, baseline wt SD; 16-month wt, 16-month wt SD: Arm 1: 6, 80.5,	No significant differences between control and intervention using repeated measures ANOVA.

Author, Year	Arm	Out- come Defined	Base- line N	Base- line Weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	N at 24 months	Weight, 24 months, mean	Change from BL	Final mea- sure, months	N at Final Mea- sure	Weight, final mea- sure, mean	Change from BL	Vari- ables adjust- ed for	Subgroup Analyses	Comment
																15.3; 89.7, 17.9 Arm 2: 11; 75.4, 12.1; 74.0, 14.3 DID p- value=0.025.	
	2	kg	21	67.7 SD: 12.9							16 months	18	67.7 SD: 13.6				

ANOVA = Analysis of Variance test; BL = Baseline; BMI = Body Mass Index; DID = Differences in between differences; N = Sample Size; SD = Standard Deviation; SEM = Standard Error of the Mean; Wt = Weight

Table 17c. Waist circumference outcomes in studies in college-settings, combination interventions

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Waist Circum- ference, mean	N at 12 months	Waist Circum- ference, 12 months, mean	Change from BL	N at 24 months	Waist Circum- ference, 24 months, mean	Change from BL	Variables Adjusted for	Comment
Combination Interventions												
Hivert, 2007 ¹	1	cm	57	72 SEM: 1	54		Mean change: 0 SEM: 0	48		Mean change: 0 SEM: 1		Repeated measures ANOVA p for group effect 0.11.
	2	cm	58	72 SEM: 1	51		Mean change: (-1) SEM: 0	48		Mean change: (-1) SEM: 1		

ANOVA = Analysis of Variance test; BL = Baseline; Cm = centimeter; N = Sample Size; SEM = Standard Error of the Mean

Table 17d. Adherence in studies in college-settings

Author, Year	Arm	Outcome Defined	Baseline N	Baseline Adherence, mean	Final Measure	N at Final Measure	Adherence, Final Measure, mean	Change from BL
Combination interventions								
Hivert, 2007 ¹	1	Attended at least 60% of the seminars	57	N/A				
	2		58	12-month N: 31 % of baseline: 53%	24 months	48	24-month N: 15 % of baseline: 26%	
Matvienko, 2001 ²		None						

BL = Baseline; N = Sample Size; N/A = Not Applicable

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Hivert MF, Langlois MF, Berard P, et al. Prevention of weight gain in young adults through a seminar-based intervention program. Int J Obes (Lond) 2007; 31(8):1262-9.
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Matvienko O, Lewis DS, Schafer E. A college nutrition science course as an intervention to prevent weight gain in female college freshmen. J Nutr Educ 2001; 33(2):95-101.

Table 18. Characteristics of studies on populations with cardiovascular disease and type 2 Diabetes Mellitus

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Abraira, 1980 ¹ United States	Not reported	Single	Clinical	Randomized intervention	5% calculated IBW Type 2 Diabetes Mellitus patients Veteran attending Diabetes outpatient clinic at Hines VA No history of weighing >5% over IBW in the last 5 years and also not > 15% over IBW before that. No complicating diagnoses that could independently affect weight or diet (such as congestive heart failure, cirrhosis of the liver, renal insufficiency, neoplasia). Not to be receiving any drug known to affect blood lipid levels (clofibrate, cholestyramine, nicotinic acid, etc.). Not under insulin treatment.	Yes	Not described Diet
Anderssen, 1995 ² Torjesen, 1997 ³ Europe	1990-1991	Single	Other : cohort study in Oslo	Randomized intervention	Age: 41-50 BMI: >24 Atherothrombogenic syndrome Relatively inactive (exercising at the most once per week and characterized by a maximal oxygen uptake of 35.4 +/- 5.9 ml/kg/min) Diastolic blood pressure of 86-99 mmHg Total cholesterol of 5.20-7.74 mmol/l Fasting triglycerides >1.4 mmol/l HDL cholesterol <1.20 mmol/l No overt cardiovascular disease or diabetes Not using drugs that might interfere with test results Not suffering from disease or having personal traits that make them unsuited for participation No refusal to sign the declaration	No	Usual care Self-management Diet Self-management Diet Physical Activity

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
					of willingness Not on lipid-lowering diet Not engaging in regular endurance training two times a week or more		
Babazono, 2007 ⁴ Asia	2004-2004	Single	Other: Membership	Randomized intervention	Systolic Blood Pressure 130-159, Diastolic Blood pressure 85-99, or Hemoglobin A1c >5.6 Participants were members of the National Health Insurance in Umi Town; Fukuoka Prefecture, Japan Persons for whom physicians judged avoidance of medical treatment to be safe were included.	No	Usual care Self-management Diet Physical Activity
Clark, 2004 ⁵ Europe	Not reported	Single	Clinical	Randomized intervention	Age: 40-70 BMI: >25 Type 2 Diabetes Mellitus Well enough to participate in a regular walking program.	No	Usual care Self-management
Gram, 2010 ⁶ Europe	Not reported	Single	Newspaper and Clinical	Randomized intervention	Age: 25-80 BMI: >25 Type 2 Diabetes Mellitus Type 2 Diabetes Mellitus for >1 year Hemoglobin A1c in the range 7% to 10% Stable anti-diabetic treatment for at least 3 months before inclusion No symptomatic heart disease No myocardial infarction within the past 3 months No severe lung disease	No	Usual care Physical activity (2 active arms)
Kumanyika, 2005 ⁷ United States	1992	Multicenter	Not reported	Randomized intervention	Age: 30-54 Men and women who were at least moderately overweight. Approximately 110–165% of the Metropolitan Life Insurance Company weight standards. Diastolic Blood	No	Usual care Diet

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
					Pressure between 83 and 89 Systolic Blood Pressure not over 140mmHg when nine readings taken over three visits were averaged. No current treatment for hypertension. No evidence of cardiovascular disease, diabetes mellitus, renal insufficiency, or any other serious illness. No current or planned pregnancy. Willingness or ability to adhere to trial procedures.		
Plotnikoff, 2011 ⁸	NR	NR	Other: Diabetes education programs	Randomized intervention	Condition: T2DM, confirmed diagnosis based on glucose or HbA1c No type1 diabetes or gestational diabetes No physician identified contraindications associated with PA	NR	Self management
Razquin, 2010 ⁹ Razquin, 2009 ¹⁰ Europe	Not reported	Multicenter	Clinical	Randomized intervention	Age: Men 55-80; women 60-80 BMI: >25 High cardiovascular risk population: Presence of type 2 diabetes mellitus or three or more coronary heart disease risk factors (e.g., current smoker, blood pressure >140/90 mmHg or use of antihypertensive drugs, low-density lipoprotein cholesterol level >160 mg/dL [4.14 mmol/L]) Family history of premature coronary heart disease before age 55 years in men or age 60 years in women). No history of coronary heart disease or other cardiovascular diseases, any severe chronic	No	Printed information on low- fat diet Diet (2 active arms)

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
					illness, drug or alcohol addiction, history of allergy or intolerance to olive oil or nuts, and low predicted likelihood of changing dietary habits according to the Prochaska stages of change model		
Samaras, 1997 ¹¹ Australia	Not reported	Single	Clinical	Randomized intervention	Age: 40-70 Those performing <1 hour weekly exercise NIDDM No history/symptoms or signs of Ischemic Heart Disease Not smoking No specific echocardiogram findings	No	Usual care Self-management Physical Activity
Stefanick, 1998 ¹² Location not reported	Not reported	Single	Not reported	Randomized intervention	Age: women 45-64 and men 30-64 BMI: men <34, women <32 Men with Heavy density lipoprotein <60, Low density lipoprotein 125-210 Women with Heavy density lipoprotein <60 and Low density Lipoprotein 125-190 No history of heart disease, stroke, diabetes, recent cancer, other life-threatening illness, or any condition that limited their ability to engage in moderate-intensity exercise No current use of insulin or medications for heart problems, blood pressure, or high serum cholesterol levels Not smoking more than nine cigarettes per day No consumption of more than four alcoholic drinks daily. Women agreeing not to change	No	Usual care Diet Physical activity Diet, Physical Activity

Author, year Study Location	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
					their hormonal therapy, if any, for one year.		
Toobert, 2011 ¹³	NR	Multicenter	Clinical	Randomized intervention	Age: 30-75 Condition: T2DM Language: English or Spanish Ethnicity: Latino/Hispanic Living independently, having a telephone. Not being on an insulin pump, not being developmentally disabled, or having end-stage renal disease. Only randomized if completed baseline assessments.	NR	Usual care Combination
Yates, 2010 ¹⁴ Europe	2006-2007	Single	Other : diabetes screening programs	Randomized intervention	BMI: >25 BMI: >23 for South Asians Impaired glucose tolerance Must not have reported taking steroids	No	Printed material: brief information sheet on impaired glucose tolerance and how Physical activity can be used to treat/control the condition. Physical Activity

BMI = Body Mass Index; HbA1c = Glycated Hemoglobin; HDL = High Density Lipoprotein; IBW = Ideal Body Weight; mg/dl = milligram per deciliter; mmHg = millimeter of mercury (unit of blood pressure); mmol/l = milimole per liter; NIDDM = Non-insulin Dependent Diabetes Mellitus; NR = Not Reported; PA = Physical Activity; T2DM = Type 2 Diabetes Mellitus

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Table 19. Participant characteristics in studies not reporting on groups with cardiovascular disease and type 2 Diabetes Mellitus

Author, year	Total N	Follow-up period, months	% Women	Age	Race	Education	Smokers	Comments
Abraira, 1980 ¹	30	24	0	Arm2: mean : 49 Arm3: mean : 52				Duration of diabetes in years Arm2: mean : 11 Arm3: mean : 12 All participants on insulin
Anderssen, 1995 ² Torjesen, 1997 ³	97	12						
Babazono, 2007 ⁴	99	Not reported	Arm1: women : 51.1 Arm2: women : 58	Arm1: mean : 64.5 Arm2: mean : 64.3				~30% with HTN at baseline in each group; 20% in intervention and 14.3% in control group with DM at baseline
Clark, 2004 ⁵	100	Not reported	Overall: women, : 42	Overall: mean : 59.5				
Gram, 2010 ⁶	68	Not reported	Overall: women, N: 31	Arm1: mean : 61 Arm2: mean : 59 Arm3: mean : 62				At baseline in the three Arms, there was a statistically significant difference (P=0.04) for hip circumference (in cm): Arm 1: 114 Arm 2: 111 Arm 3: 107
Kumanyika, 2005 ⁷	1159	Not reported	Sex reported differently by group: say that "approx two thirds "were male but		Black overall: N: 203 % : 17	"about half" were college graduates		

Author, year	Total N	Follow-up period, months	% Women	Age	Race	Education	Smokers	Comments
			don't give an exact number					
Plotnikoff, 2011 ⁸	Overall: 96 Arm 1: 49 Arm 2: 47	12	Overall: 60	Overall: 60(25-78)	NR	Some post secondary: 65%	NR	
Razquin, 2009 ⁹	187	Not reported	Arm1: women, : 54 Arm2: women, : 52 Arm3: women, : 46	Arm1: mean : 69 Arm2: mean : 67.48 Arm3: mean : 68.40				
Razquin, 2010 ¹⁰	737	Not reported	Arm1: women, : 57 Arm2: women, : 56 Arm3: women, : 52	Arm1: mean : 68.3 Arm2: mean : 67.7 Arm3: mean : 67.6			Arm1: % : 18 Arm2: % : 16 Arm3: % : 13	69%, 64% and 63% of patients in Arm 1, Arm 2 and Arm 3, respectively, had diabetes
Zazpe, 2008 ¹¹ Razquin, 2010 ¹⁰ Razquin, 2009 ⁹	1776	Not reported	Arm1: women, : 57.7 Arm2: women, : 53.8 Arm3, : 49	Arm1: mean: 68 Arm2: mean: 67.2 Arm3: mean: 67	Not reported	Arm1: Less than high school, %: 75.9% Arm2: Less than high school, %: 76.0% Arm3: Less than high school, 5: 72.6%	Arm1: %: 16.9% Arm2: %: 19.5% Arm3: 5: 19.0%	Prevalence of Diabetes, %: Arm1: 47.8% Arm2: 51% Arm3: 47.5%
Samaras, 1997 ¹²	26	12	Overall: women, N: 16 Arm1: women, N: 7 Arm2: women, N: 9	Arm1: mean : 60.5 Arm2: mean : 60.5				Excluded current smokers
Stefanick, 1998 ¹³	367	Not reported	report characteristics stratified by sex	Arm1: mean : 56.9 Arm2: mean : 47.8 note this is stratified by sex and not intervention				all characteristics and results stratified by sex
Toobert, 2011 ¹⁴	Overall: 280	6-12	Overall: 100	Arm 1: 58.7	Latina: 100%	HS diploma:	Current:	

Author, year	Total N	Follow-up period, months	% Women	Age	Race	Education	Smokers	Comments
	Arm 1: 138 Arm 2: 142 Arm 3:			Arm 2: 55.6 Age differs by group P=0.009		Arm 1: 27.1 Arm 2: 20 Some College: Arm 1: 30.1 Arm 2: 28.6	Arm 1: 12.6 Arm 2: 9.2	
Yates, 2010 ¹⁵	74	Not reported	Overall: women, : 31	Overall mean: 65	Asian/Pacific Islander overall: % : 26		Current smoker, overall: % : 11	36 (49%) were taking aspirin, 5 (7%) were taking non-steroidal anti-inflammatory medication, 43 (58%) were taking statins, 25 (34%) were taking beta-blockers and 14 (19%) were taking angiotensin-converting enzyme inhibitors.

Cm = centimeter; DM = Diabetes Mellitus; HS = Highschool; HTN = Hypertension; N = Sample Size; NR = Not Reported

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Table 20. Description of interventions in studies on populations with cardiovascular disease and/or type 2 diabetes mellitus

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
KQ1: self-management						
Clark, 2004 ¹	6 months	Usual care/no intervention	The key features of the intervention were assessment, patient participation in goal setting, selecting personalized strategies to overcome barriers, and follow-up contacts. The assessment used the specific self-report measures to assess eating patterns and level of physical activity. These measures established the patient's current lifestyle, identified the most problematic areas, and identified the patient's barriers to making lifestyle changes. Info then used to guide discussion with the patient to help develop discrepancy between current status and desired goals., Number of sessions, 3 in-person, 3 telephone, In person, By Phone (do not use for text messages) Goal setting: 1st in-person visit (30 min), participants set one dietary and one physical activity goal; set further goals at 12- and 24-wk in-person visits if initial goals met.			
KQ2: Diet						
Zazpe, 2008 ²	36 months	Control: Leaflet about the American Heart Association dietary recommendations and single meeting with a dietician about this diet		<u>Mediterranean diets encouraged:</u> <ul style="list-style-type: none">• Use of virgin olive oil• Consumption of<ul style="list-style-type: none">○ ≥ 2 servings per day of vegetables○ ≥ 3 servings per day of fruit○ ≥ 3 servings per week of legumes○ ≥ 3 servings per week of fish or seafood○ ≥ 3 servings per week of nuts or seeds		

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
				<ul style="list-style-type: none"> ○ White meats (ie, poultry without skin or rabbit) instead of red meats or processed meats ○ ≥ 7 glasses each week of wine if participant consumes wine ○ Regularly cooking with salsa made with minced tomato, garlic, and onion simmered in olive oil. <ul style="list-style-type: none"> • Discouraged consumption of cream, butter, margarine, cold meats, pate, duck, carbonated and/or sugared beverages, pastries, commercial bakery products, French fries or potato chips, and out-of-home precooked meals. <p><u>Individual sessions:</u> Personalized motivational interview administered by dietician quarterly with positive recommendations to follow this food pattern</p> <p><u>Group sessions:</u> Educational sessions run by dieticians with up to 20 participants per session and separate sessions for each group.</p> <p><u>Individual and group sessions:</u> Included information on typical Mediterranean-diet foods and seasonal shopping lists, meal plans, and cooking recipes.</p> <p>Participants had free and continuous access to their center's</p>		

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
				<p>dietician.</p> <p><u>Free provision of olive oil:</u> Participants in the “Mediterranean Diet with Virgin Olive Oil” arm were given 3-month quantities of virgin olive oil (1 L/week).</p> <p><u>Free provision of mixed nuts:</u> Participants in the “Mediterranean Diet with Mixed Nuts” arm were given 3-month quantities of mixed nuts (30 g/day, distributed as 15 g walnuts, 7.5 g almonds, and 7.5 g hazelnuts).</p>		
Abraira, 1980 ³	24 months	<p>Usual Care (Hines VA Diabetic Diet):</p> <ul style="list-style-type: none"> • Three meals + bedtime snack • Strict avoidance of refined sugars • Consumption of starches • Avoidance of saturated fat • No exchange system • No caloric goal • No specific carbohydrate distribution • No cholesterol restriction 		<p>American Diabetes Association Diet:</p> <ul style="list-style-type: none"> • Calculated daily caloric goal based on ideal body weight and energy expenditure • Daily meal pattern planned and distributed through a food exchange • Three meals + bedtime snack • Carbohydrate distribution: breakfast (30%), lunch (30%), dinner (30%), and snack (10%). • Moderate restriction of both refined sugars and carbohydrates. 		Both diets delivered by dietitians at quarterly regular clinic visits
KQ3: Physical activity						
Yates, 2010 ⁴	6 months	Received printed information sheet by mail about impaired glucose tolerance and			<p>PREPARE+ pedometer:</p> <ul style="list-style-type: none"> • Single in-person, 180-min group, session at baseline consisting of information 	

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
		the role of physical activity in controlling impaired glucose tolerance			about impaired glucose tolerance and counseling about perceived effectiveness of exercise, walking self-efficacy beliefs, barriers to walking, and self-regulatory strategies <ul style="list-style-type: none"> • 10 minute review of progress in person at 3 and 6 months • Received steps per day goal and pedometer 	
					PREPARE <ul style="list-style-type: none"> • Same as PREPARE+ pedometer but NO pedometer given 	
Anderssen, 1995 ⁵ Torjesen, 1997 ⁶	12 months	Usual care/no intervention			Physical activity: Three supervised, group 1-hour endurance exercise sessions per week Goal to attain improve peak VO2 with by targeting 60-80% of peak heart rate Eight weeks of progression in intensity and duration of the program followed by maintenance of intensity. At the first training session, participants are informed orally and in writing about simple principles of training physiology	
KQ5: Combination						
Stefanick, 1998 ⁷	9-11 months	Usual care/no intervention		Dieticians presented dietary recommendations, Counseling, Other : 1 individual counseling		

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
				<p>session followed by 8 group lessons; 6-8 months maintenance phase with monthly contacts, Other : initial intervention in-person; maintenance could be in-person (group or individual) or by mail/phone</p> <p>NCEP Step 2: less than 30 percent total fat, less than 7 percent saturated fat, and less than 200 mg of cholesterol per day</p> <p>Other: Participants entered a 12-week adoption phase in which an individualized counseling session was followed by eight one-hour, mixed-sex group lessons on replacing dietary sources of saturated fat with complex carbohydrates, low-fat dairy foods, and other alternatives, including lean meats. Weight loss was not emphasized in the group sessions, which were held separately for the diet-alone and diet plus-exercise groups and which averaged 15 persons per group. A six-to-eight-month maintenance phase consisted of monthly contacts with study dietitians, by mail or telephone or in group or private meetings.</p>		
				Exercise staff delivered intervention in individual and group sessions	1 individual followed by 6-wks adoption phase in groups (3 x/week) followed by maintenance phase x 7-8 month (in groups or at home) Physical activity; individual visit then group; maintenance through group or home, Individual (running, lifting,	

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
					<p>swimming).</p> <p>Group (classes, organized sports), 3 Times/sessions per week for 60 Minutes.</p> <p>The aerobic-exercise program began with a private meeting with members of the exercise staff, followed by a six-week adoption phase in which participants attended supervised, one-hour, mixed-sex exercise sessions, three times per week, that were held separately for the exercise-alone and diet-plus-exercise groups.</p> <p>The subjects were instructed not to discuss diet during these sessions.</p> <p>Throughout a seven-to-eight-month maintenance phase, participants could attend supervised group sessions three times per week, supplement the required monthly group sessions with home-based activities, or both, with the goal of engaging in aerobic activity equivalent to at least 16 km (10 mile) of brisk walking or jogging each week.</p>	
			:	see NCEP Step 2 (Arm 2) intervention description	<p>see exercise only (Arm 3) description</p> <p>Weight loss was not emphasized in the group</p>	

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
					<p>sessions, which were held separately for the diet-alone and diet plus-exercise groups and which averaged 15 persons per group.</p> <p>Exercise: The subjects were instructed not to discuss diet during these sessions.</p>	
Samaras, 1997 ⁸	6 months	Usual care/no intervention	Group sessions: safe exercise, exercise-specific education to improve confidence, coping w/ diabetes & exercise, self-esteem issues, decision making, goal setting & achieving mastery & enjoyment of chosen exercise, One time/month, In person. Goal setting: log books for goal setting, goal and progress review		<p>Physical activity educational handouts</p> <p>Exercise: Group (classes, organized sports), 1 Time/session per month</p>	Could still attend exercise sessions after 6 month program; do not state general exercise goals for participants outside of monthly sessions
Gram, 2010 ⁹	4 months	Usual care/no intervention : Given the diabetes outpatient clinic's standard written information on exercise as part of the treatment for Type 2DM Subjects did not receive supervised training. Like patients in Arms 2 and 3, control group patients were advised to be physically active at inclusion			<p>Intervention - advised to exercise outside training sessions; post-intervention - tailored advice/neighborhood opportunities.</p> <p>Physical activity: Counseling, Other : Unclear, Other : probably in-person//Exercise: Individual (running, lifting, swimming) Group (classes, organized sports) Individually tailored program with aerobic and strength training, Times/sessions per week : Twice weekly for first 2 months, and then once weekly for final 2 months, Minutes : 45 (10-min warm up + 30 min exercise + 5-min cool down) Individually based; however, participants had to work</p>	<p>Exercise on Prescription (EP) focuses on muscle strength and physical fitness.</p> <p>Nordic walking (NW) is an outdoor activity that does not require specific equipment and seems to be easier than other sports to adjust to meet the individual's needs and to fit into daily living.</p>

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
					<p>continuously for a min of 30mins at a workload of at least moderate intensity by perceived exertion Supervised by a physiotherapist The training program was individually tailored and included both strength training and aerobic exercise. Training individualized on the basis of a cycle test at inclusion, the participant's physical capacity, and his/her goals. Session equipment: ergometer cycles, rowing machines, step machines, and strength training machines. Participants interviewed 3 times by the physiotherapist using a structured interview at weeks 0, 8, and 16, then assisted with goal setting, and provided with advice about training and exercise.</p> <p>During the intervention, a physiotherapist emphasized and instructed participants to increase physical activity outside of the training sessions.</p> <p>At the end of the intervention:</p> <ul style="list-style-type: none"> - participants were given information on physical training opportunities available in their neighborhood and individually tailored advice - Each participant was guided 	

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
					to take the initiative to find suitable forms of training in the follow-up period	
					<p>A physiotherapist instructed and supervised this treatment arm. Intervention - advised to exercise outside training sessions; post-intervention - tailored advice/neighborhood opportunities.</p> <p>Physical activity: Counseling, Other : Unclear, Other : presumed in-person//Exercise: Group (classes, organized sports)</p> <p>Use of the same type of walking sticks (Exel Trainer Pro; ESB Sports Oy, Kitee, Finland) for Nordic Walking, 2 times a week for 2 months and then weekly for last 2 months.</p> <p>Each supervised session lasted 45 minutes and included a 10-minute warm-up, 30 minutes of exercise/Nordic walking, and a 5-minute cool down.</p> <p>Walking distance and intensity individually based. Participants instructed to walk at a speed of at least moderate intensity continuously for a minimum of 30 minutes by perceived exertion//The training for this group was conducted outdoors on forest paths</p> <p>Participants kept walking sticks through 12 months of study</p>	

Author, Year	Duration of Intervention (Only for interventional studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
					<p>This arm was instructed and supervised by a physiotherapist</p> <p>During the intervention, a physiotherapist emphasized and instructed participants to increase physical activity outside of the training sessions</p> <p>At the end of the intervention:</p> <ul style="list-style-type: none"> - participants were given information on physical training opportunities available in their neighborhood and individually tailored advice - Each participant was guided to take the initiative to find suitable forms of training in the follow-up period 	
				Dietary history interview (taken by dietician) used to estimate weighted glycemic index (GI) and overall glycemic load (based on 2002 international table of GI and GL values)		
Kumanyika, 2005 ¹⁰	36-48 months	Usual care/no intervention	Individual counseling conducted based on results of health checkups and health assessment charts on physical activity, nutrient intake, and lifestyle at the baseline.	Participants were provided with the knowledge-skills by intensive initial counseling, with subsequent counseling less frequently basis to prevent relapse and support maintenance of sodium reduction, Counseling, > 15 Number of sessions, In person Sodium intake <1800 mg/day by 6 months (individual goal<1600 mg): Participants were expected to make targeted changes in their		

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
				<p>usual food selections and eating patterns to lower sodium intake without affecting caloric intake or other aspects of dietary intake or lifestyle.</p> <p>1 initial individual counseling session 10 weekly group counseling sessions (intensive phase) 4 monthly group counseling sessions (transitional phase) Periodic 'mini-series' of intervention sessions on selected topics Individual in-person, telephone, and mail contacts as needed</p> <p>Groups: 60–90 min sessions; initial review of progress and information sharing among participants; interactive presentation and discussion</p> <p>Content: How to identify Na content of foods, prepare lower Na foods, modify recipes, and make lower Na food selections at and between meals and when eating away from home; taste-testing lower Na packaged foods and recipes; how to make small, progressive Na intake changes; alternatives to high-Na eating behaviors; general behavioral modification and relapse prevention techniques, including self-monitoring of Na intake; counselor and peer support</p> <p>To increase adherence: Counselor feedback based on suBMitted food</p>		

Author, Year	Duration of Intervention (Only for intervention al studies)	Control	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity	Comment
				records. Individual and group feedback on changes in urinary Na excretion based on timed, overnight urine samples or 24-h urine samples Various reminders and incentives throughout follow-up.		
Babazono, 2007 ¹¹	12 months	Usual care/no intervention; received result of health exam. Printed Materials	Goal to increase fruits/veg. and physical activity. Visits at health center at 0, 4, and 6 months. Visits at home twice 5 Number of sessions; In person Goal setting: Overall goal to increase Fruits and vegetable intake and physical activity. The support team – consisting of qualified dietitians, health exercise instructors, and public health nurses encouraged patients to set their own goals and to select lifestyle improvements that they were interested in making. They helped intervention group patients choose and prioritize physical activities to achieve goals set by the patients themselves. The support team provided advice, problem solved if needed, and reinforced positive changes.	increase fruits and vegetable intake, Counseling; 5Number of sessions, In person Fruit/vegetable rich: Increase vegetables at every meal Increase vegetables in miso soup Increase intake of seaweed or mushrooms Increase soybean cake intake Decrease salty foods Decrease oily foods Decrease sugar intake Decrease alcohol intake Increase time for meals Eat more slowly and/or chew for a longer time.	Challenge cards used to promote physical activity Physical activity: Counseling, 5Number of sessions: 5, In person. Exercise: Individual (running, lifting, swimming) Walk to workplace Increase walking around home Step exercise at home Jogging Stretching Muscle training Cycling Exercise at workplace Exercise at training gyms Increase time playing sports	

DM = Diabetes Mellitus; EP = Exercise on Prescription; GI = Glycemic Index; GL = Glycemic Load; Na = Sodium; NCEP = National Cholesterol Education Program; NW = Nordic Walking; VO2 = Volume of Oxygen (Measure of oxygen consumption); Wks = Weeks
Including exercise vs control only for ODES, deleted diet and diet + exercise because of weight loss goal

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Table 21a. BMI outcomes in studies on cardiovascular disease and/or type 2 diabetes mellitus

Author, year	Arm	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Between-group Difference at 12 Months	Measure of association	Test for Trend	Variables adjusted for	Comment
Self-management intervention												
Clark, 2004 ¹	1	kg/m2	50	Mean: 31.3, SD: 5.01	50	Mean: 32.72, SD: 4.77	Mean: 1.42					P=0.000 for change from baseline
	2		50	Mean: 32.4, SD: 4.49	50	Mean: 32.06, SD: 4.03	Mean: -0.34	Mean: -1.76 95%CI: -0.2 to 3.7, P=0.075 (reference=control)				P=0.088 for change from baseline
Plotnikoff, 2011 ²	1	Kg/m2	49	34.8 (9)	49		-1.2					
	2		47	34.3 (5.7)	47		-0.8					
Diet intervention												
Zazpe, 2008 ³	1	Kg/m2	485	Mean: 29.5 SEM: 3.6	485		% with decreased BMI=41.2		P=0.484 for chi squared test			
	2		533	Mean: 29.3 SEM: 3.5	533		% with decreased BMI=37.7					
	3		533	Mean: 29.4 SEM: 3.4	533		% with decreased BMI=40.9					
Physical activity intervention												
Torjesen, 1997 ⁴	1	kg/m2	43	Mean: 28.3 SD : 3.1	N : 43		Mean change: 0.4, SD: 0.1					
	2		49	Mean: 28.6 SD : 3.1	N : 49		Mean change: -0.3, SD: 0.2		Mean difference: -0.7 95%CI: -0.8 to -0.6, P<0.001 (reference= Arm 1)			

Author, year	Arm	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Between-group Difference at 12 Months	Measure of association	Test for Trend	Variables adjusted for	Comment
Yates, 2010 ^b	1	kg/m2	Mean: 29.7, SD: 4.5	N : 26			Mean change (95%CI): -0.3, (-0.8 to 0.2)				Baseline BMI	LLCI for Arm 3 should probably be -0.6 rather than +0.6 (? typographical error)
	2		Mean: 28.7, SD: 5	N : 24			Mean change (95% CI): 0.1 (-0.5 to 0.7)		Arm 1: N=26 Arm 2: N = 24 Adjusted mean between-group difference from baseline 0.5 (95% CI: -0.3 to 1.2) P=0.212 (reference=control) Arm 2 vs Arm 3 Mean between group difference from baseline 0.3			
	3		Mean: 29.3, SD : 5.1	N : 24			Mean change (95% CI) : -0.1 (-0.6 to 0.4)		Arm 1: N=26 Arm 3: N=24 Adjusted mean between-group			

Author, year	Arm	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Between-group Difference at 12 Months	Measure of association	Test for Trend	Variables adjusted for	Comment
									difference from baseline: 0.2 (-0.5 to 0.9) P= 0.575 (reference=control)			
Combination interventions												
Gram, 2010 ^o	1	kg/m2	22	Mean : 32.8 SD : 4.0	n : 20	Mean : 32.6, SE: 0.9						
	2		24	Mean : 32.4 SD : 4.1	n : 24	Mean : 31.8, SE: 0.9		Mean difference -0.71 (95% CI: -1.42 to 0.00) Se: 0.4 P=0.049				
	3		22	Mean : 31.4 SD : 4.3	n : 21	Mean : 30.9, SE: 0.9		Mean difference: -0.49 (95% CI: -1.23 to 0.25) Se: 0.4				
Samaras, 97 ^r	1	12 months minus baseline	13	Mean : 35.7 SE: 1.6		Mean : 0.29 SE: 0.45				No significant difference by arm with ANOVA or Mann Whitney test		Please note: at 12 months measurements were "Changes in Anthropometric & Metabolic Parameters" from baseline measures
	2		13	Mean : 32.3 SE: 1.1		Mean : -0.1 SE: 0.05						
Babazono, 2007 ^b	1	kg/m2	41	Mean : 24 SD : 2.5	N : 41 Check if this is the last	Mean : 23.9 SD : 2.4	-0.1			No statistically significant differences in BMI		

Author, year	Arm	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	Between-group Difference at 12 Months	Measure of association	Test for Trend	Variables adjusted for	Comment
					timepoint reported					between groups at baseline or after 1 yr of follow up		
	2		46	Mean : 23.6 SD : 3.2	N : 46 Check if this is the last reported timepoint	Mean : 23.1 SD : 3.2	-0.5		Mean between-group change from baseline: -0.4			

ANOVA = Analysis fo Variance test; BMI = Body Mass Index; CI = Confidence Interval; Kg/m^2 = kilogram per meter squared; LLCI = Lower Level Confidence Interval; N = Sample Size; SD = Standard Deviation; SE = Standard Error; SEM = Standard Error of the Mean; Yr = Year;

Table 21b. Weight change outcomes in interventional studies on CVD_T2DM

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
Diet Interventions															
Razquin, 2010 ⁹	1	kg	196	Mean : 74.5.3 SE: 11.8				36	Not reported	SE : 0.3 Mean change : -0.10		Arm 1 N=196 Arm 2 N=302 36-mo body weight change (36 mo vs baseline) 0.202 (95% CI: -0.593 to 0.997) P=0.618			
	2		302	Mean : 75.6 SE: 11.9				36	Not reported	Mean SE: 0.2 Mean change : -0.21					
	3		239	Mean : 74.6 SE: 10.3				36	Not reported	Mean SE : 3.8 Mean change : -0.07					
Abraira, 1980 ¹⁰	2	abs weight in kg;		Mean : 63.0	Mean change : 0.74		Mean change : 0.94					Mean between-group change at 12 mo: -0.8 (reference=un measured diet)	note "no significant changes in either group"		% change in weight reported at 12 mo and 24 mo; abstracted 12- and 24-mo data from Fig 1 using Engauge

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
	3			mean : 64.4	mean change : 1.58		mean change : 0.96								
Physical Activity Interventions															
Yates, 2010 ⁹	1	kg	26	mean : 82.7, SD : 14.7	n : 26	Mean: 81.9	Mean: - 0.8, 95%CI: -2.3 to 0.6							Other : baseline weight	
	2		24	mean: 80.7, SD: 17.2	n : 24	Mean: 81.2	Mean: 0.5, 95% CI: -1.2 to 2.2					Arm 1 N =26 Arm 2 N=24 Mean between-group difference from baseline 1.4 (95% CI: -0.8 to 3.5) P=0.199 Reference=Arm 1			
	3		24	mean : 82.8,SD : 14.6	n : 24	Mean: 82.3	Mean: - 0.5, 95% CI: -2.1 to 1.1					Arm 1 N =26 Arm 3 N=24 Mean between-group difference from baseline 0.3 (95% CI: -1.8 to 2.5) P=0.749 Reference=Arm 1			
Anderssen, 1995 ¹¹	1	kg	43	Mean: 89.3, SEM: 2.1	n: 43	Mean: 90.4	Mean: 1.1, SEM: 0.4								

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
	2		49	Mean: 89.7, SEM: 1.7	n: 49	Mean: 88.8	Mean: -0.9, SEM: 0.7					Mean between-group difference from baseline -2 95% CI: -3.4 to -0.6, P=0.007			
Combination Interventions															
Kumanyika, 2005 ¹²	1	kg	577					36	NR	SD : 5.3 Mean change : 1.8			None of these weight change differences attained statistical significance		Within ethnicity-gender subgroups, changes were smaller in the active intervention versus control for men and larger for women. Weight change differences were not statistically significant overall or in subgroups.
	2		582					36	NR	SD : 5.2 Mean change : 1.7		Mean between-group change: -0.1, SE: 0.31,			

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
												P=0.75 Reference=arm1			
Samaras, 1997 ⁷	1	kg at 12 mo minus baseline	13	Mean : 98.2 SE : 3.4	Check if this is the last timepoint reported	Mean : 0.79 SE : 1.09							No between-arm difference on ANOVA or Mann Whitney		Measures at 12 months are "changes since baseline measures)
	2		13	Mean : 83.0 se : 3.6	Check if this is the last reported timepoint	Mean : 0.14 se : 1.09									
Babazono, 2007 ⁸	1	kg	41	Mean : 58.6 SD : 9.1	N : 41 check if this is the last timepoint reported	Mean : 58.1 SD : 8.8	-0.5						no statistically significant differences in body weight between the two groups at baseline or after 1 yr follow up		
	2		46	Mean : 58.5 SD : 9.7	N : 46 Check if this is the last reported timepoint	Mean : 57.1 SD : 9.5	-1.4					Mean between-group change from baseline: -0.9			
Gram, 2010 ⁶	1	kg	22	Mean : 99	N: 20 check if	Mean : 98.8						Arm 1 N= 20 Arm 2 N=24			

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
				SD : 15	this is the last timepoint reported	SD SE: 3.2									
	2		24	Mean : 93.6 SD : 14.8	N: 24 Check if this is the last reported timepoint	Mean : 92.5 SD SE: 3.2	Mean difference between Groups -1.26 (95%CI -3.09 to : 0.58) Se: 0.9								
	3		22	Mean : 88.9 SD : 14.3	N : 21 Check if this is the last reported timepoint	Mean : 87.1 SD se : 3.3	Mean between Group difference: -1.1, SE: 1.1, 95%CI: -3.31 to 1.11								
Stefanick, 1998 ¹³ Women	1	kg	45	Mean: 69.6, SD: 10.5 (for all 4 arms)	45		Mean: 0.8, SD: 4.2					P<0.001 from ANOVA comparing weight change across all 4 arms			P values adjusted for multiple comparisons using Bonferroni's adjustment
	2		43		43		Mean: -0.4, SD: 2.5					Mean between-group difference (95% CI): -1.2 (-2.6 to 0.2) Reference=ar			

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
												m1			
	3		46		46		Mean: -2.7, SD: 3.5					P<0.05 versus Arm 2, P<0.001 versus Arm 1; Mean between-group difference (95% CI): -3.5 (-5.1 to -1.9) Reference=arm1			
	4		43		43		Mean: -3.1, SD: 3.7					P<0.01 versus Arm 2, P<0.001 versus Arm 1 Mean between-group difference (95% CI): -3.9 (-5.6 to -2.2) Reference=arm1			
Stefanick, 1998 ¹³ Men	1	kg	46	Mean: 84.2, SD: 10.8 (for all 4 arms)	46		Mean: 0.8, SD: 2.7					P<0.001 from ANOVA comparing weight change across all 4 arms			
	2		47		47		Mean: -0.6, SD: 3.1					Mean between-group difference (95% CI): -1.4 (-2.6 to -0.2)			

Author, year	Arm	Outcome defined	Baseline N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final measure, months	N at Final Measure	Weight, final measure, mean	Change from BL	Measure of Association	Test for Trend	Variables Adjusted for	Comment
												Reference=arm1			
	3		49		49		Mean: -2.8, SD: 3.5					P<0.05 versus Arm 2, P<0.001 versus Arm 1 Mean between-group difference (95% CI): -3.6 (--4.9 to -2.3) Reference=arm1			
	4		48		48		Mean: -4.2, SD: 4.2					P<0.001 versus Arm 2, P<0.001 versus Arm 1 Mean between-group difference (95% CI): -5.0 (--6.4 to -3.6) Reference=arm1			

Abs = Absolute; ANOVA = Analysis of Variance test; BL = Baseline; Kg= kilogram; N = Sample Size; SD = Standard Deviation; SEM = Standard Error of the Mean

Table 21c. Waist circumference outcomes in interventional studies on cardiovascular disease and/or type 2 diabetes mellitus

Author, year	Arm	Outcome defined	Base-line N	Base-line BMI, mean	N at 12 months	Waist circ, 12 months, mean	Change from BL	Final measure , months	N at final measure	Waist circumference, final measure, mean	Change from BL	Measure of association	Between-group Difference at 12 Months	Test for trend	Variables adjusted for	Comment
Self-management intervention																
Clark, 2004 ¹	1	cm	50	Mean: 101.25, SD: 11.4	Not reported	Mean: 103.6, SD: 10.63	Mean: 2.35									P=0.001 for change from baseline
	2		50	Mean: 104.22, SD: 10.46	Not reported	Mean: 102.7, SD: 10.25	Mean: -1.52						Mean: -3.87 95% CI: -2.1 to 9.9 (reference=control)			P=0.002 for change from baseline
Plotnikoff, 2011 ²	1	cm	49	110.4 (12.7)	49		-3.2									significant change from baseline in each group (P<0.01) but P>0.1 for between group diff in change; change at 12 months adjusted (?for baseline value, unclear); used LOCF for missing data

Author, year	Arm	Outcome defined	Base-line N	Base-line BMI, mean	N at 12 months	Waist circ, 12 months, mean	Change from BL	Final measure , months	N at final measure	Waist circumference, final measure, mean	Change from BL	Measure of association	Between-group Difference at 12 Months	Test for trend	Variables adjusted for	Comment
	2		47	111.8 (16.7)	47		-5.2									
Physical activity intervention																
Anderssen, 1995 ¹¹	1	cm	43	Mean: 102.3, SE: 1.4	43	Mean: 103.2	Mean: 0.9, SE: 0.4									
	2		52	Mean: 102.6, SE: 1.4	52	Mean: 100.7	Mean: -1.9, SE: 0.6						Mean between-group difference from baseline -2.8 P<0.05			
Diet interventions																
Razquin, 2009 ¹⁴		Waist circumference (define)	59	mean : 93.79 SD : 9.78				36	59	mean : 0.11 SD : 4.56						
			65	mean : 98.83 SD : 10.14				36	65	mean : -0.63 SD : 4.76						
			63	mean : 96.67 SD : 9.30				36	63	mean : -0.23 SD : 3.60						
Combination interventions																
Gram, 2010 ⁶		cm	22	Mean: 113 SD : 10	N: 20 check if this is the last timepoi	Mean : 112 se : 2						Arm 1 N=20 Arm 2 N=24			Other : baseline waist circumference	

Author, year	Arm	Outcome defined	Base-line N	Base-line BMI, mean	N at 12 months	Waist circ, 12 months, mean	Change from BL	Final measure , months	N at final measure	Waist circumference, final measure, mean	Change from BL	Measure of association	Between-group Difference at 12 Months	Test for trend	Variables adjusted for	Comment
					nt reported											
			24	Mean : 110 SD : 10	N : 24 check if this is the last reported timepoint	Mean : 108 se : 2	Mean difference -2.38 (95% CI: -4.73 to -0.03) SE: 1.2 P=0.012									
			22	Mean : 109 SD : 11	N : 21 check if this is the last reported timepoint	Mean : 108 se : 2	Mean difference -1.62 (95% CI: --3.76 to 0.52) SE: 1.1									

BL = Baseline; CI = Confidence Interval; Circ = Circumference; Cm = centimeter; LOCF = Last Observation Carried Forward; SD = Standard Deviation; SE = Standard Error

Table 21d. Adherence outcomes in interventional studies cardiovascular disease and/or type 2 diabetes mellitus

Author, year	Arm	Outcome Defined	Baseline N	Baseline Adherence, mean	Final measure	N at Final measure	Adherence, final measure, mean	Change from BL	Measure of Association	Comment
Physical activity interventions										
Anderssen, 1995 ¹¹	2	Percentage of supervised exercise sessions attended (plus individual sessions)	49	Not applicable		49	57%	Not applicable		Average of 1.8 hours per week spent in exercise
Combination interventions										
Gram, 2010 ⁶	1	Adherence reported as overall mean attendance rate (%) during the intervention (4-months)			over 4 mo of intervention	24	64.6			Adherence reported as overall mean attendance rate (%) during the intervention (4-months) 12 (50%) participants in the EP group had adherence corresponding to ≥70% attendance rate 12 (54.5%) participants in the NW group had adherence corresponding to ≥70% attendance rate A 70% attendance rate was interpreted

Author, year	Arm	Outcome Defined	Baseline N	Baseline Adherence, mean	Final measure	N at Final measure	Adherence, final measure, mean	Change from BL	Measure of Association	Comment
										as successful attendance in this study
	2				over 4 mo of intervention	21	63.5			
Samaras, 1997 ⁷	2	Compliance with exercise sessions					100%			
Toobert, 2011 ¹⁵	1	mean attendance at sessions between 12 and 24 mo (%)	138		24 months	93				
	2		142			97	46%			

EP = Exercise on Prescription; Mo = month; NW = Nordic Walking

; Table 21e. QOL outcomes in studies without an underlying condition

Author, year	Arm	Outcome Defined	Baseline N	Baseline QOL , mean	Final Measure	N at Final Measure	QOL , final measure, mean	Change from BL	Measure of Association	Between group differences	Variables Adjusted for	Comment
Combination interventions												
Gram, , 2010 ⁶		Health-related quality of life (measured using the Short Form Health Survey [SF-36] questionnaire)								There were no significant differences in quality of life measured by SF-36 between and within groups (p358)		

BL = Baseline; N = Sample Size; QOL = Quality of Life; SF-36 = Short Form health survey

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Table 22. Characteristics of studies on populations with cancer conditions

Author, year							
Study Location	Years of recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Chlebowski, 2006 ¹ United States	1994-2001	Multicenter	Clinical	Randomized intervention	Age: 48-79 Resected unilateral invasive breast cancer survivors with at least 10 years life expectancy Acceptable adjuvant therapy At least 20% calories from fat Medically stable for intervention trial entry within 365 days of surgery	No	Other Diet
Djuric, 2002 ² United States	1997-1999	Single	Work place School Community/ geographic	Randomized intervention	Age: 21-50 At least one first-degree relative with breast cancer A current benign mammogram or breast examination with follow-up recommendation of ≥ 1 year No expected changes in use of oral contraceptives Good general health No expected changes in lifestyle during the study.	No	Usual care Diet (3 active arms)
Schwartz, 2009 ³ United States	Not reported	Single	Clinical	Randomized intervention	Histological confirmed diagnosis of breast cancer, lymphoma and colon cancer. Exercised less than 120min /week Chemotherapy and radiation naive. Beginning chemotherapy with steroid as part of treatment plan; as chemo or anti-nausea No Psych illness No cardiovascular, movement-limiting arthritis or pulmonary disease that will preclude exercise program No steroid intake in last 6 months. No Paget's disease, hyperparathyroidism, rheumatoid arthritis, ankylosing spondylitis, and other metabolic bone disease.	Yes	Usual care Physical activity (2 active arms)
Wijndaele, 2009 ⁴	Not reported	Multicenter	Community/ geographic	Prospective	Not having hearing, speech, or cognitive disabilities that would prevent completing a telephone interview.	Yes	No control listed Self-management (2

Author, year							
Study Location	Years of recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention active arms)
Australia							

Psych = Psychological

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Table 23 Participant characteristics in studies on populations with Cancer conditions

Author, year	Total N	Follow-up period, months	% Women	Age	Race	Education	Smokers
Chlebowski, 2006 ¹	2437	Median : 60	100% women	Arm1: mean : 58.5 Range : 43.6-73.4 Arm2: mean : 58.6 Range : 44.4-72.8	White Arm1: N : 826 Arm2: N : 1235 Black Arm1: N : 75 Arm2: N : 52 Hispanic Arm1: N : 58 Arm2: N : 37 Asian/Pacific Islander Arm1: N : 58 Arm2: N : 86 Unknown overall Arm1: N : 1 Arm2: N : 6	less than High school, Arm1: N : 39 Arm2: N : 21 High school, Arm1: n : 452 Arm2: n : 326 College degree, Arm1: n : 394 Arm2: n : 232 Post-graduate degree, Arm1: n : 334 Arm2: n : 236	Current smoker, Arm1: N : 105 Arm2: N : 57
Djuric, 2002 ²	122	Mean : 12	100% women Arm1: women, n : 23 Arm2: women, n : 24 Arm3: women, n : 25 Arm4: women, n : 23	Overall: mean : 38	White overall: n : 91 % : 75 Black overall: n : 22 Hispanic overall: n : 6 American Indian/Alaska native overall: n : 2 Arabic overall: n : 1	College degree, overall: n : 87 % : 71%	Not reported
Schwartz, 2009 ³	112	Mean : 12	100%	Overall mean age 47 ± 9.4 Arm1: mean : 48 Arm2: mean : 47 Arm3: mean : 48	90% white	Some college: % : 83 Arm1: n : 27	Not reported

Author, year	Total N	Follow-up period, months	% Women	Age	Race	Education	Smokers
						% : 83 Arm2: n : 27 % : 80 Arm 3: n=27 % 77	
Wijndaele, 2009 ⁴	1867	Maximum : 36	Overall: women, % : 38.9	20-49: 8.6% 50-59 19.5% 60-69 34.1% ≥70 37.8%	Not reported	<=12 years overall: % : 53.5 12 years: % 10.1 Technical college overall: % : 23.1 University overall: % : 13.3	Current smoker, overall: % : 7.0

N = Sample Size

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2. Djuric Z, Poore KM, Depper JB et al. Methods to increase fruit and vegetable intake with and without a decrease in fat intake: Compliance and effects on body weight in the nutrition and breast health study. Nutr. Cancer 2002; 43(2):141-51.

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4. Wijndaele K, Lynch BM, Owen N, et al. Television viewing time and weight gain in colorectal cancer survivors: a prospective population-based study. Cancer Causes Control 2009; 20(8):1355-62.

Table 24a. Description of interventions in studies on populations with cancer

Author, Year	Duration of Intervention	Control/ usual care	Active intervention, Self-management	Active intervention, Diet	Active intervention, Physical Activity	Comment
Chlebowski, 2006 ¹	72 months	Usual care/baseline dietitian visit then dietitian contact every 3 months, written information, vitamin and mineral counseling		Fat intake reduced to 15% while maintaining nutritional adequacy; incorporated SCT principles; no counseling on weight reduction; eight biweekly individual, in person counseling sessions, then dietitian contact every 3 months. Subjects keep daily food record.		
Djuric, 2002 ²	12 months	Usual care/no intervention Given Food Guide Pyramid from National Dairy Council, but not discussed		3 active diet arms: low fat, high fruits and vegetables, combination of low-fat/high fruits and vegetables; data collected using 24-h recall, food frequency questionnaires, and 4-day food records; RD's taught women how to keep food records; monthly group meetings held for each diet group; participants met with RD weekly until they understood dietary assignment		Subjects were also stratified by race (Caucasian vs. non-Caucasian); low fat arm had high dropout rate so randomization scheme was rebalanced so more subjects were randomized to low fat arm over last year of study
Schwartz, 2009 ³	12 months	Usual care/no intervention			Physical activity: Education, One time session, Exercise: Individual (running, lifting, swimming) Times/sessions per week : 4times per week lasting 20 minutes Moderate intensity range on Borg rating of perceived exertion scale. Subjects were asked to perform weight bearing aerobic exercise, like walking, jogging or dancing.	

Table 24b. Description of approaches in observational studies on populations with cancer

Author, Year	Duration of Intervention (Only for interventional studies)	Control/ usual care	Active Intervention, Self-management	Active Intervention, Diet	Active intervention, Physical Activity	Comment
Wijndaele, 2009 ⁴					Active Australia survey to calculate weekly physical activity	Association between television time and BMI

BMI = Body Mass Index

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Table 25a. BMI Outcomes in studies on subjects with cancer

Author, Year	Arm	Outcome defined	Baseline N	Baseline BMI, mean	N at 12 months	BMI, 12 months, mean	Change from BL	N at 24 months	BMI, 24 months, mean	Change from BL	N at 36 months	BMI, 36 months, mean	Change from BL	Measure of association
Physical activity intervention														
Wijndaele, 2009 ¹		BMI change (define)	1867	26.3 (5.0 SD)				1202	27.4 (5.0 SD)	1.1	1028	27.6 (5.0 SD)	1.3	

BL = Baseline; BMI = Body Mass Index; N = Sample Size; SD = Standard Deviation

Table 25b. Weight outcomes in studies on subjects with cancer.

Author, Year	Arm	Outcome Defined	Base-line N	Baseline weight, mean	N at 12 months	Weight, 12 months, mean	Change from BL	Final mea-sure	N at Final mea-sure	Weight, final measure, mean	Change from BL	Measure of asso-ciation	Test for trend	Variables adjusted for	Comment
Diet Interventions															
Chlebowski, 2006 ²	1	KG	2437	72.6	1310	72.8	0.2	60		998	-1.1		paired t test		
	2		975	72.7	854	70.6	-2.1			386	-2.7				
Djuric, 2002 ³	1	Body weight (lbs converted to kg)	26	144 (65.5 kg) SD : 25	25	143 (65) SD : 27	-1 (-0.5 kg)	60					Wilcoxon rank sum test		
	2		40	155 (70.5) SD : 33	24	144 (65.5) SD : 31	-11 (-5 kg)								
	3		27	145 (65.9) SD : 26	25	149 (67.7) SD : 26	4 (1.8 kg)								
	4		29	152 (69.1) SD : 29	23	152 (69.1) SD : 30	0								
Physical activity Interventions															
Schwartz, 2009 ⁴	1	Weight (kg)	33	70.3 SD : 12.7	33	76.2 SD : 13.6	5.9	60					intent to treat		
	2		34	74.8 SD : 12.7	34	72.3 SD : 13.6	-2.5								
	3		34	77.1 SD : 16.3	34	76.7 SD : 14.9	-0.4								

BL = Baseline; kg = kilogram; lbs = Pounds (unit of weight); N = Sample Size; SD = Standard Deviation

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Table 26. Characteristics of weight maintenance intervention studies in populations with psychiatric disorders

Author, Year	Years of Recruitment	Single or Multicenter	Recruitment Setting	Study Design	Inclusion Criteria	Study's stated goal is weight maintenance	Control Active Intervention
Alvarez-jimenez 2010 ¹	2002-2004	Single	Clinic	RCT	Age: 16-50, psychosis	Yes	Usual Care Self-management, diet, physical activity
McCreadie 2005 ²	NR	Multisite	Community/geographic	RCT	DSM-IV diagnosis of schizophrenia	No	No intervention Diet (provided with fruits and vegetables) Diet (provided with fruits and vegetables plus lesson plans on how to prepare them)

DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; NR = Not Reported; RCT = Randomized Controlled Trial

References

1.

Alvarez-Jimenez M, Martinez-Garcia O, Perez-Iglesias R, et al. Prevention of antipsychotic-induced weight gain with early behavioural intervention in first-episode psychosis: 2-year results of a randomized controlled trial. Schizophr. Res. 2010; 116(1):16-9.

2.

McCreadie RG, Kelly C, Connolly M et al. Dietary improvement in people with schizophrenia: Randomised controlled trial. British Journal of Psychiatry 2005; 187(4):346-51.

Table 27. Baseline characteristics of participants in weight maintenance studies in populations with psych disorders

Author, Year	Baseline N	Mean/Median Age, Min Max, years	Mean/Median follow-up	Women	Race, n (%)	Education	Smoking
Alvarez-jimenez 2010 ¹	61	mean : 26.8 Median : 24.2 Range : 15-44	Maximum : 24	24.6%	NR	NR	NR
McCreadie 2005 ²	102	mean : 45	Maximum : 18	29%	NR	NR	68% (approximately 2/3)

NR = Not Reported

References

1. Alvarez-Jimenez M, Martinez-Garcia O, Perez-Iglesias R, et al. Prevention of antipsychotic-induced weight gain with early behavioural intervention in first-episode psychosis: 2-year results of a randomized controlled trial. Schizophr. Res. 2010; 116(1):16-9.

2. McCreadie RG, Kelly C, Connolly M et al. Dietary improvement in people with schizophrenia: Randomised controlled trial. British Journal of Psychiatry 2005; 187(4):346-51.

Table 28. Description of interventions in studies in populations with psychiatric disorders

Author, Year	Duration of Intervention (Only for interventional studies)	Control/ Usual care	Active Intervention, Self-management	Active Intervention, Diet	Active Intervention, Physical Activity
Alvarez-jimenez 2010 ¹	3 months	Usual care/no intervention Randomized to 1 of 3 different antipsychotic meds	Randomized to 1 of 3 different antipsychotic meds Early behavioral intervention behavior therapy, psycho education, manual delivery comprised of 10-14 individual modules	Education, manual delivery, "dietary counseling"	
McCreadie 2005 ²	6 months	Usual care/no intervention		Free fruit and vegetables alone versus free fruits and vegetables + instruction. Randomized by residential house; Eating frequency, At least five portions of free fruit and vegetables per resident per day; For free fruits/veg + instruction, In addition to free instruction in meal planning and food preparation (no frequency stated), occupational therapist worked with patients in the third and sixth months, In person Residents were encouraged to take part in shopping expeditions and make appropriate purchases	

References

1. Alvarez-Jimenez M, Martinez-Garcia O, Perez-Iglesias R, et al. Prevention of antipsychotic-induced weight gain with early behavioural intervention in first-episode psychosis: 2-year results of a randomized controlled trial. Schizophr. Res. 2010; 116(1):16-9.

2. McCreadie RG, Kelly C, Connolly M et al. Dietary improvement in people with schizophrenia: Randomised controlled trial. Br J Psychiatry 2005; 187(4):346-51.

Table 29a. BMI outcomes in interventional studies among adults with psychiatric disorders

Author, Year	Arm	Baseline N	Baseline BMI, mean (SD)	1 year N	1 year BMI, mean (SD)	Year 1		18 month N	2 year BMI, mean (SD)	2 year		Factors accounted for in the mean difference compared to control
						Change in outcome from baseline	Mean difference compared to Group 1			Change in outcome from baseline	Mean difference compared to Group 1	
McCreadie , 2005 ¹	Control	33	NR					24				“There was no significant between- group difference at any time point in measures of change from baseline in ...body mass index...” pg. 349
	Arm2	37	NR					36				
	Arm3	32	NR					31				
Alvarez-jimenez 2010 ²	Control	33	NR			3.68				3.94		
	Arm2	28	NR			3.68				3.46		

BMI = Body Mass Index; N = Sample Size; SD = Standard Deviation

Table 29 b Weight outcomes in interventional studies among adults with psychiatric disorders

Author, Year		Baseline N	Baseline Weight, mean (SD)	1 year N	1 year Weight Change, mean (SD)	Year 1		Year 2				Factors accounted for in the mean difference compared to control
						Change in outcome from baseline	Mean difference compared to Group 1	Change in outcome from baseline	Mean difference compared to control			
Alvarez- jimenez 2010 ²	Control	33	NR		11.84 kg			11.46 kg				
	Arm2	28	NR		10.19 kg	3.68 kg/m2		9.98 kg				

Kg/m2 = kilogram per meter squared; N = Sample Size; SD = Standard Deviation

References

1. McCreadie RG, Kelly C, Connolly M *et al.* Dietary improvement in people with schizophrenia: Randomised controlled trial. *British Journal of Psychiatry* 2005; 187(4):346-51.

2. Alvarez-Jimenez M, Martinez-Garcia O, Perez-Iglesias R, Ramirez ML, Vazquez-Barquero JL, Crespo-Facorro B. Prevention of antipsychotic-induced weight gain with early behavioural intervention in first-episode psychosis: 2-year results of a randomized controlled trial. *Schizophr. Res.* 2010; 116(1):16-9.

Appendix F. Strength of Evidence Tables and Risk of Bias Assessment

Table 1a. Strength of evidence of studies among adults in the general population

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of Evidence
	Risk of Bias	Consistency	Directness	Precision	
BMI change					
Self-management					Insufficient No studies identified
Dietary 1 trial (N=41,173 analyzed) ¹ 2 observational studies (9,683 analyzed) ^{2 3}	Moderate Trial: Blinded outcome assessors; most of internal validity questions answered “yes”. Observational: Met confounding control, selection bias standards.	Consistent No meaningful between group difference between groups in the trial or observational studies.	Indirect Not designed to assess weight maintenance in the trial and 1 of 2 observational studies.	Precise Trial: Statistically significant. Observational: Statistically significant.	Low The dietary trial and approaches did not identify an effective dietary pattern to prevent weight gain according to our between group difference threshold, despite the statistically significant results.
Physical activity 4 trials (687 analyzed) 1 observational (500 analyzed)	Moderate 3 of 4 trials had blinded outcome assessment; Compliance not reliable; Losses to fup not accounted for in all trials. Observational: Met confounding control, selection bias standards.	Consistent Neither group favored with the exception of 1 study where both groups had a decrease in BMI	Indirect Not study designed to assess weight maintenance.	Imprecise No measure of variability or lack of statistical significance in most trials. Traffic variable statistically significant, but walkability was not in the observational study.	Low All trial participants lost weight, regardless of intervention. Participants who were taught to monitor their heart rate by their primary care provider during exercise had a greater decrease in BMI than controls.
Combination 3 trials (535 analyzed) ⁴⁻⁶	Moderate Unclear if outcome assessor blinded in 2 of 3 trials	Consistent Neither group favored.	Direct 2 of 3 trials aimed to prevent weight gain	Imprecise Only 1 study reported a standard error	Low No meaningful between group difference between intervention groups and controls. All participants remained within 0.5 units of BMI from baseline.
Environment	Moderate	N/A	Indirect	Imprecise	Insufficient

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of Evidence
	Risk of Bias	Consistency	Directness	Precision	
1 observational (500 analyzed) ³	Observational: Met confounding control, selection bias standards. Adjusted for factors that differed between persons who completed both surveys and persons who completed only the first in analyses.	Did not report on between group differences. Reported on ordinal regression coefficients with an unclear reference group.	Goal of study was health risk assessment	Statistically significant traffic variable, but unclear what unit of traffic change used in analysis. Walkability was not statistically significant.	Study did not report on between group differences.
Weight change					
Self-management 0 trials 3 observational studies (120,877 analyzed) ⁷	Moderate Met confounding control, selection bias standards. Weight was self-reported but validated to be accurate in a sub-study.	Consistent Same trends found across cohorts	Indirect No study's goal was weight maintenance.	Precise Findings were statistically significant.	Low No meaningful between group differences for sleep duration and television viewing, although the findings were statistically significant.
Dietary 2 trials (42,279 analyzed) 8 observational studies (168,921 analyzed) ^{2 7-9} 10 11	Moderate Larger trial had blinded outcome assessors and most of internal validity questions answered "yes". The smaller trial had poor reporting which made it difficult to determine blinding of outcome assessors and other internal validity measures. Observational: Met confounding control, selection bias standards.	Inconsistent Neither trial found a meaningful between group difference. Two of the observational studies found meaningful differences.	Indirect One study's goal was weight maintenance.	Precise Many studies reported statistically significant findings.	Low The interventions did not have meaningful between group effects. A healthy eating pattern was associated with less weight gain. ⁷ Eating outside the home was associated with greater weight gain. ²
Physical activity	Moderate	Inconsistent	Indirect	Precise	Low

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of Evidence
	Risk of Bias	Consistency	Directness	Precision	
1 trial (138 analyzed) 6 observational studies (161,890 analyzed) ^{7-9 12}	High quality trial and observational studies.	Neither group favored. The largest observational studies did not find a meaningful between group difference with increasing exercise duration.	No study's goal was weight maintenance.	Many studies reported statistically significant findings.	Increasing physical activity over time is associated with less weight gain. ¹²
Combination 2 trials (420 analyzed) ^{5 13}	Moderate Unclear if outcome assessor blinded	Consistent	Direct Trials aimed to prevent weight gain	Precise Trial that reported a measure of variability was statistically significant. The confidence interval excluded 2.5 kg.	Low No meaningful between group difference between intervention groups and controls. All participants remained within 1.5kg of their baseline weight.
Built environment 1 trial (2151 analyzed)	Moderate Outcome assessor not blinded	N/A	Indirect Goal of study was cardiovascular disease risk reduction	Imprecise No variability reported	Low
Waist circumference					
Self-management					Insufficient No studies identified
Dietary 2 trials (N=51,043 randomized) ^{1 14} 1 observational study (N=5,515 analyzed)	Low Trial: Very few randomized patients were included in the waist circumference analyses. Observational: Met confounding control, selection bias standards. Waist circumference was measured by trained staff.	Inconsistent Meaningful between group difference found for Whites and Hispanics in observational study.	Indirect No study's goal was weight maintenance.	Precise Trials: The larger study was statistically, but did not meet the between group difference threshold. The smaller study was neither statistically nor did it meet the between group difference threshold. Observational: Statistically significant for Whites only.	Low No meaningful between group difference except for Whites with very healthy eating patterns. Healthy eating scores 2 z-scores above the mean associated with 2 to 3cm smaller waistlines in Whites and Hispanics.
Physical activity 1 trial (120 analyzed)	Moderate Unclear blinding of	Not applicable	Indirect Not designed to study	Imprecise No measure of	Low Neither group favored between gym based exercise and control on

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of Evidence
	Risk of Bias	Consistency	Directness	Precision	
	outcome assessor, last observation carried forward used for missing data		weight maintenance.	variability reported.	weight maintenance in the elderly.
Combination 1 trial (156 analyzed)	Moderate Unclear if outcome assessor blinded	Not applicable	Indirect Trial aimed to change diet and physical activity patterns	Imprecise No standard errors reported	Low No meaningful between group difference between intervention groups and controls. All participants remained within 2cm of their baseline waist circumference.
Progression to overweight or obesity					
Self-management					Insufficient No studies identified
Dietary 0 trials 2 observational (12,089 analyzed) ²	Moderate Met confounding control, selection bias standards.	Inconsistent One of 2 studies reported a meaningful between group difference.	Indirect One study's goal was weight maintenance.	Imprecise One study reported a statistically significant finding.	Low Eating food outside the home one or more times per week associated with a 20-30% increased risk of overweight or obesity. ² A less than 5% decreased odds reported for a healthy eating index score.
Physical activity					Insufficient No studies identified
Combination 2 trials (361 analyzed)	Moderate Unclear if outcome assessor blinded in 1 of 2 trials	Consistent No meaningful between group difference between intervention and control groups.	Direct Trials aimed to prevent weight gain	Imprecise No measures of variability reported	Low All participants tended to gain weight during the study period in the 3 year trial, whereas participants in the intervention and control groups tended to maintain their weight in the 1-year trial.
Adherence					
Self-management interventions					Insufficient No studies identified
Dietary interventions					Insufficient No studies identified
Physical activity interventions 4 trials (687 analyzed)	Moderate 3 of 4 had blinded outcome assessment; Compliance not reliable; Losses to fup not accounted for in all trials	Consistent Adherence less than 80% in all trials.	Indirect Not study designed to assess weight maintenance.	Imprecise No measures of variability reported.	Low Adherence with the interventions ranged from 33% to 71%.
Combination interventions 2 trials (464 analyzed)	Moderate Unclear if outcome assessor blinded in 1 of 2 trials	Consistent Adherence less than 80% in both trials.	Direct Trials aimed to prevent weight gain	Imprecise No measures of variability reported	Low Adherence to the interventions was low. Adherence to a majority of the sessions ranged from 50 to 73%.

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of Evidence
	Risk of Bias	Consistency	Directness	Precision	
Mortality*					
Self-management					Insufficient No studies identified
Dietary 1 trial (N=48,835 randomized) ¹	Moderate Blinded outcome assessors; most of internal validity questions answered “yes”; intention to treat analysis not reported.	Not applicable	Indirect Not designed to assess weight maintenance	Imprecise Not clinically nor statistically significant	Low No meaningful between group difference in mortality between the groups. Intervention group 0.1% less mortality than controls
Combination					Insufficient No studies identified
Adverse events					
Self-management					Insufficient No studies identified
Dietary					Insufficient No studies identified
Physical activity 1 trial (284 analyzed)	Moderate Blinded outcome assessment but poor reporting on other internal validity measures.	Not applicable	Indirect Not designed to assess weight maintenance	Imprecise Not clinically nor statistically significant	Low “No serious adverse events reported during the trial.”
Combination					Insufficient No studies identified

*No other clinical or health related quality of life results were reported.

Table 1b. Risk of bias assessment of studies addressing weight maintenance among adults from the general population

		QUESTION*																											
		Reporting										External validity			Internal Validity-bias						Internal Validity-confounding and selection bias						Power		
Author, year	N analyzed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
BMI/diet																													
Bes-Rastrollo ²	9182	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	U	Y	Y	Y	Y	N	N	Y	Y	N
Berry, 2010 ³	500	Y	N	Y	Y	Y	N	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	
Howard, 2006 ¹	48835	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	Y	Y	Y	Y	U	Y	Y	Y	Y	N	Y	Y	Y	
BMI/physical activity																													
Berry, 2010 ³	500	Y	N	Y	Y	Y	N	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	
Lamb, 2002 ¹⁵	260	Y	Y	N	Y	P	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y		
Muscari, 2010 ¹⁶	120	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	U	U	Y	Y	Y	Y	Y	Y	U	Y	Y	Y		
Petrella, 2003 ¹⁷	284	Y	Y	N	Y	N	N	Y	N	N	Y	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	Y	N	U	Y	Y		
Schmitz, 2007 ¹⁸	164	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	U	Y	N	Y	
BMI/combination																													
Burke, 2003 ⁶	137	Y	Y	Y	Y	Y	N	N	N	N	Y	U	U	U	N	U	Y	N	Y	N	Y	Y	U	Y	N	Y	N	Y	
French, 2011 ⁴	90 households	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	U	Y	Y	Y	Y	Y	Y	U	Y	Y	N		
Levine, 2007 ⁵	284	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	U	Y	Y	Y	N	Y	Y	Y	Y	U	Y	Y	Y	
BMI/Environment																													
Berry, 2010 ³	500	Y	N	Y	Y	Y	N	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	
Weight/self-management																													
Mozaffarian, 2011 ⁷	120877	Y	Y	N	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Weight/diet																													
Adair, 2011 ⁸	3028	Y	Y	N	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Bes-Rastrollo ²	9182	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Bhargava,2002 ¹⁴	926	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	U	U	U	N	U	Y	N	Y	Y	Y	N	N	N	N	Y	
Howard, 2006 ¹	48835	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	Y	Y	Y	Y	U	Y	Y	Y	N	Y	Y	Y		
Lewis, 2011 ⁹	3906	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	U	N	N	U	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Mozaffarian, 2011 ⁷	120877	Y	Y	N	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Pereira, 2005 ¹⁰	3031	Y	Y	N	Y	Y	Y	Y	N	N	Y	U	U	N	N	U	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Purslow, 2008 ¹⁹	6764	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	N	N	U	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N	
Schulz,2005 ²⁰	24958	Y	Y	Y	Y	Y	Y	Y	N	N	Y	U	U	N	N	U	Y	Y	Y	U	Y	Y	Y	N	N	Y	N	N	

		QUESTION*																										
		Reporting										External validity			Internal Validity-bias							Internal Validity-confounding and selection bias						Power
Author, year	N analyzed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Vioque, 2008 ¹¹	206	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	U	Y	N	Y	U	Y	Y	Y	N	N	Y	N	N
Weight/physical activity																												
Adair, 2011 ⁸	3028	Y	Y	N	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N
Lee, 2011 ¹²	34079	Y	Y	Y	Y	Y	Y	Y	N	N	Y	U	U	N	Y	U	Y	Y	Y	U	Y	Y	Y	Y	U	Y	Y	Y
Lewis, 2011 ⁹	3906																											
Mozaffarian, 2011 ⁷	120877	Y	Y	N	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N
Schmitz, 2007 ¹⁸	164	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	U	Y	N	Y
Weight/combination																												
Levine, 2007 ⁵	284	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	U	Y	Y	Y	N	Y	Y	Y	Y	U	Y	Y	Y
Lombard, 2010 ¹³	215	Y	Y	Y	Y	Y	Y	Y	N	Y	N	U	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Weight/environment																												
Fortmann, 1981 ²¹	2151	N	Y	N	Y	N	N	N	N	N	Y	U	U	Y	N	N	U	N	Y	U	Y	N	Y	N	N	U	N	N
Waist circ/diet																												
Bhargava,2002 ¹⁴	926	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	U	U	U	N	U	Y	N	Y	Y	Y	Y	N	N	N	Y
Howard, 2006 ¹	48835	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	Y	Y	Y	Y	U	Y	Y	Y	Y	N	Y	Y	Y
Waist circ/physical activity																												
Muscari, 2010 ¹⁶	120	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	U	U	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y
Waist circ/combination																												
Burke, 2003 ⁶	137	Y	Y	Y	Y	Y	N	N	N	N	Y	U	U	U	N	U	Y	N	Y	N	Y	Y	U	Y	U	Y	N	Y
Lombard, 2010 ¹³	215	Y	Y	Y	Y	Y	Y	Y	N	Y	N	U	U	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Progression to overweight and obesity/diet																												
Bes-Rastrollo ²	9182	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	Y	N	N	Y	Y	Y	U	Y	Y	Y	N	N	Y	Y	N
Progression to overweight and obesity/combination																												
Burke, 2003 ⁶	137	Y	Y	Y	Y	Y	N	N	N	N	Y	U	U	U	N	U	Y	N	Y	N	Y	Y	U	Y	U	Y	N	Y

		QUESTION*																											
		Reporting										External validity			Internal Validity-bias							Internal Validity-confounding and selection bias						Power	
Author, year	N analyzed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Levine, 2007 ⁵	284	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	U	Y	Y	Y	N	Y	Y	Y	Y	U	Y	Y	Y	
Adherence/physical activity																													
Lamb, 2002 ¹⁵	260	Y	Y	N	Y	P	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	N	Y	
Muscari, 2010 ¹⁶	120	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	U	U	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y	
Petrella, 2003 ¹⁷	284	Y	Y	N	Y	N	N	Y	N	N	Y	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	Y	Y	N	U	Y	Y	
Schmitz, 2007 ¹⁸	164	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	U	Y	N	Y	
Adherence/co mbination																													
French, 2011 ⁴	90 households	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	U	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	N	
Levine, 2007 ⁵	284	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	N	N	U	Y	Y	Y	N	Y	Y	Y	Y	U	Y	Y	Y	
Mortality/diet																													
Howard, 2006 ¹	48835	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	Y	Y	Y	Y	U	Y	Y	Y	Y	N	Y	Y	Y	
Activity-related injury/physical activity																													
Petrella, 2003 ¹⁷	284	Y	Y	N	Y	N	N	Y	N	N	Y	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	Y	Y	N	U	Y	Y	

*Questions

1. Is the hypothesis/aim/objective of the study clearly described?
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
3. Are the characteristics of the patients included in the study clearly described?
4. Are the interventions of interest clearly described?
5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
6. Are the main findings of the study clearly described?
7. Does the study provide estimates of the random variability in the data for the main outcomes?
8. Have all important adverse events that may be a consequence of the intervention been reported?
9. Have the characteristics of patients lost to follow-up been described?
10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?
11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?
13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?
14. Was an attempt made to blind study subjects to the intervention they have received? (We did not use the responses to this question to rate the Risk of Bias given the nature of the interventions)
15. Was an attempt made to blind those measuring the weight outcomes of the intervention? (This item must have been answered Yes for a trial to have low Risk of Bias)
16. If any of the results of the study were based on “data dredging”, was this made clear?

- 17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?
- 18. Were the statistical tests used to assess the main outcomes appropriate?
- 19. Was compliance with the intervention/s reliable?
- 20. Were the main outcome measures used accurate (valid and reliable)?
- 21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
- 22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?
- 23. Were study subjects randomized to intervention groups?
- 24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?
- 25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
- 26. Were losses of patients to follow-up taken into account?
- 27. Did they report a power calculation?

N=no,P=partially, U=unable to determine, Y=yes

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Table 2a. Strength of evidence of studies among obese adults*

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
Physical Activity (KQ3)					
BMI change					Insufficient
					No studies identified
Weight change					
1 trial (120 analyzed) ¹	Moderate	N/A	Indirect	Imprecise	Low
	Outcome assessor not blinded		Goal of study was to increase physical activity during commute to work	Confidence intervals for both groups contain 1	Cycling group had 0.1 unit greater decrease in BMI than walking group
Waist circumference change					
1 trial (120 analyzed) ¹	Moderate	N/A	Indirect	Imprecise	Low
	Outcome assessor not blinded		Goal of study was to increase physical activity during commute to work	Confidence intervals for both groups contain 1	Cycling group had 0.5 cm greater decrease in waist circumference than walking group
Adherence					
1 trial (120 analyzed) ¹	Moderate	N/A	Indirect	Precise	Insufficient
	Outcome assessor not blinded		Goal of study was to increase physical activity during commute to work	P<0.001	Although the bicycling intervention group was more likely to ride a bicycle at least 2 kilometers per day than the walking group, the adherence was only 39% in the bicycling group and 9% in the walking group. Overall, adherence was poor.

*No other key questions, clinical or health related quality of life results were reported.

Table 2b. Obese only

		QUESTION*																										
		Reporting										External validity			Internal Validity-bias						Internal Validity-confounding and selection bias						Power	
Author, year	N analyzed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Weight and waist circumference/physical activity																												
Hemmingsson, 2009 ¹	120	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	U	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y

- *Questions
1. Is the hypothesis/aim/objective of the study clearly described?
 2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
 3. Are the characteristics of the patients included in the study clearly described?
 4. Are the interventions of interest clearly described?
 5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
 6. Are the main findings of the study clearly described?
 7. Does the study provide estimates of the random variability in the data for the main outcomes?
 8. Have all important adverse events that may be a consequence of the intervention been reported?
 9. Have the characteristics of patients lost to follow-up been described?
 10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?
 11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?
 12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?
 13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?
 14. Was an attempt made to blind study subjects to the intervention they have received? (We did not use the responses to this question to rate the Risk of Bias given the nature of the interventions)
 15. Was an attempt made to blind those measuring the weight outcomes of the intervention? (This item must have been answered Yes for a trial to have low Risk of Bias)
 16. If any of the results of the study were based on “data dredging”, was this made clear?
 17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?
 18. Were the statistical tests used to assess the main outcomes appropriate?
 19. Was compliance with the intervention/s reliable?
 20. Were the main outcome measures used accurate (valid and reliable)?
 21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
 22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?
 23. Were study subjects randomized to intervention groups?
 24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?
 25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
 26. Were losses of patients to follow-up taken into account?
 27. Did they report a power calculation?

N=no,P=partially, U=unable to determine, Y=yes

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Table3a. Strength of evidence of studies among adults in the work environment

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
BMI change					
Combination	Risk of Bias	Consistency	Directness	Precision	
5 interventional trials, n=7,443	Moderate risk of bias – three randomized interventions, lack of blinding in studies	Inconsistent – point estimate favors intervention in 2 trials, and favors control in 3 trial	Direct – goal of all studies but one was prevention of weight gain	Precise – variability reported in all studies	Low
Weight change					
Combination	Risk of Bias	Consistency	Directness	Precision	
4 interventional trials, n=72,572	Moderate risk of bias – two randomized trials, lack of blinding in studies	Consistent – point estimate favors intervention in all trials	Direct – goal of all studies was prevention of weight gain	Precise – variability reported in all studies	Moderate
Waist circumference					
Combination	Risk of Bias	Consistency	Directness	Precision	
2 interventional trials, n=829	High risk of bias – only one randomized trial, lack of blinding in studies	Consistent – point estimate favors intervention in both trials	Indirect – goal of one study was prevention of weight gain	Precise – variability reported in all studies	Low
Adherence					
Combination	Risk of Bias	Consistency	Directness	Precision	
3 interventional trials, n=2,754	Moderate risk of bias – all randomized interventions, lack blinding	Inconsistent – adherence not measured consistently across studies	Indirect – goal of two studies was prevention of weight gain	Imprecise – variability not reported	Low

Table 3b. Risk of bias assessment of studies in a work setting among adults

	QUESTION*																											
	Reporting											External Validity			Internal Validity-bias						Internal Validity-confounding and selection bias						Power	
Author, year	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
BMI/ combination																												
Goetzel, 2009 ¹ Goetzel, 2010 ²	10,281	Y	Y	Y	Y	Y	Y	Y	N	N	Y	U	U	Y	N	N	Y	Y	Y	U	Y	N	Y	N	N	Y	Y	N
Kwak, 2010 ³	553	Y	Y	Y	Y	P	N	Y	N	Y	Y	U	Y	U	N	N	U	U	Y	U	Y	N	U	N	N	Y	Y	Y
Lemon, 2010 ⁴	806	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Linde, 2012 ⁵	1,672	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
McEachan, 2011 ⁶	1,260	Y	Y	Y	Y	Y	Y	Y	N	N	Y	U	U	U	N	Y	Y	Y	Y	U	Y	N	Y	Y	Y	Y	N	N
Weight/ combination																												
Dekkers, 2011 ⁷	276	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	U	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Goetzel, 2009 ¹ Goetzel, 2010 ²	10,281	Y	Y	Y	Y	Y	Y	Y	N	N	Y	U	U	Y	N	N	Y	Y	Y	U	Y	N	Y	N	N	Y	Y	N
Kwak, 2010 ³	553	Y	Y	Y	Y	P	N	Y	N	Y	Y	U	Y	U	N	N	U	U	Y	U	Y	N	U	N	N	Y	Y	Y
Robbins, 2006 ⁸	124,367	Y	Y	Y	Y	N	N	N	N	Y	Y	U	U	U	N	U	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N
Waist circumference/ combination																												
Dekkers, 2011 ⁷	276	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	U	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Kwak, 2010 ³	553	Y	Y	Y	Y	P	N	Y	N	Y	Y	U	Y	U	N	N	U	U	Y	U	Y	N	U	N	N	Y	Y	Y
Adherence/ combination																												
Dekkers, 2011 ⁷	276	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	U	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Lemon, 2010 ⁴	806	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Linde, 2012 ⁵	1,672	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y

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Table 4a. Strength of evidence of studies among adults in the college environment

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
BMI change					
Combination					
2 trials, n=155	Moderate Outcome assessor not blinded	Consistent Point estimate favors intervention in all trials	Direct Goal of studies was prevention of weight gain	Imprecise No variability reported	Low
Weight change					
Combination					
2 trials, n=155	Moderate Outcome assessor not blinded	Consistent Point estimate favors intervention in all trials	Direct Goal of studies was prevention of weight gain	Imprecise No variability reported	Low
Waist circumference					
Combination					
1 trial, n=115	Moderate Outcome assessor not blinded	N/A	Direct Goal of studies was prevention of weight gain	Imprecise No variability reported	Low
Adherence					
Combination					
1 interventional trial, n=115	Moderate Outcome assessor not blinded	N/A	Direct Goal of studies was prevention of weight gain	Imprecise No variability reported	Low

N/A = Not Applicable

Table 4b. Risk of bias assessment of studies in the college environment

	QUESTION*																											
	Reporting											External Validity			Internal Validity-bias						Internal Validity-confounding and selection bias						Power	
Author, year	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
BMI/ combination																												
Hivert, 2007 ¹	115	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	Y	N	U	Y	Y	Y	Y	Y	Y	Y	Y	U	Y	Y	Y
Matvienko, 2001 ²	40	Y	Y	Y	Y	Y	Y	Y	N	Y	N	U	U	Y	N	U	U	N	Y	N	Y	Y	Y	Y	U	Y	N	N
Weight/ combination																												
Hivert, 2007 ³	115	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	U	U	N	U	N	N	Y	Y	Y	Y	Y	Y	U	U	Y	Y
Matvienko, 2001 ²	40	Y	Y	Y	Y	Y	Y	Y	N	Y	N	U	U	Y	N	U	U	N	Y	N	Y	Y	Y	Y	U	Y	N	N
Waist circumference/ combination																												
Hivert, 2007 ³	115	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	U	U	N	U	N	N	Y	Y	Y	Y	Y	Y	U	U	Y	Y
Adherence/ combination																												
Hivert, 2007 ³	115	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	U	U	N	U	N	N	Y	Y	Y	Y	Y	Y	U	U	Y	Y

*Questions

1. Is the hypothesis/aim/objective of the study clearly described?
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
3. Are the characteristics of the patients included in the study clearly described?
4. Are the interventions of interest clearly described?
5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
6. Are the main findings of the study clearly described?
7. Does the study provide estimates of the random variability in the data for the main outcomes?
8. Have all important adverse events that may be a consequence of the intervention been reported?
9. Have the characteristics of patients lost to follow-up been described?
10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?
11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?
12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?
13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?
14. Was an attempt made to blind study subjects to the intervention they have received? (We did not use the responses to this question to rate the Risk of Bias given the nature of the interventions)
15. Was an attempt made to blind those measuring the weight outcomes of the intervention? (This item must have been answered Yes for a trial to have low Risk of Bias)
16. If any of the results of the study were based on “data dredging”, was this made clear?
17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?
18. Were the statistical tests used to assess the main outcomes appropriate?
19. Was compliance with the intervention/s reliable?
20. Were the main outcome measures used accurate (valid and reliable)?

21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
22. Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time?
23. Were study subjects randomized to intervention groups?
24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?
25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
26. Were losses of patients to follow-up taken into account?
27. Did they report a power calculation?

BMI = Body Mass Index, N=no, P=partially, U=unable to determine, Y=yes

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Table5a. Strength of evidence of studies among adults with or at risk for cardiovascular disease or diabetes mellitus

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
BMI change					
Self-Mangement interventions					
2 RCTs 196	Moderate based on lack of reporting on masking of outcome assessors and lack of adequate reporting	Consistent	Indirect (weight maintenance not stated goal)	Imprecise based on lack of reporting on variability	Low Range: -1.76 kg/m ²
Diet interventions					
1 RCT 1551	Moderate based on lack of reporting on masking and lack of internal validity based on q14-27	Not applicable (one study)	Indirect (weight maintenance not stated goal)	Imprecise (no measure of variability)	Low Range: not available
Physical activity interventions					
2 controlled trials 166	Moderate based on lack of reporting on masking of outcome assessors and completers analysis for 1 study	Inconsistent (based on different signs for between group differences)	Indirect	Imprecise	Low Range: -0.2 to -0.7 kg/m ²
Combination interventions					
4 RCTs 384	Moderate based on lack of reporting on masking and lack of internal validity based on q14-27	Consistent	Indirect (weight maintenance not stated goal)	Imprecise based on lack of reporting on variability and width of CI > 0.8 units when provided	Low Range: -0.39 to -0.71 kg/m ²
Weight change					
Diet intervention					
2 controlled trials 767	High based on lack of randomization, lack of reporting on masking, and lack of internal validity by q14-27	Consistent	Indirect (weight maintenance not stated goal in one study but was in the other)	Imprecise (don't have enough measures of variability)	Low Range: -0.11 to -0.84 kg
Physical activity intervention					
2 controlled trials 166	Moderate based on lack of reporting on masking of outcome assessors and completers analysis	Inconsistent	Indirect	Imprecise (on cusp with one study being imprecise and one not based on 2.5 kg width of	Low Range: -0.3 to -2.0 kg

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
	for 1 study			CI)	
Combination intervention					
4 controlled trials 1719	Moderate based on lack of masking	Consistent	Indirect	Imprecise	Low Range: -0.1 to -1.26 kg
Waist circumference					
Self-Mangement interventions	Risk of Bias	Consistency	Directness	Precision	
2 RCTs 196	Moderate based on lack of reporting on masking of outcome assessors and lack of adequate reporting	Consistent	Indirect (weight maintenance not stated goal)	Imprecise based on lack of reporting on variability and width of CI > 2 cm when provided	Low Range: -3.87 cm
Diet intervention					
1 controlled trials 187	Moderate based on lack of reporting on masking of outcome assessors and lack of adequate reporting	Not applicable (one study)	Indirect (weight maintenance not stated goal)	Imprecise based on CI >2cm	Low Range: -0.34 to -0.74 cm
Physical activity intervention					
1 controlled trial 92	Moderate risk of bias based on lack of masking of outcome assessors	Not applicable (one study)	Indirect	Imprecise	Low Range: -2.8 cm
Combination intervention					
1 RCT 68	Moderate risk of bias based on lack of reporting on masking of outcome assessors	Not applicable (one study)	Indirect	Imprecise	Low Range: -2.38 cm
Adherence					
Physical activity intervention					
1 controlled trial 92	Moderate risk of bias based on lack of masking of outcome assessors	Not applicable (one study)	Indirect based on lack of external validity	Imprecise (N<400)	Low Range: 57%
Combination					
3 RCT 191	Moderate based on lack of reporting on masking	Inconsistent (by magnitude since is	Indirect (weight maintenance not stated	Imprecise (N<400)	Low Range: 46% to 100%

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	
	and lack of internal validity based on q14-27	adherence, sign is not applicable)	goal)		
QOL					
Combination intervention					
1 controlled trial 68	Moderate risk of bias based on lack of masking of outcome assessors	Not applicable (one study)	Indirect	Imprecise	Low Range: Not available

CI = Confidence Interval; QOL = Quality of Life; RCT = Randomized Controlled Trial

Table 5b. Risk of bias assessment of studies addressing weight maintenance among adults with or at risk for cardiovascular disease of diabetes mellitus.

	QUESTION*																											
	Reporting											External validity			Internal Validity-bias						Internal Validity-confounding and selection bias						Power	
Bibliograph	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
BMI/self-management																												
Clark, 2004 ¹	Y	Y	N	N	N	Y	N	N	N	Y	Y	U	U	N	U	U	N	Y	Y	Y	Y	Y	Y	U	N	Y	N	Y
Plotnikoff, 2011 ²	Y	Y	Y	Y	Y	Y	Y	N	N	N	U	U	Y	U	U	U	U	Y	U	Y	Y	Y	Y	U	Y	N	Y	Y
BMI/Diet																												
Meloni, C., 2004 ³	169	Y	Y	N	N	Y	Y	Y	N	N	N	U	U	U	N	U	Y	N	Y	U	Y	Y	Y	Y	U	N	U	N
Razquin, 2010 ⁴	737	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	U	U	U	U	U	U	N	Y	Y	Y	Y	Y	U	Y	Y	N	N
BMI/Exercise																												
Yates, T2010 ⁵	74	Y	Y	Y	Y	P	Y	Y	N	Y	Y	U	U	U	U	U	Y	Y	Y	U	Y	Y	Y	Y	U	N	N	N
Gram, 2010 ⁶	68	Y	Y	Y	Y	Y	Y	Y	Y	N	N	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	U	Y	Y	Y
BMI/combination																												
Haruyama, 2009 ⁷	549	Y	Y	Y	Y	P	Y	Y	N	Y	Y	Y	Y	Y	N	Y	U	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N
Samaras, 1997 ⁸	26	Y	Y	Y	Y	Y	N	Y	N	N	N	U	U	Y	U	U	Y	N	Y	Y	Y	Y	U	Y	U	N	U	N
Babazono, 2007 ⁹	99	Y	Y	Y	Y	P	Y	Y	N	N	N	Y	U	Y	N	U	U	N	Y	N	Y	Y	Y	Y	U	N	N	N
Torjesen, 1997 ¹⁰	219	Y	Y	N	Y	P	Y	Y	N	Y	N	U	U	N	N	N	U	N	Y	Y	Y	Y	Y	Y	U	N	N	N
Plotnikoff, 2011 ²	Y	Y	Y	Y	Y	Y	Y	N	N	N	U	U	Y	U	U	U	U	Y	U	Y	Y	Y	Y	U	Y	N	Y	Y
Toobert, 2011 ¹¹	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	U	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	N	Y
Weight/Diet																												
Abraira, 1980 ¹²	30	Y	Y	Y	Y	P	N	Y	Y	N	N	U	U	Y	N	N	U	N	Y	Y	Y	Y	Y	N	N	N	U	N
Razquin, 2009 ¹³	187	Y	Y	Y	Y	P	Y	Y	Y	N	N	U	U	U	N	U	U	N	Y	N	Y	Y	U	Y	Y	N	N	N
Kumanyika, 2005 ¹⁴	1159	Y	Y	Y	Y	Y	Y	Y	N	N	N	U	U	U	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	U	Y
Meloni, C., 2004 ³	169	Y	Y	N	N	Y	Y	Y	N	N	N	U	U	U	N	U	Y	N	Y	U	Y	Y	Y	Y	U	N	U	N
Razquin, 2010 ⁴	737	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	Y	Y	N	N
Stefanick, 1998 ¹⁵	367	Y	Y	Y	Y	P	Y	Y	N	Y	Y	U	U	U	N	U	Y	U	Y	U	Y	U	U	Y	U	U	Y	N
Weight/exercise																												
Yates, T2010 ⁵	74	Y	Y	Y	Y	P	Y	Y	N	Y	Y	U	U	U	U	U	Y	Y	Y	U	Y	Y	Y	Y	U	N	N	N
Weight/combination																												
Samaras, 1997 ⁸	26	Y	Y	Y	Y	Y	N	Y	N	N	N	U	U	Y	U	U	Y	N	Y	Y	Y	Y	U	Y	U	N	U	N
Babazono, 2007 ⁹	99	Y	Y	Y	Y	P	Y	Y	N	N	N	Y	U	Y	N	U	U	N	Y	N	Y	Y	Y	Y	U	N	N	N
Gram, 2010 ⁶	68	Y	Y	Y	Y	Y	Y	Y	Y	N	N	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	U	Y	Y	Y

Hare-Bruun, 2006 ¹⁶	376	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	U	N	N	U	U	Y	Y	Y	Y	Y	N	N	Y	Y	N
Toobert, 2011 ¹¹	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	U	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	N	Y
Waist circumference /Self-management																												
Clark, 2004 ¹	Y	Y	N	N	N	Y	N	N	N	Y	Y	U	U	N	U	U	N	Y	Y	Y	Y	Y	Y	U	N	Y	N	Y
Plotnikoff, 2011 ²	Y	Y	Y	Y	Y	Y	Y	N	N	N	U	U	Y	U	U	U	U	Y	U	Y	Y	Y	Y	U	Y	N	Y	Y
Waist circumference /Diet																												
Razquin, 2009 ¹³	187	Y	Y	Y	Y	P	Y	Y	Y	N	N	U	U	U	N	U	U	N	Y	N	Y	Y	U	Y	Y	N	N	N
Razquin, 2010 ⁴	737	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	Y	Y	N	N
Waist circumference/ Combination																												
Samaras, 1997 ⁸	26	Y	Y	Y	Y	Y	N	Y	N	N	N	U	U	Y	U	U	Y	N	Y	Y	Y	Y	U	Y	U	N	U	N
Gram, 2010 ⁵	68	Y	Y	Y	Y	Y	Y	Y	Y	N	N	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	U	Y	Y	Y
Toobert, 2011 ¹¹	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	Y	N	U	Y	U	Y	N	Y	Y	Y	Y	U	Y	Y	N	Y
Adherence/ exercise																												
Gram, 2010 ⁶	68	Y	Y	Y	Y	Y	Y	Y	Y	N	N	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	U	Y	Y	Y
QOL/exercise																												
Gram, 2010 ⁶	68	Y	Y	Y	Y	Y	Y	Y	Y	N	N	U	U	U	U	U	U	N	Y	Y	Y	Y	U	Y	U	Y	Y	Y
QOL/ combination																												
Samaras, 1997 ⁸	26	Y	Y	Y	Y	Y	N	Y	N	N	N	U	U	Y	U	U	Y	N	Y	Y	Y	Y	U	Y	U	N	U	N
Activity-realted injury/ combination																												
Samaras, 1997 ⁸	26	Y	Y	Y	Y	Y	N	Y	N	N	N	U	U	Y	U	U	Y	N	Y	Y	Y	Y	U	Y	U	N	U	N

*Questions

1. Is the hypothesis/aim/objective of the study clearly described?
2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
3. Are the characteristics of the patients included in the study clearly described?
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16. If any of the results of the study were based on “data dredging”, was this made clear?
17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?
18. Were the statistical tests used to assess the main outcomes appropriate?
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21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
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23. Were study subjects randomized to intervention groups?
24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?
25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
26. Were losses of patients to follow-up taken into account?
27. Did they report a power calculation?

BMI = Body Mass Index, N=no, P=partially, U=unable to determine, Y=yes

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Table 6a. Strength of evidence of studies among adults with cancer

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence
	Risk of Bias	Consistency	Directness	Precision	Range of mean differences between groups
BMI change					
Self-management	Moderate	Not applicable	Indirect	Precise	Low
1 Observational study (n=1867) ¹	Accounted for confounding and losses to followup	One study	Substudy of a colorectal cancer registry	Statistically significant, but no meaningful between group difference	Less than 5 hours per day television viewing associated with a 0.6 kg/m2 greater BMI 31 months after colorectal cancer diagnosis than viewing less than 3 hours per day. Borderline meaningful between group.
Diet					Insufficient
Physical activity					Insufficient
Combination	Moderate	Not applicable	Indirect	Precise	Low
1 trial (2,164 analyzed) ²	No blinding of outcome assessors	One study	Goal of study to prolong relapse-free survival	Clinically and statistically meaningful.	Self-management and dietary intervention had a 1.1 kg/m2 lower BMI at 5 years.
Weight change					
Self-management					Insufficient
Diet	Moderate	Not applicable	Indirect	Imprecise	Low
1 trial (97 analyzed) ^{3 4}	No blinding of outcome assessors	Only one trial	Trial not designed to prevent weight gain	Standard errors not reported for difference in weight change	No meaningful between group difference between interventions and control.
Physical activity	Moderate	Not applicable	Direct	Precise	Moderate
1 trial (N=101 analyzed) ⁵	No blinding of outcome assessors	One trial	The intervention had a weight maintenance goal		Aerobic and resistance exercise performed at home prevented weight gain over 5 years.
Combination	Moderate	Not applicable	Indirect	Precise	Low
1 trial (2,164 analyzed) ²	No blinding of outcome assessors	One study	Goal of study to prolong relapse-free survival	Clinically and statistically meaningful.	Self-management and dietary intervention lost 2.9 kg compared to 0.2 kg weight gain in controls.
Waist circumference					
All approaches					Insufficient
Adherence					
Self-management					Insufficient

Diet 1 trial (97 analyzed) ^{3 4}	Moderate No blinding of outcome assessors	Not applicable Only one trial	Indirect Trial not designed to prevent weight gain	Imprecise Fewer than 400 participants analyzed	Low 60-90% adherence among intervention groups.
Physical activity 1 trial (N=101 analyzed) ⁵	Moderate No blinding of outcome assessors	Not applicable Only one trial	Direct The intervention had a weight maintenance goal	Imprecise Fewer than 400 participants	Low 65-79% adherence to intervention at 1 year.
Combination 1 trial (2,164 analyzed) ²	Moderate No blinding of outcome assessors	Not applicable One study	Indirect Goal of study to prolong relapse-free survival	Precise Greater than 400 participants.	Low Intervention group reduced calories from fat through 5 years of followup.
Adverse events					
Self-management					Insufficient
Diet					Insufficient
Physical activity					Insufficient
Combination 1 trial (2,164 analyzed) ²	Moderate No blinding of outcome assessors	Not applicable One study	Indirect Goal of study to prolong relapse-free survival	Imprecise No event occurred.	Low No adverse events associated with dietary and self-management intervention.

Table 6b. Risk of bias assessment of studies addressing weight maintenance among adults with cancer

		QUESTION*																											
		Reporting										External validity			Internal Validity-bias						Internal Validity-confounding and Selection Bias						Power		
Author, year	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
BMI/self-management																													
Wijndaele, 2009 ¹	1867	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	U	U	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N
Weight/Diet																													
Chlebowski, 2006 ²	2437	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	U	U	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Djuric, 2002 ⁴	122	Y	Y	Y	Y	P	Y	Y	N	Y	Y	U	U	U	N	U	Y	Y	Y	N	Y	Y	Y	Y	U	N	Y	N	
Weight/exercise																													
Schwartz, 2009 ⁵	112	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	U	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	N	Y	N

- *Questions
1. Is the hypothesis/aim/objective of the study clearly described?
 2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
 3. Are the characteristics of the patients included in the study clearly described?
 4. Are the interventions of interest clearly described?
 5. Are the distributions of principal confounders in each group of subjects to be compared clearly described?
 6. Are the main findings of the study clearly described?
 7. Does the study provide estimates of the random variability in the data for the main outcomes?
 8. Have all important adverse events that may be a consequence of the intervention been reported?
 9. Have the characteristics of patients lost to follow-up been described?
 10. Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?
 11. Were the subjects asked to participate in the study representative of the entire population from which they were recruited?
 12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?
 13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?
 14. Was an attempt made to blind study subjects to the intervention they have received? (We did not use the responses to this question to rate the Risk of Bias given the nature of the interventions)
 15. Was an attempt made to blind those measuring the weight outcomes of the intervention? (This item must have been answered Yes for a trial to have low Risk of Bias)
 16. If any of the results of the study were based on “data dredging”, was this made clear?
 17. In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls?
 18. Were the statistical tests used to assess the main outcomes appropriate?
 19. Was compliance with the intervention/s reliable?
 20. Were the main outcome measures used accurate (valid and reliable)?
 21. Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
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 24. Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable?
 25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
 26. Were losses of patients to follow-up taken into account?

27. Did they report a power calculation?
BMI = Body Mass Index, N=no,P=partially, U=unable to determine, Y=yes

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Table7a. Strength of evidence of studies among adults with mental illness

Number of Studies, Participants	Domains Pertaining to Strength of Evidence				Strength of evidence Range of mean differences between groups
Dietary interventions	Risk of Bias	Consistency	Directness	Precision	
BMI Change					
Self management interventions					Insufficient
Diet 1 trial (91 analyzed) ¹	Moderate No blinding of outcome assessors	Not applicable One study	Indirect Goal of study to increase fruit and vegetable consumption	Imprecise No measure of variability reported.	Low Neither group favored in BMI 18 months after providing fruit and vegetables to group homes.
Physical activity					Insufficient
Combination 1 trial (59 analyzed) ²	Moderate No blinding of outcome assessors	Not applicable One study	Direct Goal of study to prevent anti-psychotic associated weight gain.	Imprecise No measure of variability reported. Study reports not statistically significant.	Low Behavioral intervention preferred to decrease weight gain compared with usual care, although not statistically significant.
Weight					
Self-management					Insufficient No studies identified
Diet					Insufficient No studies identified
Physical activity					Insufficient No studies identified
Combination 1 trial (59 analyzed) ²	Moderate No blinding of outcome assessors	Not applicable One study	Direct Goal of study to prevent anti-psychotic associated weight gain.	Imprecise No measure of variability reported. Study reports not statistically significant.	Low Behavioral intervention preferred to decrease weight gain compared with usual care, although not statistically significant.

BMI = Body Mass Index

Table 7b. Risk of bias assessment of studies addressing weight maintenance among adults with psychiatric disorders

	QUESTION*																											
	Reporting											External validity			Internal Validity-bias							Internal Validity-confounding and selection bias						Power
Author, Year	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
BMI/ diet																												
McCreadie, 2005 ¹	102	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	U	N	U	N	N	Y	Y	Y	Y	Y	Y	U	Y	N	Y	Y	Y
Weight/ combination																												
Andersen, 2004 ³	2111	Y	Y	N		N	Y	N	N	Y	Y	U		U	N	N	N		Y		Y	Y	Y		N	N	Y	N

- *Questions
1. Is the hypothesis/aim/objective of the study clearly described?
 2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
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 4. Are the interventions of interest clearly described?
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 12. Were those subjects who were prepared to participate representative of the entire population from which they were recruited?
 13. Were the staff, places, and facilities where the patients were treated representative of the treatment the majority of patients receive?
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 25. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
 26. Were losses of patients to follow-up taken into account?
 27. Did they report a power calculation?

BMI = Body Mass Index, N=no, U=unable to determine, Y=yes

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