Strategies to Prevent Weight Gain Among Adults

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Johns Hopkins University
Introduction

Effective Health Care Program
Comparative Effectiveness Review
Number 97

Strategies To Prevent Weight Gain Among Adults

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. From 2003 to 2008, only 31 percent of adults were a healthy weight. Obesity was estimated to cost $190 billion on 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.

Body mass index (BMI)—expressed as weight in kilograms divided by height in meters squared (kg/m²)—is commonly used to classify underweight (BMI <18.5 kg/m²), healthy or normal weight (BMI 18.5–24.9 kg/m²), overweight (BMI 25.0–29.9 kg/m²), obesity (BMI ≥30.0 kg/m²), and severe obesity (BMI ≥40.0 kg/m²).

Adults tend to gain weight progressively through middle age. Although the average weight gained per year is 0.5 to 1.0 kg, the modest accumulation of weight over time can lead to obesity. "The estimated age-adjusted prevalence of overweight and obesity (BMI ≥25.0 kg/m²) 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
Learning Objectives

• Identify strategies to prevent weight gain.
• Summarize the evidence on the effectiveness of strategies to prevent weight gain.
• Discuss the effectiveness of environmental-level strategies to prevent weight gain among adults.
What to Expect

<table>
<thead>
<tr>
<th>Background</th>
<th>Definitions, incidence, and prevalence of obesity</th>
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<tr>
<td>Methods</td>
<td>Grading the strength of a body of evidence</td>
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<td>Key Questions</td>
<td>Clinical questions addressed</td>
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<td>Results</td>
<td>What was found</td>
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<td>Conclusions</td>
<td>What was learned about interventions to prevent adult weight gain</td>
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<tr>
<td>Clinical Practice</td>
<td>How to use these findings</td>
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</table>
What is obesity?

How prevalent is obesity?

What are the consequences of obesity?

How do you prevent weight gain?
Healthy People 2020

• Increase the prevalence of healthy weight among adults to 34%

• Reduce the prevalence of obesity among adults to <30%
Defining Obesity and Overweight

\[ BMI = \frac{\text{weight in kg}}{\text{height in m}^2} \]

- **Underweight**
  - BMI < 18.5

- **Healthy weight**
  - BMI 18.5 – 24.9

- **Overweight**
  - BMI 25.0 – 29.9

- **Obesity**
  - BMI ≥ 30.0

- **Extreme Obesity**
  - BMI ≥ 40.0
Prevalence of Overweight & Obesity

<table>
<thead>
<tr>
<th></th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976-1980</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>2007-2008</td>
<td>34</td>
<td>34</td>
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</table>
Progression to Obesity from Healthy Weight

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-39 years</td>
<td>33</td>
<td>32</td>
</tr>
<tr>
<td>40-59 years</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>60 and up</td>
<td>37</td>
<td>42</td>
</tr>
</tbody>
</table>
Obesity by Sex & Ethnicity

![Bar chart showing obesity rates by sex and ethnicity.]

- Men:
  - Non-Hispanic White: 32%
  - Non-Hispanic Black: 37%
  - Mexican American: 36%

- Women:
  - Non-Hispanic White: 33%
  - Non-Hispanic Black: 50%
  - Mexican American: 45%
Obesity as a Risk Factor for Other Conditions

- Type 2 diabetes
- Cardiovascular disease
- Mortality
- Arthritis
- Cancers & cancer recurrence
Need to Prevent Progression to Obesity

Morbidity & Mortality

Increase in Morbidity & Mortality

- Healthy Weight: BMI 18.5 – 24.9
- Overweight: BMI 25 – 29.9
- Obesity: BMI ≥ 30
- Extreme Obesity: BMI ≥ 40
Strategies to Prevent Weight Gain

Strategies
- Self-management
- Diet
- Physical activity
- Medications
- Combinations of strategies

Settings
- Clinics
- Community
- Higher education
- Workplace

Targeted Audience
- Family history of obesity or diabetes
- Diagnosis of obesity or diabetes
- Medication
Scope of the Review

Population
Adults (≥18 years)

Interventions
Self-management, diet, physical activity, medication, combination

Comparators
No intervention, usual care, information packet, other intervention

Outcomes
Adherence, weight gain, obesity-related outcomes, adverse events
Statistically Significant & Clinically Meaningful

Statistically Significant

\[ P < 0.05 \]

Clinically Meaningful

- 0.5 kg of weight
- 0.2 units of BMI
- 1 cm of waist circumference
<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Further research is very unlikely to change the confidence in the estimate of effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Further research may change the confidence in the estimate of effect and may change the estimate.</td>
</tr>
<tr>
<td>Low</td>
<td>Further research is likely to change the confidence in the estimate of effect and is likely to change the estimate.</td>
</tr>
<tr>
<td>Insufficient</td>
<td>Evidence either is unavailable or does not permit estimation of an effect.</td>
</tr>
<tr>
<td>KQ 1</td>
<td>What is the comparative effectiveness of <em>self-management strategies</em> for the prevention of weight gain among adults?</td>
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<tr>
<td>------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>KQ 2</td>
<td>What is the comparative effectiveness of <em>dietary strategies</em> for the prevention of weight gain among adults?</td>
</tr>
<tr>
<td>KQ 3</td>
<td>What is the comparative effectiveness of <em>physical activity strategies</em> for the prevention of weight gain among adults?</td>
</tr>
<tr>
<td>KQ 4</td>
<td>What is the comparative effectiveness of <em>medications</em> for the prevention of weight gain among adults?</td>
</tr>
<tr>
<td>KQ 5</td>
<td>What is the comparative effectiveness of <em>a combination of self-management, diet, physical activity, and medication strategies</em> for the prevention of weight gain among adults?</td>
</tr>
<tr>
<td>KQ 6</td>
<td>What is the comparative effectiveness of <em>environmental-level strategies</em> for the prevention of weight gain among adults?</td>
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Key Questions in Relation to Each Other

Adherence to Interventions
- Individual-level (KQs 1-5)
  - Adherence
- Environment-level (KQ 6)
  - Use of environmental modification

Interventions
- KQ1 – Self-management
- KQ2 – Dietary
- KQ3 – Physical activity
- KQ 4 – Medication
- KQ 5 – Combinations
- KQ6 – Environment-level

Adverse Effects of Intervention
- Burden of intervention
- Nutritional deficiencies
- Eating disorders
- Other adverse events
- Activity-related injury
- Adverse effects of medication
- Other adverse effects

Weight Gain Prevention

Obesity-Related Clinical Outcomes
- Mortality
- Cancer recurrence in populations with cancer
- Quality of life
Studies Addressing the Key Questions

- **Self-management**: 6 studies
- **Dietary strategies**: 14 studies
- **Physical activity**: 15 studies
- **Medication**: 0 studies
- **Combination strategies**: 21 studies
- **Environmental-level**: 1 study
## Studies Addressing Populations

<table>
<thead>
<tr>
<th>Population Category</th>
<th>Number</th>
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<tbody>
<tr>
<td>General populations</td>
<td>23</td>
</tr>
<tr>
<td>Workplace or college</td>
<td>7</td>
</tr>
<tr>
<td>Cardiovascular disease or diabetes</td>
<td>12</td>
</tr>
<tr>
<td>Cancer</td>
<td>4</td>
</tr>
<tr>
<td>Psychiatric disorders</td>
<td>2</td>
</tr>
</tbody>
</table>
What are self-management strategies to prevent weight gain?
Self-Management Strategies

- Goal setting
- Self-monitoring
- Problem solving
- Relapse prevention
- Stimulus control

- Regulate time spent:
  - Watching TV
  - Sleeping

- Enhance self-care
- Acquire social support
Results: Self-Management

• Weight change:
  ► TV viewing ≥ 5 hrs/day and sleeping < 6 hrs/night statistically associated with weight gain.
  ► No meaningful between-group difference associated with sleep duration or TV viewing.

  **Strength of Evidence: Low**

• BMI, waist circumference, progression to overweight or obese, adherence, quality of life, mortality, adverse events:
  ► Studies did not evaluate.

  **Strength of Evidence: Insufficient**
What are dietary strategies to prevent weight gain?
Dietary Strategies to Prevent Weight Gain

- Eating patterns
- Macronutrients
  - Example: fiber
- Micronutrients
Dietary Strategies: BMI

• Change in BMI:
  ► Low-fat diet statistically associated with less BMI gain.
  ► No meaningful difference between diet strategies.

Strength of Evidence:
Low
Dietary Strategies: Weight Change

- Weight change:
  - Healthy eating pattern associated with less weight gain than unhealthy eating pattern.
  - Eating outside home associated with greater weight gain than consuming almost all meals at home.

**Strength of Evidence: Low**
Dietary Strategies: Waist Circumference

- Waist Circumference:
  - Healthy eating associated with 2-3 cm smaller waistlines at 1 year.
  - Low-fat diet had statistically smaller waist circumference; not clinically meaningful.

**Strength of Evidence: Low**
Dietary Strategies: Progression to Overweight or Obese

• Progression to Overweight/Obese:
  ► Eating outside the home ≥ 1 times/week associated with 20%-30% increased risk of overweight or obesity.
  ► Healthy eating scores associated with decreased odds of obesity.

Strength of Evidence: Low
Dietary Strategies: Mortality

• Mortality:
  ► Low-fat group had 0.1% less mortality than nutrition guideline groups.
  
  **Strength of Evidence: Low**

• Adherence, quality of life, and adverse events:
  ► Studies did not evaluate.
  
  **Strength of Evidence: Insufficient**
What are physical activity strategies to prevent weight gain?
Physical Activity Strategies

- Walking
- Running
- Biking
- Training programs
• Changes in BMI
  ▶ Group taught to monitor heart rate + physician advice had a greater decrease in BMI than control group.

Strength of Evidence: Low
Physical Activity: Weight Change

• Weight change:
  ▶ Increase in physical activity over time associated with less weight gain.

Strength of Evidence: Low
physical activity: waist circumference

- Change in waist circumference
  - No difference between gym-based exercise and control condition in elderly.

strength of evidence: low
• Adherence:
  ► Adherence within the interventions ranged from 33% to 71%.
  **Strength of Evidence: Low**

• Adverse events:
  ► No serious adverse events occurred.
  **Strength of Evidence: Low**

• Progression to overweight/obese, quality of life, and mortality:
  ► Studies did not evaluate.
  **Strength of Evidence: Insufficient**
What are medications to prevent weight gain?
Medications to Prevent Weight Gain

- **Orlistat:**
  - Lipase inhibitor
  - Over-the-counter
  - Approved for long-term use

- **Phentermine or diethylpropion**
  - Only approved for short-term use for weight loss
  - Not appropriate for this systematic review

- No study evaluated effectiveness of orlistat for weight gain in general population
Combination Strategies

- Medication
- Self-management
- Physical activity
- Diet
Combination Strategies: BMI

• Change in BMI:
  ► Family interventions met between-group differences at 1 year; not statistically significant.
  ► Interventions among women found no statistically or clinically meaningful differences between groups.

Strength of Evidence: Low
• Weight Change:
  ► One trial found no difference between groups.
  ► Trial evaluating a lifestyle intervention, including goal setting, self-monitoring, social support, problem solving, training to prevent weight relapse, diet, physical activity, and text message reminders.
  ► Meaningful and statistical between-group differences favoring the lifestyle intervention.

Strength of Evidence: Low
Combination Strategies: Waist Circumference

- Waist circumference:
  - Meaningful loss in mothers in the intervention group, although not statistically significant.
  - Couples intervention with group sessions and mailed modules aimed at increasing physical activity and improving nutrition found no difference between groups.

Strength of Evidence: Low
Combination Strategies: Progression to Overweight or Obesity

- Progression to overweight/obesity:
  - Intervention among women found no difference between groups
  - No difference in couples intervention

Strength of Evidence: Low
Combination Strategies: Adherence

• Adherence:
  ► Range: 50% to 73%
  Strength of Evidence: Low

• Quality of life, mortality, and adverse events:
  ► Studies did not evaluate.
  Strength of Evidence: Insufficient
What are community-based or environmental-level obesity prevention interventions?
Environmental-Level Strategies

- Fast food outlets posting calories
- Corner food stores posting calories or carrying fresh foods
- Increasing the availability of fresh food
- Having sidewalks
- Adding/improving sidewalks and planting trees to improve walkability
Environmental-Level Strategies: BMI and Weight Change

• BMI:
  ► Traffic correlated with a statistically significant increase in BMI.
  ► Estimates for walkability were not statistically significant.

  Strength of Evidence: Low

• Weight change:
  ► Control community had 0.3% increase in relative weight versus no change in intervention communities.
  ► Differences were statistically significant; meaningful differences could not be calculated.

  Strength of Evidence: Low
Environmental-Level Strategies: Other Outcomes

- Waist circumference, progression to overweight/obese, adherence, quality of life, mortality, or adverse events:
  - No studies evaluated.

Strength of Evidence: Insufficient
Evidence among Other Populations

What about obese adults?

What about strategies in the workplace?

What about college-based strategies?

What about adults with CVD or DM?

What about adults with cancer?

What about adults with mental illness?
Obese Adults from a General Populations

- Weight change or waist circumference:
  - No difference between adults who walk or bicycle to work and those only encouraged to walk to work.

Strength of Evidence: Low
Workplace-based Strategies

- Weight change and waist circumference:
  - Workplace strategies may include posting signs to remind people to take the stairs or eat healthful meals at lunch.
  - Combined diet, physical activity, and environmental interventions meaningfully and statistically prevented weight gain and waist circumference.
  - Combined Internet-based diet and physical activity counseling prevented weight gain.

Strength of Evidence: Moderate
• Weight change and BMI:
  ► Intervention focused on preventing the “freshman 5” or “freshman 15”
  ► Small group sessions teaching about goal setting, diet, and physical activity prevented increase in weight gain or BMI.

Strength of Evidence: Low
Cardiovascular Disease or Diabetes Mellitus

- BMI, weight change, and waist circumference:
  - Physical activity strategies prevent weight gain.

**Strength of Evidence:**
Low
Adults with Cancer

• Weight change:
  ▶ Physical activity prevented weight change.
  Strength of Evidence: Moderate

• BMI:
  ▶ Reducing television viewing associated with less BMI gain.
  Strength of Evidence: Low
Adults taking Antipsychotics

• BMI and weight change:
  ► Dietary strategy and combined diet and physical activity strategy did not differ from no intervention.

  Strength of Evidence: Low
Conclusions
What did we learn?
Conclusions

- **Low-fat diets**
  - More effective than nutrition guideline handouts

- **Monitoring heart rate during exercise**
  - More effective than routine clinic visit with physician advice

- **Group lifestyle sessions and text messages to mothers**
  - More effective than diet and physical activity guideline handouts

- **Eating fewer meals prepared outside the home**
  - More effective than eating more meals prepared outside the home
Future Research Needs

• Evaluate strategies to prevent weight gain in healthy weight individuals separately from overweight and obese individuals.
• Evaluate interventions for individuals initiating antipsychotic medications.
• Evaluate interventions for patients initiating diabetes and some cancer medications.
• Compare differing degrees of intensity of strategies.
• Need additional well-designed trials evaluating the same interventions and similar outcomes.
Gaps in the Evidence

• Observational cohorts
  ► Need for researchers to state weight measurement as goal

• Intervention trials
  ► Need to extend studies to sufficient duration; ≥ 1-year follow-up
  ► Need for additional rigorous trials evaluating similar interventions and outcomes
What should I discuss with patients?
What to Discuss with Patients

✓ Concerns about obesity and the patient’s welfare
✓ Remind patient of their weight at last visit and current visit
✓ Inform patient of BMI and how to diagnose overweight/obesity
✓ Factors contributing to overweight/obesity:
  - Less physical activity
  - More sedentary/screen time
  - Eating away from home
✓ Teach the patient how to monitor heart rate during exercise
What to Discuss with Patients

- Health consequences of overweight and obesity
- Effectiveness of obesity prevention interventions
- What can be done at home
- Identify group support from friends or apps
- Encourage patients to:
  - Take the stairs
  - Walk instead of drive
  - Cook at home instead of ordering in or going out
What to Discuss with Patients

✓ What to do if healthful food or safe physical activity locations are not accessible
✓ What constitutes an appropriate serving size
✓ Importance of monitoring total daily caloric intake versus total daily food intake
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