



Review article

Lifestyle interventions for weight loss among overweight and obese adults with serious mental illness: A systematic review and meta-analysis^{☆,☆☆}



John A. Naslund^{a,b,*}, Karen L. Whiteman^b, Gregory J. McHugo^c, Kelly A. Aschbrenner^{b,c},
Lisa A. Marsch^{c,d}, Stephen J. Bartels^{a,b,c,e}

^a The Dartmouth Institute for Health Policy and Clinical Practice, Dartmouth College, Lebanon, NH, United States

^b Health Promotion Research Center at Dartmouth, Lebanon, NH, United States

^c Department of Psychiatry, Geisel School of Medicine at Dartmouth, Lebanon, NH, United States

^d Center for Technology and Behavioral Health, Dartmouth College, Lebanon, NH, United States

^e Department of Community and Family Medicine, Geisel School of Medicine at Dartmouth, Lebanon, NH, United States

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ABSTRACT

Objective: To conduct a systematic review and meta-analysis to estimate effects of lifestyle intervention participation on weight reduction among overweight and obese adults with serious mental illness.

Method: We systematically searched electronic databases for randomized controlled trials comparing lifestyle interventions with other interventions or usual care controls in overweight and obese adults with serious mental illness, including schizophrenia spectrum or mood disorders. Included studies reported change in weight [kg] or body mass index (BMI) [kg/m²] from baseline to follow-up. Standardized mean differences (SMD) were calculated for change in weight from baseline between intervention and control groups.

Results: Seventeen studies met inclusion criteria (1968 participants; 50% male; 66% schizophrenia spectrum disorders). Studies were grouped by intervention duration (≤ 6 -months or ≥ 12 -months). Lifestyle interventions of ≤ 6 -months duration showed greater weight reduction compared with controls as indicated by effect size for weight change from baseline (SMD = -0.20 ; 95% CI = $-0.34, -0.05$; 10 studies), but high statistical heterogeneity ($I^2 = 90\%$). Lifestyle interventions of ≥ 12 -months duration also showed greater weight reduction compared with controls (SMD = -0.24 ; 95% CI = $-0.36, -0.12$; 6 studies) with low statistical heterogeneity ($I^2 = 0\%$).

Conclusion: Lifestyle interventions appear effective for treating overweight and obesity among people with serious mental illness. Interventions of ≥ 12 -months duration compared to ≤ 6 -months duration appear to achieve more consistent outcomes, though effect sizes are similar for both shorter and longer duration interventions.

1. Introduction

Obesity among people with serious mental illness is a major public health concern. Rates of obesity in this at-risk group consisting of people with schizophrenia, schizoaffective disorder, major depressive disorder, and bipolar disorder, are nearly double observed rates in the general population [1–3]. Obesity combined with high chronic disease burden, increased cardiovascular risk, and poor health behaviors, contributes to dramatically reduced life expectancy among people with serious mental illness [4–6]. Numerous challenges interfere with

achieving weight loss among overweight and obese individuals with serious mental illness including metabolic effects of psychoactive medications, impact of symptoms on motivation, poor dietary habits, and high levels of sedentary behavior [2,7,8]. Chronic poverty also places individuals with serious mental illness at increased risk of homelessness, and has devastating consequences on quality of life, self-esteem and ability to pursue leisure activities such as engaging in exercise [9].

Weight reduction among overweight and obese individuals is an important target for improving cardiovascular health. Research shows

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^{*} Corresponding author at: The Dartmouth Institute for Health Policy and Clinical Practice, Dartmouth College, Lebanon, NH, United States.

E-mail address: john.a.naslund@gmail.com (J.A. Naslund).

that even modest weight loss of 5–10% can reduce cholesterol levels, improve glycemic control, and lower blood pressure [10–12]. Extensive research supports lifestyle interventions focused on nutrition education and increasing physical activity participation for achieving weight loss in general patient populations [13–15]. However, among people with serious mental illness, evidence to support lifestyle interventions remains mixed [16]. This can partly be attributed to methodological limitations with many of the intervention studies conducted to date. For example, over the past decade there has been growing interest in supporting weight loss and cardiovascular risk reduction among people with serious mental illness through lifestyle interventions, however many studies have lacked adequate comparison conditions, have recruited small sample sizes, and have collected outcomes after short follow-up periods [16].

Despite these concerns, prior systematic reviews have highlighted the acceptability of lifestyle interventions for promoting physical activity and healthy eating among people with serious mental illness [17,18], and meta-analyses have demonstrated potential effectiveness of lifestyle interventions of short duration (≤ 6 months) for achieving weight loss in this high-risk group [19–21]. However, there are significant limitations related to these prior systematic reviews and meta-analyses. First, many reviews have included studies that enrolled participants who were not overweight or obese defined as having a body mass index (BMI) ≥ 25 kg/m²; therefore, it is difficult to determine true effectiveness of lifestyle interventions specifically for achieving weight loss among overweight and obese individuals with serious mental illness. Second, existing meta-analyses have not been restricted to randomized studies, thereby making it difficult to reliably draw conclusions regarding the effect of lifestyle interventions compared to control conditions. Third, there has been a recent emergence of several large-scale rigorous trials of longer duration (≥ 12 months) lifestyle interventions for weight loss since many of the existing systematic reviews and meta-analyses were published. Therefore, an updated analysis of the effect of lifestyle interventions for weight loss among people with serious mental illness is warranted.

We conducted an updated systematic review and meta-analysis of published randomized trials of lifestyle interventions targeting weight loss among people with serious mental illness. Specifically, our aim was to estimate the effect of lifestyle intervention participation on reduction in body weight among overweight and obese adults with serious mental illness. We assessed the effects of lifestyle interventions promoting physical activity and healthy eating of short (≤ 6 months) and long (≥ 12 months) duration on change in participants' body weight. The effect of lifestyle interventions was also assessed with respect to obtaining clinically significant weight reduction for participants as indicated by a weight loss of 5% or greater among studies of lifestyle interventions of ≥ 12 -months duration.

2. Materials and methods

2.1. Data sources and search strategy

We adhered to the PRISMA reporting guidelines [22]. The search strategy protocol was published to the PROSPERO International prospective register of systematic reviews (Registration number: CRD42015019026). The following databases were searched in May 2016 for randomized controlled trials evaluating lifestyle interventions for weight loss in overweight and obese adults with serious mental illness: Medline, Embase, Scopus, Cochrane Central, CINAHL, and PsycINFO. Reference lists of included studies, prior systematic reviews, and Google Scholar were also searched to identify additional relevant studies. The search strategy included a combination of key words and medical subject heading (MeSH) terms related to "serious mental illness", "weight loss", and "lifestyle intervention". Table 1 lists the complete search strategy used in Medline.

2.2. Inclusion criteria

In accordance with the PRISMA statement, we used the participants, interventions, comparisons, outcomes, and study design (PICOS) criteria [22] to assess study eligibility:

Participants: Adults (aged ≥ 18 years, no upper limit) classified as overweight or obese (body mass index [BMI] ≥ 25 kg/m² or BMI ≥ 23 kg/m² for Asian populations) with serious mental illness defined as having either a schizophrenia spectrum (schizophrenia or schizoaffective disorder) or mood disorder (major depressive disorder or bipolar disorder).

Interventions: Any lifestyle intervention for weight loss. These included behavioral interventions and interventions targeting self-monitoring, dietary changes, nutrition education, fitness, exercise or physical activity. Interventions involving pharmacological agents, nutritional supplements, or surgical procedures were excluded.

Comparators: All types of comparison conditions were considered eligible. This included other lifestyle interventions, minimal interventions, or usual care.

Outcomes: The primary outcome of interest was change in body weight at follow-up. This could be measured as change in weight (kg) or change in BMI (kg/m²) at follow-up. Eligible studies had to report a quantitative measure of change in body weight. We also included studies that reported the proportion of participants who achieved $\geq 5\%$ weight loss at follow-up. This outcome was also collected because modest $\geq 5\%$ weight loss is associated with reduction in cardiovascular risk among overweight and obese individuals [10,15,23].

Study design: Randomized controlled trials reporting weight outcomes at follow-up. No restrictions based on date of publication or language.

2.3. Study selection

One researcher (JAN) screened titles for relevant studies. Two researchers (JAN & KLW) independently screened abstracts of relevant studies for eligibility. The same two researchers compared lists of potentially eligible studies and decided on a final list of studies to undergo full-text review. The researchers resolved discrepancies regarding study inclusion/exclusion through discussion.

2.4. Data extraction

One researcher (JAN) extracted the following data from the full text articles using a data extraction form adapted from Avenell et al. [24]: study setting; participant characteristics (age, sex, and diagnosis); lifestyle intervention characteristics; comparison group characteristics; length of follow-up; and change in weight or BMI outcomes. A second researcher (KLW) reviewed the data tables to confirm accuracy of data extraction. Study inclusion and selection are illustrated in the PRISMA flow diagram (Fig. 1). Results from a single study are often published as multiple manuscripts, such as reporting of secondary outcomes. Therefore, we were careful to avoid over counting studies, though secondary analyses from studies that met our inclusion criteria were also reviewed to supplement data extraction. All authors reviewed the final list of included studies.

2.5. Methodological quality assessment

We used an adapted version of the Methodological Quality Rating Scale (MQRS) to assess methodological quality of included studies [25]. An item related to assessment of the control condition was included from another methodological quality assessment measure [26]. The adapted MQRS involves ratings for the following 12 methodological quality dimensions: 1) study design; 2) replicability of study procedures; 3) reporting of baseline characteristics; 4) use of manualized interventions; 5) adequate description of the comparison condition; 6)

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