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The effectiveness and usability of online, group-based interventions for people with severe obesity: Systematic review protocol

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Abstract

Background: Globally, obesity is a growing crisis. Despite obesity being preventable, over a quarter of the United Kingdom adult population is currently considered clinically obese (typically Body Mass Index $\geq 35\text{kg/m}^2$). Access to treatment for people with severe obesity is limited by long wait times and local availability. Online and group-based interventions provide means of increasing the accessibility of obesity prevention and treatment services. However, there has been no prior review of the effectiveness of group-based interventions delivered online for people with severe obesity.

Objective: The purpose of this systematic review protocol is to provide an evaluation of the effectiveness and usability of different types of online, group-based interventions for people with severe obesity.

Methods: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols and the Population, Intervention, Comparator, and Outcome frameworks were used to structure this review. The review will systematically search seven databases: Medline, Embase, the Cumulative Index of Nursing and Allied Health Literature, American Psychological Association PsycNet, Web of Science, the Cochrane Library, and the ProQuest Dissertations and Theses databases. Two authors will independently screen the titles and abstracts of identified articles, select studies for inclusion based on the eligibility criteria, and extract data into a standardized form. Any disagreements will be discussed and resolved by a third reviewer if necessary. Risk of bias will be assessed using the Cochrane Collaboration Risk of Bias tool and a descriptive analysis will be used to evaluate effectiveness and usability.

Results: The systematic review has not yet been started. It is expected to be completed and submitted for publication by May 2021.

Conclusions: This systematic review will summarize the effectiveness and usability of online, group-based interventions for people with obesity. It will identify the types of online delivery that have the strongest support to help inform the development of more useful and engaging interventions for people with severe obesity.

Trial Registration: PROSPERO (reference number will be added when received)

Keywords

Internet-based Interventions (MeSH), Telemedicine (MeSH), Group-based interventions, Obesity (MeSH), Severe obesity, Obesity Management (MeSH), Weight Loss (MeSH), Weight Reduction Programs (MeSH), Diet Therapy (MeSH), Exercise (MeSH), Systematic Review (MeSH), weight management

Introduction

Background

Obesity is a serious and growing crisis; over a quarter of UK adults are considered obese (26% of men and 29% of women) [1]. Adults with a Body Mass Index (BMI) greater than or equal to 35kg/m² are considered to have a very high health risk [2]. This is a significant concern, as obesity has been linked to a number of physical and mental health conditions, such as type 2 diabetes, heart disease, cancer, stroke, and depression [3,4]. The COVID-19 pandemic has only made obesity a more urgent health issue to tackle. Evidence to this point has identified a notably increased risk of severe COVID-19 symptoms, need for hospitalization and intensive care, and increased mortality for patients who are overweight and obese [5]. This has highlighted the need for sustained and effective interventions to improve physical activity and dietary behaviours to prevent a worsening impact on health outcomes [5].

The UK has a four-tiered pathway for obesity services: tier 1 refers to universal obesity prevention services, tier 2 covers community-based lifestyle weight management services, tier 3 is specialist obesity services (provided by a multidisciplinary team), and tier 4 is surgery [6,7]. The higher tiers (3 and 4) are specifically targeted towards adults with high BMIs ($\geq 40\text{kg/m}^2$, or 35kg/m^2 with a co-morbidity) [4].

In practice, however, access to these services is not universal. An All-Party Parliamentary Group found that more than a third of people with obesity had not accessed any of these services, and almost 40% of people had found the process moderately or incredibly difficult [8]. Additionally, of the 91% of Clinical Commissioning Groups (that tier 3 services fall under) that responded to a freedom of information request, less than 60% commissioned tier 3 services [8]. Likewise, in a survey conducted by Public Health England, people reported long waiting lists for, and a lack of local, tier 3 services [9]. A longitudinal cohort study found that almost three quarters of people with severe obesity (BMI $\geq 35\text{kg/m}^2$) did not access any treatment over the course of 7 years; this figure was lower, but still high (almost 60%), for people with morbid obesity (BMI $\geq 40\text{kg/m}^2$) [10]. These statistics highlight a significant problem with access to and availability of obesity prevention services in the UK.

Rationale

There are several strategies that can help address the need for greater accessibility of interventions for people with severe obesity. Group-based interventions may improve accessibility by potentially reducing the resources needed to provide interventions by supporting more patients with fewer staff hours required. This also has the potential to reduce waiting times to access interventions [4]. Group-based interventions are a common tool to promote health behaviour change [11] and previous systematic reviews have found that group-based interventions are generally effective at promoting physical activity and weight loss [12,13].

Another strategy that is increasingly used to improve accessibility to a variety of health interventions is the use of digital and online platforms of delivery. Online delivery strategies have become increasingly common as COVID-19 restrictions have forced services to adapt the way they provide support [14]. A wide variety of platforms have been used to deliver services, with mixed feedback from participants [14]. A previous systematic review found evidence suggesting that web-based interventions are more effective at promoting and maintaining weight

loss than minimal or no interventions, but that evidence of their effectiveness compared to in-person interventions is mixed [15]. Another systematic review found that online interventions were more effective at promoting weight loss in the short-term, but not the long-term, compared to offline interventions [16]. A systematic review of mobile-based interventions for people who are overweight or obesity also found evidence of their effectiveness in primary and secondary health care settings [17], but evidence for their effectiveness in general is mixed [18]

. This suggests that online platforms have potential to support effective weight loss interventions, but that further research is needed to determine best practice.

Combining these two strategies - group-based and web-based - could further improve the accessibility of interventions, particularly given the COVID-19 restrictions on in-person interactions. However, no previous systematic reviews were identified that examined online, group-based interventions for people with obesity. One systematic review did review online social network weight management interventions, but only included five studies, and was focused specifically on social networks without including other types of online interventions [19]. Several searches of keywords (“online OR digital”, “group-based interventions OR group interventions OR group behaviour change”, and “weight loss OR obesity”) on PROSPERO failed to identify any systematic reviews that are currently exploring the effectiveness of different types of online, group-based interventions for people with obesity.

Therefore, there is a need for a systematic review of studies that evaluate online, group-based interventions for people with severe obesity to determine their effectiveness, their usability, and the conditions which make them most effective and engaging for participants. An overview of the different types of online, group-based weight loss interventions will make it easier to identify best practices and contribute to the development of new online, group-based interventions that can best promote and maintain weight loss.

To focus the evaluation, this systematic review will examine two main research questions. First, what means of delivering online, group-based behaviour change interventions for adults with severe obesity is the most effective at establishing and maintaining positive health behaviour changes and weight loss? Second, what are the perceptions of the acceptability, usability, and overall user experience for different online, group-based behaviour change interventions for adults with severe obesity?

Methods

Overview

The population, intervention, comparator, and outcome template and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) [20] will be used to structure the review and to identify appropriate Medical Subject Headings (MeSH) for the literature search. This systematic review will be composed of a literature search, article selection, data extraction, quality appraisal, data analysis, and data synthesis. This review was prospectively registered on PROSPERO (reference number TBD).

Eligibility criteria

The population, intervention, comparator, outcome, and study type framework (Table 1) is based on the research question stated above.

Table 1. PICOS framework

Population	Adults (≥ 18) with severe obesity (defined for this review as BMI ≥ 35)
Intervention	Online, group-based interventions aiming to change health behaviour relating to obesity (physical activity and dietary behaviour)
Comparator	Other types of group-based interventions, including comparisons with face-to-face, phone, and other online platforms than the main intervention
Outcomes	The primary objective is to identify the types of online platforms used for group-based interventions for people with obesity and their effectiveness. Therefore, the primary outcomes will be the effectiveness of the interventions at supporting behaviour changes (physical activity and dietary behaviour) and weight loss. Secondary outcomes will include levels of engagement with the intervention, and patient-reported experience (including measures of acceptability, usability, or satisfaction). Other secondary outcomes – including details about the intervention design, aim, and format – will also be examined.
Study types	Studies that evaluate at least one online, group-based intervention for people with severe obesity will be eligible (including RCTs, quantitative, qualitative, cohort, and case studies). Reviews, protocols, and papers that describe interventions without evaluating them will be excluded.

Search strategy

Seven databases will be searched to find articles for this review: Medline, Embase, CINAHL, APA PsycNet, Web of Science, the Cochrane Library, and the ProQuest Dissertations and Theses databases. Key terms relating to online, group-based interventions for people with severe obesity were extracted from an initial review of the literature and used to develop the search terms and search strategy. Search terms will include MeSH terms and keywords relating to online interventions, group-based interventions, and severe obesity. The search terms that will be used in this review are grouped into those three themes (see Table 2) and the search string will be created using the following structure: online (MeSH OR Keywords) AND group-based (MeSH OR Keywords) AND severe obesity (MeSH OR Keywords). No date limit will be set. See Appendix 1 for a sample search string.

Table 2. Search terms

Category	MeSH	Keywords (in title or abstract)
Online	Telemedicine OR Internet OR Internet-based Intervention	Internet OR online OR web OR digital OR “videoconferenc*” OR video call OR virtual
Group-based		Group based OR (group adj1 (based OR intervention

		OR treatment OR virtual OR session*)) OR “group intervention*” OR “group treatment*” OR “group sessions*” OR “virtual group”
Severe obesity	Obesity OR Obesity, Morbid OR Obesity Management	Obese OR obesity OR “specialist weight management” OR (BMI adj1 (“35” OR “40” OR “45”)) OR “Tier 3 weight management”

Inclusion criteria

The review will include studies that evaluate online, group-based interventions for people with severe obesity (defined for this review as BMI \geq 35kg/m²). Online, group-based interventions will be defined as an intervention delivered primarily online to a set of three or more people. Interventions that are primarily group-based will be included, even if they have a small individual component. Interventions will need to target weight management for people with obesity, but can focus on behavioural (e.g. diet, physical activity) or physical (e.g. weight loss or maintenance of weight loss) components. Interventions with comparisons to control groups with no intervention, waiting list or irrelevant interventions, minimal interventions, usual care, in-person interventions, or other online interventions will all be included.

Exclusion criteria

Studies of children and adolescents (participants < 18 years old) will be excluded. Studies that address diet or physical activity behaviour changes with a primary purpose other than managing obesity or weight loss (e.g. rehabilitation after surgery, COPD, diabetes, etc.) will also be excluded. Interventions that are primarily one-on-one but have a small group-based component will be excluded.

Screening and Article Selection

The references identified from the database searches will be exported into a citation management software EndNote X9 for storage and duplicate removal. There will be three stages of screening: 1) the reference management search function will be used to screen the articles against the inclusion and exclusion criteria, 2) two independent reviewers will screen the titles and abstracts, 3) two independent reviewers will screen the full-text of the studies to determine final eligibility for inclusion. All disagreements between the reviewers will be discussed and a third reviewer will be consulted if consensus cannot be reached. A PRISMA flow diagram will be used to record the details of the screening and selection process to ensure study reproducibility.

Data Extraction

Two independent reviewers will examine the full text of all of the included articles to extract outcomes into a predetermined form (see Table 3). Any disagreements between the reviewers will be discussed and resolved by a third reviewer if consensus cannot be reached.

Table 3. Article information and data extraction

Article information	Data to be extracted
General study information	
	Year of publication
	Country of study
	Sample demographics (including age, gender, target population)
	Initial sample size
	Analysed sample size
Intervention	
	Online platform
	Aim of intervention (e.g. increase physical activity, improve dietary behaviour, etc.)
	Group size
	Number and length of intervention sessions
	Intervention duration and follow-up periods
	Theory the intervention is based on (if any)
	Behaviour Change Techniques [21] used in the intervention (if any)
Evaluation	
	Outcomes measured
	Effect of intervention on behaviour change outcomes
	Effect of intervention on health outcomes (e.g. weight, BMI)
	Participant engagement (e.g. drop-out rates, number of sessions attended, etc.)
	Acceptability

	Usability
	Participant satisfaction / feedback
	Other key performance indicators reported

Quality Appraisal and Risk of Bias Assessment

Two reviewers will independently assess the risk of bias of all of the included studies. Any disagreements will be discussed or resolved by a third reviewer. The risk of bias of the randomized controlled trials will be assessed using the Cochrane Collaboration Risk of Bias 2 tool to assign high or low risk of bias, or some concerns [22,23]. Non-randomised studies will be assessed using the ROBINS-I tool [24]. Figures will be created to summarise the risk of bias in each study and the extent of each bias across all studies.

Data Analysis and Synthesis

Due to the expected variety of study aims, measures, and reported outcomes, it is not likely that a meta-analysis will be feasible. However, the feasibility of a meta-analysis will be considered when studies have been assessed. A descriptive analysis will be conducted to summarize the extracted data. General study information will be summarised in a table. Outcomes relating to the intervention will be synthesised quantitatively; e.g. by providing the percentage of studies that used a particular platform, theory, or Behaviour Change Technique and had a particular aim and by providing the mean, median, and range for outcomes such as group size, number of sessions, and session duration.

The primary outcomes - the effect of the intervention on behaviour change and health outcomes – will be quantified by providing the percentage of studies that found significant evidence of effectiveness. Substantial evidence of effectiveness will be considered to be a significantly better performance of the intervention than the comparator. Behaviour change and physical health outcomes will be considered separately.

Analysis of other outcomes, such as acceptability, usability, and patient feedback will be determined upon review of the studies, as this could be analysed qualitatively or quantitatively depending on what is reported. Any qualitative data reported by the study will be assessed using a thematic analysis to identify similarities and differences in participant responses to the interventions. The risk of bias in the studies will be considered in the synthesis.

Results

The full systematic review has not yet begun, but is expected to be completed and submitted for publication by May 2021.

Discussion

A systematic review of the literature on online, group-based behaviour change interventions for adults with severe obesity will contribute to the establishment of guidelines for best practice. With the strained capacity to provide specialist weight management services (also

known as Tier 3 services), and the additional constraints of the COVID-19 pandemic on group-based and face-to-face services, a better understanding of how group-based interventions can be effectively delivered remotely will help inform and improve the development of online interventions for adults with severe obesity in the UK. Based on the data, this section will explore what conclusions can be drawn, the limitations of the systematic review, and key topics for future research.

Author Contributions

The review topic was conceived by all of the authors collectively. MMI wrote the protocol with revisions from DS, LB, JP, MT, RC, AC, and EM.

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Appendices

Appendix 1. Sample Search of Ovid MEDLINE and In-Process and Other Non-Index Citations (<1946 to December 04, 2020)

#	Searches	Results
1	Telemedicine/	24929
2	internet/	74039
3	Internet-Based Intervention/	303
4	internet.ab,ti.	51857
5	online.ab,ti.	117683
6	web.ab,ti.	115599
7	digital.ab,ti.	126111
8	"videoconferenc*".ab,ti.	2217
9	video call.ab,ti.	66
10	virtual.ab,ti.	59625
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10	473589
12	(group adj1 (based or intervention or treatment or virtual or session*)).ab,ti.	93589
13	group based.ab,ti.	8540
14	"group intervention*".ab,ti.	3281
15	"group treatment*".ab,ti.	4148
16	"group session*".ab,ti.	3951
17	"virtual group*".ab,ti.	78
18	12 or 13 or 14 or 15 or 16 or 17	94408
19	obesity/	183655
20	obesity, morbid/	20120
21	obesity management/	126
22	(obesity or obese).ab,ti.	298809
23	"specialist weight management".ab,ti.	26
24	(BMI adj1 "35").ab,ti.	1607
25	(BMI adj1 "40").ab,ti.	1372
26	(BMI adj1 "45").ab,ti.	158
27	"Tier 3 weight management".ab,ti.	8
28	19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27	346426
29	11 and 18 and 28	258