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An integrative review of multicomponent weight management interventions for adults with intellectual disabilities

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Background: Obesity is more prevalent in people with intellectual disabilities and increases the risk of developing serious medical conditions. UK guidance recommends multicomponent weight management interventions (MCIs), tailored for different population groups.

Methods: An integrative review utilizing systematic review methodology was conducted to identify the types of MCIs delivered to adults with intellectual disabilities.

Findings: Five studies were identified. All of the studies' MCIs were tailored for adults with intellectual disabilities. Tailoring included measures such as simplified communication tools, individualized sessions, and the presence of carers where appropriate.

Conclusions: Emerging evidence suggests ways in which MCIs can be tailored for adults with intellectual disabilities but, given the few studies identified, it is not possible to recommend how they can be routinely tailored. Further studies are justified for adults with intellectual disabilities at risk of obesity-related conditions.

KEYWORDS

intellectual disabilities, interventions, obesity, review, weight management

1 | INTRODUCTION

Obesity, defined as a body mass index (BMI) of ≥ 30 , is a national (UK) and an international concern. Obesity increases an individual's chances of developing serious medical conditions including coronary heart disease, stroke, type 2 diabetes and some types of cancers (World Health Organisation, 2004). Worldwide, obesity has more than doubled since 1980 and in 2014 more than 600 million adults were obese (World Health Organisation, 2015); 26% of all men and 24% of all women in

England were categorized as obese in 2013 (Health Survey for England, 2013). However, the problem of obesity is even greater in people with intellectual disabilities: of those adults with intellectual disabilities in England that had their BMI tested in the previous 2 years, 38% were obese (Public Health England, 2015). The problem of obesity and the risks of developing serious obesity-related medical conditions and premature deaths from these conditions are therefore as great, if not greater, for individuals with intellectual disabilities as they are for the general population in England. This is a health inequality matter of concern.

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The reasons for the high prevalence of obesity found amongst people with intellectual disabilities are complex. When trying to account for this difference, it is “wise to examine the potential role played by differential exposure to ‘social determinants’ of health.” (Emerson & Hatton, 2014, p. 39). Contributing factors may include adverse environmental factors such as poor nutrition and poor neighbourhoods (Abu-Saad & Fraser, 2010; Bolte, Tamburlini, & Kohlhuber, 2010), complex social, psychological and biological pathways (Emerson & Hatton, 2014), psychosocial factors such as social exclusion, low control, discrimination and victimization (Matthews, Gallo, & Taylor, 2010), poverty and low socio-economic status (Roux & Mair, 2010), and that people may be more vulnerable and less resilient to such adverse factors (Davydov, Stewart, Richie, & Chaudieu, 2010). In addition, people with intellectual disabilities can face barriers including communication problems, a lack of routine support from carers or a failure by healthcare providers to make reasonable adjustments to mainstream services, so they can be used by individuals with intellectual disabilities (Hatton, Roberts, & Baines, 2011). Some studies have also found variations in healthcare practitioners’ confidence in their ability to support individuals with intellectual disabilities to gain and maintain a healthy weight (Stein, 2000; West Midlands NHS Trust, 2011). Research has highlighted the impact of cumulative exposure to such complex multiple adversities, and the “cascading” effects on developmental health in childhood and across a person’s subsequent lifetime (Davey Smith, 2002; Graham, 2007; Krahn & Fox, 2014). Some medical conditions such as congenital heart problems in people with intellectual disabilities may not be preventable, but all of the remaining disparities that follow in the cascading effects on their lives may be either preventable or amendable to intervention (Krahn & Fox, 2014).

1.1 | Complex problems require complex solutions

Attempts to tackle complex problems such as obesity increasingly use complex interventions. The Medical Research Council has produced guidance for the development and evaluation of complex interventions (Craig et al., 2008; Moore et al., 2015). The guidance recommends that complex interventions are developed systematically, using the best evidence available and the appropriate theory. The interventions should be tested using a phased approach beginning with trials and then moving on to exploratory and full evaluations, with wide dissemination of results and further research to monitor implementation (Craig et al., 2008; Moore et al., 2015).

1.2 | UK obesity and weight management guidance

The UK guidance for obesity and weight management recommends multicomponent weight management interventions (MCIs) for people who are obese (National Institute for Health and Care Excellence (NICE), 2014a, 2014b; Scottish Intercollegiate Guidelines Network (SIGN), 2010). The recommended interventions should comprise three components: (i) dietary changes to create a diet with a daily energy deficit of 2,510 kJ (600 kcal); (ii) support to increase the levels of physical activity; and (iii) the incorporation of behavioural methods to support sustained behaviour change. The guidance suggests that

these interventions should be tailored to meet the needs of different population groups (NICE, 2014a, 2014b; SIGN, 2010). In August 2016, Public Health England published guidance on making reasonable adjustments to weight management services for people with intellectual disabilities (Public Health England, 2016). The guidance provided examples of easy-read leaflets from five providers and eleven case studies (only three of which had received some form of evaluation). However, the reasonable adjustments guidance and case studies provided were solely focused on the management of weight through diet-only or exercise-only. None of the examples provided were MCIs.

The existing UK guidance for obesity and weight management (SIGN, 2010; NICE, 2014a, 2014b) may fail to adequately address the needs of people with intellectual disabilities (Mizen, Macfie, Findlay, Cooper, & Melville, 2012). This lack of focus “may contribute to inequalities around outcomes and access to services as experienced by them” (NICE, 2014b, p. 35).

1.3 | Previous reviews

Previous reviews of weight management interventions for all adults (Kirk, Penney, McHugh, & Sharma, 2012) and for adults with intellectual disabilities have been conducted (Hamilton, Hankey, Miller, Boyle, & Melville, 2007; Jinks, Cotton, & Rylance, 2011; Sales & Walker, 2011; Spanos, Melville, & Hankey, 2013). A range of weight management interventions were identified by these reviews including stand-alone dietary interventions, stand-alone physical activity interventions, behavioural and/or educational interventions, health promotion interventions and various combinations of these different components. To date, however, there have been no comprehensive reviews of MCIs for adults with, or without, intellectual disabilities.

1.4 | Aim

This integrative review aimed to identify the type of MCIs delivered to adults with intellectual disabilities—including if and how these interventions are tailored for this population group.

This review aimed to address the following research questions:

1. What types of MCIs are delivered to adults with intellectual disabilities?
2. How are MCIs delivered to adults with intellectual disabilities, by whom and in what settings?
3. Are MCIs effective in terms of achieving clinically significant weight loss in adults with intellectual disabilities who are obese?
4. What are the views and experiences of participants, their carers and the healthcare practitioners involved in the delivery of MCIs?

2 | DESIGN

An integrative review was undertaken. The review utilized systematic review methodology and combined the findings of a range of

different research studies including quantitative and qualitative studies. Reviews which integrate quantitative and qualitative studies in this way have the potential to develop a comprehensive understanding of problems relevant to health and social care because they include a diverse range of data sources, which may enhance a holistic understanding of the phenomenon of concern (Whittemore & Knaf, 2005).

2.1 | Search strategy

A search strategy was developed using MeSH headings, key terms and syntax specific to each database. Electronic databases were searched in July 2015: Ovid Medline (1946 to 14-07-2015), Embase (1974 to 15-07-2015), CINAHL Complete (Cumulative Index to Nursing & Allied Health Literature) (1975 to 14-07-15); and Cochrane (1993 to 16-07-2015). The key terms and MeSH headings used were combined. Citations were initially screened on title and then on abstract. This process was undertaken independently by two researchers (AJD and JMEG). Any articles that met the inclusion criteria were read in full. Any queries over articles were discussed by the project team in order to reach a decision whether to include or exclude these articles.

2.2 | Eligibility criteria

1. Primary research studies of individuals with intellectual disabilities aged 18 years and over participating in MCIs (involving all three recommended components of diet, physical exercise and behaviour change) or their carers or the healthcare practitioners involved in the delivery of such interventions to adults with intellectual disabilities.
2. Peer-reviewed full journal articles.
3. Studies were included from any country, if they were published in full and in English.
4. All types of primary research study.

Studies were not included if they:

1. Were research protocols with no published findings.
2. Involved weight management in adults where obesity was attributed to specific genetic syndromes.
3. Involved drug treatment or surgery.
4. Involved Special Olympic athletes.

2.3 | Data extraction

Data for the following characteristics were extracted:

1. Study detail (author, year of publication, country of origin, setting and study type).
2. Staff delivering the intervention (professions).
3. Type of intervention (description, duration, follow-up).

4. Participants characteristics (age, gender, sample size, record of weight status, record of the level of intellectual disability, e.g., mild, moderate, profound or severe).
5. Outcome measures (e.g., weight and BMI change).
6. Information on if and how interventions were tailored.
7. Findings.

2.4 | Quality appraisal

A checklist was developed to assess the quality of identified studies. The checklist was adapted from the Critical Appraisal Skills Programme (CASP), a critical appraisal framework for use with qualitative studies (www.casp-uk.net, accessed 10.09.2015); Walsh & Downe, 2006), and the CONSORT checklist for assessing the quality of controlled trials (CONSORT critical appraisal tool, www.consort-statement.org, accessed 09.02.2016). The quality assessment was undertaken by the lead author and findings discussed with two other researchers with experience of review methodology. The critical appraisal of studies considered issues such as the appropriateness of the study's design to the study's research objective, the risk of bias (including selection bias, allocation bias, detection bias, data collection methods, attrition, statistical analysis, integrity of the intervention and reporting bias), the quality of reporting, generalizability and replicability (based on the description of the intervention). Studies that were critically appraised were rated as either strong, moderate or weak.

2.5 | Synthesis

There was diversity between the study designs, the types of interventions described and the outcomes reported. This precluded a formal systematic review or meta-analysis. The results of the review are therefore presented in a narrative format.

3 | RESULTS

On initial screening of titles and abstracts, 120 articles appeared to meet the inclusion criteria. Full-text papers were obtained for 119 of the 120 articles. The full-text paper for one of these 120 articles was not available (Beeken et al., 2015), and it transpired from follow-up contact made with the practitioners involved in this study's (Shape-Up) intervention that this was a general healthy eating advice and training programme. It was not a multicomponent weight management intervention (comprising diet, exercise and behaviour change components); 95 of the 119 full-text papers' studies were excluded because they were not MCIs either. A further 12 full-text papers were identified by checking references of identified articles, citation searches, searches of key authors and hand-searching journals and grey literature. Thirty-six full-text papers were assessed; 31 of the 36 full-text articles assessed were excluded because the interventions were either health promotion interventions (10 articles), behaviour and/or educational interventions (8 articles), physical only

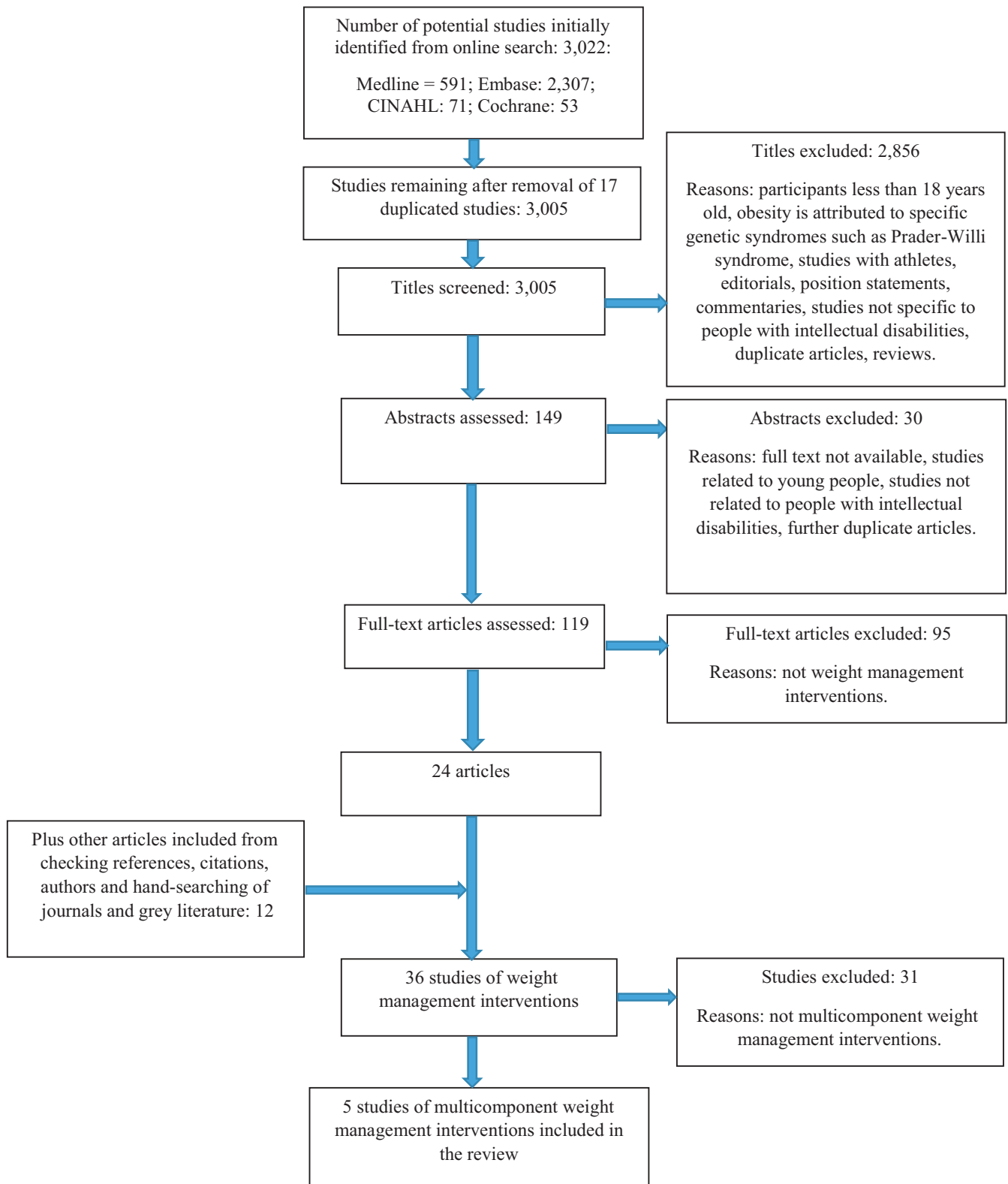


FIGURE 1 Flow chart illustrating the literature search strategy

interventions (8 articles), or diet-only or diet and physical activity only interventions (3 articles). There was insufficient information provided regarding the actual components of the studies' interventions in two of the 31 studies, and it was therefore not clear whether they were studies involving MCIs.

Five studies met the eligibility criteria for inclusion in the review and these all included diet, exercise and behaviour change components (Bergstrom, Hagstromer, Hagberg, & Elinder, 2013; Melville et al., 2011; Spanos et al., 2013; Spanos, Hankey, Boyle, & Melville, 2014; Sundblom, Bergstrom, & Elinder, 2015). The study protocol for

TABLE 1 Excluded weight management intervention studies

Type of intervention	References
Health promotion	Aronow and Hahn (2005) Bazzano et al. (2009) Bradley (2005) Chapman, Craven, and Chadwick (2005) Chapman, Craven, and Chadwick (2008) Ewing, McDermott, Thomas-Koger, Whitner, and Pierce (2004) Marshall, McConkey, and Moore (2003) McDermott et al. (2012) Poyner (2008) Rimmer, Heller, Wang, and Valerio (2004)
Behaviour	Fisher (1986) Fox, Haniotes, and Rotatori (1984) Fox, Rosenberg, and Rotatori (1985) McCarran and Andrasik (1990)
Behaviour and education	Geller and Crowley (2009) Harris and Bloom (1984) Mann, Zhou, McDermott, and Poston (2006) Sailer, Miltenberger, Johnson, Zetocha, and Egemo-Helm (2006)
Diet-only	Jolly and Jamieson (1999)
Physical activity-only	Calders et al. (2011) King and Mace (1990) Mendonca, Pereira, and Fernhall (2011) Moss (2009) Oviedo, Guerra-Balic, Baynard, and Javierre (2014) Stanish, McCubbin, Draheim, and van der Mars (2001) Wu et al. (2010) Yen, Lin, Wu, and Hu (2012)
Diet and physical activity	Draheim, Williams, and McCubbin (2002) Saunders et al. (2011)
Unclear	Steele and Capehorn (2015) Thomas and Kerr (2011)

the cluster randomized controlled trial (RCT) (Bergstrom, Hagstromer, Hagberg & Elinder, 2013) identified by the review was also obtained and reviewed for further information about the study (Elinder, Bergstrom, Hagberg, Wihlman, & Hagstromer, 2010).

The process for selecting studies is illustrated in Figure 1. Table 1 provides a summary of the 31 excluded articles. Table 2 provides a summary of the five multicomponent weight management intervention studies included in this review.

The identified studies included a cluster RCT (Bergstrom, Hagstromer, Hagberg & Elinder, 2013), two quasi-experimental (pre- and post-test) intervention studies (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014) and two qualitative studies (Spanos et al., 2013; Sundblom, Bergstrom & Elinder, 2015).

All of the critically appraised studies were rated as strong. The studies provided clear rationales for the research, and this was contextualized by existing literature. Two of the studies were based on Social Cognitive Theory (Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Sundblom, Bergstrom & Elinder, 2015). The other studies followed recommended UK guidance relating to MCIs (Melville et al., 2011; Spanos et al., 2013; Spanos, Hankey, Boyle & Melville, 2014). The research designs in these studies were apparent, appropriate and consistent with the research intent and/or research objectives. Sample sizes were given in all of the studies, although it was unclear whether

steps were taken to try to reduce sampling bias in two studies (Melville et al., 2011; Sundblom, Bergstrom & Elinder, 2015). All of the studies provided detailed descriptions of the multicomponent intervention, which would enable replicability and transferability of the intervention. One identified cluster RCT (Bergstrom, Hagstromer, Hagberg & Elinder, 2013) followed the CONSORT checklist for the transparent reporting of trials (www.consort-statement.org/?o=1001). This included, for example, the use of a power calculation and measurement of intervention fidelity. The results of this study are therefore generalizable to similar contexts regarding participants and type of residences (Bergstrom, Hagstromer, Hagberg & Elinder, 2013).

The mean sample size of the intervention groups in the studies was 54 (range 17–130). Mixed gender groups were used in three studies (Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014), but the gender was not specified in the other study (Sundblom, Bergstrom & Elinder, 2015). Three studies included participants with mild or moderate intellectual disabilities (Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014), and two of these studies also included participants with severe or profound intellectual disabilities (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014). One study involved participants with intellectual disabilities who were taking part in a

TABLE 2 Studies included in the integrative review

Country	Setting	Type of study	Participants	Intervention components, theoretical basis and staff involved	Duration	Follow up	Outcomes assessed	Findings
Bergstrom, Hagstromer, Hagberg & Elinder, (2013)								
Sweden	Residential based setting 33 sites	Cluster randomized controlled trial (RCT)	N = 130 with mild or moderate intellectual disabilities (57% women and 43% men aged 20–66 years) 43% obese	Complex multi-component intervention based on Social Cognitive Theory (Bandura, 1986). Aimed to improve health behaviour (diet and physical exercise) of residents through personal factors, such as knowledge, skills, preferences, and self-efficacy among the residents as well as through improvements in their social and physical environment, which was dependent on the knowledge, skills, and work routines of the caregivers. The intervention included health ambassadors, a health course for residents and a study circle for carers.	12–16 months	No follow up after 16 months	Physical activity. Weight loss using body mass index (BMI). Waist circumference. Dietary quality. Life satisfaction.	Positive intervention effect was found on physical activity, with an average increase of 1,608 steps per day among participants in the intervention group. No significant effects were found on BMI.
Melville et al. (2011)								
UK	Residential based setting	Quasi-experimental (pre and post testing of an intervention)	N = 47 with mild, moderate, severe and profound intellectual disabilities. 59% females, 41% males. Mean age 48.3 years. 100% obese	Intervention (Take 5) based on recommendations for multi-component weight management interventions (NICE, 2014a). The intervention included a personalised dietary prescription producing a 600 kcal/2,510 kJ per day energy deficit; methods to support increased physical activity levels and the use of behavioural approaches to promote change in physical activity and dietary patterns. The intervention was delivered by a dietician and a sports medicine graduate to individual participants in their own homes using accessible resources. Carers were involved in supporting participants.	9 sessions each lasting up to 60 min, held every 2–3 weeks	24 weeks	Weight loss using BMI. Waist circumference. Levels of physical activity.	Of the 47 participants who completed the TAKE 5 multicomponent intervention, 17 (36%) lost 5% or more of their initial body weight.
Spanos et al. (2013)								
UK	Residential based setting	Qualitative	N = 24 carers (carers of people with intellectual disabilities participating in a multicomponent weight management intervention)	Qualitative study which explored the experiences of carers supporting adults with intellectual disabilities participating in a multi-component weight management intervention (Take 5) delivered by a dietician and a sports graduate. Take 5 components included energy deficit diet, methods to increase physical activity levels and behavioural change approaches. The intervention was based on UK recommended guidance for multi-component weight management interventions (NICE, 2014a).	6 months	None	Carers' views of an intervention.	This study identified barriers and facilitators experienced by carers during the process of supporting an individual with an intellectual disability to lose weight. These included the need for motivation, improved support and for adapted information and materials to improve communication.

(Continues)

TABLE 2 (Continued)

Country	Setting	Type of study	Participants	Intervention components, theoretical basis and staff involved	Duration	Follow up	Outcomes assessed	Findings
Spanos, Hankey, Boyle & Melville, (2014)								
UK	Residential based setting	Quasi-experimental (pre and post testing of an intervention)	N = 52 with mild, moderate and profound intellectual disabilities (61% females and 39% males). Median age 51 years and age range 26–73. 100% obese (BMI ≥ 30)	TAKE 5 intervention (described in Melville et al., 2011 above) for obese adults with intellectual disabilities. Delivered by researchers and dietitians.	9 sessions held over a 16 week period	None	Weight loss using BMI.	Compared the Glasgow and Clyde Weight Management Service's (GCWMS) multicomponent weight management intervention with TAKE 5 (a tailored version of GCWMS intervention for adults with intellectual disabilities). No significant differences found between the 2 groups in the amount of weight loss, change in BMI, success of achieving 5% clinically significant weight loss, and rate of weight loss across the 16 week intervention.
Sundblom, Bergstrom & Elinder (2015)								
Sweden	Residential based setting	Qualitative	N = 17 staff and managers	This qualitative study described the implementation process for a multicomponent intervention designed to improve the diet and physical activity of adults with intellectual disability, viewed from the perspectives of staff involved in the delivery of the intervention (health ambassadors, support staff and managers). The intervention was based on Social Cognitive Theory (Bandura, 1986) and consisted of three components: (i) a health course for residents, (ii) a health ambassador in each residence and (iii) a study circle for the staff in each residence.	12–16 months	None	The views of staff involved in the delivery of the intervention.	Findings highlighted the importance of motivation for change among managers, carers and participants.

TABLE 3 Summary of how multi-component weight management interventions in the identified studies were tailored for adults with intellectual disabilities

By using appropriate communication tools such as Talking Mats, photos, symbols, pictorial illustrations and food models/tools to simplify information, simple spoken/written communication, DVDs and the use of hand-outs appropriate for people with intellectual disabilities (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014).

Sessions delivered by health care professionals and clinical researchers (with experience of working with people with intellectual disabilities) (Melville et al., 2011; Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Spanos, Hankey, Boyle & Melville, 2014).

Sessions delivered on a personalised focused, one-to-one basis to participants in their own homes. (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014).

The presence and support of carers where appropriate (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014).

The incorporation of behavioural methods for problem solving, self-control, goal setting, emotional coping responses and maintaining motivation (Melville et al., 2011; Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Spanos, Hankey, Boyle & Melville, 2014).

The inclusion of physical activities that participants could undertake in their own home or in other familiar environments (Melville et al., 2011; Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Spanos, Hankey, Boyle & Melville, 2014).

Physical activities in keeping with the individual participant's own level of abilities (Melville et al., 2011; Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Spanos, Hankey, Boyle & Melville, 2014).

Training, peer-education, knowledge, health literacy and motivation techniques for participants, carers and staff (Melville et al., 2011; Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Spanos, Hankey, Boyle & Melville, 2014).

tailored version of an existing multicomponent weight management intervention and matched this with participants without intellectual disabilities taking part in the existing (non-tailored) weight management intervention (Spanos, Hankey, Boyle & Melville, 2014). No identified studies involved both participants with and without intellectual disabilities taking part in the same multicomponent weight management intervention.

In two studies, all of the participants were adults with intellectual disabilities who were obese (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014). One study sample comprised 43% of adults with intellectual disabilities who were obese with the remaining 57% of participants being either overweight, normal weight or underweight (Bergstrom, Hagstromer, Hagberg & Elinder, 2013). The other studies were concerned with the views and experiences of the carers of participants with intellectual disabilities or the healthcare practitioners involved in the delivery of interventions to this population group (Spanos et al., 2013; Sundblom, Bergstrom & Elinder, 2015).

Two studies (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014) included outcome measures for height, weight, BMI, waist circumference, physical activity (accelerometers), dietary and physical activity (questionnaire), and information was also collected on blood pressure, hypertension, heart disease, diabetes, arthritis, asthma and sleep apnoea. One study utilized semi-structured

interviews with carers involving questions related to carers' perceptions of weight loss, challenges faced whilst supporting participants to change diet and physical activity, and carers' perceptions of the intervention (Spanos et al., 2013). Two studies included outcome measures for physical activity (pedometry), BMI, waist circumference, dietary quality (photographs), satisfaction with life (quality of life scale) and work routine changes (Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Sundblom, Bergstrom & Elinder, 2015).

3.1 | What types of multicomponent weight management interventions are delivered to adults with intellectual disabilities?

Three UK studies examined a multicomponent weight management intervention entitled "TAKE 5" (Melville et al., 2011; Spanos et al., 2013; Spanos, Hankey, Boyle & Melville, 2014). The Take 5 intervention was an adaptation of the Glasgow and Clyde Weight Management Service's multicomponent weight management intervention designed for delivery to the general population and based on UK obesity and weight management guidance. The Take 5 intervention had been adapted for delivery to obese adults with intellectual disabilities and included sessions that incorporated a personalized energy deficit diet, physical activity advice and behavioural change techniques. Themes discussed in the initial weight loss sessions included:

The benefits of losing weight, motivation towards a healthy lifestyle, energy deficit diets, the importance of physical activity, principles of healthy eating, healthy ways to cook, emotions and overeating, disadvantages of eating out and takeaways, using behaviour change to alter "bad habits," coping with cravings, diet myths, an introduction to new ways of motivating participation in physical activity, relapse prevention and evaluating success.

Themes discussed in the weight management sessions included:

Individualised maintenance dietary planning, the importance of being active and adopting regular eating patterns, regular self-monitoring of weight and food intakes, barriers to healthy eating and physical activity, snacking, lapses, eating out/social activities, healthy menu planning and an overview of the principles of weight maintenance.

Two Swedish studies evaluated a complex multicomponent intervention for all adults with intellectual disabilities regardless of their weight (Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Sundblom, Bergstrom & Elinder, 2015). This intervention aimed to improve diet and exercise activity and targeted both carers and residents in community residences for people with intellectual disabilities. The intervention involved (i) appointment of a health ambassador in each community residence who attended network meetings with other health ambassadors from other residences, (ii) a study circle for carers,

and (iii) a health course for the residents. The intervention was aimed at strengthening knowledge and skills amongst participants and staff in a supportive environment and was based on Social Cognitive Theory (Bandura, 1986) according to which behaviour, personal factors and environmental influences all interact in a dynamic process.

3.2 | How are multicomponent interventions delivered to adults with intellectual disabilities, by whom and in what setting?

Different practitioners were involved in the delivery of the identified MCIs to adults with intellectual disabilities. These included dieticians and sports graduates ($n = 2$), health ambassadors, support staff and managers ($n = 2$), researchers and dieticians ($n = 1$). The studies' interventions took place in residential-based settings. The mean duration of the multicomponent interventions was 9 months (range 2–16 months).

3.3 | How are multicomponent weight management interventions tailored for adults with intellectual disabilities?

All of the MCIs described in the studies were tailored for delivery to adults with intellectual disabilities. Table 3 summarizes how the MCIs in the identified studies were tailored for adults with intellectual disabilities.

3.4 | Are multicomponent interventions effective in terms of achieving clinically significant weight loss in adults with intellectual disabilities who are obese?

Two studies included in the review reported clinically significant weight loss outcomes in adult participants with intellectual disabilities who were obese: Melville et al. (2011) reported that 36% of participants achieved a 5% weight loss with the TAKE 5 intervention. Spanos, Hankey, Boyle & Melville, (2014) reported that 41% of participants achieved a 5% weight loss with TAKE 5 compared to 37% in a comparison group of adults without intellectual disabilities who were obese.

3.5 | What are the views and experiences of participants, their carers and the healthcare practitioners involved in the delivery of multicomponent weight management interventions?

One study explored the views and experiences of 24 carers of participants with intellectual disabilities (Spanos et al., 2013) and another explored the views and experiences of 17 healthcare practitioners involved in the delivery of a multicomponent intervention to adults with intellectual disabilities (Sundblom, Bergstrom & Elinder, 2015). None of the identified studies explored the views and experiences of people with intellectual disabilities participating in the interventions. Common findings across these two studies were a lack of support for individuals with intellectual disabilities and poor communication as barriers to the implementation of the interventions. The role of supportive carers

was emphasized along with the need for motivation amongst all participants, carers and healthcare practitioners. The findings also emphasized the need for accessible resources to aid communication.

4 | DISCUSSION

This is the first integrative review of MCIs delivered to adults with intellectual disabilities. The review found a paucity of research in this field. Only five studies describing just two different tailored MCIs for adults with intellectual disabilities were identified. Only two of these studies reported clinically significant weight loss outcomes in participants with obesity (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014). The weight loss findings were associated with TAKE 5, a UK multicomponent weight management intervention, which was tailored for adults with intellectual disabilities who are obese. The personalized focused and themed sessions delivered by a healthcare practitioner (with experience of working with people with intellectual disabilities) on a one-to-one basis in an individual's home together with the involvement of motivated and supportive carers, participants and healthcare practitioners may be key factors in the reported effectiveness of the TAKE 5 tailored multicomponent intervention. However, TAKE 5 may not reflect current routine practice. It is not clear whether the implementation of such highly intensive, personalized one-to-one interventions is sustainable in routine practice following completion for trials of such interventions. In routine practice, healthcare practitioners may not have long-term access to the types of funding and other resources made available to researchers for clinical research trials. In routine practice, adults with intellectual disabilities who are obese may be referred to other types of weight management interventions; for example, diet-only or physical activity only interventions delivered in group settings by healthcare practitioners without experience of working with individuals who have intellectual disabilities.

Interestingly, one of the intervention studies reported finding no clinically significant differences in weight loss outcomes between participants with or without intellectual disabilities who are obese (Spanos, Hankey, Boyle & Melville, 2014). This suggests that a multicomponent weight management intervention may be equally effective in adults with and adults without intellectual disabilities who are obese. However, further controlled studies and longer-term studies are needed to confirm this one study's findings.

Future multicomponent weight management intervention studies need to provide clear descriptions of what an intervention actually comprises, its theoretical basis, its expected outcomes, how it is implemented, how it is monitored and how it is evaluated in line with MRC guidelines for complex interventions (Craig et al., 2008; Spanos, Hankey, Boyle & Melville, 2014; Melville et al., 2013; Moore et al., 2015). However, there are challenges involved in undertaking research in this field. For example, a researcher's choice of intervention may be constrained by issues such as sample recruitment, settings and resources available, and evaluation may take place whilst the intervention is being implemented, rather than starting beforehand (Craig

et al., 2008; Moore et al., 2015). Research has also mainly focused on the development and evaluation of weight management strategies, and there has been a lack of research to explore the longer-term effectiveness of weight management interventions that follow an initial weight loss phase (Spanos et al., 2013).

Weight loss outcomes alone are not sufficient to measure the effectiveness or acceptability of a multicomponent weight management intervention. However, this review identified only two qualitative studies which explored the views and experiences of carers or healthcare practitioners involved in the delivery of MCIs (Spanos et al., 2013; Sundblom, Bergstrom & Elinder, 2015). The review did not find any qualitative studies which explored the views and experiences of people with intellectual disabilities participating in MCIs. A greater emphasis on the views and experiences of the individuals concerned through qualitative research in this field may lead to a better understanding of barriers and facilitators to weight management, and to *why* and *how* interventions may or may not work. Such an understanding, in turn, may lead to the design and implementation of more acceptable and effective interventions for this population group.

4.1 | Studies' limitations

The samples used in the studies were heterogeneous, and it was therefore not possible to compare the studies' findings. Two studies limited their inclusion criteria to only include participants who were obese (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014). One study included 43% of obese participants, and the other 57% were either underweight, normal weight, overweight or underweight (Bergstrom, Hagstromer, Hagberg & Elinder, 2013). Three studies included participants with mild to moderate intellectual disabilities

(Bergstrom, Hagstromer, Hagberg & Elinder, 2013; Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014), and two of these three studies also included people with profound intellectual disabilities (Melville et al., 2011; Spanos, Hankey, Boyle & Melville, 2014). The other two studies explored the views and experiences of carers and healthcare practitioners involved in the delivery of an intervention (Spanos et al., 2013; Sundblom, Bergstrom & Elinder, 2015). None of the identified studies explored the views and experiences of adults with intellectual disabilities. These limitations raise queries as to whether all of the studies' intervention findings are generalizable to all adults with intellectual disabilities.

Some studies were excluded by this review (Table 1) because there was insufficient information provided regarding the actual components of the studies' interventions and it was not clear whether they were studies involving MCIs (comprising diet, physical exercise and behaviour change components).

4.2 | Limitations of this review

This review was limited to English language studies. There may be other relevant studies published in different languages. The review was also limited to studies involving adults with intellectual disabilities. There may be transferable evidence from studies involving children and young people with intellectual disabilities.

5 | CONCLUSIONS

This review has identified emerging evidence, which suggests that MCIs are being tailored for adults with intellectual disabilities who are

BOX 1 Suggested considerations for future research in this field

- Information on the theoretical underpinning for weight management interventions should be included in future published studies.
- Published studies to provide more detail regarding the actual components of the weight management interventions under investigation.
- Further studies should explore the organisational culture and resources that enable staff to implement interventions over time.
- Justification for sample sizes needs to be included in future studies, and the sampling and settings used in studies should reflect that people with intellectual disabilities are not a homogeneous group.
- Further controlled studies of multi-component weight management interventions including cluster-randomised designs—based on MRC guidelines for complex interventions and CONSORT guidance for trials.
- Systematic reviews of multi-component weight management interventions for all adults who are obese (including adults from different population groups).
- Qualitative studies seeking out the views and experiences of participants, their carers (and or support workers) and service providers to improve our understanding of the barriers and facilitators to weight management.
- Research to explore the longer-term effectiveness of multi-component weight management interventions for different population groups.
- A range of outcome measures (e.g. body mass index, waist circumference, dietary quality, physical activity levels, and satisfaction with life) may be needed in future intervention studies.
- Any unintended consequences of an intervention should be reported in future studies.
- An intervention may need to be adapted during implementation to suit local settings and a description of any such adaptation should be described in the study's findings.

obese, and that such tailored interventions may be effective for this population group, but there were relatively few studies identified and these studies were methodologically different and used different samples. Also, there was a lack of qualitative research involving people with intellectual disabilities to explore their views and experiences of the MCI. Therefore, it is not possible to make any conclusive recommendations about such interventions and how they may be tailored for adults with intellectual disabilities. Further controlled studies (with a qualitative element) based on MRC guidelines and recommendations for complex interventions are justified in this field. However, given the high prevalence of obesity and the associated health-related risks and the need for interventions in this population group, and given that the risks associated with these interventions are low, then healthcare providers and practitioners may wish to consider findings from the emerging studies to help tailor existing multicomponent weight interventions for this population group.

Responding to obesity and obesity-related health risks in individuals with intellectual disabilities should be seen as an important health inequality issue by healthcare policymakers, service commissioners, providers and practitioners. This review suggests that UK obesity and weight management policy and guidelines may be failing to fully address the needs of adults with intellectual disabilities who are obese or overweight. There is also an identified lack of evidence-based research in this field. These gaps may contribute to inequalities around access to interventions and outcomes experienced by this population group. This review's findings imply that UK policy and guidance on obesity and weight management needs to be reviewed to inform practice for healthcare practitioners involved in obesity and weight management for adults with intellectual disabilities. This review also suggests some considerations for future research in this field. These are summarized in Box 1.

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CONFLICT OF INTEREST

None.

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APPENDIX 1

Search Strategy

1. exp Learning Disorders/or exp Intellectual Disability/
2. learning disabilities.mp.
3. intellectual disabilities.mp.
4. mental retardation.mp.
5. mental retardation/
6. mentally disabled persons.mp. or exp Mentally Disabled Persons/
7. developmental disabilities/
8. obesity.mp. or exp Obesity/
9. overweight.mp. or exp Overweight/
10. underweight.mp. or exp Thinness/
11. weight loss.mp. or exp Weight Loss/
12. weight gain.mp. or exp Weight Gain/
13. diet/
14. Nutrition Therapy/or nutrition.mp.
15. physical activity.mp.
16. lifestyle.mp. or exp Life Style/

17. exp Exercise/
18. exp Body Mass Index/or exp Body Weight/or weight management.mp. or exp Food Habits/or exp Hypertension/
19. exp Behavior Therapy/or exp Health Knowledge, Attitudes, Practice/or behaviour change.mp. or exp Health Promotion/
20. health education.mp. or exp Health Education/
21. primary prevention.mp. or exp Primary Prevention/
22. 1 or 2 or 3 or 4 or 5 or 6 or 7
23. 8 or 9 or 10 or 11 or 12
24. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
25. 22 and 23 and 24
26. limit 25 to (English language and humans and all adult)

KEY

/ = Mesh—Medical subject heading

exp = explore subject heading

mp = multi-purpose (searches several fields at once)

Also searched the following word variations:

ti = title word search

ab = abstract word search

kw = key word search