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RESEARCH PAPER

Comparing the effectiveness of a multi-component weight loss intervention in adults with and without intellectual disabilities

D. Spanos,* C. Hankey,* S. Boyle† & C. Melville*

*College of Medical Veterinary and Life Sciences, University of Glasgow, Glasgow, UK

†Glasgow and Clyde Weight Management Service, NHS Greater Glasgow and Clyde, Glasgow, UK

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Correspondence

C. Melville, College of Medical Veterinary and Life Sciences, University of Glasgow, First Floor Admin Building, Mental Health & Wellbeing, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, UK.

Tel.: +44 (0) 141 211 3878

Fax: +44 (0) 141 211 0356

E-mail: craig.melville@glasgow.ac.uk

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Abstract

Background: The prevalence of obesity in adults with intellectual disabilities (ID) is rising, although the evidence base for its treatment in this population group is minimal. Weight management interventions that are accessible to adults with ID will reduce the inequalities that they frequently experience in health services. This short report compared the effectiveness of weight management in those with and without ID who completed nine sessions of a multi-component weight management programme.

Methods: TAKE 5 is a 16-week multi-component weight management intervention for adults with ID and obesity [body mass index (BMI) ≥ 30 kg m⁻²]. This intervention is an adaption of the weight management programme provided by the Glasgow & Clyde Weight Management Service (GCWMS) for adults without ID and obesity (National Health Service based). Fifty-two participants of the TAKE 5 programme were individually matched by baseline characteristics (sex, age and BMI) with two participants without ID of the GCWMS programme. Comparisons in terms of weight and BMI change and rate of weight loss were made for those who attended all nine sessions.

Results: There were no significant differences between the groups in the amount of weight loss (median: -3.6 versus -3.8 kg, respectively, $P = 0.4$), change in BMI (median: -1.5 versus -1.4 kg m⁻², $P = 0.9$), success of achieving 5% weight loss (41.3% versus 36.8%, $P = 0.9$) and rate of weight loss across the 16-week intervention.

Conclusions: A multi-component weight loss intervention can be equally effective for adults with and without ID and obesity.

Introduction

People with intellectual disabilities (ID) have complex health needs, including epilepsy and mental-ill health (Cooper *et al.*, 2007). In comparison with people without ID, they are at increased risk of chronic health conditions (Yamaki, 2005). Obesity, a chronic disease that has reached epidemic dimensions globally (International Obesity Task Force, 2009), can be an important health issue for adults with ID (Rimmer & Yamaki, 2006). Obesity in adults with ID has increased the last over 20 years (Melville *et al.*, 2007) and has reached levels of prevalence

27% in UK and 33.6% in USA of the adult population (Stancliffe *et al.*, 2011). Contributing factors to high levels of obesity in adults with ID include poor dietary habits, and very high levels of physical inactivity (McGuire *et al.*, 2007; Matthews *et al.*, 2011).

Weight management interventions for adults with intellectual disabilities

Multi-component weight loss interventions have been advocated by current UK clinical guidelines for all adults without ID [National Institute for Health & Clinical

Excellence (NICE), 2006]. Such interventions incorporate a weight loss period of 3–6 months, followed by a weight maintenance intervention [Scottish Intercollegiate Guideline Network (SIGN), 2010]. The effectiveness of multi-component weight management services delivered in primary care in UK for adults without ID such as the Glasgow & Clyde Weight Management Service (GCWMS) and the Counterweight programme have been assessed and reported in studies (Counterweight Project Team, 2008; Morrison *et al.*, 2012). For example, evaluation of the GCWMS at 16 weeks showed that 35.5% of the service users lost 5 kg and an evaluation of the Counterweight programme at 6 months showed that 38.0% of the service users lost $\geq 5\%$ of their initial body weight.

There is no published audit assessing the clinical effectiveness of multi-component weight management services in UK for adults with ID that follow current national clinical guidelines for the general population (NICE, 2006; SIGN, 2010) and are delivered by health professionals. It has to be noted that an audit of the existing obesity services for adults with ID in Surrey has shown that the provision of weight management services in the community and in primary care for this population group is insufficient (Smallman *et al.*, 2011). However, Smallman *et al.* (2011) did not evaluate the effectiveness of the service provided.

Several studies have reported that there is lack of research examining the effectiveness of weight management interventions in adults with ID (Hamilton *et al.*, 2007; Jinks *et al.*, 2011). However, some evidence and the current national consensus statement by the British Dietetic Association (2011) suggest that making weight loss interventions accessible to people with ID by tailoring the intervention to their cognitive, communication and literacy abilities (Ziviani *et al.*, 2004) appears justified, and could reduce some of the health inequities that adults with ID frequently experience when using health services (Campbell & Martin, 2010).

The gap in provision of suitable methods and materials to enable people with ID to make healthy lifestyle choices is identified as a general problem [National Health Service (NHS) Health Scotland, 2004] and communication has been reported as a crucial barrier to the effective health care of people with ID (Krahn *et al.*, 2006). Individuals with ID have expressed the need for improved communication with health professionals, aiming to rely less on the carers who support them (Murphy, 2006).

In addition, the health and lifestyle differences between those with and without ID may affect how specific weight management programmes are implemented (e.g. individuals with ID and autism or individuals with Down's syndrome may take longer to accept a lifestyle change that is not part of their routine than those without ID) (Emerson & Baines, 2010; Mahy *et al.*, 2010). This means that proposed lifestyle changes such as challenging poor

dietary habits and pronounced inactivity may lead to a different pattern and rate of weight change in those with ID.

In practice, all of the above assertions suggest a comparison of the same weight loss intervention between two population groups with ID or without ID may show differences in the rate and amount of weight loss, possibly indicating the need for interventions of different durations than those currently advocated. Therefore, the present study aimed to determine whether a multi-component weight loss intervention adapted to the needs of adults with ID and obesity is as effective in this population group as it was in those without ID?

Materials and methods

Participants and matching

A 'matching' process was used to identify two participants who completed the GCWMS to match with each participant who had completed the TAKE 5 weight management programme adapted to meet the needs of those with ID. Matching was considered an ideal method for the comparison of the two interventions because it eliminates differences in baseline variables that would interfere with the outcome of weight loss (Bland & Altman, 1994). Therefore, each participant with mild, moderate and profound ID who completed TAKE 5 ($n = 52$) was taken as a potential index subject and matched with two participants free of ID who had completed the GCWMS ($n = 1421$) according to three baseline criteria: (i) sex; (ii) age within 1 year; and (iii) the same or body mass index (BMI) within $\pm 0.3 \text{ kg m}^{-2}$.

Both population groups were living in the area of Glasgow but the recruitment for the two interventions and the delivery of the two interventions took place in different periods. The GCWMS was developed in 2004 as an ongoing specialist service within the NHS. From 2004, data from all referrals are routinely collected, stored and used to audit the service (Morrison *et al.*, 2012). Recruitment and data collection for the TAKE 5 study was completed between 2009 and 2010 (Melville *et al.*, 2011).

Anthropometric measurements, height and weight, were made by trained health professionals from TAKE 5 and the GCWMS. Weight was measured at each session (every 2 weeks) and on completion of the intervention (16 weeks). The TAKE 5 study and the GCWMS collected information on hypertension, heart disease, diabetes, arthritis, asthma and sleep apnoea.

Interventions

Similarities

Both multi-component interventions (16-week duration) have been described in detail previously (Melville *et al.*,

2011; Morrison *et al.*, 2012). Both interventions comprised nine sessions that incorporated recommendations for the management of obesity in adults without ID (NICE, 2006; SIGN, 2010):

- A prescription of a personalised diet calculated to achieve an energy deficit of 2510 kJ day⁻¹ (600 kcal day⁻¹).
- Advice to improve physical activity (5 days of moderate physical activity 45–60 min).
- Behavioural approach techniques to facilitate changes in physical and dietary patterns.

Differences

Even though the core methodology for the two interventions was the same, TAKE 5 and the GCWMS had four main differences:

- TAKE 5 was delivered to participants on a one-to-one basis, whereas the GCWMS was delivered using group sessions.
- The researcher for TAKE 5 delivered the sessions at the house of each participant but the dietitians in GCWMS delivered all the group sessions at a clinical setting.
- In TAKE 5, participants were encouraged to have their carers present at the time of the sessions, and were asked to support participants where appropriate.
- The GCWMS offered 10 optional structured supervised activity classes that participants could attend but TAKE 5 did not.

Adaptations

The researcher delivering TAKE 5 intervention used appropriate methods and techniques such as augmentative communication ('Talking Mats') that aims to enable participants to express their choices during the intervention (Brewster, 2004) and used photos and food models, as well as fat and muscle models, to simplify information.

The GCWMS incorporated POWERPOINT (Microsoft Corp. Redmond, WA, USA) presentations at each group session. These were used in TAKE 5 as a basis to develop hand-outs suitable for adults with ID. The adaptations were made by a clinician experienced at working with adults with ID (DS) in consultation with other health professionals in the field. Adaptations to the written form were based on the recommendations of the Royal College of Nursing (2006).

Primary outcomes

The effectiveness of the two interventions at 16 weeks was compared in terms of:

- Total weight change (kg).
- Total weight change (%).
- Total BMI change (kg m⁻²).

Weight changes for both interventions were also compared in terms of expected weight loss using estimated energy requirements determined by Schofield equations (Schofield, 1985).

Statistical analysis

Data management and statistical analyses were performed using SPSS, version 18 (SPSS Inc., Chicago, IL, USA). Medical conditions were reported in absolute numbers and proportions (%). Analysis of normality using the Shapiro–Wilk test showed that no continuous variables were normally distributed; therefore weight and BMI changes were reported as median values and ranges. Between groups comparisons with respect to weight and BMI change were performed using the nonparametric Mann–Whitney test. $P < 0.05$ was considered statistically significant.

Results

Demographics

All TAKE 5 participants ($n = 52$), median (range) age 51 (26, 73) years and median (range) BMI 38.4 (31.7, 62.8) kg m⁻² were matched with 104 GCWMS participants without ID (Table 1). The entire sample ($n = 156$) comprised 61 males (39.1%) and 95 females (60.9%).

Health characteristics

The baseline health characteristics of both population groups are reported in Table 2. The incidence of heart disease and diabetes was significantly higher in GCWMS participants with arthritis, and asthma was significantly higher in TAKE 5 participants ($P < 0.05$). Both groups were similar with respect to the occurrence of high blood pressure and apnoea.

Attendance

Participants with ID had significantly higher attendance at all nine sessions than the participants with no ID (88.5% versus 18% $P < 0.05$). Some participants (36%)

Table 1 Demographic characteristics of participants with ID and matched participants with no ID at baseline (median, range)

Characteristics	ID ($n = 52$)		NID ($n = 104$)	
	Median	Range	Median	Range
Age (years)	51	26–73	51	28–73
Weight (kg)	96.5	67.6–185.8	107.5	77–187.6
Height (m)	1.54	1.31–1.88	1.65	1.37–1.86
BMI (kg m ⁻²)	38.4	31.7–62.8	37.8	31.5–63.4

BMI, body mass index; ID, participants with intellectual disabilities; NID, participants with no intellectual disabilities.

Characteristics	ID (<i>n</i> = 52)		NID (<i>n</i> = 104)		<i>P</i> *
	<i>n</i>	%	<i>n</i>	%	
Raised blood pressure	10	19.2	10	9.6	0.091
Heart disease	–	–	13	12.5	0.008**
Diabetes	4	7.7	22	21.2	0.034**
Arthritis	5	9.6	2	2.0	0.029**
Asthma	8	15.4	1	1.0	0.000**
Obstructive sleep apnoea	1	1.9	1	1.0	0.616

**P* < 0.05.

**Differences between the ID and NID groups.

ID, participants with intellectual disabilities; NID, participants with no intellectual disabilities.

Table 2 Comparison of health characteristics of the participants from both population groups at baseline (number of participants and percentages)

Outcome at 16 weeks	ID (<i>n</i> = 46)		NID (<i>n</i> = 19)		<i>P</i> *
	Median	Range	Median	Range	
Total weight change (kg)	–3.6	–18.5 to 3.0	–3.8	–23.5 to 3.2	0.4
Total weight change (%)	–3.8	–16.9 to 2.6	–3.6	–18.2 to 2.0	0.9
Total BMI change (kg m ^{–2})	–1.5	–5.9 to 1.0	–1.4	–7.9 to 1.1	0.9

*Differences between the ID and NID groups.

BMI, body mass index; ID, participants with intellectual disabilities; NID, participants with no intellectual disabilities.

Table 3 Comparison of anthropometric outcome measures at 16 weeks from baseline for nine sessions completers (median, range)

with no ID attended a total of 8 sessions; the rest attended five to seven sessions.

Comparison of weight change outcomes

This short report presents the results of the participants from both matched population groups that attended all nine sessions (ID: *n* = 46; no ID: *n* = 19). Participants of both interventions did not differ with respect to the absolute amount of weight lost (median: –3.6 versus –3.8 kg; *P* = 0.4) or the change in BMI (median: –1.5 versus –1.4 kg m^{–2}; *P* = 0.9) (Table 3).

The proportion of each group achieving 5% weight loss did not differ (38.5% for TAKE 5 and 36.5% for GCWMS participants; *P* = 0.9).

Rate of weight change at each session and at 16 weeks

Participants of both programmes did not differ with respect to the amount of weight lost at each session but failed to achieve the total weight loss predicted using estimated energy requirements (Table 4). Both groups of participants achieved significantly lower weight loss after session 4 than the expected weight loss (2 pounds week^{–1} or 0.9 kg week^{–1}) based on the energy deficit diet (*P* < 0.05) (Table 4).

Discussion

There is a worldwide concern about the lack of accessible health services suitable for the needs of adults with ID (World Health Organization, 2007). The assessment of the TAKE 5 weight management intervention provides new evidence that could be used in the development of accessible weight management services for adults with ID and lead to a clinically significant weight loss.

Key findings

The findings of the present study show that the two population groups in TAKE 5 and GCWMS had different health characteristics, with participants with ID having a lower incidence of diabetes and heart disease. This may reflect the differing referral criteria to each programme; general practitioners or hospital consultants refer patients to the GCWMS when they have a BMI over 30 kg m^{–2} and have other co-morbidities, or have a BMI over 35 kg m^{–2}.

By contrast to the participants without ID, most of the participants with ID attended all of the nine sessions of the weight loss intervention. Attendance in weight management is crucial and studies have shown that it is usually associated with greater weight losses (Moroshko

Table 4 Comparison of weight change from session 1 (median, range)

Sessions	ID (<i>n</i> = 46)		NID (<i>n</i> = 19)		Expected weight change	<i>P</i> *	<i>P</i> **
	Median	Range	Median	Range	Median		
2	-0.9	-2.9 to 1.5	-0.9	-8.9 to 1.8	-0.9	0.6	0.9
3	-1.8	-15.1 to 4.3	-1.7	-10.7 to 1.8	-1.8	0.7	0.9
4	-2.0	-15.5 to 4.5	-2.1	-12.3 to 2.6	-2.7	0.5	0.1
5	-2.6	-15.5 to 4.3	-2.8	-12.3 to 2.6	-3.6	0.5	0.02
6	-2.6	-18.1 to 5.3	-3.2	-17.5 to 2.8	-4.5	0.4	0.003
7	-2.9	-18.3 to 4.4	-3.25	-17.5 to 2.3	-5.4	0.3	0.000
8	-3.3	-18.9 to 3.4	-3.6	-17.5 to 3.2	-6.3	0.8	0.000
9	-3.6	-18.5 to 1.07	-3.8	-23.5 to 3.2	-7.2	0.9	0.000

*Differences between the ID and NID groups.

**Differences between median weight loss and expected weight loss.

ID, participants with intellectual disabilities; NID, participants with no intellectual disabilities.

et al., 2011; Stubbs *et al.*, 2012). It is possible that the one-to-one delivery of the sessions in TAKE 5 were crucial in ensuring maximal attendance of the participants with ID and ensuring a good level of understanding of the programme. Group-based interventions can sometimes offer attractive cost savings, often being at least as effective in terms of weight loss as one-to-one individual interventions, by requiring less health professional hours (Paul-Ebhohimhen & Avenell, 2009). However, we suggest that participants with ID would be less able to succeed at weight loss in a group treatment setting, and that the one-to-one delivery of TAKE 5 made the intervention accessible to the participants. An estimate of cost effectiveness is justified to warrant the use of the intervention in community settings.

Our comparison has shown that both the interventions appeared equally effective in terms of actual weight loss, success in achieving 5% weight loss and the rate of weight loss over the intervention period. These findings suggest that TAKE 5 in its current adapted form and multi-component structure overcame potential barriers such as communication, accessibility and difficulties to encourage behavioural change and effectively supported individuals with ID to lose weight.

However, both population groups did not achieve the expected weight loss at the end of weight loss intervention, which can be attributed to the difficulty in achieving weight loss. It is a process that requires sustained motivation, social support and time to improve dietary practices and physical activity (Byrne *et al.*, 2012; Teixeira *et al.*, 2012). Such variables cannot be taken into consideration within prediction equations used to calculate the expected weight loss.

Comparison with other studies

The effectiveness of a multi-component weight management intervention in people with and without ID has

been examined only by Ewing *et al.* (2004), who evaluated the impact of the Health Education Learning Programme (HELP) for people with mild to moderate ID (*n* = 97) and people without ID (*n* = 97). The 8-week programme was designed to educate participants to improve their physical activity levels, make healthier dietary choices and reduce their levels of stress. The study found a statistically significant difference in BMI reduction ($P < 0.001$) between the two groups, with more participants without ID (44.3%) decreasing BMI by ≥ 0.75 units than the participants without ID (18.5%). However, the study did not follow the recommendations for the use of a 3–6-month weight management intervention [NICE, 2006; SIGN, 2010; National Institutes of Health (NIH) National Heart, Lung, & Blood Institute (NHLBI) North American Association for the Study of Obesity (NAASO), 2000], did not use the matching process and, by contrast to the present study, did not show a total clinically significant weight reduction for both population groups.

Limitations

Even though the two populations in the present study were matched, several factors make the two population groups in this short report different. These include differences in social background (education, employment), which can impact on weight loss (Siu *et al.*, 2011). Individuals with ID are more susceptible to social exclusion in terms of education and employment than adults without ID (Emerson & Baines, 2011).

An important difference between the two interventions was the inclusion of the carers during the TAKE 5 intervention. The carers were present at the sessions to support participants in communication and understanding, although they also played an active role in

social support during weight management as close members of the participants providing encouragement (Spanos *et al.*, 2013). Even though this type of close and direct support was potentially missing from the participants treated by the GCWMS, group sessions such as those in GCWMS do provide some type of social support by including members who share the same weight problems and experiences, and also encourage each other (Verheijden *et al.*, 2005; Riedera and Ruderman, 2007).

An important difference between GCWMS and the TAKE 5 intervention is the inclusion of structured supervised physical activity classes for the participants without ID but not for the participants with ID. The TAKE 5 weight loss intervention did not include an exercise programme and only promoted the recommendations of national clinical guidelines (NICE, 2006; SIGN, 2010) on healthy physical activity levels and focused on reducing sedentary behaviour. The intervention included advice and information to encourage participants to attend appropriate activity classes at the day centre they attended. The researcher also advised the carers to support the participants to plan activities as part of the daily activity routines. Both interventions encouraged activity to be part of the goal setting process and part of the self-monitoring process. The effect of TAKE 5 with respect to physical activity successfully decreasing the sedentary behaviour of participants has been published elsewhere (Melville *et al.*, 2011), although the impact of the GCWMS has not been assessed.

However, regardless of the differences in the mode of delivery, group or one-to-one, supervised exercise classes or general information on physical activity, both the TAKE 5 and GCWMS programmes followed the same design principles, provided the same information and had the same planned outcomes.

Conclusions

The present study shows that TAKE 5, a multi-component weight loss intervention adapted for adults with ID and obesity, can be equally effective in this group as in adults without ID. TAKE 5 in its current form may challenge the disparities in the provision of weight management services for people with ID. However, a larger randomised controlled trial could provide more robust results and examine any potential cost-benefits.

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Conflict of interests, source of funding and authorship

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DS was responsible for the conception, design, analysis and interpretation of the data, and drafted the paper. CH was responsible for the conception, design, drafting and reviewing of the paper. DB provided data from the GCWMS and reviewed the paper. CM was responsible for the conception and design of the study, and drafting and reviewing the paper. All authors critically reviewed the manuscript and approved the final version submitted for publication.

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