



Providing weight management via the workplace

Journal:	<i>International Journal of Workplace Health Management</i>
Manuscript ID:	IJWHM-10-2014-0040.R2
Manuscript Type:	Research Paper
Keywords:	Workplace Health, Nutrition, Obesity, Weight Management

SCHOLARONE™
Manuscripts

View Only

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

1 **Structured Abstract**

2 *Purpose*

3 Assess the feasibility and benefits of providing weight management support via the
4 workplace.

5 *Design*

6 Quasi-experimental design using non-random assignment to a 12 week Slimming World
7 (SW) weight management programme, either within the workplace or at a regular community
8 group. Weight was recorded weekly and a 39-item questionnaire focussed on mental and
9 emotional health, self-esteem, dietary habits and physical activity habits administered at
10 baseline, 12 weeks, 6 and 12 months.

11 *Findings*

12 243 participants enrolled (workplace n=129, community n=114) with 138 completers (defined
13 as those weighing-in at baseline and attending at least once within the last 4 weeks;
14 workplace n=76, community n=62. Completers reported a mean weight change of -4.9kg ±
15 3.4 or -5.7% ± 3.8. Mental and emotional health scores increased (P<0.05) from baseline to
16 12 weeks. Self-worth scores increased (P<0.05) from baseline to 12 weeks, 6 months and
17 12 months. Healthy dietary habit scores increased and unhealthy dietary habit scores
18 decreased (P<0.05) from baseline to 12 weeks, 6 months and 12 months. Healthy physical
19 activity habit scores improved (P<0.05) from baseline to 12 weeks and 6 months. There
20 were no significant differences between groups.

21 *Research limitations*

22 Participant demographic was predominantly female (94%) aged 42.3 years, with only 13
23 men participating.

24 *Practical implications*

25 The results support the use of a 12 week SW weight management programme as a credible
26 option for employers wanting to support employees to achieve weight loss and improve
27 psycho-social health outcomes which could lead to improvements in quality of life and work
28 performance

29 *Originality/value*

30 Provides evidence for the delivery of weight management support via the workplace.

31
32 **Keywords:** Workplace Health, Weight Management, Obesity, Nutrition

33 **Article classification:** Research paper

34 Introduction

35 In England, 42% of men and 36% of women are overweight, while 26% of men and women
36 over 16 are classed as obese (HSCIC, 2012). Overweight and obesity are associated with
37 increased risks of a number of health conditions, including coronary heart disease, diabetes,
38 joint problems and high blood pressure (Wang *et al.* 2011). There are also considerable
39 psychological consequences to being overweight including feelings of low self-worth, low
40 self-esteem and low self-confidence.

42 The current UK government aims to achieve a sustained downward trend in the number of
43 people who are obese by 2020, through helping people to improve their diets, by eating
44 more fruit and vegetables and increasing levels of physical activity (DoH, 2011). Being
45 overweight and obese has an impact not only on an individual basis but also in the wider
46 community and economy. The estimated total cost to the economy due to loss of earnings
47 and cost of care related to obesity amounted to £16bn in 2007. This has the potential to rise
48 to £50bn by 2050 if obesity continues to increase at its current rate (Foresight, 2007).

50 As a result of this financial cost, employers, whether private or public, have been
51 recommended to serve their own economic interests by attempting to address obesity in the
52 workplace (Heinen & Darling, 2009). Workplace environment has been highlighted as a
53 potentially important setting for promoting health related opportunities to employees (DoH,
54 2011; Gortmaker *et al.*, 2011; AOMRC, 2013). Within the workplace overweight employees
55 are more likely to have higher absenteeism and presenteeism; encounter difficulties with
56 using equipment or seating; and be less able to cope with the physical demands of their
57 employment (HSE, 2012). In the UK, employers have been proactive in signing-up for the
58 national government's '*Responsibility Deal – Health at Work Network*' and have pledged to
59 improve the work environment for their employees (DoH, 2012).

61 Workplace weight management programmes involving education and counselling including
62 elements of dietary and physical activity behaviour have reported both short-term (Benedict
63 & Arterburn, 2008; Verweij *et al.*, 2011), and long-term (Scroggins *et al.*, 2011)
64 improvements in body weight. However, current literature reviewing specific dietary
65 modifications in the workplace question the overall long-term effectiveness of research in
66 this area (Geaney *et al.*, 2013, Anderson *et al.*, 2009, Mhurchu *et al.*, 2010; Meas *et al.*,
67 2012). As such, further exploration of workplace weight management programmes is
68 necessary to determine the efficacy of such programmes and to identify and develop best
69 practice (Quintiliani *et al.*, 2010).

70

71 The (East Midlands, UK) *Platform for Health and Wellbeing* is a network of private, public
72 and voluntary sector organisations working to improve health and reduce obesity. Member
73 organisations commit to undertaking actions to improve health and wellbeing of employees,
74 individuals and/or communities in the East Midlands area. Slimming World (SW), as a
75 member of East Midlands Platform for Health and Wellbeing, is the largest commercial
76 weight management organisation in the UK, based on group attendances, serving over
77 600,000 members each week. SW has also been operating referral schemes (*Slimming*
78 *World on Referral*) to the NHS since 2000, with its effectiveness appropriately reviewed in
79 the scientific literature (Lavin *et al.*, 2006; Stubbs *et al.*, 2011 and 2013). However, little is
80 known on the effectiveness of referral to community groups via the workplace. As a result a
81 pilot study was developed to assess the feasibility and benefits of providing weight
82 management support via the workplace.

83 **Methods**

84 *Design and intervention programme*

85 The study utilised a quasi-experimental design using non-random assignment to the regular
86 12 week SW weight management programme from two workplaces, one private and one
87 public which are part of the East Midlands *Platform for Health and Wellbeing* network. The
88 study offered employees a choice of attendance at either an in-house *workplace-based* SW
89 group or a traditional established *community-based* SW group for 12 weeks. Four workplace
90 groups were established (3 at lunchtime and 1 after work) for the purpose of this study (2
91 sites in each of the public and private sector organisations). Both the community and
92 workplace groups received the same SW programme run by trained SW consultants.

93
94 SW is a multicomponent behaviour change support programme meeting the UK's National
95 Institute of Health and Clinical Excellence 'best practice' criteria for weight management
96 services (NICE, 2014). This includes an eating plan based on energy density and satiety
97 with group based support to facilitate behaviour change in diet and activity. The programme
98 helps adults develop the lifestyle changes needed to reduce weight, prevent weight gain,
99 and support long-term weight maintenance. Facilitator-led peer group support structure is
100 used to share experiences and ideas, supporting participants in making healthy lifestyle
101 changes around food and activity to promote weight loss. Formal and detailed characteristics
102 have been published elsewhere (Lavin *et al.*, 2006).

104 *Participants and Protocol*

105 After receiving approval from the Faculty HLSS Research Committee at the University of
106 Lincoln, participants were recruited from two organisations located in the East Midlands of
107 England, UK, representing both the private sector and public sector. The study was
108 advertised to employees via posters and internal electronic communications. Interested
109 employees contacted their occupational health teams for further information, who
110 determined suitability for inclusion ($BMI \geq 25\text{kg/m}^2$) in the study and gained informed
111 consent. Eligible participants were offered attendance at either an 'in-house' *workplace-*
112 *based* or a traditional *community-based* SW group of their choice for 12 consecutive weeks.
113 Intervention places were accommodated on a first-come first-served basis, with target
114 numbers for both community and workplace groups set at 140.

115
116 Enrolment vouchers were supplied to participants covering the costs of normal group
117 membership for the 12 weeks for both community and workplace groups. An overview of the
118 process is shown in Figure 1. Initially, 284 employees showed interest in the programme.
119 After screening and baseline questionnaires, 278 were allocated to their desired group.

120 *Outcome Measures*

121 After the screening and referral process, baseline measurements (age (yrs), gender, height
122 (m), weight (kg) and Body Mass Index (kg/m^2)) were collected from each participant by a
123 trained SW consultant managing the designated group session at the first week of
124 attendance. At each subsequent attendance the participant's weight was assessed on the
125 same set of calibrated scales, recording weight and weight change to the nearest 200g
126 (Seca Ltd, Birmingham, England). Date of attendance, weight and weight change were
127 recorded from the scales electronically and submitted to a central database. Participants
128 who started the programme, weighing-in at baseline, and attended at least once within the
129 last 4 weeks (weeks 8-12) were classified as 'completers' of the programme.

131 *Questionnaire*

132 A self-reported online questionnaire was administered via email link at four different time
133 points: baseline (week 0) and immediately post-SW programme (12 weeks) with follow-up
134 intervals of 6 months and 12 months after the initial enrolment. All questionnaires
135 administered required the same set of questions to be completed. The 39-item questionnaire
136 focussed on four main assessment sections: mental and emotional health (8-items), self-
137 esteem (11-items, adapted from Rosenberg's Scale (Rosenberg, 1965)), dietary habits (14-
138 items; healthy habits and unhealthy habits) and physical activity habits (7-items).
139 Participants selected an appropriate response on a five-point Likert scale ranging from "do
140 not agree" to "agree very much". Likert scale scores were summarised to calculate an
141 overall section (and sub-section) score. The questionnaire sections had previously been
142 administered (South Derbyshire Health Authority, 1999 and Stubbs *et al.*, 2012) and were
143 adapted in line with the aims of this study.

145 *Data Analysis*

146 Data were analysed using SPSS for windows (SPSS Inc., Chicago, IL) and Microsoft Excel
147 (Microsoft Corp, Redmond, WA, USA). Results are represented as means (standard
148 deviation, SD) and percentages where relevant. Weight, weight change, BMI and attendance
149 data were subjected to parameter checks for outliers and anomalous data before statistical
150 analysis. The data was independently analysed by the University of Lincoln. Initially, group
151 characteristics were assessed using independent *t* tests. Participant weight (kg), and BMI
152 (kg/m^2) data were subjected to a factorial analysis-of-variance (ANOVA) having two levels
153 for *groups* (workplace or community, between-subjects factor) and two levels of *time*
154 (baseline and 12 weeks, within-subjects factor). The factorial ANOVA also determined
155 whether any changes (with all participants) in these outcome variables were due to being
156 enrolled on the SW programme (a general effect). Independent *t* tests analysed differences

1
2
3 157 with participant percentage weight change (%), total change (kg), BMI change (kg/m²) and
4 158 attendance between workplace and community-based groups at 12 weeks. The same
5
6 159 procedures as stated were also adopted to analyse data from the 'completers' of the
7
8 160 programme. Due to an unanticipated decline in the response rates (at time points 12 weeks,
9
10 161 6 months and 12 months), questionnaire data was only analysed with the completers of the
11
12 162 programme. Subsection scores were analysed by a series of *independent* (between
13
14 163 workplace and community groups) and *dependent t-tests* (within the entire participant
15
16 164 sample). Suitable alternative nonparametric test were deployed when assumptions were not
17
18 165 met for the parametric tests. Internal consistency of the questionnaire sections and sub
19
20 166 scales was measured by using Cronbach's alphas after administration. Statistical
21
22 167 significance was set at $P<0.05$.

For Review Only

168 Findings

169 *Participant Demographics*

170 From the original 284 expressions of interest, 243 employees enrolled on to the programme
171 (Workplace n=129, Community n=114). Following data cleansing, 11 workplace participants
172 and 1 community participant were removed from the analysis due to incomplete data sets
173 (Figure 1). In total 231 participant were recruited, 116 private sector (n=59 workplace and
174 n=57 community) and 115 public sector (n=59 workplace and n=56 community).

175
176 Participant baseline characteristics (age, height, weight and BMI) did not differ between
177 workplace and community groups (Table 1). Of the initial sample (n=231), 138 participants
178 (59.7%) completed the programme. Participants were categorised as 'completers'
179 (~~workplace n=76, community n=62~~) if they started the programme, weighed-in at baseline,
180 and attended at least once within the last 4 weeks (weeks 8-12); 'non-completers' were
181 categorised as those who started the programme, weighed-in at baseline and who did not
182 attended in the last 4 weeks. Participant characteristics of completers were also not
183 significantly different in baseline measures between workplace and community groups
184 (Table 2). Characteristics of the 'non-completers' of the programme (n=93) are also shown in
185 Table 2.

187 *Weight data: all enrolled completers and non-completers*

188 A mean weight change of -3.4kg (± 3.4), BMI change of -1.3kg/m^2 (± 1.3), percentage weight
189 change of -3.9% (± 3.8) with the average number of sessions attended at 7.2 (± 3.6) is
190 reported when analysing the whole sample (n=231, both workplace and community groups).
191 As a general effect, a significant decrease in weight ($87.5 \pm 17.8\text{kg}$ vs $84.2 \pm 17.9\text{kg}$) and
192 BMI ($32.4 \pm 6.5\text{ kg/m}^2$ vs $31.2 \pm 6.5\text{ kg/m}^2$) was reported ($P < 0.05$). There was no significant
193 effect between workplace and community groups. Weight ($F(1, 229) = 2.0, P > 0.05$) and BMI
194 ($F(1, 229) = 2.1, P > 0.05$) outcomes did not differ between workplace and community-based
195 participants. Similarly, there were no significant differences detected between workplace and
196 community groups with percentage weight change (%), total change (kg), BMI change
197 (kg/m^2) and attendance (all $P > 0.05$, Table 2).

199 *Weight data: completers of the programme*

200 Completers (of both workplace and community groups, n=138) reported a mean weight
201 change of -4.9kg (± 3.4), BMI change of -1.8kg/m^2 (± 1.2), percentage weight change of -
202 5.7% (± 3.8) with the average number of sessions attended at 9.8 (± 1.8). As a general effect
203 combined data from workplace and community groups), a significant difference between

204 start (87.7 ± 18.1 kg) and end weight (84.2 ± 18.2 kg) was detected ($P < 0.05$), with
205 reductions between starting BMI (32.6 ± 6.3 kg/m²) and end BMI (30.8 ± 6.2 kg/m²) also
206 reported ($P < 0.05$). There was no significant effect between workplace and community
207 groups. Workplace and community-based 'completers' did not differ with weight ($F(1, 136) =$
208 $0.47, P > 0.05$) and BMI ($F(1, 136) = 0.49, P > 0.05$) outcomes. No significant differences were
209 detected between workplace and community groups with percentage weight change (%),
210 total change (kg), BMI change (kg/m²) and attendance (all $P > 0.05$, Table 2).

211

212 *Questionnaire data*

213 The following sections and subscales reported Cronbach's alpha for completer participants:
214 Mental and emotional, 0.64, Self-worth, 0.78; Dietary habits - Healthy, 0.83; Dietary habits -
215 Unhealthy, 0.89; Physical activity habits - Healthy, 0.72; Physical Activity habits - Unhealthy,
216 0.70.

217

218 Questionnaire responses declined at each interval of administration: *Baseline* (n=138):
219 Workplace n=76, Community n=62; *12 weeks* (n=97 [70%]): Workplace n=55, Community
220 n=42; *6 months* (n=70 [50%]): Workplace n=40, Community n=30; *12 months* (n=45 [33%]):
221 Workplace n=25, Community n=20. Response rate on the sequence of questionnaires was
222 similar between both workplace and community groups, with no significant differences
223 detected between workplace and community groups on any of the subscale sections (Table
224 3).

225

226 When analysing the data for all 'completer' participants (Table 4), subscale section scores
227 differed between times of questionnaire administration. Mental and emotional health section
228 scores increased by 0.6 ($P < 0.05$) from baseline to 12 weeks (+0.6) and decreased 0.4
229 between 6 months to 12 months (-0.4). Self-worth section scores increased 2.9 from
230 baseline to 12 weeks (+2.9); baseline to 6 months (+2.0) and baseline to 12 months (both
231 +2.0). Healthy dietary habit section scores increased from baseline to 12 weeks (+3.5),
232 baseline to 6 months (+3.5) and baseline to 12 months (all +3.5). Unhealthy dietary habit
233 section scores decreased from baseline to 12 weeks (-4.6), baseline to 6 months (-4.5) and
234 baseline to 12 months (-3.5). Healthy physical activity habit section scores increased from
235 baseline to 12 weeks (+1.4) and baseline to 6 months (+0.9). A decrease of 1.1 was
236 reported between 12 weeks and 12 months (-1.1) and 0.6 between 6 months and 12 months
237 (-0.6) was also detected with the scores in this section. Unhealthy physical activity habit
238 section scores decreased 3.0 from baseline to 12 weeks (-3.0), and baseline to 6 months (-
239 3.0) and whilst baseline to 12 months decreased (-2.2).

240

1
2
3 241 Of those participants who completed the baseline and all follow up questionnaires (12
4 242 weeks, 6 and 12 month), 20-30% of participants reported that their health was affecting their
5
6 243 work (22%), social life (28.6%) and other daily activities (28.6%) before the trial. However
7
8 244 after 12 weeks of weight management support this decreased across all three areas; at 12
9
10 245 weeks only 15.5% reported that their health affected their work, 20.6% social life, and 14.4%
11
12 246 other daily activities. Further decreases were reported at 6 months (6.5% work, 9.8% social
13
14 247 life and 9.8% other activities) and 12 months (5.7% work, 10% social life and 11.4% other
15
16 248 activities) respectively.

17
18 250 Participants were also asked to indicate whether they would consider continuing the weight
19
20 251 loss programme after their initial 12 week trial by attending a local community group. 46.4%
21
22 252 of participants (n=112) expressed an intention to continue attending a Slimming World
23
24 253 community based group, of which 60 became paying members after 12 weeks (n=36
25
26 254 community and n=24 workplace). When investigating why participants did not continue to
27
28 255 attend after the intervention 27 participants felt that the weekly attendance fees were a
29
30 256 barrier to continue, however a number of the participants also felt that they had been
31
32 257 equipped to continue to lose weight on their own (n=23) with no difference between
33
34 258 workplace or community groups. Twelve of the workplace participants felt that they didn't
35
36 259 want or have time to attend a group outside of work, with a further 11 expressing time
37
38 260 pressures or being too busy to continue with the programme. In addition, participants
39
40 261 evaluated how easy they found the SW programme to follow day-to-day whilst at work. Over
41
42 262 half 52% of the participants (52%) reported the plan very easy or easy to follow, with 15%
43
44 263 reporting it difficult or very difficult to follow.

1
2
3 264 **Discussion**
4

5 265 The aim of the current investigation was to assess the feasibility and benefits of offering
6 266 weight management support via the workplace. The results demonstrate that there was
7 267 enthusiasm for a weight management service and employees offered membership to
8 268 Slimming World via the workplace achieved significant weight loss during the 12 week trial
9 269 period.

10 270 The average weight loss after 12 weeks of all participants (-3.9%, n=231) and of those
11 271 'completing' the intervention (-5.7, n=138) was comparable to audits of referred-NHS
12 272 members (-4.0%, n=34,271) and high attenders (-5.5%, n=19,907) (Stubbs *et al*, 2011). A
13 273 5% weight loss has been linked to a number of health benefits including, but not limited to:
14 274 reduced blood pressure; improved cholesterol levels; reduced risk of developing type 2
15 275 diabetes; improved blood sugar levels; and reduced risk for certain cancers (DOH, 2011).
16 276 This indicates that the weight loss intervention may have the potential to benefit wider health
17 277 problems.
18 278

19 279 In addition, the average attendance over the 12 week pilot intervention was similar between
20 280 the community (7.2 weeks) and the workplace (7.3 weeks) groups for all participants, with
21 281 'completers' recording slightly greater attendance (community 10.0 weeks; workplace 9.6
22 282 weeks). There was however no significant difference between groups. It was anticipated that
23 283 closed workplace groups may not perform as well as community groups because Slimming
24 284 World groups thrive with the regular addition of new members resulting in the provision of
25 285 fresh support, ideas, expertise, enthusiasm and motivation from members at all stages of
26 286 their weight loss journey. Without this, the closed group environment may have become
27 287 stale and unsustainable for the longer term. We anticipate that the duration of the study was
28 288 short enough that the workplace groups had not exhausted their ideas or become stale, and
29 289 had benefited from psychological and social support from their fellow members between
30 290 meetings within the workplace. However, it is unclear whether closed workplace groups
31 291 would have remained effective beyond the relatively short 12 week intervention.
32 292

33 293 Following the pilot intervention and as an addition to this study all participants were given the
34 294 option of continuing to gain support from Slimming World by attending an established
35 295 Slimming World community group, regardless of initial trial arm. From the 243 initial
36 296 participants, 46.4% (n=112) of participants stated that they intended to continue attending at
37 297 the end of the 12 week intervention, with 60 participants reporting they had attended post
38 298 intervention at 6 months. Future research should aim to include weight loss data at 6 and 12
39 299 months post intervention and could extend the workplace group programme from 12 weeks
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 300 or look at facilitation into an established community group for longer term support to
4 301 determine longer-term benefits.

5
6 302

7 303 *Questionnaire*

8
9 304 Participants gave self-reported accounts of behaviour change related to diet and physical
10 305 activity by answering questionnaires at baseline, 12 week (three), six and twelve months.
11 306 Over the 12 week study period participants reported a decrease in unhealthy eating and
12 307 inactivity habits (e.g. eating unhealthy snacks and watching a lot of TV) and an increase in
13 308 healthy eating and activity habits (e.g. cooking from scratch and going out for walks). These
14 309 behaviour changes were sustained over the follow-up period (6 and 12 months). This
15 310 suggests that the 12 week intervention encouraged sustainable healthy habit forming
16 311 behaviours which are likely to be beneficial for sustained weight loss and or maintenance of
17 312 weight loss.

18
19
20
21
22 313

23
24 314 In addition, measures of self-worth increased between baseline and 12 weeks, remaining
25 315 elevated compared to baseline throughout the follow-up. Mental and emotional health
26 316 improved significantly between baseline and 12 weeks and was sustained at 6 months.
27 317 However scores decreased between 6 and 12 months. This suggests that participation in
28 318 this intervention improves mental well-being for participants at least in the medium term,
29 319 extending to 6 months post participation, which could lead to improvements in work
30 320 performance and overall quality of life.

31
32
33
34
35
36 321 Participant feedback was also gathered regarding the ability of the workplace environment to
37 322 fully enable the SW programme to be followed whilst at work. Choices at meal times tended
38 323 to be restricted to the regular menu at the cafeteria on site or what was available at
39 324 convenience locations (e.g. vending machines, or local shops). Participants indicated that
40 325 limited free time during an already busy working week was a barrier for those attending
41 326 workplace groups that took place during the working day. Unfortunately, creating
42 327 environmental changes within the workplace to support healthier choices on site was beyond
43 328 the scope and purpose of this current investigation; however the limited feedback we did
44 329 receive highlighted the importance of gaining support from the workplace management in
45 330 order to facilitate a weight management change. Consideration of these types of contextual
46 331 factors has been suggested to enhance the design, delivery and evaluation of healthy eating
47 332 strategies in this setting (Quintiliani *et al.*, 2010) and modifications to the food environment
48 333 would support workplace employees to make healthier choices easier (Anderson *et al.*,
49 334 2009).

50
51
52
53
54
55
56
57 335
58
59
60

336

337 *Limitations*

338 Whilst the current investigation adds novel data to the debate of whether weight
339 management via the workplace is a suitable opportunity to address employee weight, there
340 are limitations when interpreting the study findings. Participant response rate with the
341 questionnaires dropped considerably from post-intervention (12 weeks) to 6 months (50%)
342 and 12 months (33%). Despite prompts to complete the questionnaires, the majority of
343 participants neglected this process at least once (n=93) resulting in a reduced number of
344 participants included within the analysis (participants were required to complete
345 questionnaires at all intervals to be included). Inevitably, the declining response rate caused
346 a further problem with data analysis with the use of multiple t-tests rather than the typical or
347 expected approach for this type of data set (e.g. a two-way analysis of variance). Indeed,
348 this issue has increased the chances of a Type 1 error regarding the results of the
349 questionnaire.

350

351 The current investigation collected weight data during the 12 week programme using the
352 standard Slimming World model of 'weekly weigh-ins' with trained Consultants. Unfortunately
353 it is unclear if participants continued their weight loss progress beyond the 12 week
354 intervention programme as weight was no longer recorded at weekly weigh-ins. Although
355 unreliable, self-reported weight was requested from the participants in a follow-up
356 correspondence, however the data was not complete and may have been inaccurate and
357 therefore has not been included in the study analysis. Although self-reported weight at
358 follow-up may not lead to an overestimation in weight loss (Jolly *et al.*, 2011), future studies
359 may wish to organise weigh-in sessions at fixed time points to allow accurate weight
360 measures to be recorded post 12 week intervention to determine the effects of the
361 intervention on weight change in the long term. Furthermore, future investigations may seek
362 to produce long-term dietary, health and cost-effective indicators which link explicitly to the
363 context of the workplace, in-terms of absenteeism and productivity (Geaney *et al.*, 2013).

364 In addition, participants were self-selecting to take part in this study, with the majority (94%)
365 female, aged 42.3 years with a joining BMI of 32.5kg/m². Only 13 men took part in this
366 investigation with an average age of 39.8 years and joining BMI of 32.1kg/m². Whilst this
367 intervention may have attracted a particular demographic that may not be representative of
368 the workforce or general population as a whole, it is representative of commercial weight
369 management organisations general membership (Slimming World; 95% female, 5% male).

370

1
2
3 371 **Conclusion**

4
5 372 The current study attempted to integrate a commercially available weight management
6 373 programme into the workplace for employees to attend by choice. This approach was as an
7 374 innovation over other methods which have been primarily considered in previous systematic
8 375 reviews in this area (Mhurchu *et al.*, 2010; Meas *et al.*, 2012; Geaney *et al.*, 2013) and to the
9 376 author's knowledge is the first such study in the UK to include a workplace Slimming World
10 377 weight management group.

11 378 The results illustrate that the Slimming World programme works effectively for the short term
12 379 (12 weeks) in both workplace and community groups (in terms of weight loss) when
13 380 employees are recruited from local organisations and given the opportunity to choose a
14 381 delivery option. The results indicate healthy behaviour changes occur, many of which are
15 382 maintained beyond the intervention period. The data suggests completers of the programme
16 383 report improvements in mental/emotional state, dietary habits, physical activity habits and
17 384 self-esteem after taking part in the intervention compared to baseline. However, it must be
18 385 acknowledged that questionnaire respondent rates reduced toward the end of the study
19 386 affecting the power of this interpretation. Whilst there was no significant difference between
20 387 groups in weight loss outcomes, the sustainability of closed workplace-groups beyond 12
21 388 weeks remains uncertain particularly as community groups thrive with the addition of new
22 389 members resulting in the provision of support and motivation from members at all stages of
23 390 their weight loss journey. Without this, the closed group environment may become stale and
24 391 unsustainable for the longer term. The study also highlights a number of potential barriers for
25 392 employees when attending a weight management programme in the workplace and these
26 393 may need to be considered when investigating the long term success of this type of
27 394 intervention.

28
29
30
31
32 395 The data from the current investigation supports the use of a 12 week Slimming World
33 396 weight management programme as a credible option for employers wanting to support
34 397 employees achieve weight loss and improve psycho-social health outcomes which could
35 398 lead to improvements in general wellbeing, overall quality of life and work performance.
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

399 **References**

400 Academy of Medical Royal Colleges (2013), Measuring Up: The Medical Professional
401 Prescription for the Nations Obesity Crisis, available at:
402 http://www.aomrc.org.uk/publications/statements/doc_view/9673-measuring-up.html

403 Anderson, L. M., Quinn, T. A., Glanz, K., Ramirez, G., Kahwati, L. C., Johnson, D. B.,
404 Buchanan, L., Archer, W.R., Chattopadhyay, S. Kalra, G. & Katz, D. L. (2009). The
405 effectiveness of worksite nutrition and physical activity interventions for controlling employee
406 overweight and obesity: a systematic review. *American Journal of Preventive Medicine*,
407 37(4), 340-357.

408 Benedict M.A. and Arterburn. D. (2008), Worksite-based weight loss programs: A systematic
409 review of recent literature. *American Journal of Health Promotion*, 22(6): 408-416.

410 Department of Health (2011), *Healthy Lives, Healthy People: A call to action on obesity in*
411 *England*.

412 Department of Health (2012), *Health at Work Network*, available at:
413 <https://responsibilitydeal.dh.gov.uk/category/healthatwork-network/>

414 Foresight. (2007) *Tackling Obesities: Future choices – project report*. London: The
415 Stationary Office.

416 Geaney, F., Kelly, C., Greiner, B. A., Harrington, J. M., Perry, I. J., & Beirne, P. (2013). The
417 effectiveness of workplace dietary modification interventions: A systematic review.
418 *Preventive Medicine*, 57(5): 438–447.

419 Gortmaker, S.L., Swinburn, B.A., Levy, D., Carter, R., Mabry, P.L., Finegood, D.T., Huang,
420 T., Marsh, T. and Moodie, M.L. (2011), Changing the future of obesity: science, policy, and
421 action. *The Lancet*, 378: 838-847.

422 Health and Safety Executive (2006), *HSE Horizon scanning intelligence group short report:*
423 *Obesity as a workplace issue*, available at: [http://www.hse.gov.uk/horizons/current-](http://www.hse.gov.uk/horizons/current-issues/socioeconomic/obesity.htm)
424 [issues/socioeconomic/obesity.htm](http://www.hse.gov.uk/horizons/current-issues/socioeconomic/obesity.htm)

425 Health and Social Care Information Centre (2012), *Statistics on obesity, physical activity and*
426 *diet: England 2012*, available at: [http://www.aso.org.uk/wp-](http://www.aso.org.uk/wp-content/uploads/downloads/2012/03/2012-Statistics-on-Obesity-Physical-Activity-and-Diet-England.pdf)
427 [content/uploads/downloads/2012/03/2012-Statistics-on-Obesity-Physical-Activity-and-Diet-](http://www.aso.org.uk/wp-content/uploads/downloads/2012/03/2012-Statistics-on-Obesity-Physical-Activity-and-Diet-England.pdf)
428 [England.pdf](http://www.aso.org.uk/wp-content/uploads/downloads/2012/03/2012-Statistics-on-Obesity-Physical-Activity-and-Diet-England.pdf)

- 1
2
3 429 Heinen, L., & Darling, H. (2009). Addressing obesity in the workplace: the role of employers.
4 430 *Milbank Quarterly*, 87(1), 101-122.
5
6
7 431 Jolly, K. Lewis, A., Beach, J., Denley, J., Adab, P., Deeks, J.J., Daley, A. and Aveyard, P.
8 432 (2011) Comparison of range of commercial or primary care led weight reduction
9 433 programmes with minimal intervention control for weight loss in obesity: Lighten Up
10 434 randomised controlled trial. *British Medical Journal*, 343.
11
12
13 435 Lavin, J. H., Avery, A., Whitehead, S. M., Rees, E., Parsons, J., Bagnall, T., Barth, J.H., &
14 436 Ruxton, C. H. S. (2006), Feasibility and benefits of implementing a Slimming on Referral
15 437 service in primary care using a commercial weight management partner. *Public Health*, 120
16 438 (9): 872-881.
17
18
19
20 439 Maes, L., Van Cauwenberghe, E., Van Lippevelde, W., Spittaels, H., De Pauw, E., Oppert, J.
21 440 M., Van Lenthe, F. J., Brug, J. and De Bourdeaudhuij, I. (2012). Effectiveness of workplace
22 441 interventions in Europe promoting healthy eating: a systematic review. *The European*
23 442 *Journal of Public Health*, 22(5), 677-683.
24
25
26
27 443 Mhurchu, C. N., Aston, L. M., & Jebb, S. A. (2010). Effects of worksite health promotion
28 444 interventions on employee diets: a systematic review. *BMC Public Health*, 10(1), 62.
29
30
31 445 National Institute of Health and Clinical Excellence (2014) Managing overweight and obesity
32 446 in adults – lifestyle weight management services.
33
34
35 447 Quintiliani, L., Poulsen, S., & Sorensen, G. (2010). Healthy eating strategies in the
36 448 workplace. *International Journal of Workplace Health Management*, 3(3), 182-196.
37
38
39 449 Rosenberg, M. (1965), *Society and the adolescent self-image*. Princeton, NJ: Princeton
40 450 University Press.
41
42
43 451 Scroggins, J.F., Sakumoto, K.N., Schaefer, K.S., Bascom, B., Robbins, D.J. and Whalen,
44 452 C.L. (2011), Short-term and long-term weight management results of a large employer-
45 453 sponsored wellness program. *Journal of Occupational & Environmental Medicine*. 53(11):
46 454 1215-1220
47
48
49 455 South Derbyshire Health Survey: Southern Derbyshire Health Authority (1999).
50
51
52 456 Sorensen, G., Linnan, L. and Hunt, M.K. (2004), Worksite-based research and initiatives to
53 457 increase fruit and vegetable consumption. *Preventive Medicine*, 39: S94-S100.
54
55
56
57
58
59
60

- 1
2
3 458 Stubbs, R. J., Pallister, C., Whybrow, S., Avery, A. and Lavin, J. (2011), Weight outcomes
4 459 audit for 34,271 adults referred to a primary care/commercial weight management
5 460 partnerships scheme. *Obesity Facts*, 4: 113-120.
6
7
8 461 Stubbs, R. J., Pallister, C., Avery, A., Allan, J. and Lavin, J. (2012), Weight, body mass index
9 462 and behaviours change in a commercially run lifestyle programme for young people. *Journal*
10 463 *of Human Nutrition and Dietetics*, 25: 161-166.
11
12
13 464 Stubbs, R. J., Brogelli, D. J., Barber, J., Pallister, C., Whybrow, S., Avery, A. and Lavin, J.
14 465 (2013), Service evaluation of weight outcomes as a function of initial BMI in 34,271 adults
15 466 referred to a primary care/commercial weight management partnership scheme. *BMC*
16 467 *Research Notes*, 6: 161-164
17
18
19
20 468 Verweij, L.M., Coffeng, J., van Mechelen, W. and Proper, K.I. (2011), Meta-analyses of
21 469 workplace physical activity and dietary behaviour interventions on weight outcomes. *Obesity*
22 470 *Reviews*. 12: 406-429
23
24
25
26 471 Wang, Y.C., McPherson, K., Marsh, T., Gortmaker, S.L. and Brown, M. (2011), Health and
27 472 economic burden of the projected obesity trends in the USA and the UK. *The Lancet*, 378:
28 473 815-825
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

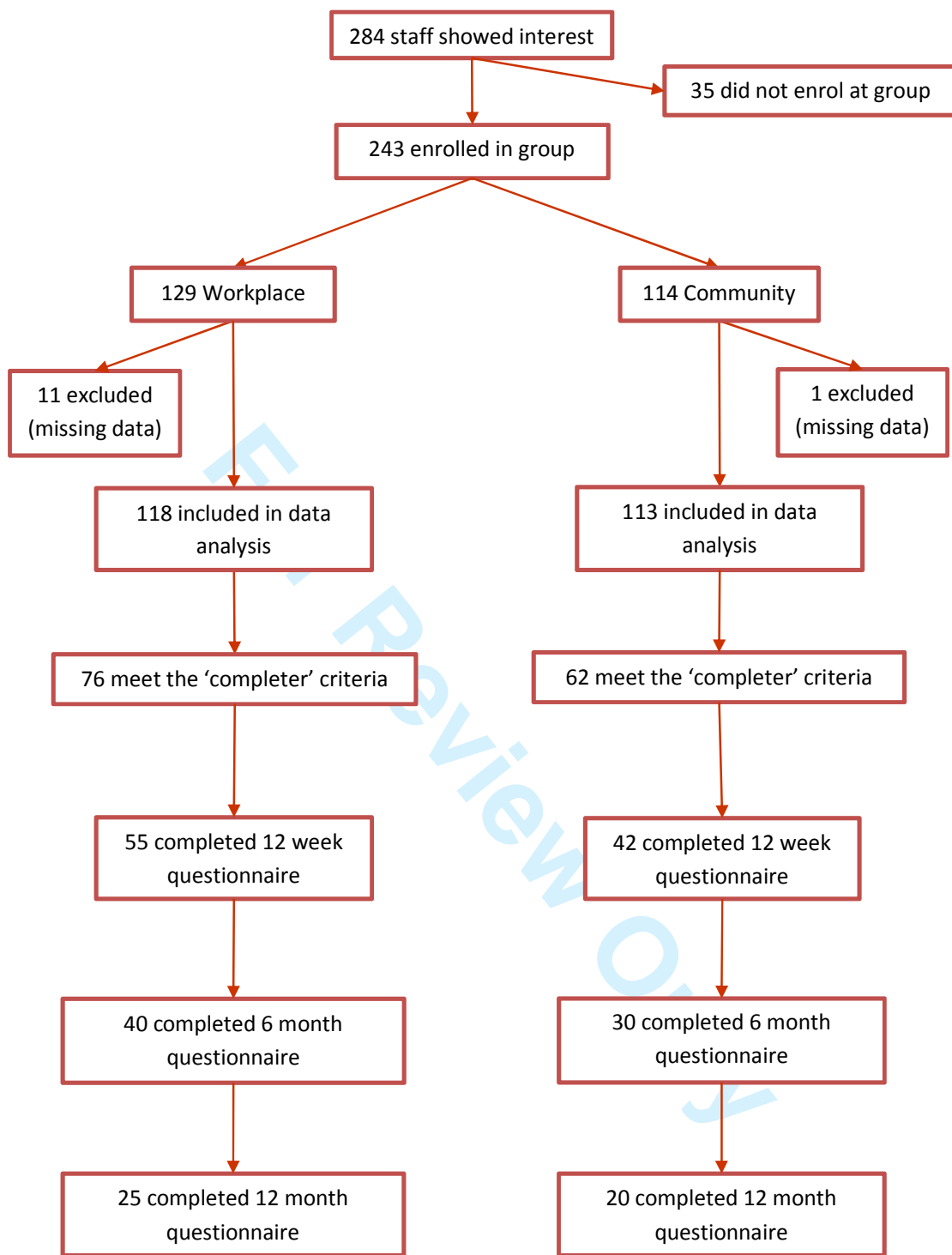


Figure 1: Overview of the study protocol. Participants were categorised as 'completers' if they started the programme, weighed-in at baseline, and attended at least once within the last 4 weeks (weeks 8-12).

Table 1: Employee descriptive and demographic data, including specific designation into workplace and community sites

	Public sector organisation referral		Private sector organisation referral		All Workplace (n=118)	All Community (n=113)	P Value
	Workplace (n=59)	Community (n=56)	Workplace (n=59)	Community (n=57)			
Males (n):	1	1	7	3	8	4	
Females (n):	58	55	52	54	110	109	
Age (yrs):	46.4 ± 9.6	45.6 ± 10.7	36.7 ± 9.4	41.0 ± 10.4	41.7 ± 10.6	42.6 ± 10.6	>0.05
Height (m):	1.63 ± 0.08	1.64 ± 0.07	1.65 ± 0.08	1.65 ± 0.07	1.64 ± 8.2	1.64 ± 7.1	>0.05
Start weight (kg):	87.5 ± 17.0	88.8 ± 18.2	87.4 ± 21.6	85.9 ± 13.4	87.2 ± 19.3	87.8 ± 16.2	>0.05
Start BMI (kg/m ²):	33.0 ± 6.8	33.1 ± 6.1	32.1 ± 8.0	33.0 ± 5.0	32.5 ± 7.3	32.4 ± 5.6	>0.05

Data are expressed as mean ± SD

Table 2: Descriptive data and weight outcomes for all participants enrolled on the 12 week Slimming World programme

	Workplace (n=118)	Community (n=113)	Difference (+/-)	Combined data (n=231)	Workplace 'completers' (n=76)	Community 'completers' (n=62)	Difference (+/-)	Combined 'completers' (n=138)	Combined 'non-completers' (n =93)
Age (yrs):	41.7 ± 10.6	42.6 ± 10.8	-0.9	42.2 ± 10.7	43.0 ± 10.5	45.0 ± 9.7	-2	43.9 ± 10.2	39.6 ± 11.0
Height (m):	1.64 ± 0.83	1.63 ± 0.71	0.01	1.64 ± 0.77	1.63 ± 0.81	1.65 ± 0.77	-2	1.64 ± 0.79	1.64 ± 7.3
Start Weight (kg):	87.3 ± 19.3	87.8 ± 16.2	-0.5	87.5 ± 17.8	87.3 ± 19.2	88.2 ± 16.9	-0.9	87.7 ± 18.1	87.2 ± 17.5
End Weight (kg):	83.6 ± 19.2	84.7 ± 16.5	-1.1	84.2 ± 17.9*	82.3 ± 19.0	83.6 ± 17.3	-1.3	82.8 ± 18.2*	86.1 ± 17.3
Total Weight change (kg):	-3.7 ± 3.2	-3.0 ± 3.7	0.7	-3.4 ± 3.4	-5.1 ± 2.9	-4.7 ± 4.0	0.4	-4.9 ± 3.4	-1.1 ± 1.9
Weight change (%)	-4.2 ± 3.7	-3.5 ± 3.9	0.7	-3.9 ± 3.8	-5.8 ± 3.4	-5.4 ± 4.0	0.7	-5.7 ± 3.7	-1.3 ± 2.1
Start BMI (kg/m ²):	32.5 ± 7.3	32.4 ± 5.6	0.1	32.4 ± 6.5	32.7 ± 7.0	32.3 ± 5.3	0.4	32.6 ± 6.3	32.2 ± 6.8
End BMI (kg/m ²):	31.1 ± 7.2	31.3 ± 5.6	-0.2	31.2 ± 6.5**	30.9 ± 7.0	30.6 ± 5.3	0.3	30.8 ± 6.2**	31.8 ± 6.7
BMI change (kg/m ²):	-1.4 ± 1.2	-1.1 ± 1.3	0.3	-1.3 ± 1.3	-1.9 ± 1.1	-1.8 ± 1.4	0.1	-1.8 ± 1.2	-0.4 ± 0.7
Attendance (weeks):	7.3 ± 3.5	7.2 ± 3.9	0.1	7.2 ± 3.6	9.6 ± 1.6	10.0 ± 1.9	-0.4	9.8 ± 1.8	3.5 ± 1.9

Data are expressed as mean ± SD.

*denotes a significant difference between the *Start* and *End weight* (kg) (*P* <0.05)

**denotes a significant difference between the *Start* and *End BMI* (kg/m²) (*P* <0.05)

Table 3: Group comparison: summarised questionnaire subscale data for 'completers' during the study

Questionnaire Subscales	Workplace completers				Community completers			
	Baseline (n=76)	12 weeks (n=55)	6 months (n=40)	12 months (n=25)	Baseline (n=62)	12 weeks (n=42)	6 months (n=30)	12 months (n=20)
Mental and emotional:	11.8 ± 2.1	12.3 ± 1.9	12.1 ± 2.4	11.9 ± 1.9	11.8 ± 2.2	12.1 ± 1.8	12.0 ± 1.9	11.5 ± 2.1
Self-worth:	29.0 ± 5.4	31.6 ± 5.8*	30.2 ± 5.7**	30.4 ± 6.4***	30.5 ± 5.7	32.1 ± 3.8	31.9 ± 4.4**	31.4 ± 5.1***
Dietary habits:								
<i>Healthy</i>	14.9 ± 3.5	19.1 ± 4.1*	18.3 ± 4.4**	18.4 ± 4.6***	15.5 ± 4.3	17.9 ± 5.2*	18.9 ± 4.8**	18.4 ± 4.6***
<i>Unhealthy</i>	19.9 ± 5.9	15.1 ± 4.1*	15.2 ± 4.8**	16.4 ± 5.5***	19.3 ± 5.2	14.7 ± 4.5*	14.7 ± 5.3**	15.5 ± 5.8***
Physical activity habits:								
<i>Healthy</i>	5.2 ± 2.0	6.7 ± 2.0*	6.1 ± 1.8**	5.6 ± 2.2†‡	4.9 ± 1.9	5.9 ± 2.2	5.5 ± 2.2	4.9 ± 1.7
<i>Unhealthy</i>	12.5 ± 5.0	9.1 ± 3.8*	9.1 ± 4.2**	10.2 ± 4.2**	13.1 ± 4.2	10.5 ± 4.1*	10.7 ± 4.1**	10.9 ± 3.6***

Data are expressed as mean ± SD

Cronbach's Alpha: Mental and emotional, 0.64; Self-worth, 0.78; Dietary habits - Healthy, 0.83; Dietary habits - Unhealthy, 0.89; Physical activity habits - Healthy, 0.72; Physical Activity habits - Unhealthy, 0.70

* denotes a significant difference between *baseline* to *12 weeks* ($P < 0.05$)

** denotes a significant difference from *baseline* to *6 months* ($P < 0.05$)

*** denotes a significant difference from *baseline* to *12 months* ($P < 0.05$)

† denotes a significant difference from *12 weeks* to *12 months* ($P < 0.05$)

‡ denotes a significant difference from *6 months* to *12 months* ($P < 0.05$)

Table 4: Combined data: summarised questionnaire and subscale data for ‘completers’ (both workplace and community) during the study.

Questionnaire Subscales	Baseline (n=138)	12 weeks (n=97)	6 months (n=70)	12 months (n=45)
Mental and emotional:	11.7 ± 2.0	12.3 ± 1.8*	12.1 ± 2.2	11.7 ± 2.0 [‡]
Self-worth:	28.9 ± 5.5	31.8 ± 5.8*	30.9 ± 5.2**	30.9 ± 5.8***
Dietary habits:				
<i>Healthy</i>	15.1 ± 3.9	18.6 ± 4.6*	18.6 ± 4.5**	18.6 ± 4.6***
<i>Unhealthy</i>	19.5 ± 5.4	14.9 ± 4.7*	15.0 ± 5.0**	16.0 ± 5.7***
Physical activity habits:				
<i>Healthy</i>	5.0 ± 1.8	6.4 ± 2.1*	5.9 ± 2.0**	5.3 ± 2.0 ^{†‡}
<i>Unhealthy</i>	12.7 ± 4.5	9.7 ± 4.0*	9.7 ± 4.2**	10.5 ± 3.9***

Data are expressed as mean ± SD
 Cronbach’s Alpha: Mental and emotional, 0.64, Self-worth, 0.78; Dietary habits - Healthy, 0.83; Dietary habits - Unhealthy, 0.89; Physical activity habits - Healthy, 0.72; Physical Activity habits - Unhealthy, 0.70
 * denotes a significant difference between *baseline* to *12 weeks* ($P < 0.05$)
 ** denotes a significant difference from *baseline* to *6 months* ($P < 0.05$)
 *** denotes a significant difference from *baseline* to *12 months* ($P < 0.05$)
 † denotes a significant difference from *12 weeks* to *12 months* ($P < 0.05$)
 ‡ denotes a significant difference from *6 months* to *12 months* ($P < 0.05$)