**An observational study of inequalities in the uptake of weight management interventions in a pragmatic trial**

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**ABSTRACT**

**Background:** Primary care referral to a commercial open-group behavioural weight loss programme is a cost effective intervention, but only 10% of patients receiving this intervention are male.

**Aim:** To explore whether observed biases in participation in these interventions reflect biases in uptake of the invitation to participate.

**Design and Setting:** Comparison of invited population and recruited participants in a randomised controlled trial of primary care referral to a commercial open-group behavioural weight loss programme in England.¹

**Results:** Seventeen practices provided data. They invited 13,949 patients and recruited 910 (6.5% of those invited). Women were twice as likely as men to enrol in the trial [OR (95%CI) =2.01 (1.75-2.32)]. However, the proportion of men was 3 times higher than seen in routine primary care referrals or similar trials that invited patients opportunistically. People from less deprived areas were more likely to enrol than those in more deprived areas [OR=1.77 (1.55-2.03)]. Older patients (≥40y) were more likely to enrol than younger patients [OR=1.60 (1.34-1.91)].

**Conclusion:** Men, younger people and those from more deprived areas were less likely to take up the invitation to participate in this trial. The gender bias was smaller than observed in routine practice, suggesting a substantial proportion of the inequity observed previously is a consequence of bias in the offer of intervention. This study suggests a simple way to overcome much of the gender bias is to write to patients who are overweight and offer referral. Uptake of the invitation to participate was lower in lower SES groups suggesting the need to preferentially offer referrals to this group to reduce health inequalities and for research to explore barriers to uptake.

**How this fits in**

Referral to a commercial open-group behavioural weight loss programme is a cost effective intervention for use in primary care settings, but only 10% of patients receiving this intervention through an NHS referral are male. The current study found that when all eligible patients in a practice were invited to participate in a trial offering this type of intervention, men, people from more deprived areas, and those aged under 40 years were less likely to participate but the proportion of men participating was 3 times that seen in practice and in other trials that recruited opportunistically. This suggests that a substantial proportion of the gender inequity observed in NHS referrals and many clinical trials is a consequence of practitioner bias in offer of intervention. A simple strategy to reduce gender inequality in participation in commercial open-group behavioural weight loss programme is to invite all eligible patients by letter.

**INTRODUCTION**

There is now good evidence that for people who are overweight, referral to a commercial open-group behavioural weight loss programme is a cost effective intervention for use in primary care (1). However, there remains a perception that these interventions only serve a subset of the population; namely middle class, middle aged, women(2). Demographic biases in participation in weight loss interventions offered through primary care may contribute to health inequalities but there has been little systematic study of how these biases arise.

The prevalence of obesity is similar in men and women(3) but men are under-represented in randomised controlled trials of behavioural weight management interventions(4) and are less likely to have received treatment for obesity in clinical practice.(5) In audits of commercial weight loss programmes accessed through primary care, ~90% of participants were women.(6,7) Data on the effect of social status is less clear. There is a social gradient in the prevalence of obesity, particularly in women, such that people who are of a lower socioeconomic status (SES) are more likely to be obese than those of a higher SES(3) and an audit of routine clinical data on obesity treatment in primary care suggests that patients from more deprived areas are more likely to receive treatment for obesity.(5) However, population-based survey data suggests that those from more deprived areas are less likely to use commercial open-group behavioural weight loss programmes than those from less deprived areas.(2) There are no data on the SES distribution of people participating in these programmes when a referral is offered by the primary care provider at no cost to the individual. Qualitative data suggest that when the GP offers referral to a commercial programme, this can increase the perceived legitimacy of the intervention for those that might ordinarily perceive these types of programme as “not for them”, and that the provision of a “free” weight management intervention can encourage participation in those who may not wish to spend family income on their own weight management.(8)

Given the diverse determinants of participation biases it is important to distinguish between inequalities in who is offered referral to a commercial weight loss programme, which may reflect differences in practitioner behaviour or aspects of the referral system, and inequalities in who accepts the offer, reflecting inter-individual differences among participants. For example, the gender bias may occur because men are less willing to participate in commercial open-group behavioural weight loss programmes,(9) because men are less likely to visit the practice and thus less likely to be identified as likely to benefit from treatment,(10) or because clinicians are less likely to offer this type of intervention to men. In a randomised controlled trial of a commercial open-group behavioural weight loss programmes where GPs and nurses recruited patients opportunistically, the recruited participants were 12% male(11) – a similar proportion to that seen in the audits of routine practice.(6,7) However in the Lighten Up trial, which recruited participants via a letter to all eligible patients, and which offered a variety of interventions including these commercial programmes, the proportion of male participants was more than double this figure (30%).(12) This comparison across studies suggests that there may be a bias in who is offered this type of weight management support in routine practice. But there are currently no data on the *uptake* of intervention by gender in response to an offer from the GP.

The analysis reported here uses data from the WRAP (Weight Loss Referrals for Adults in Primary Care) trial, which recruited participants via an invitation sent to all eligible patients (adults with Body Mass Index (BMI) ≥ 28kg/m2; identified by search of electronic records) in participating GP practices.(13) By comparing the demographic characteristics of participants who enrolled in the trial to the characteristics of the invited population, we can identify any demographic biases in which individuals took up the invitation from the GP to participate in this trial, and control for any bias in who was offered the opportunity to participate.

**METHOD**

**Design and Setting**

This study compares the invited and recruited populations of the WRAP trial. WRAP is a multi-centre randomised controlled trial evaluating the clinical and cost effectiveness of referral to a commercial group-based behavioural weight loss programme (Weight Watchers) for adults in England who are overweight or obese. Participants were recruited through 23 primary care practices in England who did not already have an existing contract with a commercial weight loss provider. Recruitment took place between October 2012 and February 2013.

**Invited Population**

Each practice searched their electronic register and identified patients who were eligible to participate in the trial (Age ≥18 years, BMI≥28kg/m2). GPs then excluded those who would be unsuitable for the study (e.g. patients who were violent/terminally ill/had a history of an eating disorder). Eligible patients were then sent a letter of invitation, signed by the GP, inviting them to participate in the trial. This letter explained that involvement in the trial was entirely separate to their usual GP care and could include referral to a commercial weight loss provider at no cost to the patient. Patients were asked to contact a member of the research team if they were interested in participating.

**Recruited Participants**

Patients contacted a member of the research team to express interest in the study and complete a telephone-screening. Exclusion criteria were: planned or current pregnancy in the next two years; previous or planned bariatric surgery; currently following a weight-loss programme (defined as a structured, prescribed and monitored programme and not a self-regulated diet); unable to speak English or with special communication needs that would make it difficult to participate in the interventions offered without additional support.

Patients who were eligible at the telephone screening attended a baseline visit at the research centre, where their eligibility was confirmed and they gave informed consent to participate in the study. The recruited population is defined as those eligible participants who were randomised to one of the trial arms.

**Outcome Measures**

On completion of the mail-out to patients, practices provided the research team with summary data on the gender, age, BMI and ethnicity of the patients who had been invited.

At the baseline appointment, information on the gender, age, and ethnicity was collected directly from participants using a questionnaire.

The postcode for each practice was used to calculate the index of multiple deprivation (IMD) using the English Indices of Deprivation 2010(14) as a marker of socioeconomic status (SES). The IMD ranks small geographical areas in the UK from the least deprived to the most deprived on seven indices: income, employment, health deprivation and disability, education, crime; barriers to housing and services, and living environment.

**Analysis**

Demographic differences between invited patients and recruited participants were explored separately for gender, SES, and age using frequency tables. Chi square and odds ratios (OR) were calculated for each comparison. GP practices did not provide sufficient data on the ethnicity and BMI of those invited to enable us to conduct a meaningful analysis of uptake by ethnicity or BMI.

**RESULTS**

Across the 23 practices participating in the trial, 1269 participants were recruited. Sixty eight percent of participants were female, 90% were white British, with a mean age of 53.2 years (SD 13.8) and a mean BMI of 34.5kg/m2 (SD 5.2) (Table 1).

Data on the gender and age of invited patients were provided by 17 practices (Table 2), which recruited 72% of the total study population. Practices not providing data reported problems with computer system changes or staff oversight in not recording necessary information. There were no significant differences between practices that provided data and those that did not in terms of gender, age, and baseline weight of recruited participants. Data reported here is from the 17 practices that provided data. These practices invited 13,949 patients and recruited 910 participants (6.5%). The invited population was 52% female. 10 practices had an IMD score above the national median and 7 practices had a score below the median.

**Recruitment by Gender**

Practices invited 6,785 men and 300 (4.4%) enrolled in the trial. They invited 7,164 women and 610 (8.5%) enrolled. There was a significant association between gender and enrolment [χ² (1) = 95.74; p<0.001], with women more likely than men to enrol in the trial in response to the invitation [OR (95%CI) =2.012 (1.75-2.32)].

**Recruitment by SES**

The 10 practices with an IMD score above the national median (those in more deprived areas) invited 7631 patients and recruited 376 participants (4.9%). The 7 practices with an IMD score below the national median invited 6,318 patients and recruited 534 participants (8.5%). There was a significant association between practice IMD and enrolment [χ² (1) = 61.62; p<0.001]. Patients from practices in a less deprived area were more likely to enrol in the trial than those from a more deprived area [OR (95%CI) = 1.77 (1.55-2.03)].

**Recruitment by Age**

Practices invited 10,565 patients aged ≥40 years were invited and 752 were recruited (7.0%). 3384 patients aged <40 years were invited and 155 were recruited (4.6%). There was a significant association between age and enrolment [χ² (1) = 27.15; p<0.001]. Patients over the age of 40 were more likely to participate than those under 40 [OR= 1.60 (1.34-1.91)].

**DISCUSSION**

**Summary**

In the current study, men, people from more deprived areas, and those aged under 40 years were less likely to enrol in this trial involving a commercial open-group behavioural weight loss programme relative to women, those from less deprived areas, and older patients. Although men were less likely than women to enrol in this trial, the proportion of men enrolling (32%) is three times that seen in audits of referral to commercial open-group behavioural weight loss programmes (~10%).(6,7) The proportion of men participating in the WRAP trial (32%) is similar to that seen in the Lighten Up trial (31%) that included referral to commercial behavioural weight loss programmes in their interventions and which also recruited by letter of invitation to all eligible patients suggesting this is a generalizable figure.(12) It is more than double that observed in a trial of the same commercial programme where the practitioner invited patients opportunistically (13%).(11) This suggests that a substantial proportion of the gender inequity observed in NHS referrals and many clinical trials is a consequence of practitioner bias in offer of intervention, and could be reduced by reducing this bias.

**Strengths and Limitations**

This unique data set allowed us to compare the demographic characteristics of people invited to participate in a commercial open-group behavioural weight loss programme with people who accepted that invitation. This enabled us to separate the issue of bias in who participates from bias in who is offered the opportunity to participate, and gives an important insight into potential strategies to reduce inequalities. The finding that male participation can be increased through eliminating bias in the offer of the invitation is drawn from cross-study comparisons and empirical confirmation using an experimental design may be warranted. This analysis is limited by the summary nature of data available from practices about the invited population and not all practices provided data. In particular, insufficient data was provided to allow a meaningful analysis of uptake by ethnicity or BMI and further research should explore whether there are biases in uptake of referrals for these groups. It is also important to consider that uptake in the context of trial participation might differ from uptake in routine clinical practice practice and some people might be more willing to take part in the intervention outside of the trial. For example, people who work full time may find it difficult to take time off work for study visits and this might differentially effect men and younger adults. While research staff attempt to be flexible and offer out of hours appointments, this can still be difficult. It is also not possible to say whether the biases observed here are specific to this type of intervention or common to all weight loss interventions.

 **Comparison with existing literature**

Biases in participation in weight loss interventions have previously been documented in clinical trials(4) and routine practice(5). Concerns over low male participation in weight loss interventions has led to the development of interventions that specifically target men, through links to sports clubs and a focus on masculinity(15), as well as the provision of men-only groups within existing programmes(12). There is growing evidence that some of these interventions can achieve weight loss, although there is not yet any evidence on whether they are more effective than existing interventions that are known to be effective in both men and women (or indeed whether these new interventions, often sport-related, targeted at men could also be effective for women)(16). Men who do participate in commercial weight loss interventions lose as much, if not more, weight than women. There is good reason to suppose that many men will find men-specific interventions more appealing and will be more likely to participate in these than in more traditional commercial behavioural weight loss programmes(17). However, not all men require this ‘masculine’ focus, and many men can and do lose weight through non-gender specific interventions.(16) An invitation from the GP may also legitimise attendance at a commercial open-group behavioural weight loss programme for some men who had previously viewed these as a female domain.(8) Providing alternative provision to the commercial behavioural weight loss programmes may be one way of closing the gender gap, but these data suggest that a significant proportion of bias in participation seems to emanate from who GPs think is suitable for referral to these services rather than from men themselves and their willingness to participate. Other examples of practitioner-bias have been seen in previous studies, including physicians more likely to refer overweight women for weight loss interventions than overweight men,(18) and setting larger weight loss goals for females who are obese than for men the same size.(19) Comparisons across studies suggest the gender bias in participation in commercial programmes can be considerably reduced by simply offering the intervention to everyone who is eligible.

The lower uptake rate in more deprived areas suggests some bias in the willingness or ability of patients of lower SES to participate in commercial open-group behavioural weight loss programmes. There is some evidence from survey data to suggest people of lower SES are less likely to use these types of programmes than people of higher SES.(2) However, we do not currently have data on the proportion of patients of lower SES participating in the NHS referral schemes to commercial providers, where the intervention cost is paid for by the NHS. Encouragingly, there is evidence from an audit of obesity treatment in primary care to suggest that primary care practitioners are more likely to offer some form of obesity treatment for patients of lower SES(5), perhaps in spite of the lower apparent likelihood of accepting the referral observed in this study.

Patients under the age of 40 were less likely to take up the offer to participate in this trial. This age bias is not evident in the audit of the commercial referral scheme, where the proportion of patients under 40 is similar to that in our invited population.(6) However, routine primary care data shows that older people are more likely to receive some form of treatment for obesity.(5) This could suggest that patients under 40 are less likely to take up the offer of obesity treatment, but are preferentially referred to commercial referral schemes which mitigates this bias. Further research is needed to explore age-related biases in access and uptake of treatment for obesity.

**Implications for research and practice**

British GPs are paid to maintain a register of patients who are obese, and our data suggest that comparable numbers of men and women have a recorded weight that identifies them as obese, which mirrors national prevalence data. Taken together, this suggests that GPs are equally likely to identify men and women as being overweight, but are less likely to offer men referral to a commercial weight management programme. This difference is important since referral to a commercial programme is the intervention with most evidence of effectiveness in primary care.(1) This study suggests that the gender bias in uptake of the intervention is not sufficient to explain previously observed biases in participation of these programmes. Instead, it suggests that a substantial proportion of the gender inequity observed in NHS referrals and many clinical trials is a consequence of practitioner bias in offer of intervention, rather than the acceptability of the intervention by the participant. This study suggests that a simple way to overcome much of the gender bias is to write to patients who are overweight and offer referral. There is a lower likelihood of referrals for obesity treatment to be accepted by lower SES groups, but some evidence that GPs may already be preferentially selecting lower SES groups for weight loss interventions. This seems appropriate given the greater burden of avoidable morbidity and mortality faced by these groups. It is important to explore the impact that changes in referral practices may have on participation in obesity treatment programmes.

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**Ethical Approval**

Ethical approval for this study was received from NRES Committee East of England - Cambridge East (12/EE/0363) and local approvals from NRES Committee North West - Liverpool Central (12/NW/0678) and NRES Committee South Central – Oxford 12/SC/0508. Local NHS Research and Development approvals were received for all participating practices

**Competing Interests**

ALA, SAJ, PA, and JCGH have received funding to their institutions from Weight Watchers and have given and received hospitality from providers of commercial weight loss services on a small number of occasions. PA and SAJ are conducting another publicly funded trial in which part of the intervention is delivered by and donated free by Slimming World and Rosemary Conley. Until January 2014, SAJ wrote a regular nutrition column for the Rosemary Conley Diet and Fitness magazine and received a fee.

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**Table 1: Baseline characteristics of all recruited participants (N=1269)**

|  |  |
| --- | --- |
|  | **Mean (SD)** |
| **Age (year)** | 53.2 (13.8) |
| **Weight (kg)** | 96.2 (17.4) |
| **Height (cm)** | 166.8 (9.1) |
| **BMI (kg/m2)** | 34.5 (5.2) |
|  | **N (%)** |
| **Gender** |  |
|  Female | 862 (68) |
|  Male | 407 (32) |
| **Ethnicity** |  |
| Asian/Asian British | 35 (2.8) |
| Black/Black British | 23 (1.8) |
| Mixed/ Multiple Ethnic Group | 15 (1.2) |
| White/White British | 1138 (89.7) |
| Other | 15 (1.2) |
| Not stated/Prefer not to say | 43 (3.4) |

**Table 2: Characteristics of invited and recruited populations for the 17 practices that provided data.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Invited (N)** | **Recruited****N (% of invited)** | **Odds Ratio****(95%CI)** |
| **Gender** |  |  |  |
| Male | 6785 | 300 (4.4) | - |
| Female | 7164 | 610 (8.5) | 2.01 (1.75-2.32) |
| **Practice IMD\*** |  |  |  |
| Above national median  | 7631 | 376 (4.9) | - |
| Below national median | 6318 | 534 (8.5) | 1.77 (1.55-2.03) |
| **Age** |  |  |  |
| <40 years | 3384 | 155 (4.6) | - |
| ≥40 years | 10565 | 752 (7%) | 1.60 (1.34-1.91) |

*\*Practice IMD = Index of multiple deprivation calculated using practice postcode. Higher IMD = more deprived location.*