Introduction

Obesity is a complex, multifaceted condition characterized by excess or abnormal deposition of body fat which may jeopardize an individual’s health [4, 5]. Obesity is the result of energy imbalance, which in turn is caused by interplay of many complex biological, psychological, sociocultural, environmental and economic factors [6]. To reflect amount of body fat, anthropometric measurements such as body mass index, waist circumference, waist hip ratio, WHO combined classification of disease risk; are measured using different methods [7]. The prevalence of obesity has been doubled since 1980 across the globe – from 312 million in 2004 to more than 1.4 billion obese adults in 2008 [8-10]. Almost all developed and developing countries (high income: low income) in the world are plagued by obesity epidemic, termed as globesity (2002:61) [10]. Although not identical,
terms obesity and overweight are often substituted for one another [11] in practice and the figures for both of them are often combined [12]; adding to the confusion and discrepancy in true estimates.

Obesity affects all ages and both genders; differences can be observed in the prevalence of obesity across and within continents, countries and states. There are regional differences in the prevalence of obesity within Europe [13]; number of overweight and obese individuals is increasing in England as compared to other European countries [14]. Estimates from a health survey for England shows that a quarter of adults; both men and women were obese in 2004. It has been predicted that about half of the adult men and more than a quarter of adult women would be obese by 2030 in UK [15] and this figure could rise up to 50% in 2050 for whole of the adult UK population as mentioned in UK Foresight report 'obesity system map' [16]. In contrast to England, Scotland has highest rates but one of the poorest records on male obesity amongst OECD countries. Around 42% of Scottish men aged 35-65 years are overweight (c.f. 31% women) and a further 28% are obese (c.f. 27% women) [3]. Whilst adult obesity levels overall are predicted to rise to 40% by 2030, a disproportionate increase is forecast in Scottish men [3].

Excess body weight is associated with poor health and a range of non-communicable diseases: Type 2 diabetes [17, 18], hypertension [17, 19], cardiovascular diseases [17, 20], stroke [21], osteoarthritis [22, 23], gall stones [24], benign prostatic hyperplasia [25], obstructive sleep apnoea [26, 27] and some cancers; adenocarcinoma of oesophagus and gastric cardia; endometrial, breast, and colon, for example [10, 17, 28, 29, 30] leading to a massive impact on public health and related health economics. A fair estimate of this massive burden can be estimated by the fact that NHS and special health boards had planned to spent an amount of £m 7,846.0- 8,623.0 on health alone between a period of 2008-2011[31].

Preventing obesity is a complex process. There are number of interventions and strategies to tackle overweight and obesity throughout the world, depending on country and region and target population [32]. In the UK, number of initiatives, for example Saving Lives: Our Healthier Nation, 1999 and Choosing Health: Making Healthier Lives Easier, 2004 have been implemented by joint efforts of profit and non profit organizations to help people lose weight [32]. Preventing obesity in Scotland is a key public health challenge. ‘Latest initiatives to address the problem in Scotland have included: The Scottish Government's Healthy Eating, Active Living: An action plan to improve diet, increase physical activity and tackle obesity [33], The Keep Well initiative [34], The Scottish Government's Route Map for tackling obesity [35], The Scottish Intercollegiate Guidelines Network (SIGN): national clinical guideline on obesity management [36]. The most important recent policy development is the publication of the Obesity Route Map Action Plan [37]. These policies are based on the 2007 Foresight Tackling Obesities Report; the report addressed evidence based causes of obesity in the UK’ [38].

Although a modest 5-10% weight loss maintained in the long term can significantly decrease health risk, few men engage with existing NHS and commercial weight loss
programmes, viewing them as mainly for women. Against this background, FFIT, a 12 week, evidence-based, gender-sensitised, weight loss, physical activity and healthy eating programme, was piloted in SPL clubs in September 2010. Over 350 men aged 35-65 years with a mean body mass index (BMI) of 34.5 kg/m$^2$ enrolled in FFIT. Three quarters completed the course and lost an average of 4.9% of their starting body weight. Aim of this research study is to investigate the experiences of men in the twelve months following their participation in FFIT and perceptions of reasons helping and/or hindering men maintain weight loss and other lifestyle changes that may significantly improve their current and future health.

**Methodology**

**Search strategy and sources**

The scope of the literature search was determined by the probable applicability of research papers to the specific context of long term weight loss maintenance. Compared to short term success, minimal literature is available on the factors associated with long term weight loss maintenance. Therefore, a visionary search strategy was needed to identify relevant studies over diverse fields, including those neither published in peer-reviewed journals nor addressed in highly recognized online databases in order to gain access to the relevant literature, to maximize support and gain evidence for the proposed study.

Search was carried out for the articles related to a comparatively narrow range of factors associated with long term weight loss maintenance, corresponding to what was observed in FFIT program. The PICO framework [39, 40] was used to design inclusion and exclusion criteria for the literature review (refer table 1). Philosophy and opinion based papers were not well-thought-out to be of interest.

The Literature search was carried out using a number of online databases and search engines, academic and organizational papers on the topic of obesity and weight loss maintenance between November - December 2011. These searches were updated in July 2012. Searches were restricted to dates (1991-2012; this time period had been chosen as the obesity prevalence is considered to be more conspicuous during past 20 years), language (English) and document type.

To balance specificity and sensitivity of the search terms and fields, iterative refinements were carried out. The initial strategy was to include the term obes* and adults which generated a range of articles too wide to go further with, results were mainly focussing on short term weight loss. Filters were applied for humans and years of publication which narrowed down the search, search was further filtered by adding male but it was too restrictive as not many searches were carried out in past exclusively for men. Relevant articles were sought by using the term weight maintenance and adults. Further search was carried out using the terms (barriers) and (facilitators) and (weight maintenance), directly focussing on the research question (refer table 2). Weight loss maintenance programs in group settings as well as maintenance at individual level were included in literature search, permitting investigation of the relative influence of barriers and facilitators on weight loss maintenance with and without ongoing peer support.
To discover grey literature (documents published by organizations, rather than academic journal articles or books), Google Scholar was used to sought organizational websites related to health and obesity. Citation searches and author searches were carried out on a few included articles as a final check against missing key reports. At the end, all full text articles were read and those considered to have met the proposed criteria were included in this review. Twenty one articles of relevance were found.

**Included articles**

The review included nine qualitative studies [32, 41-48], five quantitative studies [49-53], five reviews [54-58] and two randomized control trials [59, 60]. These studies included a mix of peer reviewed papers published in academic journals and reports and were critically appraised, using appropriate appraisal tools.

1. **Qualitative studies**

The quality of these studies was evaluated using CASP tool [61] to avoid the risk of poorly found research evidence on these studies. The methodology followed in the articles ranged from semi-structured interviews to focus group discussions and to qualitative surveys conducted in different settings among different population groups in different countries, meeting our inclusion criteria. The studies provide evidence that emotional factors, work commitments, family issues and lack of will power emerged as barriers; whereas stimuli such as social support, improved eating behaviours, increased levels of physical activity and self motivation emerged as facilitators to long term weight loss maintenance.

2. **Quantitative studies**

Due to the variety of study designs encountered in literature review, a subjective evaluation of quality is given to each study as good, fair or poor. The quality of these studies was evaluated using CASP tool [61] to avoid the risk of poorly found research evidence on these studies. The methodology followed in the articles ranged from telephonic interviews to case control and longitudinal surveys conducted in different settings among different population groups in different countries, meeting our inclusion criteria. Various statistical analyses tests were used in the studies. The studies add to the evidence base of existing knowledge about weight loss maintenance. Successful weight loss maintenance seemed to be related to increased levels of physical activity, emotional support from family and friends and decreased intake of energy dense foods. Findings further suggest that those adults who were sedentary or not meeting public health recommendations for physical activity had a higher probability of weight regain than those who were not [53].

3. **Reviews**

This section includes non-systematic literature reviews published on organizational websites, systematic reviews and meta-ethnography. Systematic reviews of high-quality randomized controlled trials were included. On the bases of research aims, search strategy, results and input to knowledge; a subjective evaluation of quality was carried out to each study as good, fair or poor. In contrast to earlier studies, these studies provide high quality evidence and recognize psychological factors, socio-cultural factors,
environmental factors, self-perception and body image, stigmatizing experiences related to excess body weight and experiences of weight management programs, improvements in diet and physical activity levels as the key factors to long term weight loss maintenance.

4. Randomized control trials

This section included two articles obtained from Cochrane Library. Randomization involved random allocation of subjects into groups, thereby minimizing the risk of bias and confounding while allocating treatments to different groups [62], thereby, providing high quality evidence. The studies provided high quality evidence and a causal relationship between improved eating behaviour and weight loss maintenance. Relationship between dietary improvement and weight loss maintenance in long term was also explored in these studies.

Analysis

The original data were collected by the primary researchers at Hearts and Kilmarnock centres of the FFIT program in 2010 -11. The data included transcripts of face to face interviews with 19 men 6 months after their enrolment on the program, 2 focus groups; interviewed 9 months post program participation and 40 completed questionnaires at 12 weeks during program participation, 6 months and 12 months after their enrolment on the program.

A thematic analysis of the transcripts (qualitative data) and frequency analysis of the study participants’ questionnaires was done. Qualitative research software, Nvivo 9, was used to analyze the qualitative data (QSR international private limited, 2008). Frequency analysis of the quantitative data was done using using quantitative analysis software - Predictive Analytics Software; PASW Statistics 18. The frequency distribution graphs and the number of times each code appeared in the questionnaires were tabulated and then combined and cross checked with the themes obtained by thematic analysis of the transcripts to give a thorough understanding and complete analysis of the whole data (Mixed method approach).

Results

The results represent the themes that were identified from the transcripts of individual face-to-face interviews, FGDs, combined with the data obtained from the frequency analysis of self completed questionnaires by the study participants. The resulting themes provided answers to the research questions. The themes and sub themes emerged during data analysis are as follows; details of which have been tabulated in table 3.

Barriers

About 9% of the participants identified extremes of cold and periods of snow as barriers to outdoor physical activities. Further 9% of them found episodes of sickness, adverse physical conditions (e.g. frozen shoulder and knee pain) and hospitalization due to surgery, heart attack etc. as barriers to maintain previous physical activity levels. 11% struggled to perform regular exercise due to work and job commitments during and after program enrolment. The majority of them were able to follow the protocol during weekdays but unable to do so over weekends. Occupations such as taxi driving, desk work, sitting in conferences and
meetings restricted them to lower physical activity levels. Nearly 14% reported social events such as birthdays, night outs and occasions; family issues such as having a baby, different food preferences among family members; as a challenge to maintain physical activity levels after 12 months of program completion. Further 10% identified boredom and lack of interest and lack of motivation and peer support as well as lack of determination as constraints to keep up the pace in the long term.

**Diet**

Diet emerged as one of the highly influential factors; helping participants lose weight during the program and maintain their lost weight in the long term. Eating breakfast (12%), reducing calorie intake (27%), increasing fruit and vegetable consumption (26%), watching food labels (4%), reducing portion size (10%), increasing water intake (6%), cutting down on sugary drinks (6%) helped participants maintaining weight loss in the long term. Interestingly, a drop of about 1 - 5% was identified in maintaining overall improved eating habits twelve months post program enrolment. However, increased water intake and improved portion control were found to be maintained successfully in the long term.

**Facilitators**

Participants reported getting a perception of being overweight / obese, comparing own body image with others, not getting fitted in own clothes following program participation. These factors facilitated them to lose maintaining body weight in the long run. Support from spouse and kids at home, be it getting home made food while at work or encouraging and reminding them about exercising regularly helped them adhere to the program protocol during and even after program participation. Few of them got incentives in the form of concessions and free gym memberships facilitated which kept them motivated and engaged in the activities even after program completion.

**Program experiences**

Enhanced self confidence, improved mood, affect and overall mental perception were reported by about 11% of the participants during all time points of the study. A few of them felt more confident the way they could dress themselves than before; wearing clothes of their choice in which they could not get fit earlier due to being overweight and obese. About 17% considered the program very educational in terms of increased awareness about the importance of exercise, fitness and diet and better understanding of their impacts on health; keeping them motivated to keep up the pace 12 months after program enrolment. Further, participants enjoyed the program and each other’s company; keeping them motivated to follow the program protocol post program completion also.

**Lifestyle**

Engaging in some sort of exercise (walking and jogging) helped losing weight and maintaining it post program completion, as reported by 50% of the participants. The trend remained almost the same post program enrolment. Nearly 16% reported of exercising in the gym - trend rose to 24% six months post program enrolment but fell down to 12% at twelve months time point of the study. 60% reported that they felt fitter, energetic, more active and healthier during and after
program participation. Improvement in blood pressure, decreased weight, loss of inches from waist and decreased body aches and pains were also reported. 11% reported increased awareness of alcohol related problems during program, resulting in low alcohol consumption (up to 50% in some cases) 12 months post program enrollment.

**Camaraderie**

Participants described the importance of sharing common characteristics such as age, same thinking and same physical conditions, which encouraged them to get healthier. Sharing common interests such as liking for football, wish to lose weight etc. helped them establishing friendships, encouraging to get better and healthier. A few of them discussed the importance of team building, creating new friendships and liking for each other’s company within the groups which turned out to be both encouraging and enthusiastic for them in achieving their goals.

**Discussion**

The results of the study have been able to display wide ranging experiences of men 12 months after their enrolment on the program in addition to various factors which helped and or hindered them to maintain their lost weight after completion of the program. The study has contributed to the existing knowledge on the relationship between weight loss maintenance and its determinants. The findings of the study are widely dispersed and are plentiful, providing an opportunity for a literature to emerge demonstrating the relationship between weight loss maintenance and its determinants. The results achieved from this study reverberate around and adds to the existing knowledge acquired from the literature, thereby, augmenting its credibility.

Factors such as taking regular breakfast, increasing water intake, taking care of food labels and introducing the concept of food traffic lights in the program provided additional benefits and add to the list of already known determinants of weight loss maintenance. Further, the importance of camaraderie during program participation and maintaining it after program completion emerged out to be a valuable asset to the participants which kept them motivated in the long term weight loss maintenance. Therefore, the concept of peer support and camaraderie makes an important contribution to the existing literature in terms of long term weight loss maintenance and should be explored in future studies.

The achieved sample of 19 individual interviews and 2 focus groups embraced at least one third of members from each participating group giving a good proportion in terms of variety of participants’ opinions and credibility of findings. Since qualitative studies are designed to explore something rather than testing the hypothesis and these are not deemed to statistically represent a larger population, the included sample size was considered apt and is a characteristic of qualitative studies [63]. However, in an attempt to generalize the study results and in order to present the findings in a better and more complete manner, forty self completed questionnaires were also included to make a larger sample size and to provide quality to research.
Conclusion

There is a social pattern for many diseases, with the highest burden falling on those with the lowest material resources [64]. Obesity is an exception to this statement as it is considered to be a disease of affluence. Wadden & Butryn and Wadden & Osei reported that people tend to regain 30-35% of their lost body weight within a year of losing [65, 66]. Five years following initial weight loss, they typically regain almost all of their lost weight [67]. It is hoped that evaluating people’s personal experiences following a weight loss program and the factors affecting their weight loss maintenance up to 12 months from the start of the program will provide an insight to help other people maintain their weight loss in long term which further help them counteract some of the adverse effects of being overweight and obese and would improve their overall quality of life in long term. However, 1) in order to provide high quality evidence in the subject area; it would be wise to establish causality between various factors and weight loss maintenance and 2) to address gap in knowledge related to barriers and facilitators associated with obesity and long term weight loss maintenance, rigorous scientific enquiry is needed from future studies.

Ethical consideration

No ethical approval was required since the project involved analysis of existing transcripts and no further data collection was needed. The research Ethics Committee at the Department of Nursing and Midwifery, Stirling University approved the initial study in April 2010. Participants were informed verbally and in writing that their information would be treated anonymously (participants’ names, ages and other personal details as available from the transcripts would not be revealed anytime as a matter of ethics) and about their right to withdraw from the study at any time. A written consent was obtained from all study participants prior to the interviews. The study underwent some amendments in September 2010 for approval.

References

examination surveys and epidemiological studies with 960
country-years and 9.1 million participants. Lancet 2011; 377
9. James PT, Rigby N, Leach P. International obesity task
force. The obesity epidemic, metabolic syndrome and future
prevention strategies, European journal of cardiovascular
10. WHO [homepage on the Internet]. Geneva: obesity and
overweight, fact sheet no. 311. Available from:
11. Field AE, Joaquin B, Colditz GA. Epidemiologic and
health consequences of obesity. Handbook of obesity
12. Hacking I. Fat across the disciplines, Conference at
13. Livingstone M. Childhood obesity in Europe: a growing
concern. Public health nutrition. 2001; 4(1a):109-16
14. Scarborough and Allender (National Health and Service
Information Centre for Health and Social Care, 2009)
15. National Health and Service Information Centre for Health
and Social Care, 2009. Statistics on obesity, physical activity
(accessed: 02/02/2012).
trends in obesity and impacts on health. Foresight tackling
obesities: Future choices. Available from:
http://www.foresight.gov.uk/.
17. Kopelman P. Health risks associated with overweight and
obesity. Short science review. Foresight tackling obesities.
18. Boitard C. Insulin secretion in type 2 diabetes: clinical
PK, He J. Global burden of hypertension: Analysis of world
20. Eckel RH, Barouch WW, Ershow AG. Report of the
national heart, lung and blood institute- national institute of
diabetes and digestive and kidney disease working group on
the pathophysiology of obesity associated cardiovascular
21. Stampfer MJ, McLure KM, Colditz GA, Manson JE,
Willet WC. Risk of symptomatic gall stones in women with
22. Cooper C, Inskip H, Croft P, Campbell L, Smith G,
McLaren M, Cuggon D. Individual risk factors for hip
osteoarthritis: obesity, hip injury and physical activity,
23. Cicuttini FM, Baker JR, Spector TD. The association of
osteoarthritis of the hand and knee in women: a twin study,
24. Must A, Spadano J, Coakley EH, Field AE, Colditz GA,
Dietz WH. The disease burden associated with overweight and
82(16): 1523-29.
25. Giovannucci E, Rimm EB, Chute CG, Kawachi I, Colditz
GA, Stampfer MJ, Willet WC. Obesity and benign prostatic
hyperplasia. America journal of epidemiology. 1994; 140:
989-1002.
26. Grunstein RR, Stenlof K, Hedner J, Sjostrom L. Impact of
obstructive sleep apnoea and sleepiness on cardiovascular and
metabolic risk factors in the Swedish obese subjects (SOS)
study. International journal of obesity and related metabolic
disorders. 1995a; 19: 410-18
27. Grunstein RR, Stenlof K, Hedner J, Sjostrom L. Impact of
obstructive sleep apnoea and sleepiness on cardiovascular and
metabolic risk factors in the Swedish obese subjects (SOS)
study. International journal of obesity and related metabolic
disorders. 1993a; 19: 410-18
28. Dobson R. Obesity is a risk factor for 70,000 new cancers
a year in Europe. BMJ. 2009; 339: 3171.
29. Lagergren J, Bergstrom R, Nyren O. Association between
body mass and adenocarcinoma od oesophagus and gastric


AUTHOR(S):

1. Dr Himanshu Gupta, Health Promotion Unit, Public Health Foundation of India, PHD House, Second Floor, 4/2, Sirifort Institutional Area, August Kranti Marg, New Delhi - 110 016, India; email: himanshu.gupta@phfi.org

2. Dr Cindy Gray, Institute of Health and Wellbeing, 27 Bute Gardens, University of Glasgow, Glasgow G12 8RS, UK; email:cindy.gray@glasgow.ac.uk

CORRESPONDING AUTHOR:

Dr Himanshu Gupta,
Health Promotion Unit,
Public Health Foundation of India,
PHD House, New Delhi - 110 016, India;
Email: himanshu.gupta@phfi.org

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