“Motivate”: The effect of a Football in the Community delivered weight loss programme on over 35 year old men and women’s cardiovascular risk factors.

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Abstract

The purpose of this study was to examine whether an integrated 12-week exercise, behaviour change and nutrition advice based weight management programme could significantly improve cardiovascular risk factors overweight and obese men and women over the age of 35. One hundred and ninety four men and 98 women (mean age= 52.28 ± 9.74 and 51.19 ± 9.04) attending a community based intervention delivered by Notts County Football in the Community over one year, took part in the study. Height (m), weight (kg), fitness (meters covered during a 6 minute walk) and waist circumference (cm) were measured at weeks 1 and 12 as part of the intervention. Changes in body weight, waist circumference and fitness for men and women were measured by a 2 way repeated measures ANOVA, with significance set to $p<0.05$. Weight, waist circumference and fitness significantly improved over time in both men (4.96kgs, 6.29cm, 70.22m; $p<0.05$) and women (4.26kg, 5.90cm, 35.29m; $p<0.05$). The results demonstrated that the FITC lead weight loss intervention was successful in significantly improving cardiovascular risk factors in both men and women. While the results of previous studies that have found similar success in men only programmes, this is the first study to demonstrate the efficacy of such an intervention in a mixed programme and more specifically, in women.

Keywords: football, community, obesity, CVD, public health, exercise, intervention, men, women.

Introduction

The World Health Organisation (2004) has described obesity as a global epidemic. Obesity has 'escalated' over the last four decades (Gortmaker et al., 2011) and the prevalence in UK men is amongst the highest in Europe (International Association for the Study of Obesity, 2010). Moreover there is a higher prevalence of total overweight and obesity (BMI $\geq 25kg{\cdot}m^2$) amongst men than women in the UK (NHS Information Centre, 2009a) and although a greater proportion of women are obese /morbidly obese, more men than women will be obese in the future: Indeed it is predicted that by 2050 the proportion of the population that is obese will be 60% of males and 50% of females (Foresight, 2007). Nottingham, located in the English Midlands (United Kingdom), it is estimated that around 25% of men (37,000) are obese (with a BMI $\geq 30kg{\cdot}m^2$), Applying Projections set out in Foresight indicates that the predicted number of obese men in the city is likely to reach 41% (55,020) by 2020, thus overtaking the number of obese women (Nottingham City JSNA Adult Obesity chapter, 2011). Moreover, obesity results in considerable costs to health services in the UK (forecast to reach £50billion by 2050; Foresight, 2007).

There is considerable international evidence that demonstrates the serious health consequences of excess body weight (Haslam and James 2005; Ezzati, Lopez et al., 2002; Brown et al., 2012). Illnesses associated with obesity include coronary artery disease, stroke, type 2 diabetes, anxiety and depression and some cancers (Brown etal., 2012; Kopelman, 2007). In particular, cardiovascular disease (CVD) is responsible for the majority of morbidity and mortality of both men and woman in the UK, with obese men at 40 years of age likely to reduce their life expectancy by 5.8 years (Logue et al., 2010). While these obesity-associated co-morbidities contribute to gender and socioeconomic inequalities and premature mortality, they may also affect individual men's and women's concerns about their own bodies and health status. It is for these reasons that weight management in relation to cardiovascular disease risk has been identified as a public health priority globally (Khan et al., 2008; Wang et al., 2011). This emphasises the importance of designing interventions that are acceptable to populations effected by obesity (Conn et al., 2011; Gray et al., 2013; Pringle et al., 2013).

Since as early as the mid-1980s, a joint initiative by the Football League (FL) and the Professional Footballers' Association (PFA) saw the majority of professional football clubs in the country, through their Football in The Community (FITC) departments, delivering mainly coaching-based programmes, with the primary aim of tackling the issue of hooliganism (Walters, 2009; Anagnostopoulos and Shilbury, 2013). By the mid-1990s, football's potential had been elevated to be a position as a "key" deliverer of policy objective for a range of social welfare issues, notable health (DCMS, 1999; Mellor, 2008; Tacon, 2007, Coalter, 2007, Bloyce and Smith, 2010). This belief for football (alongside sport) was championed (by many with sport, policy making and politics) in what Perkins (2000: 113) encapsulated as, "what football... can be used for almost has no bounds these days given the huge public interest in sport". Despite this widespread belief, there is little empirical evidence to support the role of football and sport in delivering on these key social welfare issues.

Numerous authors argue that there is a lack of robust evidence to support the impact of sport and physical activity on key issues including health and call for more rigorous and sustained testing (Collins and Kay, 2003; Coalter, 2007; Tacon, 2007; Spaaij, 2009). Coalter argues further that the outcomes of such sport based interventions are too vague and/or far too ambitious (2007: 30). This situation appears to be worsened by that fact FITC schemes lack the resources or skill base to collect research and evaluation (McGuuire and Fenoglio, 2004; Nichols, 2007; Parnell et al, 2013a) and the understanding of health improvement (Parnell, et al., 2013a). There is strong recommendation for rigorous, controlled evaluations to be conducted on health promotion interventions delivered by professional sport clubs (Priest et al., 2008a; 2008b). A body of literature has begun to emerge more recently with authors contributing to the evidence of the role football in health improvement.

The potential of professional sports organisations to attract participants to participate in a range of health promotion initiatives has been recognised (Daniel, 2000; Snow, 2004; Duffin, 2006; Whitty and White, 2011; Pringle, 2009; Pringle, et al., 2011; Brady et al., 2011; Gray et al., 2013). Through capitalising on the powerful social and psychological connections to professional football (Premier League, 2010) and specific clubs (e.g., loyalty, identity, validation, belonging) that 'being a fan' creates (Hirt and Clarkson, 2010). Using professional sport clubs for weight management (Witty and White, 2011; Brady et al., 2010), weight loss (Brady et al., 2010) and more recently as a "key" deliverer in health improvement policy (Pringle, McKenna and Zwolinsky, 2013). This research has mainly focused on the role of football-led health improvement in men. There is little research into the role of football in health improvement in adult women, however a recreational football based intervention for women has been shown to be more valuable at developing social capital (than running) (Ottesen, Jeppesen and Kustrup, 2010). This literature continues to support the need for further research and evaluation, which has been echoed by authors who have called for a culture change in FITC (Coalter, 2001), greater learning and development opportunities for practitioners (Hindley and Williamson, 2013) and the development of meaningful partnerships with higher education departments to improve research and evaluation and practice (Parnell et al., 2013b).

Notts County Football in the Community (NCFIT) was established in 1989. NCFIT have a track record of success within FITC having won a Football Leagues Trusts Best Community Initiative for working with young men with mental health issues in 2008, whilst also receiving the Best Community Project for Health in 2010 for their Active Schools initiative (Hindley and Williamson, 2013). In response to the City's health inequalities, the 'Motivate' programme was designed by NCFIT, in order to improve cardiovascular health in overweight (BMI $\geq$25 kg·m^2) men over 35years old in Nottingham City. The programme was piloted by NCFITC and developed with the support of researchers from Nottingham Trent University and as a result, was subsequently commissioned by NHS Nottingham city as a service for any overweight adult city resident to take up for the purpose of reducing their weight.

The aims of the present study were to examine whether the FITC lead 'Motivate' programme could significantly improve >35 year old men and women's cardiovascular risk and to see if there was any significant difference in these changes over time between men and women.

Methods

Participants and Settings

Participants were volunteers and recruited onto the Motivate programme via Nottingham City's Healthy Change Hub (a telephone based lifestyle behaviour change and referral service, provided by NHS Direct and commissioned by Nottingham City Council) (Wilcox 2013), or via self-referral following a city wide promotion campaign employed by NCFITC. This included displaying posters in various community sites (e.g. Notts. County FC, community centres, workplaces, libraries, pubs, barbers, betting shops), distributing flyers and through media coverage (e.g. local press and radio, use of social media such as twitter). Participants were accepted onto the Motivate programme if they were over the age of 18, classed as overweight (with a BMI of >25 $kg{\cdot}m^2$) and permanently lived or worked in the City of Nottingham. Only participants who were over the age of thirty five years old were included in the present study, as this is the population identified as at risk of CVD by the health commissioners and the population most likely to benefit their health (Gray et al., 2013). Upon acceptance onto the programme, participants were invited to take part in the present study via an information sheet and consent was provided by 194 men and 98 women (Table 1; 23% BME). Ethical approval was obtained from the College of Business Law and Social Science Ethics Committee at Nottingham Trent University and all participants consented to their participation in the research.

Intervention Context

The Motivate programme is a free 12 week weight loss intervention that aims to encourage and facilitate overweight individuals to increase their levels of physical activity, improve their diet and improve their lifestyle risk factors related to cardiovascular disease. Up to March 2013 Motivate was funded by Nottingham City Primary Care Trust. When the PCT was abolished and Public health responsibility moved to the city council in April 2013 it was funded from the City Councils Public Health Grant. The service was delivered in community leisure centres across Nottingham City, offering an integrated approach to weight loss. Weekly sessions lasting 1.5 hours, combining behaviour change and dietary information delivered by NHS dietetics staff (approx. half of the session); and high intensity exercise by NCFITC coaches (a little less than half of the session after transition from classroom to sports hall), were supplemented by reduced cost membership to leisure services within the City (Figure 1). In line with practice elsewhere (Pringle et al., 2013), the programme was branded using the club image, motif, colours and endorse by professional football players. Furthermore the programme was promoted through club channels, such as on match days and via social media.

The approach to the design, delivery and content of Motivate is similar to that of the Football Fans in Training (FFIT) intervention outlined by Grey et al. (2013). Process analysis of the FFIT intervention (a men only weight management programme delivered through Scottish Premier League (SPL) clubs) revealed that such an approach to a weight loss programme was acceptable to 35-65 year old male participants. However, in contrast to Motivate, the FFIT programme used football club coaching staff i.e. non-specialists in weight loss, to deliver both the nutrition and behaviour change aspects of the intervention. This aspect of the process evaluation was highlighted as a point for future consideration, as some coaching staff found it difficult to adequately prepare for these sessions; some of the calculations of calorific intake for weight loss proved difficult and therefore some coaches were unable to deliver the sessions as they were intended (Gray et al., 2013; Parnell et al., 2013a). To that end, commissioners and the research team felt that using expertise from a commissioned NHS service to deliver this aspect of the Motivate strengthened the programme and in line with recommendations in the NICE guidance (2007).

During the pilot phase of the Motivate programme development, accelerometers were used to determine the intensity of the physical activity accumulated in a sample during the exercise sessions. The same twelve men wore an Actigraph uni-dimensional accelerometer (Model GT1M, ActiGraph, LLC, Fort Walton Beach, FL) on an elastic belt provided by the manufacturer, as close to their centre of gravity as possible, for the duration of the exercise session on six separate occasions (Table 2). Accelerometers were chosen to measure physical activity as they provide a reliable, valid and objective field measure of physical activity (Nichols et al., 1999; Brage et al., 2003; Trost et al., 2005; Welk et al., 2005). In order to ensure that high and very high intensity physical activity was captured, 5 second measurement epochs were used (Welk et al., 2005). After each session, data were downloaded from the ActiGraph and uploaded to the

MAHUffe software (http://www.mrc-epid.cam.ac.uk/Research/PA/Downloads.html) for data reduction. The amount of time the men engaged in moderate, vigorous and moderate-to-vigorous intensity physical activity (MVPA) was calculated using cut-points determined by Freedson et al. (1998).

Table 1. Mean (±SD) minutes of physical activity by category of intensity during 6 different exercise sessions (*n*=12).

	Physical Activity Intensity (minutes)			
Week	Moderate	Vigorous	V. Vigorous	Total MVPA
3	6.19 (2.66)	1.54 (0.81)	2.36 (1.35)	10.08 (4.44)
4	8.68 (2.93)	5.53 (2.54)	6.62 (3.20)	20.82 (3.81)
5	7.84 (2.89)	2.69 (2.45)	3.64 (3.11)	14.18 (3.20)
7	4.81 (1.38)	2.62 (0.72)	3.99 (1.39)	11.42 (2.32)
8	8.40 (2.91)	4.06 (2.70)	6.06 (3.52)	18.52 (6.69)
9	6.81 (1.75)	2.01 (0.20)	3.97 (1.03)	12.79 (1.67)

As an incentive to increase participants' physical activity beyond the weekly sessions, reduced cost gym memberships (including exercise classes) and courses of free swimming were offered. This incentive aimed to reduce the barrier of cost to participants, many of whom came from deprived communities within the City (Nottingham JSNA, 2011; Seedfelt, Malina and Clark, 2002).

[INSERT FIGURE 1 HERE]

Procedures

All measures (height, weight, BMI, waist circumference and cardiovascular fitness) were performed at week 1 and 12 of the programme as part of the physical activity sessions and were used as part of the monitoring and goal setting tasks to aid behaviour change. According to the techniques of Lohman, Roche and Martorell (1998), height was measured to the nearest 0.1 cm using a Leicester Height Measure (Birmingham, England), with the participant stood upright and barefoot and body mass was calculated to the nearest 0.1kg using Seca weighing scales (Birmingham, England). Body mass index was calculated as $kg \cdot m^2$.

Waist circumference has been acknowledged as a substitute technique for the precise assessment of visceral fat around the abdomen (Jansen et al., 2002; Biggard et al., 2010; Dagan et al., 2013). Welborn and Dhaliwal (2007) suggest that waist circumference is superior to BMI in predicting cardiovascular disease risk, with the World Health Organisation's cut-points of 102cm in men and 88 cm in women used to denote high cadriometabolic risk within normal-weight, overweight, and obese BMI categories (Ness-Abramof and Apovian, 2008). There are a number of anatomical landmarks used to measure waist circumference such as the umbilicus, the midpoint between the lowest rib and the iliac crest, and just above the iliac crest. In a study by Ross et al. (2008), authors demonstrated that each of these waist circumference landmarks was equally effective in identifying all-cause mortality, cardiovascular disease and diabetes risk. In order to maximise the reliability of the measurement across the different measurement sights, NCFITC coaches were trained in measuring waist circumference at the umbilicus to the nearest 0.1 cm, directly on the landmarked skin with a flexible, inelastic measuring tape (Ross *et al*., 2008).

During the pilot phase of the 'Motivate' development, the Multi Stage Fitness Test (MSFT) was used as a submaximal estimate of cardiovascular fitness in men. However, due to the limited fitness of participants, many were unable complete the first shuttle of the test and it was observed and reported that this 'failure' had a negative effect on participants' self-confidence and was attributed to a number of individuals dropping out of the programme. While demonstrating that the programme was targeting those most at need of intervention, upon review, it was considered that a walking test would be a more inclusive and appropriate means of providing an estimate of cardiovascular fitness and indeed functional capacity (Soloway et al., 2001). The 6 Minute Walk Test (6MWT) was chosen because of its adaptability and acceptability (Pringle, Zwolinsky and McKenna, 2013). In this case, it was easier to administer, better tolerated, and better reflects activities of daily living than other walk tests performed in similar populations (Enright, 2003).

In order to standardise the 6 minute walk across each of the Motivate delivery sites, the leisure centre sports hall was area was used and a 25m track was marked out using plastic cones. Participants were required to complete as many laps of a 25m track during the 6 minutes as possible, picking up a counter after each 4 lap cycle. Standardised encouragement was provided during the 6 minute walk as follows:

- At minute one: “One minute gone. Well done!”
- At minute two: “Two minutes done. You're doing well - keep it up!”
- At minute three: “Half way point. Three minutes remaining. Really well done!”
- At minute four: “Last two minutes. You're doing well - keep it up!”
- At minute five: “One minute remaining. Keep it up, you’ve done so well!”

At the end of the 6 minutes, participants were asked to stop and stand still. A tape measure was used to measure the distance from where the individual stopped and the end of the lap. The distance was added to the distance denoted by the number of cones collected in order to calculate the total distance covered.

Statistical Analysis

All data were first checked for normality using the Shapiro-Wilk test and any outliers were checked for faulty measurement. In order to examine whether there was a significant change in CVD risk by gender, 2 way repeated measures Analysis of Variance (ANOVA) were conducted for body mass, waist circumference and 6 minute walk distance. Greenhouse-Geisser correction factors were applied where appropriate. All analyses were conducted using IBM SPSS Statistics 19 (IBM Corp.: Armonk, NY) and statistical significance was set to $p<0.05$. The number of men and women meeting the criterion of 5% weight loss were also calculated.

Results

Table 1 demonstrates the mean (±SD) CVD risk factor scores for men and women at weeks 1 and 12 of the programme. Shapiro-Wilk analyses revealed that all data were deemed to be normally distributed ($p>0.05$). The results of the 2 way repeated measures ANOVAs revealed that there had been a significant improvement in body weight ($F_{(1, 147)}= 178.13$, $p=0.000$), waist circumference ($F_{(1, 129)}= 110.58$, $p=0.000$) and cardiovascular fitness ($F_{(1,\ 94)}$= 22.07, p=0.000) over time. Men were significantly heavier ($F_{(1,147)}$= 9.91, p=0.002), had significantly larger waist circumferences ($F_{(1,\ 94)}$= 19.48, p=0.000) and covered significantly more meters during the 6 minute walk test than women. No interaction was found between time and gender for any of the CVD risk factors.

[INSERT TABLE 1 HERE]

Ten per cent of men and 18% of women were classified as overweight (90% and 82% classed as obese respectively) at the beginning of the programme. While 25% men remained overweight, the percentage of men classified as obese reduced to 75% at the end of 12 weeks. Three women were able to reduce their BMI to become normal weight, with fewer classified as overweight (15%) and obese (78%) at the end of the programme. Forty nine per cent of men (n= 50) and 37% of women (n= 17) who completed the 12 week programme achieved the target 5% weight loss. On average, men and women reduced their waist circumference by and 6.2cm and 5.9cm and improved the distance covered during the 6 minute walk by 70.22m and 35.29m respectively.

Discussion

The aims of this study were to examine whether the FITC delivered Motivate weight management programme could significantly improve >35 year old men and women's CVD risk and to determine if there was any significant difference in health risk improvement between men and women. The findings of the study show that the 12 week intervention, funded by a city council's Public Health Grant, delivered in partnership in the community was successful in achieving significant improvements in body weight, waist circumference and cardiovascular fitness in both men and women with a BMI over 25 kg·m^2.

The key performance indicator of the Motivate programme from a commissioning point of view was that participants should reduce their body weight by 5% by the end of the programme. While there was an overall significant reduction in body mass over the 12 weeks (*p*=0.000; 5.04kg in men, 4.62kg in women), 49% of men and 37% of women achieved this target. These results were less than the desired outcome set by commissioners at the outset of funding, but similar weight loss has been reported in professional Rugby settings (Witty and White, 2010), and more recently by Hunt et al. (2014), who's RCT of the gender sensitised FFIT healthy living programme reported 47% of men achieving a 5% weight loss. When examining mean weight loss percentage, authors determined that the 4.97% weight loss of their participants was likely to be clinically beneficial. To that end, participants in the present study may also have experienced a clinical benefit to their weight loss (4.68% in men and 4.43% in women). Because of the novelty of this type of intervention for women, comparative data are unavailable. However, in an examination of a range of commercial and primary care led weight reduction programmes, Jolly et al. (2011) found that weight loss in women over a 12 week intervention ranged from 1.4 (±4.1kg) and 4.4 (±4.3kg), suggesting that women in the present study were as successful (4.27kg) in reducing their body weight. While there was not a significant reduction in BMI, 15% of men moved from the obese to a lower risk category (overweight; 4% of women) and three women were able to move from the overweight to normal weight category, significantly reducing their CVD risk.

Understanding why participants may have struggled to reduce their overall body weight is important, especially when interpreting the success of the programme for individuals and ultimately, the commissioner. Indeed, one of the possible reasons could be that participants demonstrated an overall increase in lean mass, which would underestimate weight loss. One for the possible reasons identified for this was the intensity of the physical activities performed during the exercise sessions. Accelerometer measured intensity of the physical activity sessions demonstrated that on average, half of the time spent in MVPA was of at least a vigorous intensity. This is supported by Randers et al. (2010) in their study exploring the activity profile and physiological response to football training for untrained males and females. Authors demonstrated that small sided football had the potential to create physiological adaptations and improve performance with regular training (Randers et al., 2010). Furthermore, in their study on the physiological improvements of untrained premenopausal women undergoing a sixteen week recreational football intervention, Bangsbo et al. (2010) also demonstrated that as with men, women were able to increase their muscle strength, lean mas and fitness. Another stimulus for the possible improvement of lean mass in Motivate participants could be the enrolment of individuals to discounted leisure facilities offered by the local authority.

A different measure of body fatness and a more accurate measure of the distribution of fat is waist circumference (Brown, 2009). Waist circumference is an independent risk factor for CVD as it represents visceral fat stored in the abdomen (Janssen et al., 2002). Abdominal fat stores occur primarily in men and are likely to be more reactive than peripheral fat stores on the basis of lipolytic activity (Eggar and Dobson, 2000). A study by Jensky et al. (2011) demonstrated that a 1 standard deviation increment in the ratio of abdominal fat is significantly associated with significant increases in thoracic artery calcification (Jensky et al., 2011) and in large meta analyses have demonstrated that measures of central adiposity and not BMI are significantly related to cardiovascular mortality (Czernichow et al., 2011). Furthermore, research by Fujioka et al., (2013) in their study of effects of reducing intra-abdominal adiposity on glucose and lipid metabolism following a low calorie diet, found that women reduced their visceral fat to a greater extent than abdominal subcutaneous fat and that this was associated with significant metabolic improvements, when controlling for adipose tissue volume. Results from the present study show a significant reduction in waist circumference over the twelve weeks, with men losing on average 6.29cm and women 5.90cm, suggesting that participants on the Motivate programme are likely to have significant metabolic improvements.

When considering waist circumference as a possible performance indicator of weight loss programs, Egger and Dobson (2000) suggest that a 1 cm waist loss within men was equivalent to an average weight loss of approximately 0.75 kg. Their paper recommend neither weight nor waist circumference alone is sufficient to provide a true reflection of fat loss in men. Indeed, the use of both these measures may be necessary at different stages of a program to get a true indication of relative success in men and women, although the greater emphasis may still be put on the more potentially dangerous abdominal fat stores through waist circumference measures. Because paradoxical weight changes are more likely to occur in the early stages of a program, research has shown that after baseline weight and waist measurements are taken, weight should not be measured again for some time, possibly 4 ± 6 weeks for best results (Egger & Dobson, 2000). An exception to this may be as a check where no waist loss appears to be occurring in this time. Use of both weight and waist measures in the sequence allows for individual variations in the reactivity of fat depots between men and women and may also support individuals with their weight loss goals, especially if no change is seen in relation to weight loss.

Another independent risk factor for CVD is cardiovascular fitness (Fitzgerald et al., 2002). During the 12 weeks, participants significantly increased the distance covered in the 6 minute walk, with men covering 70.22m and women 35.29m on average. While the 6 minute walk is a somewhat crude estimate of cardiovascular fitness, it is sensitive enough to detect change over time. Most other studies have looked at football specific fitness tests such as the Yo Yo test (Randers et al., 2010) or a VO_{2max} test. The 6 minute walk allows non-experts collect fitness data in the field with minimal and non-specialist equipment (Enright, 2003). Furthermore, Enright (2003) suggests that the minimum clinically important difference (i.e., improvement) in the distance walked in a 6MWT has been estimated as 54 meters (with 95% confidence limits of 37 to 71 meters), suggesting that men on the Motivate programme were able to increase their cardiovascular fitness to a level that would clinically improve their health. This improvement may be more important to health as well as from a motivational point of view when thinking about maintenance. As suggested by Egger and Dobson (2000), people need to feel they are progressing even if progress falls short of the guidelines and it is therefore important to view change as a process requiring on-going support. Using feedback such as fitness improvements and waist circumference reduction may act as such (Egger and Dobson 2000). To that end, follow on exit routes like the leisure card are important, especially in the maintenance of any weight loss or behaviour change post intervention.

Football remains a popular activity with men in health improvement programmes (Dunn et al., 2011; Pringle et al., 2013; Gray et al., 2013). Indeed, in this intervention males were plentiful and not hard-to-engage, when recruitment was focussed on their interests and delivered in non-clinical settings. While it has been reported that the complex lives of the participants can hinder retention in football based interventions, the engagement and positive changes observed suggest that this project was able to overcome such barriers with the participants (Sherry, 2010). Activities were packaged in the male friendly language which promoted sport and fitness as opposed to health. Further activities were delivered in local community venues vs clinical settings which have been shown to be important in reaching men (Pringle et al., 2013; Gray et al., 2011). The successful engagement of women within the intervention is a unique and interesting finding, as there is very little research concerning this in health improvement interventions delivered by professional football clubs. Whilst gender specific interventions have attracted 'non-fans' (Pringle et al., 2013), suggesting other outcomes other than the draw of the football club may be influential in engaging 'non-fans'. The attraction of women suggests others factors may be in play. In fact, women's participation in football has increased exponentially over the past 15 years and it has overtaken netball as England's most popular female sport. There is a growing consensus belief that women and girls are gaining greater prominence in football culture and it is becoming a more normalised part of many girls' lives (Cauldwell, 2002). Consideration must be given to whether participating in football, a sport recognised as male (Scraton et al, 1999), can provide girls with the opportunity to resist traditional gender norms and perform alternative scripts of femininity (Butlet, 1990). This particular finding requires further research to better understand gendered identity and female participation in football club based health improvement interventions.

Limitations and Strengths

Compared to studies such as that of Hunt et al (2014), the sample size in the present study is relatively small with a high drop-out rate (compared to the number of people who first enrolled onto the programme). Despite this, the population reflects the true nature of the intervention taken place in a real world setting. While no process data were reported in this instance, qualitative data were captured from a sample of men from Motivate and will be used to better understand the reasons for drop out to help inform future programmes. However, due to the focus of the study, no process data were obtained from women and future research should include this to better understand women's reasons for engaging in a traditionally male orientated programme. A number of studies have shown this context to be successful in improving health risk factors in men, but to the authors' knowledge, this is the first to evaluate a programme aimed to target men and women.

In terms of commissioners expectations, but in line with similar studies, there were relatively low numbers meeting 5% target (especially women), but this may be due to an increase in lean mass as a result of the high intensity exercise programme. In addition, despite training being provided by researchers, there may have been possible issues with measurement error associated with inexperienced and multiple testers.

Conclusion

Weight loss interventions designed and lead by Football in the Community and supported by a multidisciplinary team can be successful in significantly reducing body weight and waist circumference, improving cardiovascular fitness and reducing cardiovascular risk in overweight adults over 35 years old. When combining behaviour change, dietary information and high intensity exercise in a weight loss programme to reduce cardiovascular risk, commissioners should look beyond a 5% weight loss as the main measure of success of a programme, as body weight alone is unlikely to provide an accurate assessment of cardiovascular risk change. The present study provides support to previous studies that have shown FITC lead programmes to improve health in men, but is the first to demonstrate that they can be as effective in women and in a mixed gender setting. Future research should examine the reasons why women attend football-lead weight loss programmes and the possible impact of mixed exercise and dietary advice based weight loss sessions on men and women's attendance and retention.

Acknowledgements

Notts County Football in the Community.

Table 1. Mean (±SD) anthropometric and CVD risk factor measures of men and women who took part in the Motivate programme.

	Men			Women		
	N	Week 1	Week 12	*N*	Week 1	Week 12
Age (years)	194	52.28 (9.74)	-	98	51.19 (9.04)	-
Height (m)	98	1.75 (0.07)	-	40	1.62 (0.07)	-
Weight (kg)	98	106.05 (17.07)*	101.09 (16.09)†	40	96.38 (17.88) *	92.11 (16.85) †
BMI (kg·m^2)	98	35.27 (4.67)	33.44 (4.10)	40	36.77 (7.44)	35.12 (6.98)
Waist Circumference (cm)	92	116.89 (12.59)*	110.60 (12.06) †	39	111.23 (12.69) *	105.33 (12.06) †
6 Minute Walk (m)	64	773.30 (168.06)*	843.52 (149.96) †	32	661.14 (113.60) *	696.43 (109.19) †

N.B. * Denotes a significant main effect for gender $p<0.05$; † Denotes a significant main effect for time $p<0.01$

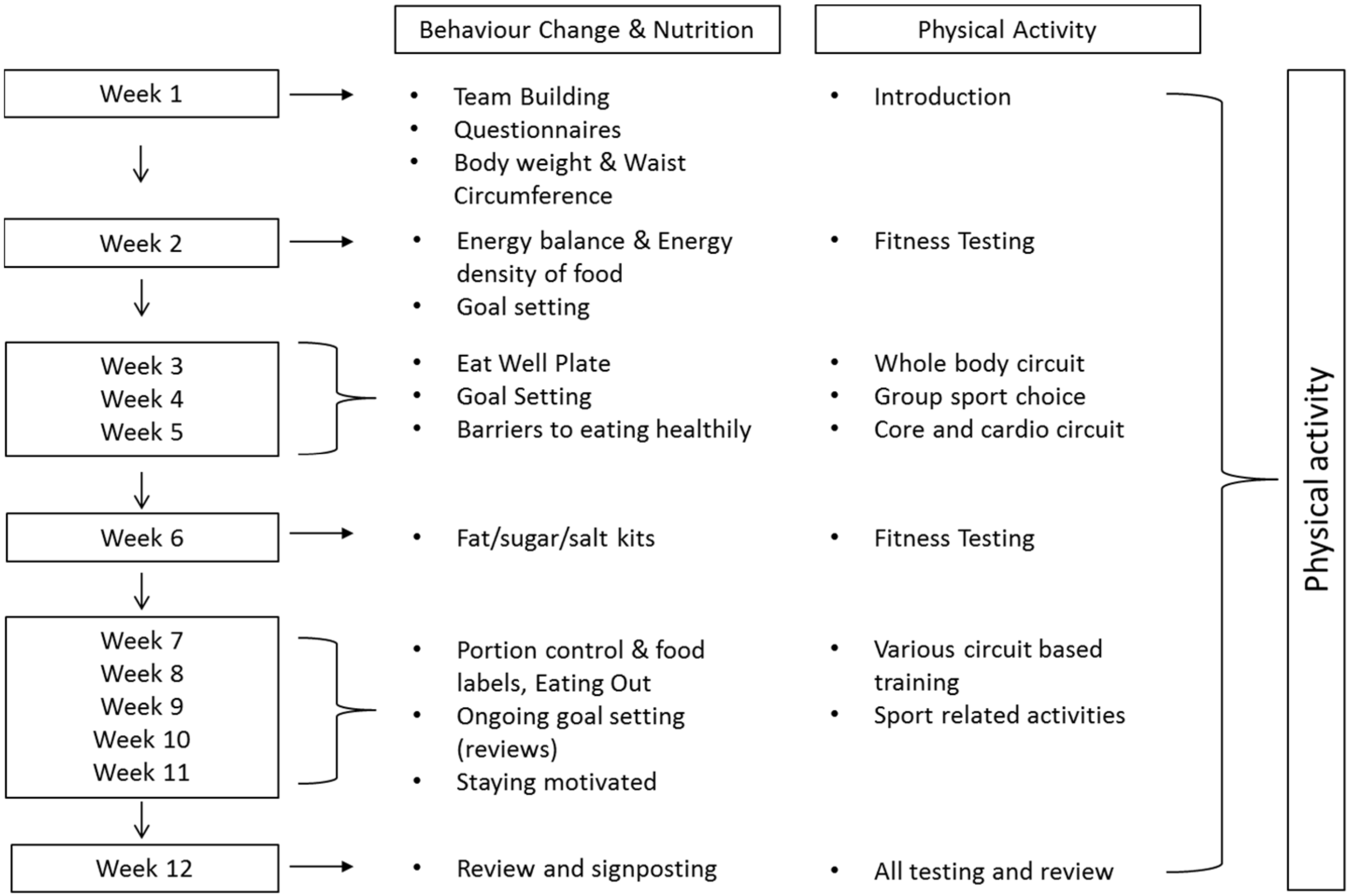

Figure 1. Schematic showing the content of the Motivate 12 week programme including behaviour change, nutrition and physical activity.

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