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A Gender-Sensitized Weight Loss and Healthy Lifestyle Program for Overweight and Obese Male Hockey Fans: Effects on Dietary Behaviours

Ashleigh De Cruz
The University of Western Ontario

Supervisor
Dr. Robert Petrella
The University of Western Ontario

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Abstract

BACKGROUND: Male dietary behaviours have often been associated with overweightness and obesity. Although little research exists to help prevent the problem, this can somewhat be explained by the lack of men engaging in healthy eating and lifestyle change. A gender-sensitized intervention study using hockey as a draw to participate may positively change dietary behaviours and associated health outcomes. **METHODS**: A 12 week, 12 session, weight loss and healthy lifestyle intervention program was conducted in which overweight and obese male fans of a local hockey team were coached to adopt healthy eating and lifestyle behaviour changes in collaboration with their favorite hockey club. **RESULTS**: After 12 weeks of intervention sessions, intervention participants displayed healthier dietary behaviours in comparison to the control group ($p=0.029$). **CONCLUSION**: A weight loss and healthy lifestyle intervention program targeting the often under-represented overweight and obese male population group can help to promote positive dietary behaviours, especially when delivered in the context and environment of being a fan of local junior hockey.

Keywords:

Overweight; obesity; dietary behaviours; physical activity; gender-sensitized; hockey fan; men; randomized controlled trial; health promotion; healthy eating

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List of Terms and Abbreviations

BMI – Body Mass Index

CHL – Canadian Hockey League

CI – Confidence Interval

DINE – Dietary Instrument for Nutritional Education Questionnaire

FFIT – Football Fans In Training

Hockey FIT – Hockey Fans In Training

OHL – Ontario Hockey League

PAR-Q – Physical Activity Readiness Questionnaire. Designed to determine the safety of one's participation in physical activity

STC – Starting the Conversation Questionnaire

WHL – Western Hockey League

WHO – World Health Organization

QMJHL – Quebec Major Junior Hockey League

Chapter One

1. Literature Review

1.1 Overweightness and Obesity

The World Health Organization (WHO) define overweightness and obesity as "an abnormal or excessive fat accumulation that may impair health" (World Health Organization, 2015). Body Mass Index (BMI) is universally used to diagnose overweightness and obesity and is measured by dividing one's weight by height after it is squared and is usually displayed as kg/m^2. Canada, the European Union and the USA all classify individuals with a BMI of 25-29.9 kg/m^2 as overweight and 30+ kg/m^2 as obese.

In 2014, the WHO reported that more than 1.9 billion adults were classified as overweight worldwide. Of these, 600 million were obese. These numbers have doubled since 1980 and equate to 39% of the global adult population being overweight and 13% being obese (World Health Organization, 2015).

Overweightness and obesity can have a severe detrimental effect on wellbeing, health, and overall quality of life. Jia and Lubetkin (2005) discovered that health-related quality of life decreased with increasing levels of obesity in US adults aged $\geq$ 18 years (n=13,646) and persons with severe obesity had the lowest scores for health-related quality of life as measured by four validated tools (PCS-12 and MCS-12) (Gandek et al., 1998) (EQ-5D and EQ VAS) (Hurst et al., 1997). This reduction in quality of life can be caused and be a cause of the harmful health impacts of overweightness and obesity. Cardiovascular diseases such as heart disease and stroke are the leading cause of mortality worldwide (Lozano et al., 2012) and overweightness and obesity increase the risk of being diagnosed with these ailments (Must et al., 1999). In Canada, the prevalence of hypertension (classified as blood pressure higher than 140/90 mmHg) (U.S. Department of Health and Human Services, 2004) has been shown to be up to more than two times higher in the overweight and obese population in comparison to their normal-weight counterparts (29% vs. 12%) (Statistics Canada, 2015). Like with

many health issues directly caused or elevated by overweightness and obesity, hypertension is sensitive to a change in body weight both positively and negatively. Neter et al., (2003) discovered through a meta-analysis of randomized controlled trials that obese patients (mean BMI = 30.7 kg/m^2) saw a significant reduction in mean systolic blood pressure (-4.44 mm Hg; 95% CI: -5.93 to -2.95) and mean diastolic blood pressure (-3.57 mm Hg; 95% CI: -4.88 to -2.25) when losing an average of -5.1 kg in weight. This reduction in weight and therefore blood pressure helps to decrease the risk of cardiovascular disease (National Heart, Lung and Blood Institute, 2004). This combination of hypertension and overweightness or obesity can lead to severe outcomes such as death due to cardiac failure, as a result of a thickening of the ventricular walls and increased heart volume (Alpert & Hashimi, 1993). Type 2 diabetes mellitus, osteoarthritis, elevated cholesterol, respiratory illnesses, and mood disorders have also all been widely reported to increase within the overweight and obese population (Resnick et al., 2000; World Health Organization, 2009 & Buchwald, 2005).

Detrimental effects caused by overweightness and obesity also leads to a severe economic burden on the world's and individual country's health care systems. Withrow and Alter (2011) conducted a systematic review examining the economic burden of obesity worldwide. Their findings showed that obesity accounts for 0.7% to 2.8% of a country's total health care expenditure. Moreover, those obese individuals have medical costs that were approximately 30% higher than those of healthy weight individuals. The economic burden on Canada alone due directly to obesity was estimated at $6 billion and this figure did not account for productivity loss, reductions in tax revenues or psychosocial costs (Obesity in Canada, 2016).

Treatment for overweight and obese individuals usually comprises of a lifestyle intervention – including changes in diet and increasing physical activity (Serdula et al., 1993). This population group is regularly advised to lose 5-10% of their body weight in order to see improvements in cardiovascular diseases (Van Gaal et al., 1997 & Wing et al., 2011). In order to achieve this recommended weight loss, as well as prevent the onset of many health complications, overweight and obese individuals are advised to become more physically active alongside making changes to their diet (Hu, 2003).

Individuals with obesity regularly seek advice from health care professionals for treatment methods. It has been reported, however, that physicians often view obesity as a behavioural problem and tend to stereotype individuals with the condition as lazy and lacking in self-control (Foster et al., 2003). This serves as a problem for individuals within this demographic as they are seeking advice for their condition but not receiving the level of care expected from a physican. Medications are also used in the treatment of obesity. A systematic review conducted by Yanovski and Yanovski, (2014), examined the medications used for obesity treatment in the US. The vast majority of drugs used for obesity treatment within the review suspend appetite and have been shown to help with weight loss when administered alongside a lifestyle intervention. In serious cases of overweightness and obesity, surgery is required. Bariatric surgery is the most successful surgical method to treat obesity in the morbidly obese (BMI >40 kg/m^2) (Buchwald and Oien, 2013 & Buchwald, 2005). Procedures such as making the stomach smaller with a gastric band or by removing part of the stomach are common methods of bariatric surgery and have been shown to assist in up to 35% weight loss three years post surgery (Courcoulas et al., 2013). These surgeries, however, contribute towards the increased economic burden on health care systems.

Due to the serious public health and economic impact, it is apparent that an innovative approach for reducing the prevalence of overweightness and obesity is needed.

1.2 Male Overweightness, Obesity and Health

In 2014, 61.8% of Canadian men and 46.2% of women aged 18 years and older were classified as overweight or obese (self-reported) (Statistics Canada, 2016). Men aged 45 to 64 years account for the age range with the highest amount of overweight or obese persons of either gender (69.5%). Other reports state that 57% of males residing in Ontario are reported as overweight or obese (Leenen et al., 2010). The destructive health implications due to overweightness and obesity already mentioned are often directly caused by excess weight around the waist, which is regularly observed in men (Despres et al., 2001). Therefore, weight loss is essential to combating the onset of conditions associated with overweightness and obesity. The importance of weight loss

within the male specific overweight and obese demographic is amplified due to a common perception of greater body size being associated with masculinity (Lemon et al., 2009 & Stribbe, 2004). Furthermore, men often view dieting as 'feminine' and have been shown to be more likely to use physical activity to control their weight (Gough, 2007).

A common trait of overweight and obese individuals is inactivity and sedentary behaviours (Proper et al., 2011). This trait has often been attributed to the male population, leading to a common public stereotype of middle-aged men being lazy individuals who watch excessive amounts of television. Matthews et al., (2008) went some way to disprove this idea by showing that women are more sedentary than men until the age of 60 years, at which point the pattern reverses. Nonetheless, Mummery et al., (2005) suggested that there is a significant association between BMI values $\geq$25 kg/m^2 and sitting time in males but not females.

The impact of overweightness and obesity does not only affect the individual with this condition. Teerds et al., (2011) showed that the sons of mothers who conceive whilst being obese are more likely to have a higher BMI in adulthood than those with mothers of normal weight. Expanding on the relationship between children and their parents, Freeman et al., (2012) conducted a longitudinal study examining the effect that healthy and overweight or obese parents have on the likelihood of their children becoming overweight or obese in later life. They identified that children with a healthy weight mother and an overweight father were substantially more at risk of becoming obese; however, having an overweight mother and a healthy weight father was not a significant predictor of future diagnosis of obesity for the child.

1.2.1 Male Dietary Behaviours

Many suggestions exist for a healthy, balanced diet. Health Canada's Food Guide (Appendix A) gives broad suggestions for nutritional intake based on age and gender. The national document gives examples of portion sizes and serving amounts for daily consumption to create a healthful diet. Males between the ages of 19 and 50 years are recommended to include 7-10 fruits and vegetables; 7-8 grain products; 2-3 milk and

alternatives and 2-3 meat and alternatives in their daily diet. This document, although detailed and resourceful, should be used as a guide only due to the vast differences in nutritional intake individuals require as a result of their lifestyle.

Differences in dietary choices between men and women become apparent during adolescence (Kiefer et al., 2013). Research also suggests that women have a greater knowledge and a more considered approach to nutrition than men and are less knowledgeable of the association between nutrition, health and the development of related diseases (Kiefer et al., 2013). Masculinity plays a part in the choices that men make surrounding their diet with evidence suggesting that men perceive cooking and dieting as feminine traits and therefore do not involve themselves in these practices (Warde & Hetherington, 1994). This impression men have of themselves as well as the widespread cultural assumption that men rely on women for health and nutritional advice (Courtenay, 2000) could be interpreted as one manifestation of hegemonic masculinity, as described by Connell and Messerschmidt, (2005). The notion of hegemonic masculinity refers to preeminent traits of masculinity, which influence male identities and practices, including health practices (Gough et al., 2007). These constructions such as being physically and emotionally stronger, as well as not acknowledging pain or seeking medical advice, can lead to serious health issues (Kapur et al., 2004) as they can reflect onto dietary behaviours.

Poor dietary choices can directly lead to major health problems. Insufficient consumption of fruit and vegetables is one of the major risk factors of heart disease and stroke (Yusuf et al., 2004). Canadian men aged 14-50 are significantly less likely than females to have fewer than five servings of fruit and vegetables per day (Statistics Canada, 2007). Furthermore, excess sugar is associated with adverse health effects including heart disease, stroke, obesity, diabetes, high blood cholesterol, cancer and dental cavities (Heart and Stroke Foundation, 2016). Excess sodium consumed by Canadians mainly comes from processed foods (77%). This increases the risk of high blood pressure, heart disease and stroke (Heart and Stroke Foundation, 2016). In Canada, men also tend to consume more calories, meat and alternatives and fast food than women (Statistics Canada, 2007).

A study by Katzmarzyk et al., (1999) displayed a positive correlation between Canadian spouses and obesity, stating that there is significant evidence that as one partner's weight increases, the other's also increases. These findings can be extended to a relationship reported by Cobb et al., (2016) who found that non-obese men whose wives became obese were 1.78 times (95% CI: 1.30 to 2.43) more likely to become obese. Furthermore, a 1-unit increase in wives' BMI was associated with a 0.10 kg/m^2 increase in BMI in their husbands (95% CI: 0.09 to 0.12).

1.2.2 Male Physical Activity Behaviours

The Canadian Society for Exercise Physiology (CSEP) provide Canadian Physical Activity Guidelines for different age groups from "early years" (0-4 years of age) through to "older adults" (65 years of age and older). Based on adults between the ages of 18-64 years, recommended physical activity includes 150 minutes of moderate to vigorous intensity aerobic physical activity per week, in bouts of 10 minutes or more (Canadian Society for Exercise Physiology, 2016). CSEP define moderate intensity as "activities that will cause adults to sweat a little and to breath harder" such as brisk walking and bike riding. Vigorous activities are defined as those that "cause adults to sweat and be out of breath" like jogging and cross-country skiing. These recommendations of time and intensity are supported by Warburton et al., (2010) and Tremblay et al., (2010).

Although these recommendations exist, a 2007-2009 analysis of physical activity conducted by Colley et al., (2011) set out to study the physical activity of Canadian adults through accelerometry. Interestingly, results suggested that overweight men partake in an average of 26 minutes of moderate to vigorous activity per day (182 minutes per week) and obese men an average of 19 minutes per day (133 minutes per week). Although overweight men complete on average, 32 minutes more physical activity than the minimum recommendation, in comparison to healthy weight men they are engaging in less physical activity (ie., 63 minutes per week less) however it is unclear if this was moderate to vigorous activity performed in 10 minute bouts or more.

Another recognized measure of physical activity is walking 10,000+ steps per day. This recommendation has become increasingly common in the 21st century and is commonly promoted despite any authoritative endorsement (Tudor-Locke et al., 2008). Origins of 10,000 steps per day can be traced to the 1960's when Dr. Yoshiro Hatano studied typical steps per day of various lifestyles and established that 10,000 steps translated to approximately 300 kcals of energy expenditure for an average middle-aged Japanese man (Hatano, 1993). With this recommendation in mind, Colley et al., (2011) discovered that overweight Canadian men walk an average of 9,491 steps per day whilst obese Canadian men walked an average of 8,342. This in comparison to healthy weight men who averaged 10,577 steps ($P<0.05$). This lack of activity can cause detrimental health issues already discussed in relation to inactivity and sedentary behaviours. Encouragingly, however, being physically active as an overweight or obese male alongside a healthy diet can significantly benefit health and physical functioning (Villareal et al., 2011 & Jakicic et al., 2005).

Little research has been conducted on the direct health benefits of increasing physical activity levels in the overweight and obese populations alone. Warburton et al., (2006) conducted a review into the role that physical inactivity plays in the development of chronic disease and premature death within the general population of men and women. Their findings showed that physical activity can be beneficial in the prevention and treatment of many chronic diseases and illnesses such as cardiovascular disease, which can equate to up to a 50% reduction in risk of premature death (Warburton et al., 2006 & Myers et al., 2004). Helmrich et al., (1991) reported that with each increase of 500 kcal energy expenditure per week came a 6% decreased incidence of type 2 diabetes); this benefit was particularly evident among the overweight and obese population.

1.3 Lifestyle Intervention Studies

Lifestyle intervention studies are commonly used in health care research. Many studies focus on changes in lifestyle within the overweight and obese population as well as other chronic and cardiovascular diseases and illnesses associated with overweightness

and obesity, such as type 2 diabetes. Pi-Sunyer et al., (2007) examined the effects of a lifestyle intervention on weight loss within overweight and obese (BMI $\geq$25 kg/m^2) people aged 45-74 years who were diagnosed with type 2 diabetes. In total, 5,145 participants were recruited to partake in an "Intensive Lifestyle Intervention" (ILI) randomized-controlled trial, which consisted of group and individual meetings to achieve and maintain weight loss through decreased caloric intake and increased physical activity. The stucture of the 1st year of the study for the ILI group centred around goals of: a) mean weight loss of $\geq$7% and increasing participants' physical activity (moderate intensity) to $\geq$175 minutes per week (months 1-6); and b) continued weight loss/maintenance, increased minutes per week of physical activty and 10,000 steps per day (months 7-12). Weekly sessions within months 1-6 (3 group, 1 individual) and 3 sessions per month (2 group, 1 individual (months 7-12)) were conducted to help achieve these goals. Exact details of session content are not reported, however, dietary changes were made in week 2 through a reduction of caloric intake (after recording intake during week 1). During weeks 3-19, a portion controlled meal plan was prescribed to facilitate participants' adherence to their caloric intake goals. Educational sessions surrounding the importance of physical activity encouraged participants to engage in at least 50 minutes of physical activity per week, as well as change habits such as taking the stairs rather than the elevator. In week 7, participants were given pedometers and encouraged to increase their step count by 250 per week until they reached $\geq$10,000 steps/day. These effects were compared to a Diabetes Support and Education (DSE) group who attended 3 group sessions in the first year where they were provided information and opportunites discussing topics related to diet, physical activity and social support, however, did not receive counselling in behavioural strategies for changing diet and physical actvity. After 1 year of the interventon, participants of the ILI lost an average of 8.6% of their intial weight vs. the DSE Group who lost 0.7% ($P<0.001$) and increased fitness levels measured by a submaximal exercise test by 20.9% vs. the DSE group who increased by 5.8% ($P<0.001$).

1.3.1 Gender-Sensitized Diet and Physical Activity Intervention Studies

Many gender-sensitized lifestyle interventions are focused on the female population group, with little research focused on overweight or obese males. Gender-sensitization (tailoring programs/education towards men or women's preferences and inclinations) has been shown to assist men with lifestyle changes, including weight loss, increased physical activity and diet modifications.

In 2011, Pagoto et al., (2011) conducted a review to investigate total male inclusion in randomized controlled trials of lifestyle interventions. Their review had strict inclusion criteria including that all studies had to be published between 1999 and 2009; were written in English and tested a dietary, exercise and/or behavioural intervention for weight loss. In total, 244 studies were reviewed with results revealing that on average, 27% of the participants were male and 73% were female. Of the studies reviewed, 32% recruited females exclusively, in comparison to just 5% that recruited only males. It is clear from this review that there is an under-representation of men in lifestyle intervention studies.

The importance of gender-sensitized lifestyle interventions is highlighted by the lack of lifestyle intervention studies involving men exclusively, the notion that men are not as concerned with their health, size and weight as women and the fact that most lifestyle interventions do not appeal to men (French & Jeffery, 1994). Attempting to engage men to participate in lifestyle interventions has been investigated in a scoping review by Gavarkovs et al., (2015). The review states that a past negative health event, personal concern for health status and motivation to improve physical appearance were cited by men as reasons to join lifestyle intervention programs. Based on the few studies that exist, this review concluded that men were attracted to group components with like-minded men, the use of humor in the delivery of health information, the inclusion of both nutrition and physical activity components, and the inclusion of some manner of competition.

In 2008, Groeneveld et al. (2008) examined the effect of a lifestyle intervention including individual counselling over a six-month period. The study participants were Dutch, male, construction workers between the ages of 18-65 years and had a BMI $\geq$28

kg/m^2. All were identified as at risk of cardiovascular diseases. The counselling that the intervention participants received involved discussions regarding pros and cons of current behaviour and behavioural change in relation to their lifestyle choices (i.e., diet, physical activity levels). Other aspects of the counselling sessions included evaluating each participant's attitude towards behaviour change. Importance of change, confidence in ability to change and readiness to change were measured on a scale of 0 (not at all) to 10 (highly) designed by Miller and Rollnick, (2002). Finally, goals were set at each session for short term gains, such as reducing the number of snacks consumed each week. Alongside the short term goals, one or more longer-term goals were set that were encouraged to be accomplished within six months (e.g., lose 20 pounds). The control group did not receive any counselling. The intervention group exhibited positive results as reported by Groeneveld et al., (2010) in comparison to the control group. Body weight in the intervention group significantly decreased by an mean of -1.4 kg, (95% CI: -2.6 to -1.2; P<0.05), 6 months after baseline and 0.9 kg (0.5 kg increase from 6 months) (95% CI: -2.6 to -1.1; P<0.05) at 12 months post baseline in comparison to the control who saw weight increase by a mean of 0.6 kg (95% CI: -2.6 to -1.2; P<0.05) at 6 months and 0.9 kg (0.3 kg increase from 6 months) (95% CI: -2.6 to -1.2; P<0.05) at 12 months. BMI also showed differences in comparison to baseline: Intervention group exhibited a mean decrease of -0.5 kg/m^2 (95% CI: -0.8 to -0.3; P<0.05) at 6 months and -0.3 kg/m^2 (0.2 kg/m^2 increase from 6 months) (95% CI: -0.8 to -0.3; P<0.05) at 12 months; the control group showed a mean increase of 0.2 kg/m^2 (95% CI: -0.8 to -0.3; P<0.05) at 6 months and 0.3 kg/m^2 (0.1 kg/m^2 increase from 6 months) (95% CI: -0.8 to -0.3; P<0.05) at 12 months.

Other lifestyle intervention studies solely for men include the Healthy Dads, Healthy Kids randomized controlled trial, intervention study conducted by Morgan et al., (2014) that aimed to assist fathers achieve their personal weight loss and influence the lifestyle behaviours of their children. The trial recruited overweight and obese, middle-aged men (40.9y ± 5.6 (mean and standard deviation); n=93) and their primary school-aged children (n=132) from a community in Australia. An intervention group participated in 7 consecutive weekly sessions, each 90 minutes in length. Four educational sessions were for fathers only and three activity sessions were attended by

fathers and their children. Content of educational sessions varied from weight loss fundamentals to sustaining healthy lifestyles. The activity sessions focused on fundamental movement skills, rough and tumble play, health-related fitness and fun, and active household and backyard games. Along with changes in weight and BMI, Morgan and colleagues examined dietary intake of the fathers, measured by the Australian Eating Survey. The 120-item, semi-quantitative Food Frequency Questionnaire has been validated in adults (Collins et al., 2014) and showed individual food item consumption over the previous three months. Men in the intervention group displayed significant changes in mean weight loss of -3.3 kg and mean BMI decrease of -1.1 kg/m^2 from their baseline weight in comparison to the control group who displayed a 0.1 kg mean weight gain and no changes in their BMI. Caloric intake per day significantly decreased by an average of -493 kcal in the intervention group in comparison to the control group (-56kcal (mean)) (converted from kilojoules).

Intervention studies examining lifestyle behaviours with dietary changes as an outcome measure in men are few and far between in Canada. One study, conducted by Nazare et al., (2013) set out to reduce caloric intake by 500 kcal per day as well as increase physical activity. In total, 144 men between 30 and 65 years of age, classified as obese (waist circumference $\geq$90 cm) were recruited for a lifestyle modification program. The non-randomized intervention study lasted one-year during which participants were individually counselled once every two weeks during the first four months with subsequent monthly visits to improve their nutritional and physical activity habits. A registered nutritionist led the interactive sessions on dietary changes; additional details related to the counselling sessions are not reported. Analysis of dietary change came via a three-day dietary record that included a non-working day. This record was completed at baseline and after one-year of the intervention and was assessed by a trained dietitian who used the data to derive a standardized score to the number of daily servings of 34 specified food groups. Standardized serving sizes were determined according to Canada's Food Guide and each record was then cross-validated by two trained dietitians. After one year of intervention, participants displayed an average daily decrease of -560 kcal ± 670 (mean and standard deviation); $P<0.0001$) as well as a daily increase in the amount of fruit and vegetables (1.42; ± 3.47 (mean and standard

deviation); P<0.01). Participants also exhibited a decrease in the amount of daily fast food (-0.25; ± 0.72 (mean and standard deviation); P<0.01), sweets (-0.29; ± 0.63 (mean and standard deviation); P<0.0001) and butter consumed (-4.6; ± 10.4 (mean and standard deviation); P<0.01) among others. The scarcity of studies in Canada examining and targeting changes in dietary behaviours suggests the need for an innovative intervention study for those at risk of cardiovascular diseases and other health ailments due to their overweightness or obesity.

1.3.2 Sporting Context Lifestyle Intervention Studies

Sports fans have long been associated with overweightness and obesity with one survey suggesting that sports fans weigh more, eat higher fat foods and have worse general health habits than their non-sports fan counterparts (Sweeney & Quimby, 2012). Fans of North America's seven biggest sports (basketball, football, baseball, hockey, golf, NASCAR and soccer) are predominantly male (67%) and between the ages of 35-55+ years (71%) (Eby, 2013). With viewing figures implying that sport accounted for eight of the top ten viewed television events of 2015 (Loudenback, 2015), it is clear that sport is a huge part of the male lifestyle. Considering this, alongside previously stated research regarding men being less likely than women to participate in lifestyle interventions, some research studies have recently been conducted using a sporting context as the draw for men to participate.

Football Fans In Training (FFIT) investigated the effect of a 12-week weight loss and healthy lifestyle intervention with a 12 month follow up, 9 months after the conclusion of the intervention on overweight and obese male soccer fans aged 35-65 with a BMI of >28 kg/m^2 using a randomized controlled trial (Hunt et al., 2014). In total, 747 men were randomized 1:1 into an intervention or control group with the intervention group attending 12 healthy lifestyle and physical activity sessions over 12 weeks and the control group not receiving any counselling. Each session was 90 minutes in length. FFIT partnered with Scottish Premier League soccer teams to run the intervention sessions within the home stadium of the club. The sessions were conducted by community coaches of the soccer club who are employees that coordinate events outside of the

day-to-day soccer operations. For example, community coaches go into local schools to help run physical education classes or assist with charity events in the club's name. Content of the educational segment of each FFIT session included, but was not limited to, learning of dietary changes, the effect of alcohol on weight gain, the importance of keeping physically active, goal setting and social support. As the weeks progressed, the time designated for education generally decreased as the time designated for physical activity increased. This coincided with the physical activity intensity increasing and the educational content becoming more focused on reviewing previously learned content. After 12 weeks of participation in FFIT, significant differences were seen (vs. control group) in mean weight loss (-5.18 kg; 95% CI: -6.00 to -3.35, P<0.0001) and mean BMI (-1.66 kg/m^2; 95% CI: -1.93 to -1.40, P<0.0001) within the intervention group. The intervention group also demonstrated significant changes in eating intake from a modified version of the Dietary Instrument for Nutrition Education (DINE) compared to the control. A reduction in fatty foods (-4.39 (mean); 95% CI -5.16 to -3.61, P<0.0001 and sugary foods (-1.52 (mean); 95% CI: -1.83 to -1.21, P<0.0001) as well as an increase in fruit and vegetable consuption (1.32 (mean) (95% CI: 1.07 to 1.57, P<0.0001).

Having shown to be an effective program, the framework of FFIT has been used for other sports such as rugby in Australia. Sealey et al., (2013) conducted a participatory, action-based experimental lifestyle intervention to evaluate the effectiveness of a 12 week lifestyle program for changes in healthy lifestyle knowledge, health perceptions and body compositon of middle-aged, overweight men. The intervention procedures were akin to FFIT, however the study design and outcome measures were different with the exception of weight, BMI and waist circumference. The study recruited men aged 35-65 with BMI >25 kg/m^2 within two cohorts, a rugby league club and a rugby union club. After 12 weeks of healthy lifestyle education and physical activity sessions, participants (n=14 completers) of both cohorts (7:7) displayed changes in some measures in comparison to baseline. The rugby league cohort had significant reductions in mean weight (-2.5 kg), BMI (-0.9 kg/m^2) and waist circumference (-6.7 cm) (all P<0.05) whereas the rugby union cohort, although exhibited trends toward mean weight loss and decreased BMI, only waist circumference was significant (-7.9 cm

(mean)). These two studies provide some justification for the incorporation of sports clubs and teams into lifestyle intervention studies to promote weight loss, physical activity and dietary changes.

1.4 Concluding Comments

It has been shown that combining changes in dietary behaviours changes and physical activity within an intervention study for men has a greater effect on weight loss than dietary change or physical activity alone (Hagan et al., 1986 and Jakicic & Otto, 2005).

After identifying the economic and health burdens caused by overweightness and obesity along with the lack of lifestyle intervention studies that exist or are attractive to men to participate in, a healthy lifestyle education and physical activity trial for Canadian men could be beneficial for their future health.

In Canada, hockey is core to the culture: two thirds of adult Canadians follow the game as a fan and 8 out of 10 identify hockey as a key part of what it means to be Canadian (Neuman, 2012). Canadians aged 30-49 (31%) make up the largest cohort of hockey fans with men (33%) twice as likely as women (16%) to say they love hockey (Neuman, 2012).

After consolidating the examined literature, it is apparent that targeting the male, overweight or obese, middle-aged population through the love of hockey could further assist in the drive to combat obesity in Canada as a consequence of dietary behaviour change.

Chapter Two

2. Methods

2.1 Introduction

The findings shown in the literature review (Chapter 1) outline the need for an intervention targeted to men at risk of chronic diseases due to overweightness and obesity.

Hockey Fans In Training (Hockey FIT) was adapted from Football Fans In Training for the Canadian market by using the love of hockey to encourage middle-aged, overweight and obese men to lose some weight, increase physical activity time and live a healthier lifestyle. Hockey FIT incorporated content from the Health*e*Steps study within its session content. Health*e*Steps is a program principally investigated by Petrella et al., (2014) that uses one-to-one lifestyle coaching with community-dwelling adults aged 18-85 years with a BMI of >25 kg/m^2. The program uses "lifestyle prescriptions" to encourage improved dietary behaviours, increased physical activity (walking) and exercise. These prescriptions were used within Hockey FIT to assist the men with setting and accomplishing targets through the 12 weeks of intervention and are further described in section 2.4.

2.2. Study Objectives

The purpose of this study was to investigate the impact of a weight loss and healthy lifestyle, education and physical activity program (Intervention: Hockey FIT group) compared to usual care (Comparator: Wait-List Control group) on dietary behaviours in male hockey fans classified as overweight or obese. The hypothesis being tested is that participants in the Hockey FIT group will display healthier dietary behaviours after 12 weeks versus the control group (and compared to baseline). This will be measured by change in the summary score from the Starting the Conversation (STC) questionnaire (primary outcome). Healthier food choices will also be apparent in the Hockey FIT

group versus the control group (and compared to baseline) by examining three summary scores from the modified Dietary Instrument for Nutritional Education (DINE) questionnaire (fatty foods, sugary foods and fruit and vegetable consumption). Both instruments are described in detail within the section 2.5.

2.3 Study Design

The current study was a sub-study of a larger pilot randomized controlled trial. Hockey FIT took place in London, ON and Sarnia, ON (total n = 80). This sub-study focuses on the London cohort exclusively (n = 40). Ethical approval was received from the Health Sciences Research Ethics Board at Western University (Appendix B). All participants provided written informed consent prior to enrolling into the study. The study was registered through ClinicalTrials.gov PRS Protocol Registration and Results System (Appendix C).

A 12 week, two-group, pilot, pragmatic, randomized controlled trial was conducted, with a 40-week maintenance phase follow up procedure. The 40-week maintenance phase is explained in greater detail within (Appendix D). Measurement sessions were performed at baseline and 12 weeks for both groups.

Inclusion Criteria

To be deemed eligible to participate in Hockey FIT, participants needed to:

- Be male
- Be aged 35-65 years
- Have a Body Mass Index $\geq$28 kg/m^2
- Clear a Physical Activity Readiness Questionnaire (PAR-Q) (Thomas et al., 1992) (*If a participant was not initially deemed healthy enough by selecting "yes" on one or more of the questions on the PAR-Q, the study principal investigator consulted with the participant to deem their safety to engage in physical activity as part of the Hockey FIT sessions).*

Participants were excluded from being randomized into Hockey FIT if they:

- Were unable to comprehend letter of information and consent documentation

The relatively lenient inclusion for this Hockey FIT study emulated that used in FFIT and intended to reflect "real-world" individuals from a local community. Participants were required to verbally agree to be available to attend Hockey FIT sessions on Tuesday evenings for 90 minutes, for 12 weeks.

Participants

A total of 40 participants were recruited for this study (London site only) with recruitment being sought through a variety of avenues (Table 1).

Participants contacted the research coordinator via email or telephone if interested in participating in the study. The research coordinator then conducted pre-screening via email or telephone to assess initial eligibility. Specifically, the research coordinator asked the potential participant their gender, age, height, weight and availability to attend Hockey FIT sessions on Tuesday nights for 12 weeks starting on a set date. If the potential participant was deemed "likely" to be eligible after this stage, they were invited to a formal in-person screening session.

Location

All assessments took place at the Western Centre for Public Health and Family Medicine, Western University, London, ON. Hockey FIT sessions took place at GoodLife Fitness Centres Inc. and The London Knights Hockey Club. These two organizations were contacted to encourage their involvement in the study. GoodLife Fitness is a nationwide company of 350+ health clubs that started in London, ON and provided an ideal setting for nine of the twelve Hockey FIT sessions to take place. A classroom, normally used for staff meetings and training sessions, was used for the educational segment of all Hockey FIT sessions that took place at GoodLife. The classroom allowed space for tables and chairs to be set up in small groupings. The physical activity

segment of each session at GoodLife took place in the aerobics studio, usually used for group fitness classes.

The London Knights are a Major Junior A Hockey Club competing in the Ontario Hockey League (OHL) under the Canadian Hockey League (CHL) umbrella. The CHL oversees 60 teams spread across the OHL, Western Hockey League (WHL) and Quebec Major Junior Hockey League (QMJHL). The majority of OHL teams are based in locations without a National Hockey League (NHL) team (highest level of professional hockey in North America). Therefore, the OHL teams are usually in smaller communities/cities. The London Knights attracted the highest average home attendance (9,013) in the 2015-16 season in comparison to the Chicago Blackhawks who attract the highest average home attendance (21,859) in the NHL. Three of the twelve Hockey FIT sessions took place at the London Knights home arena (Budweiser Gardens). The space used for the educational segment of Hockey FIT when at Budweiser Gardens was similar to that at GoodLife. A classroom/meeting room usually used by media personnel when the London Knights were playing provided a similar set up as at GoodLife. As Hockey FIT ran during the hockey off-season, physical activity segments of the 3 sessions at the arena took place where the ice pad would usually be as it had been replaced with concrete.

In-person Screening

The men that met the pre-screening for eligibility criteria attended a formal screening session that lasted approximately 20 minutes. As the men arrived they were greeted by the research coordinator that they had previously spoken to via telephone or email in the pre-screen phase. The research coordinator gave the men a Letter of Information/Consent document to read, outlining the study history and procedures. Each participant signed a Letter of Information/ Consent document if they agreed to take part in the study; letters were also signed by the research coordinator, and duplicate copies were provided to participants. Following this, men were asked to self-complete a PAR-Q. If a participant answered, “yes” to one or more of seven questions on the PAR-Q, the research team member completed a Health Care Provider Clearance form to highlight their specific concerns regarding the men’s ability to perform physical

activity. This form was then provided to the study physician and principal investigator for determination of the man's eligibility to partake in Hockey FIT.

To conclude the screening session, the men were taken individually to a private room for measures of their height (Seca 213 portable stadiometer), weight (Tanita HD351 Digital Weight Scale) and BMI. All measures were recorded on a screening case report form and a checklist was completed by the Research Coordinator to determine eligibility to participate in Hockey FIT. All eligible men were then asked to continue with a baseline assessment.

Baseline Assessments

After eligibility was confirmed, the participants immediately partook in a baseline assessment. Participant demographic and clinical characteristics were collected at baseline and are displayed in Table 3. Dietary behaviours/history were measured by two tools. The first tool was the STC; a validated questionnaire identifying participant's consumption of eight different food types per week or in some cases days "over the past few months". A score, (range 0-16) was then calculated, with 16 indicating the most un-healthful food choices (Paxton et al., 2011). The modified DINE questionnaire that calculates a fatty food score (possible range 8-68), fruit and vegetable score (possible range 0.5-6) and sugary food score (possible range 3-16) higher scores were indicative of high consumption (Roe, et al., 1994) was the second tool used to measure dietary intake.

Participants were then instructed to wear a pedometer (Digi-walker SW-200 pedometer), provided for them by the research coordinator for seven full days. Participants were asked to wear the pedometer as much as they could through the day, ideally as soon as they woke and taken off immediately before going to sleep. Participants recorded the number of steps completed each day on a log that was provided to them.

Randomization, Allocation & Blinding

Following baseline measurement and seven days of tracking steps via the pedometer, participants returned for the randomization and allocation session. The randomization sequence was computer-generated [stratified by site (London & Sarnia), 1:1 in block sizes of 4 and was compiled by the study epidemiologist using SAS version 9.4] and concealed using opaque envelopes until interventions were assigned (by an individual not involved in generating the randomization sequence). Participants were randomized in correspondence to the numerical order of the randomization envelopes and when they attended the randomization and allocation session (i.e., the first participant to attend the session was randomized [to either the Hockey FIT group (begin Hockey FIT program immediately) or Control group (begin Hockey FIT after 12-week period)] to the group within envelope number one.

Participants randomized into the Hockey FIT group were asked to keep the pedometer provided to them to use over the duration of the intervention to track their steps. Participants in this group were also given a handout regarding the Hockey FIT sessions (e.g., calendar of dates, what to wear/bring etc.) Control group participants returned their pedometer to the research coordinator. All participants (from intervention and control) were provided with Canada's Food Guide (Appendix A) and Canada's Physical Activity Guidelines (Appendix E). All participants were also given an adverse events log and the research staff member randomizing the participants stressed the importance of keeping the research team and/or their Hockey FIT coach up to date with any injuries, illnesses, or changes in medication for the entirety of the study. During 12 week assessments, a blinded assessor administered the weight measurement of the participants. Other assessors were not blinded.

2.4 Intervention: Hockey Fans in Training Program

Hockey Fans In Training program sessions started on Tuesday 12th May 2015 and ran for 12 subsequent weeks with sessions starting at 8:45pm and ending at 10:15pm (90 minutes/session). Sessions took place in two separate locations; the Budweiser

Gardens Arena (home arena of The London Knights) hosted sessions 1, 5 and 11 and a local GoodLife fitness club facility was used for all other sessions.

Participants were encouraged at their allocation and enrolment session to bring a pen and a bottle of water along to each session, as well as wear comfortable/appropriate physical activity clothing and footwear. Each participant was provided with a participant handbook on their first session that they were asked to bring to every session. The handbook provided each of the men an overview of the 12 weeks, a calendar of session locations and relevant literature needed for each session.

The Hockey FIT coach, a Western University MSc student in Kinesiology with a coaching background was trained to deliver the sessions by attending a workshop in Glasgow, Scotland led by coaches of FFIT. During his time in Glasgow, the coach attended two FFIT sessions at different clubs whilst noting the length of the session (90 minutes), ratio of coach to participants (1:10) (one head coach and one assistant) and format of the session (started with education and concluded with physical activity). The Hockey FIT coach also paid attention to the language being used by the FFIT coach in terms of making the men feel comfortable whilst also incorporating light hearted banter. The coach watched FFIT sessions take place and was given the FFIT coaches handbook to use as a reference for future designing of Hockey FIT sessions. On return from Scotland, the coach along with members of the research team used the FFIT coaching and participant handbooks as templates for Hockey FIT; the coach and participant handbooks were continuously edited and reviewed by coaches, the principal investigator and other research team members until final versions were agreed upon. The coach ran five “mock” Hockey FIT sessions, using members of the research team and their friends and/or family as study participants. The coach also worked closely with the head coach of the Sarnia cohort of Hockey FIT, a Western PhD candidate who has an extensive background in playing and coaching hockey. During all Hockey FIT sessions, the coach had an assistant, a Western undergraduate student who has previously represented the university for the varsity hockey team. The research team also met weekly before and during the Hockey FIT program to discuss progress, challenges and highlights.

Throughout the program, elements of hockey were incorporated into each session with dry land hockey drills often being integrated into the physical activity segment of the sessions. Sessions at the home arena of the club and tours of the facility also provided an association between club and program. All through the Hockey FIT sessions, the coach used light humour and banter as seen being used in FFIT sessions in Scotland. For example, the coach would make jokes about the hockey teams the men supported. This made for a relaxed atmosphere in which the participants could be comfortable around other participants.

Each session started with the coach taking attendance and asking the men to report any adverse events. After this, every week the participants were given between five and ten minutes to set/re-set or review the three lifestyle prescriptions (i.e., physical activity, exercise and healthy eating). ***Physical Activity Prescriptions:*** Every week, participants set new physical activity targets by trying to increase the number of steps they completed at their baseline measure. A target was set for each week of the program with participants trying to increase their daily step counts progressively through the 12 weeks. If a participant was finding the target too easy or difficult, the review and re-set of the physical activity prescription at the beginning of the next session allowed them to make adjustments to the target. ***Healthy Eating Prescriptions:*** Eating habits were measured by participants recording how many servings of fruit and vegetables, grain products, meat and alternative products, milk and alternative products and water (all as defined by Health Canada's Food Guide), as well as if they had breakfast or not, each day. When setting a new healthy eating prescription, participants were encouraged to increase or decrease by one serving in an attempt to get as close as possible to Health Canada's Food Guide recommendations. Healthy eating prescriptions were set in sessions two and eleven; however, participants were encouraged to change the prescription themselves if they were finding the target too easy or difficult between sessions two and eleven. ***Exercise Prescriptions:*** Finally, exercise prescriptions were set in sessions four and ten. Similar to the healthy eating prescription, men were encouraged to re-set this prescription on other weeks if they felt it necessary. This prescription encouraged men to take part in exercise that raised their heart rate to a target calculated from a STEP test (Step Test Exercise Prescription)

(Petrella et al., 2001). The purpose of the STEP test is to see how well an individual's lungs, muscles and heart work together during exercise. Results from the STEP test are used to calculate an individualized target heart rate for exercise that ensures that participants are getting the benefits of exercise while also being safe as well as a predicted V02max (maximal oxygen uptake) (Petrella et al., 2001). The STEP test protocol can be found in Appendix F. The target heart rate was then combined with trying to increase the amount of exercise each participant was currently doing by 15 minute increments per week, in an attempt to reach the Canadian Society for Exercise Physiology recommendations of 150 minutes of moderate-vigorous activity per week, in bouts of 10 minutes or more. The three prescription worksheets and healthy living tracking form can be found in the Appendix G. Each participant set their own prescriptions, with advice from the coach and other participants. The tracking of each individualized healthy lifestyle prescription goals was an important aspect of Hockey FIT sessions to build on progress and re-evaluate any goals that were becoming hard to reach.

The sessions were progressive in the amount of physical activity performed in each class. The program started with the majority of time within each session being allocated to educational teaching from the coach; however, as the program progressed, the amount of time for classroom education generally decreased while the amount of time for physical activity increased. Tables 2a and 2b show an overview of the 12 sessions.

Control Group

During the 12-week intervention, the control group participants continued with their usual activities with no contact from the researchers. Three weeks after completion of the 12 weeks assessments, control group participants were invited to attend 12 sessions of Hockey FIT following the exact same protocol as the Hockey FIT group.

2.5 Outcomes

The primary outcome of this study was to examine the difference between groups in mean change in the STC questionnaire summary score (Appendix H) at 12 weeks. Secondary outcomes included examining mean changes in the STC summary scores within each group (Hockey FIT and control), from baseline to 12 weeks. Tertiary (exploratory) outcomes included examination of mean changes between and within groups in the modified DINE questionnaire (Appendix I) summary scores (fatty foods, fruit and vegetables and sugary foods) at 12 weeks as well as a change between groups in breakfast consumption from the modified DINE.

The STC questionnaire contains eight questions that evaluate how much of certain food types one has consumed over the past "few months" (Paxton et al., 2011). The tool was designed to be administered by non-dietitians in clinical practices for assessment and counselling. The STC was derived from the Dietary Risk Assessment; a validated 54-item instrument (Jilcott et al., 2007) and identifies dietary patterns by evaluating respondent's consumption of different food types. Paxton et al., (2011) do not provide reasons for designing the STC with just eight of the 54 items used by Jilcott et al., (2007). Each of the eight questions within the STC questionnaire measures distinctly different aspects of dietary behaviour and divides the options of how many times the respondent has consumed such foods "over the past few months" (by days or weeks) into three separate choices; the left column represents the healthiest dietary choices, the middle column represents less healthy dietary choices and the right column represents the least healthy dietary choices. A left column selection scores 0, middle scores 1 and right scores 2. Therefore, the summary score (all items summed together) shows that the healthiest dietary score equals zero and the least healthy dietary score equals 16. Paxton et.al, (2011) examined the performance of the STC within an adult population with type 2 diabetes, BMI $\geq$25 kg/m^2 and at least one other risk factor for heart disease (n=463). The authors concluded that the STC is a robust tool across a variety of participant characteristics, stable over time in the absence of treatment, sensitive to treatment, and a reasonably valid measure of dietary intake compared to the previously validated dietary-fat-focused National Cancer Institute screener (Thompson et al., 2007). Paxton et al., (2011) did not, however, evaluate reliability of

the STC and after an extensive search, reliability of the STC has not been published to date.

The modified DINE questionnaire used for this study was an 18-item questionnaire designed to examine fatty foods, sugary food and fruit and vegetable intake over the previous 7 days, along with breakfast consumption and whether the respondent is vegetarian or not. The original, full DINE questionnaire was designed for use in nurse-administered health checks in general practice/worksite programs. The DINE was also designed to be administered by individuals without extensive nutritional knowledge. The objective of the original questionnaire was to give a brief initial assessment of dietary choices and to guide health care professionals to provide personalized dietary change advice in accordance to results and national recommendations (Roe et.al., 1994). In addition to food types listed in the modified version, the full version of the DINE examines types of bread, cereal and spreads (i.e., butter or margarine on and cooked in food items) that the respondent is consuming, as well as a breakdown of the types of vegetables being consumed.

The Hockey FIT study used an almost identical version of the modified version of the DINE used in FFIT (Hunt et al., 2014). The only slight change was a conversion of units from pints to cups when evaluating milk consumption. FFIT's reasoning for modifying the questionnaire was due to the time the full version takes to complete and the difficulty some participants have in completing it. Wyke et al., (2015) also reasoned that including items into the DINE that have shown to be a factor in weight gain (e.g., sugary drinks) was appropriate to capture information on relevant markers. These food types were also frequently discussed during FFIT and Hockey FIT sessions due to the role they play in weight gain and therefore trying to change the consumption frequency of such items. Therefore including items that the programs were trying to change was important to include into an outcome measure.

The modified version of the DINE has not been tested for validity and reliability and therefore the outcomes from this questionnaire are being examined as exploratory outcomes in this study. The FFIT investigators were contacted for clarification on validity and reliability to which they responded that the instrument was not tested.

Creator of the original DINE instrument, Dr. Lianne Roe (Roe et al , 1994) was also contacted during the study design stage to ask about validity and reliability of the modified tool and confirmed that the tool had not been tested, however the original had.

Similar to FFIT, DINE frequency categories were converted to scores as seen in appendix I. However these scores are slightly modified to the original DINE scores.The modified DINE also measured the amount of times the participant had consumed breakfast over the past seven days (scoring: No times = 1; 1-2 times =2; 3-5 times = 3; 6 or more times = 7), if they are a vegetarian (yes or no) and the kind of milk they usually drink (scoring: whole (3.25% milk fat) = 3; partly skimmed (1% or 2% milk fat = 2; skimmed (0.3% milk fat) = 1).

From the variables noted in Appendix I, three scores were calculated:

Fatty food score included scores from 8 variables (cheese score + beef burger or sausages + beef, pork or lamb + bacon or processed meat + pies, quiches and pastries + potato chips + (fried food + fries/2) + (milk frequency x milk type)). Possible range = 8 – 68. The lower the score i.e. closer to 8 indicates healthier food choices.

Sugary food score included scores from three variables (sugary drinks + chocolate, sweets + cookies). Possible range 3 – 16. The lower the score i.e. closer to 3 indicates healthier food choices.

Fruit and vegetable score included scores from only the fruit and vegetable variable. Possible range = 0.5 – 6. The higher the score i.e. closer to 6 indicates healthier food choices.

2.6 Sample Size and Data Analysis

The sample size for the full study was calculated with weight loss at 12 weeks as the primary outcome. This was a sub-study and as such the sample size was extrapolated out of what was needed for the full trial. We propose that 40 participants (20 per group) is a reasonable sample size for this sub-study. Specifically with 18 participants per group, our study would have 80% power at the 5% significance level to detect an

effect size of 0.95 - a large effect size (Lachin, 1981). We estimate a dropout rate of 10% which increases out calculation to 20 participants per group (40 total). We feel that this is a conservative dropout rate given our past experience.

Data Entry and Management

Data entry was managed by the Hockey FIT coach who followed a code book designed by the study epidemiologist. This ensured correct coding was entered through the Microsoft Excel spreadsheet. After initial data entry, a secondary member of the research team verified the data entered as correct to eliminate mistakes when inputting.

Statistical Analysis

Baseline characteristics were compared between groups with independent sample t-tests for data with normal distribution. The STC along with modified DINE fatty food scores were transformed for parametric analysis after Shapiro-Wilk tests for normality. One way analysis of co-variance (ANCOVA) was applied for statistical analysis at 12 weeks, using baseline values as covariates to control for pre-existing differences between groups for STC and modified DINE summary score outcome measures. Results will be displayed as mean and standard deviation (M ± SD), confidence interval (CI) and the probability value (P). Statistical analyses were run through IBM SPSS software version 23 (IBM, 2015). An alpha level of 0.05 was used for all tests and both significant and non-significant results are reported.

Chapter Three

3. Results.

The effects of a gender-sensitized weight loss and healthy lifestyle program for overweight and obese male hockey fans on dietary behaviours.

Participants were enrolled from April 2015, through May 2015. Table 1 shows the methods of advertising used for study recruitment. In total, 68 people contacted the study coordinator with interest in participating.

Sixteen people did not return calls from the research team following initial expressed interest. Ten failed a pre-screen prior to a formal screening (BMI (n=5); Age (n=2); Time commitment (n=2); Gender (n=1)). Forty-two participants were assessed for eligibility. 2 were not eligible (BMI (n=1); Time commitment (n=1)). A total of 40 participants were randomized into either the intervention (Hockey FIT group) or comparator (Control group). A total of 34 participants were re-assessed at the 12-week assessment. Seventeen were assessed from the Hockey FIT group; 2 participants could not be contacted for an assessment and 1 participant discontinued the intervention and did not want to attend an assessment. Seventeen were assessed from the control group; 2 participants could not be contacted for an assessment and 1 participant discontinued the intervention and did not want to attend an assessment. The CONSORT (Consolidated Standards of Reporting Trials) diagram (Figure 1) shows the number and distribution of participants throughout the 12-week intervention as well as the time frame for assessments.

Baseline Characteristics

Baseline characteristics for all participants and then separated for Hockey FIT and control participants are listed in table 3. Briefly, participants were (all characteristics displayed as mean and standard deviation) aged 46.83 ± 9.47 years, had a BMI of 36.93 kg/m^2 ± 6.65, predominately Caucasian (97.5%), highly educated (45% with a bachelor degree or higher) and most were married (80%). Participants had an average waist circumference of 120.73 cm ± 13.3 and walked 6746 ± 3083 steps per day. Participants

scored an average of 7.3 ± 2.65 summary score on the STC questionnaire (Hockey FIT group = 7.35 ± 3.06; Control group = 7.25 ± 2.24) and 22.03 ± 5.91 fat summary score (Hockey FIT group = 21.62 ± 5.99; Control group = 22.5 ± 6.0); 2.31 ± 1.34 fruit and vegetable summary score (Hockey FIT group = 2.47 ± 1.34; Control group = 2.13 ± 1.38) and 4.22 ± 1.26 sugary food summary score (Hockey FIT group = 4.18 ± 1.38; Control Group = 4.27 ± 1.16) on the modified DINE questionnaire. There were significant differences in baseline characteristics between Hockey FIT and control groups in self-reported, currently active respiratory illnesses (asthma, , emphysema or bronchitis), chest pain and anxiety ($P<0.05$).

Primary Outcome: Starting The Conversation Summary score

At 12 weeks post baseline, (after the Hockey FIT group completed the 12 weeks of Hockey FIT healthy lifestyle and physical activity intervention sessions), the Hockey FIT group displayed significantly lower STC summary scores compared to the control group (post-score), therefore showing healthier food intake choices (Hockey FIT: 4.2 [CI: 3.273 to 5.267] vs. Control: 5.8 [CI: 4.748 to 6.803]), p=0.029 (mean and confidence interval are reported from the original data. 'P' values are reported from transformed data after Shapiro-Wilk tests for normality showed abnormal data) (Figure 2). Overview of each individual questions frequency of selection for baseline and 12-week assessment within the STC questionnaire as well as mean and standard deviation for the STC summary score can be found in Figure 3. Thirty three participants from a maximum of 40 were sought for analysis for observations of STC changes. Seventeen were from the Hockey FIT group (n=3 dropouts during the intervention) and 16 from the control group (n=3 dropouts; n=1 missing values in baseline questionnaire). A paired samples T-test was used to explore mean change between baseline and 12 week STC summary scores within Hockey FIT and Control groups; significant changes were observed for both (Hockey FIT group; $P< 0.001$ vs. Control Group $P> 0.01$).

Exploratory Outcome: Modified DINE Summary Scores for Fatty foods, Sugary Foods, Fruit and Vegetables and Breakfast consumption

At 12 weeks post baseline the Hockey FIT group displayed a significant increase (post-score) in the modified DINE fruit and vegetable summary score compared to the control group, therefore showing an increase in fruit and vegetables consumption after 12 weeks of intervention (Hockey FIT: 3.7 [CI: 3.018 to 4.339] vs. Control: 2.7 [CI: 1.961 to 3.368, p=0.041 (Figure 4). There were no significant differences between groups observed in fatty or sugary food scores after 12 weeks of intervention sessions. Fatty foods: (Hockey FIT: 19.6 [CI: 17.222 to 21.877] vs. Control: 22.7 [CI: 20.232 to 25.189]), p=0.073 (mean and confidence interval are reported from the original data. 'P' value reported from transformed data after Shapiro-Wilk tests for normality showed abnormal data) (Figure 5). Sugary foods: (Hockey FIT: 3.5 [CI: 3.153 to 3.82] vs. Control: 3.5 [CI: 3.161 to 3.87]), p=0.904 (Figure 3). Overview of each individual questions frequency of selection for baseline and 12-week assessment within the STC questionnaire as well as mean and standard deviations for the modified DINE three summary scores can be found in Figure 6.

A paired samples T-test was used to explore mean change between baseline and 12 week modified DINE fatty food, fruit and vegetable and sugary food summary scores within Hockey FIT and Control groups; significant changes were observed in the Hockey FIT group within fruit and vegetable scores ($P<0.01$) and sugary food scores ($P<0.01$) but not fatty food scores ($P>0.05$). Significant changes were observed in the Control group within sugary food scores ($P<0.03$) but not in fatty food ($P>0.05$) and fruit and vegetable ($P>0.05$) scores.

A Chi-square test for independence (Fisher's Exact Test) showed no significant differences between Hockey FIT and Control groups at baseline ($P= 0.229$) or at 12 weeks ($P= 0.383$) in the amount of times participants had breakfast. A McNemar test for observations of changes within groups in breakfast consumption showed no significant differences between Hockey FIT and Control groups at baseline (Hockey FIT: $P=0.125$; Control group: $P=0.500$).

32 participants from a maximum of 40 were sought for analysis for observations of DINE summary scores for fruit and vegetables, fatty foods and sugary food score changes. 17 were from the Hockey FIT group (n=3 dropouts during the intervention) and 15 from the control group (n=2 dropouts; n=3 missing values in baseline questionnaire).

Chapter Four

4. Discussion

This study was a sub-study of the Hockey Fans In Training pilot pragmatic randomized controlled trial examining weight loss, physical activity, dietary and lifestyle changes over a 12 week intervention period within two junior hockey clubs. The purpose of this sub-study was to investigate dietary behaviour changes post 12 weeks of intervention sessions within a sample of overweight and obese middle-aged men who were all fans of the same team (London Knights junior A hockey team).

Primary Outcome; Dietary Behaviour Changes: The STC Summary Score

The findings of this study show that a 12-week, gender-sensitised weight loss and healthy lifestyle intervention that focuses on changes in dietary behaviours can assist towards making a positive health impact on male, middle-aged sports fans who are overweight or obese. Significantly lower scores in summary scores from the STC questionnaire within the Hockey FIT group vs. Control group, 12 weeks after baseline demonstrate that educational learning for men surrounding food intake and dietary choices within a "male only" environment, improves the dietary intake and healthy eating choices, of those that are at risk of illnesses and diseases commonly associated with poor dietary behaviours. These findings supplement previous literature exploring the effect of lifestyle interventions on dietary behaviours such as the study conducted by Nazar et al., (2013) who found after one year of a lifestyle intervention participants displayed increased intake of fruit and vegetables and a decrease in fast food, sweets and butter intake among others.

Although mean change (baseline to 12 weeks) in the STC summary score was significant in the Hockey FIT group, change within the control group was also observed. This change in the control group can be somewhat attributed to the participants that were randomized to the control group already being motivated to change their lifestyle and dietary behaviours (i.e., they volunteered to be a participant in this research study. An

abstract and research poster for the American College of Sports Medicine's annual meeting by Muise et al., (2016) states that results from an online questionnaire, post attending at least 6 of the Hockey FIT sessions, show that the main reasons for joining the program were to lose weight and increase physical activity. Secondly, each participant, regardless of which group they were randomized to received a printed copy of Canada's Food Guide. Research has shown that men are not as well educated in comparison to their female counterparts in nutritional information and facts (Warde & Hetherington, 1994); thus, this resource may have been enough to influence dietary behaviours of an already motivated control group (i.e., providing information on portion sizes and recommended food intake).

Observations by the coach from the 12 program sessions support the belief that Canada's Food Guide may have impacted some men who were unaware of the daily food intake guidelines (i.e., men changed their diets over the 12 weeks between assessments). During the intervention, the coaches reported that the men often referred to Canada's Food Guide within their handbook as a resource that had helped them to understand the recommendations made within the guide. Further explanation for the control group displaying a positive change in their food intake despite not participating in Hockey FIT sessions can be attributed to Hockey FIT and control group participants potentially knowing each other prior to participation in the program. Many participants were season ticket holders for the London Knights, some of whom have held season tickets for more than 20 years and may have been friends with other season ticket holders. The social interaction between season ticket holders and any other friends or associates between group participants, could have led to Hockey FIT session content being shared through conversation or the physical sharing of resources although the coach or research personel were never aware of this happening. These factors are all similar to those reported by FFIT (Hunt et al., 2014).

The time of year in which Hockey FIT intervention sessions took place can go some way to explaining the significant changes observed in the Hockey FIT group. Sessions started in mid-May 2015 and concluded at the end of July 2015. During this time, the summer weather may have motivated the participants to be more active and follow the recommendations for dietary intake amongst other recommendations during the

Hockey FIT program more diligently. This is somewhat supported by Chan and Ryan, (2009) who found that physical activity participation drops in correlation to a drop in outside temperature and that increasing temperature was associated with increased steps/day, with a 2.9% increase for each 10˚C increase in temperature in adults (mean age 44 years) residing in Charlottetown, Prince Edward Island, Canada.

Content of the Hockey FIT intervention sessions has been shown to be a major contributor to observed changes in dietary behaviours with 100% of men stating that they had started to eat a healthier diet during the program (Muise et al., 2016). This can be expected due to the education segments of Hockey FIT sessions, often being heavily focused on dietary changes such as teaching on how to read and understand food labels and what to pay attention to when eating take out and restaurant meals along with healthy eating prescriptions that participants set twice during the intervention and encouraged to frequently edit throughout the program.

Exploratory Outcomes; Dietary Behaviour Changes: DINE Summary Scores

Observed changes in fruit and vegetable consumption summary scores were significantly higher in the Hockey FIT group vs. the Control group following the intervention. This could be directly related to the content of Hockey FIT intervention sessions focusing on the importance of increasing fruit and vegetable consumption, most noticeably through the healthy eating lifestyle prescription (Appendix G). Other reasons for observed outcomes can also be considered. In Ontario, a vast amount of commonly consumed fruit and vegetables are only able to be grown within the province between the months of July and September (Foodland Ontario, 2016). This short window for homegrown fruit and vegetables leads to importing from the USA, China, Brazil and Mexico which in turn leads to an inflation in prices during the winter months of up to 13% (Quinn, 2016). Hockey FIT intervention sessions ran through summer months and therefore fruit and vegetables were more easily accessable at a lower price. Intake over the winter months is the lowest of the four seasons: Spring (March, April, May) = 25.6%; Summer (June, July, August) = 25%; Fall (September, October, November) = 25.6%; Winter (December, January, February) = 23.8%

(Goverment of Canada, 2012), showing that an intervention program during the winter could even more beneficial and show different results.

Non-significant changes were observed in the fatty food and sugary food summary scores for the modified DINE. This may be attributed to a small sample size as well as intervention session content. Although healthy eating prescriptions were used to try and reduce the amount of fatty and sugary foods the participants were consuming, an increase in physical activity may have resulted in the men eating more or not changing their fatty and sugary food intake. During the sessions, recommendations for caloric intake were made by the coach for the participants depending on their physical activity level. An increase in physical activity leads towards an increase in the amount of calories consumed per day (Canadian Diabetes Association, 2006). Muise et al., (2016) reported that 78% of Hockey FIT participants had increased their physical activity level after completing the 12 weeks of intervention.

Limitations and Future Research

Some limitations of this study exist and need to be noted. Firstly, it should be recognized that the sample size used for statistical analysis may be too small to fully acknowledge that the observed changes may be relative to a larger sample size, however similar dietary behaviour results were recognized within the FFIT study who investigated 747 men in regards to a significant increase in fruit and vegetable daily consumption. Secondly, although compliance to the 12 Hockey FIT sessions was high and averaged 76.5%, 3 participants attended less that half (6) of the sessions. Efforts were made to maintain adherence to the sessions, however, only one participant attended 100% of the sessions.

The modified DINE questionnaire, although used by FFIT to detect dietary behaviours in a similar demographic (with results published in The Lancet Journal, impact factor: 45.217 in 2014), has not been validated. This led to results from the questionniare to be investigated in an exploratory manner as opposed to the primary outcome measure. Finally, the intervention lasted three months during the summer. Motivation to participate and make changes to diet may have been influenced by the time of year the

study took place during. This time of year was the off-season for junior A hockey competition and therefore participants may have been motivated to “fill their time” with a new project. Reliability of the STC questionnaire has to date, not been tested although validity of the tool has. Further investigation into the reliability of the tool should be considered prior to further extensive use.

Another limitation to be acknowledged is the generalizability of the results. Only one of the participants was not caucasian and research into other ethnicities may see different outcomes due to cultural and religious impacts. The community in which the study took place could also be seen as a limitation in order to interpret results for other communities. London, ON has a population of over 300,000 inhabatents however many other towns and cities with junior hockey teams have a much smaller population i.e. Owen Sound, ON; population, 22,000.

This sub-study of a larger randomized controlled trial has helped to support previous evidence, most notably from FFIT in Scotland, U.K. that a lifestyle intervention study within a professional sports setting for Canadian overweight and obese middle-aged men is beneficial to positively change dietary behaviours.

Taking into account the limitations stated, some recommendations for future research should be considered that could further elucidate the nature of poor dietary behaviours as well as to develop preventative interventions. Firstly, for use in future studies, tests for validity and reliability for the modified DINE are recommended prior to administration. Secondly, other tools to measure dietary behaviour changes that are validated and tested for reliability could be used. The Dietary Screener Questionnaire designed by the National Health and Nutrition Examination Survey (National Cancer Institute, 2015) examines similar food catagories to those in the STC and modified DINE and is currently in the process of validity testing. This tool could be a useful alternative to the STC and DINE for future outcome measures within similar studies. Finally, future studies should consider running the intervention alongside the hockey/sporting season to detect changes in dietary behaviours or to see if differences still exist. Changing behaviours may be more difficult in the winter months in Canada.

Expanding on the success of Hockey FIT and FFIT in the middle-aged, overweight or obese, male hockey fan population to other target groups should also be considered for future research. In 2013, 42 million infants and young children were classified as overweight or obese, worldwide with this number expected to rise to 70 million by 2025 if current trends continue (World Health Organization, 2015). Adapting Hockey FIT for children and adolescents could be a benefical way to help prevent and treat childhood obesity through similar incentives as were seen in Hockey FIT with men. It has been reported that hockey is the 3rd most participated in sports in Canada within children aged 5-14 years, after soccer and swimming (Statistics Canada, 2008). Targeting and recruiting, overweight and obese children through the love of hockey may however need different approaches to those used in Hockey FIT. For example, social media could be a strong avenue to recruit teenage children but younger children may not have social media accounts. Advertising through emails from the clubs to their season ticket holders may be benefical to recruit through parents of the children as they are more likely to be season ticket holders. Recruiting through the parents, would likely be more benefical than through the children, who may not know or want to admit that they are overweight or obese. The attraction of the program may be similar to children as it was the middle-aged men. Getting a behind-the-scenes look at their favorite hockey club alongside the interaction with hockey personell, most notably players of the team are likely to be two big draws to participate, and probably more of a draw than the opportunity to change their lifestyle to a healthier one.

Adaptions to Hockey FIT could also be considered for other sports having shown to be a success in hockey, (Hockey FIT), soccer (FFIT), (Hunt et al., 2014) and to a lesser extent, rugby (Sealey et al., 2013).

In Canada, the Canadian Football League (CFL) has nine teams across the country. The average TV audience of CFL games in 2015 was 590,000 (Zelkovich, 2015) and average game attendance being 24,737 (Canadian Football League, 2015). This demonstrates that a large fan base for a Canadian-only sport exists and could potentially be another market for a Hockey FIT-like program to be administered. Furthermore, although CFL viewer demographic could not be found, National Football League (NFL) viewer

demographics in the U.S. suggest that 65% of viewers are male, between the ages of 35-54 years (Eby, 2013).

Finally, longitudinal studies should be considered for future programs to track the progress of the participants at set time points, post the conclusion of the session interventions and 12 month follow up. This is something that the researchers of FFIT are including into their program follow-ups, however, this is yet to be reported.

4.1. Conclusion

In conclusion, the implementation of a 12-week weight loss and healthy lifestyle intervention study that is gender-sensitized and conducted in a sporting environment/context can be seen to have a positive effect on dietary behaviours as a whole and on individual food catagories such as fruit and vegetables, in male hockey fans who are overweight or obese. Futhermore, these findings highlight the importance of engaging men in programs that appeal to their interests and passions to decrease the risk of chronic diseases and illnesses associated with being overweight or obese.

Hockey FIT can be easily tailored for other target groups and incorporating this program or similar lifestyle interventions into other communities and demogrpahics using sport or other interests of “at-risk populations” could also be benefical to reduce the risk of associated diseases and illnesses.

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Tables and Figures

Table 1: Advertisement and recruitment avenues of Hockey FIT

Organization	Avenue	Number of People who contacted Hockey FIT
CTV News	Short news piece outlining the plan of Hockey FIT prior to the recruitment stage.	2
London Free Press	Newspaper article outlining the plan of Hockey FIT prior to the recruitment stage.	6
CJBK Radio	Radio interview with Dr. Petrella (Principal Investigator) outlining the plan of Hockey FIT prior to the recruitment stage.	1
Western University	Article within the Western News magazine outlining the plan of Hockey FIT prior to the recruitment stage.	1
Word of Mouth	Interested or recruited participants promoting the study to family, friends and colleagues.	14
The London Knights	- Email to all season ticket holders advertising the study. - "Tweet" from the official Twitter page to all followers, advertising the study.	19 6
Budweiser Gardens	Recruitment within the arena of the London Knights during a playoff game. The coach handed out flyers advertising the study.	5
Blue Water Hockey League	Local hockey organization with an over 35 year's league for men. Email sent to all club members from the club administrator.	7
Source 4 Sports	Poster advertising the study displayed within retail store.	1
Western Fair	Poster advertising the study displayed within local hockey arena.	2
Sports Xpress Magazine	Copy of poster printed into local free sports magazine.	2
Komoka Arena	Poster advertising the study displayed within local hockey arena.	2

Table 2a: Overview of Sessions 1-6 of Hockey Fans In Training

Sessions 1-6	Segment	Content	Time
1. Introduction to Hockey FIT	***Education***	Introduction of the Hockey FIT coaches/ Overview of Hockey FIT and its origins/ Influences on food choices, control of eating and exercise habits/ Introduction to lifestyle (physical activity, exercise and healthy eating) prescriptions and group goal-setting.	70
	Physical Activity	Walking tour around the hockey arena. This provided an opportunity to ensure all participants pedometers were working/ being worn correctly.	20
2. Healthy Eating Overview	***Education***	Prescription evaluation and re-set/Eating well/ setting SMART (Specific, Measureable, Achievable, Realistic, and Timely) goals and goals for healthy eating.	65
	Physical Activity	Walk around the GoodLife Fitness Centre facility	25
3. Meal Planning & Weight Loss	***Education***	Prescription evaluation and re-set/ Discussion on compensation / trade off / zero sum / losing what you've gained followed/ Healthy eating planning/ Individual weight loss/ Getting support and principles of fitness	60
	Physical Activity	Walk around the GoodLife Fitness Centre facility	30
4. Becoming Fit	***Education***	Prescription evaluation and re-set/ Facts about exercise and being more active/ STEP Test/ Exercise prescriptions and talked about overcoming barriers, action plans for exercise goals and how to monitor heart rate whilst exercising.	65
	Physical Activity	Aerobic activity.	25
5. Alcohol and Weight Gain	***Education***	Prescription evaluation and re-set/ Alcohol facts/ Myths about alcohol/ Planning your drinking (sugary and caffeinated drinks were also discussed)	50
	Physical Activity	Aerobic activity.	40
6. Stages of Change	***Education***	Prescription evaluation and re-set/ Stages of change in participant's lifestyles/ Sharing experiences of the program to date and measuring progress	45
	Physical Activity	A strength and muscular endurance activity session concluded week six.	45

Table 2b: Overview of Sessions 7-12 of Hockey Fans In Training

Sessions 7-12	Segment	Content	Time
7. Weight Loss	***Education***	Prescription evaluation and re-set/ Weight loss to date/ Targets, motivation and reflection were reviewed for encouraging participants to continue with the changes they had made in their lifestyles.	45
	Physical Activity	Strength and aerobic activity.	45
8. Food Labels	***Education***	Prescription evaluation and re-set/ Food labels /Tips for better eating.	45
	Physical Activity	Strength, aerobic and flexibility.	45
9. Eating Out	***Education***	Prescription evaluation and re-set/ Meals/ Eating out/ Takeout meals and fast food.	45
	Physical Activity	Strength, aerobic and flexibility.	45
10. Triggers for Setbacks	***Education***	Prescription evaluation and re-set/ Myths of healthy living/ Triggers for eating and drinking/ Exercising less.	55
	Physical Activity	Strength and aerobic.	35
11. Energy Balance	***Education***	Prescription evaluation and re-set/ Planning eating/ Energy balance/ Control over eating.	45
	Physical Activity	Strength and flexibility activities.	45
12. Review of Progress	***Education***	Celebrating achievements and planning ahead to encourage maintenance of a healthy lifestyle/ Reflection of the past 12 weeks	60
	Physical Activity	Aerobic class.	30

Table 3: Participant Baseline Characteristics. Tests for significance by independent samples T-Test *= significant differences between groups at baseline.

Characteristic	**All Participants (n=40)**	**Intervention (Hockey FIT)**	**Control**	**P-value**
Age; *years, mean (SD)*	46.83 (9.47)	46.9 (9.88)	46.75 (9.29)	0.93
Height; *cm, mean (SD)*	179.1 (7.19)	179.9 (7.3)	178.3 (7.18)	0.64
Weight; *kg, mean (SD)*	118.2 (19.73)	115 (17.79)	121.5 (21.47)	0.43
Body Mass Index; *mean (SD)*	36.93 (6.65)	35.5 (5.28)	38.37 (7.65)	0.14
Waist Circumference; cm, mean (SD)	120.73 (13.30)	118 (11.55)	123.5 (14.64)	0.28
Physical Activity; steps per week, mean (SD)	6746.02 (3082.55)	7356 (3028.21)	6135 (3090.28)	0.94
Education; *Bachelors degree of higher, No. (%)*	18 (45)	9 (45)	9 (45)	0.5
Ethnicity; *Caucasian, No. (%)**	39 (97.5)	20 (100)	19 (95)	0.04
Marital Status; *Married and not separated, No. (%)*	32 (80)	15 (75)	17 (85)	0.9
Smoker; *Current Smokers, number (%)*	4 (10)	3 (15)	1 (5)	0.25
Alcohol consumption; *drinks per week, mean (SD)*	7.67 (8.65)	7.7 (8.43)	7.65 (9.1)	0.50
Medical Conditions; Currently Active				
Hypertension; *No. (%)*	9 (22.5)	5 (25)	4 (20)	1.0
Chest pain with Exertion; *No. (%)**	1 (2.5)	1 (5)	0 (0)	0.04
High Cholesterol; *No. (%)*	11 (27.5)	4 (20)	7 (35)	0.99
Diabetes (Type 2); *No. (%)*	4 (10)	3 (15)	1 (5)	0.42

Characteristic	**All Participants (n=40)**	**Intervention (Hockey FIT)**	**Control**	**P-value**
Cancer; *No. (%)*	0 (0)	0 (0)	0 (0)	n/a
Arthritis / Joint Problems; *No. (%)*	9 (22.5)	6 (30)	3 (15)	0.45
Back Problems; *No. (%)*	5 (12.5)	2 (10)	3 (15)	0.56
Asthma, Emphysema or Bronchitis; *No. (%) **	3 (7.5)	0 (0)	3 (15)	0.0
Anxiety; *currently active, No. (%)**	1 (2.5)	1 (5)	0 (0)	0.04
Self-Esteem Summary Score; *mean (SD)*	23 (4.59)	23.25 (4.72)	22.75 (4.58)	0.70

(Self- Esteem: Score out of 30. 30 = High self-esteem; 0 = low self-esteem)

*** = Significantly different characteristics at baseline between groups.**

Figures

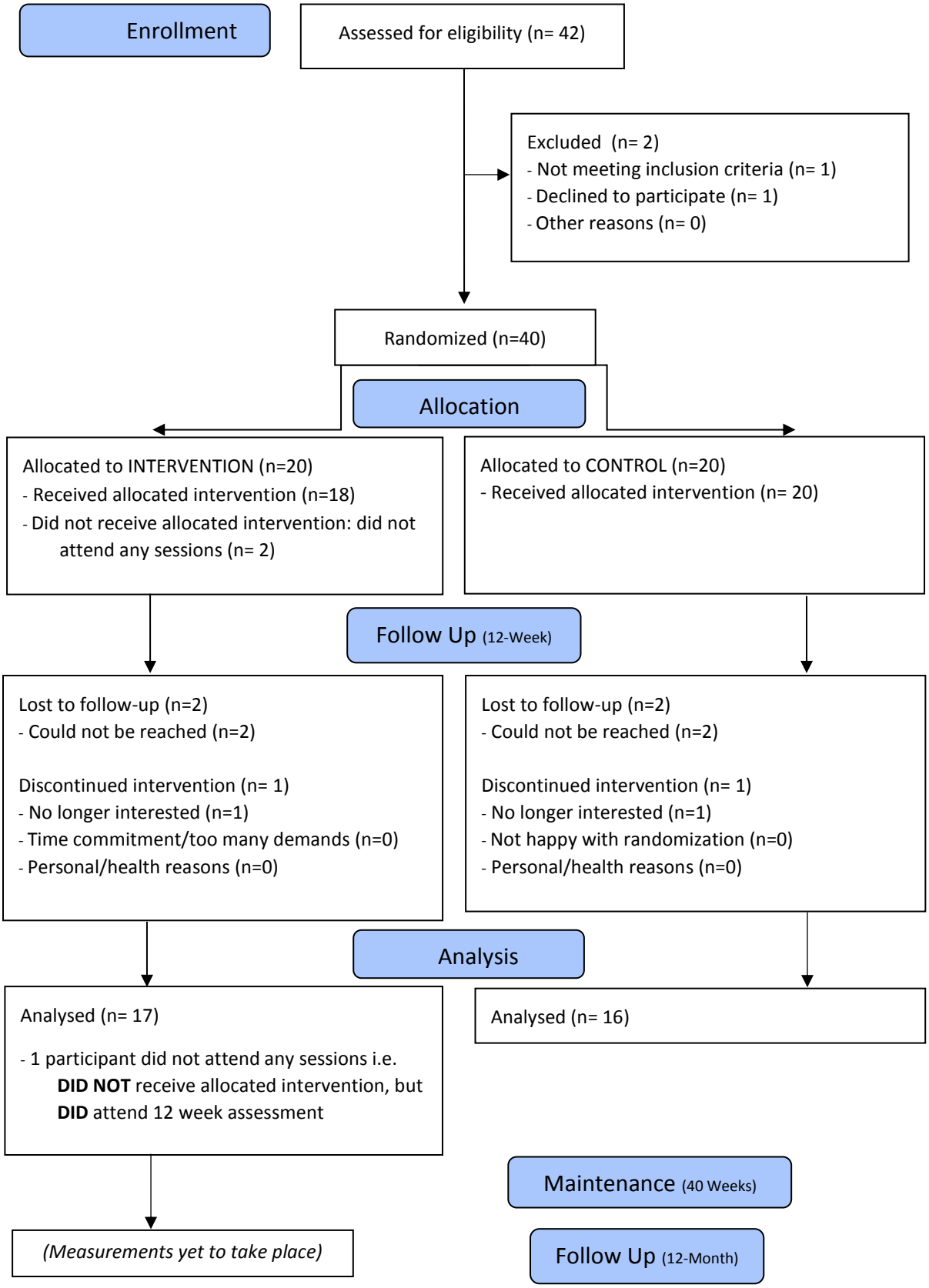


Figure 1: CONSORT Flow Diagram

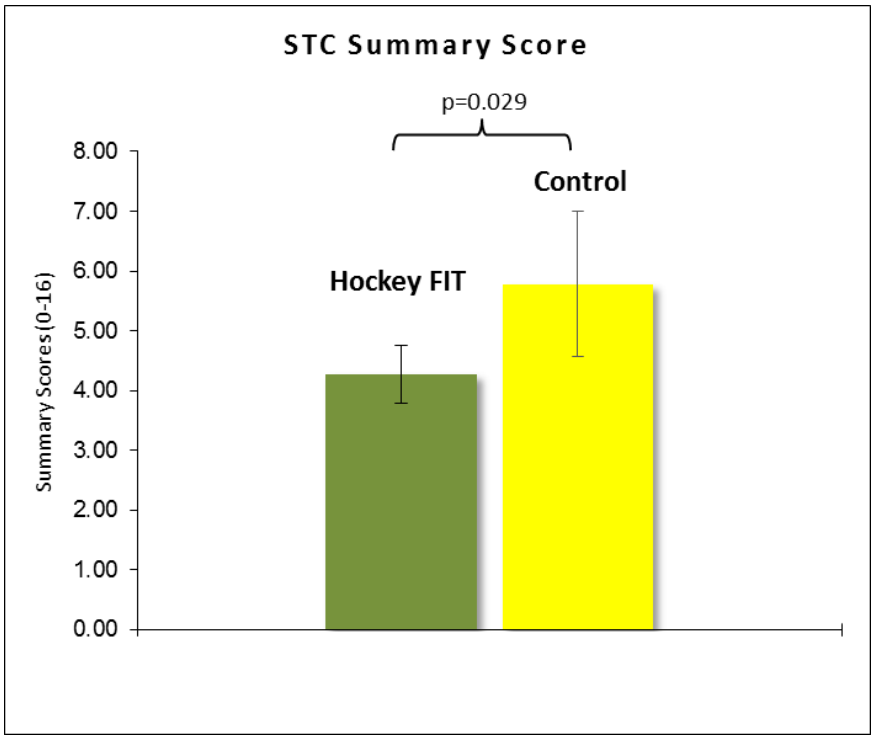


Figure 2: STC Summary Score at 12 weeks post baseline (after 12 weeks of Hockey FIT intervention sessions). ANCOVA showed that the Hockey FIT group experienced significant differences in comparison to control (p=0.029). Scored from 0-16. Scores closer to 0 indicate healthier food choices. (Graph displayed as mean and CI)

Starting The Conversation Score Changes	Hockey FIT Group (n=17)		Control Group (n=16)	
Over the past few months…	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
How many times a week did you eat fast food meals or snacks?				
Less than 1 time (0 = questionnaire score)	3 (17.6%)	9 (52.9%)	4 (23.5%)	8 (47.1%)
1-3 times (1 = questionnaire score)	7 (41.2%)	8 (47.1%)	9 (52.9%)	7 (41.2%)
4 or more times (2 = questionnaire score)	7 (41.2%)	0 (0%)	3 (17.6%)	1 (5.9%)
How many servings of fruit did you eat each day?				
5 or more (0)	0(0%)	3 (17.6%)	3 (17.6%	1 (5.9%)
3-4 (1)	6 (35.3%)	11 (64.7%)	13 (76.5%)	2 (11.8%)
2 or less (2)	11 (64.7%)	3 (17.6%)	1 (5.9%)	13 (76.5%)
How many servings of vegetables did you eat each day?				
5 or more (0)	0 (0%)	4 (23.5%)	2 (11.8%)	2 (11.8%)
3-4 (1)	8 (47.1%)	10 (58.8%)	5 (29.4%)	9 (52.9%)
2 or less (2)	9 (52.9%)	3 (17.6%)	9 (52.9%)	5 (29.4%)
How many regular sodas (pop) or glasses of sweet tea did you drink each day?				
Less than 1 (0)	10 (58.8%)	13 (76.5%)	13 (76.5%)	14 (82.4%)
1-3 (1)	4 (23.5%)	3 (17.6%)	3 (17.6%)	2 (11.8%)
3 or more (2)	3 (17.6%)	1 (5.9%)	0 (0%)	1 (5.9%)
How many times a week did you eat beans (like pinto or black beans), chicken, or fish?				
3 or more times (0)	12 (70.6%)	13 (76.5%)	9 (52.9%)	10 (58.8%)
1-2 times (1)	4 (23.5%)	2 (11.8%)	6 (35.3%)	4 (23.5%)
Less than one time (2)	1 (5.9%)	2 (11.8%)	1 (5.9%)	2 (11.8%)
How many times a week did you eat regular snack chips or crackers (not low fat)?				
1 time or less (0)	11 (64.7%)	13 (76.5%)	7 (41.2%)	10 (58.8%)
2-3 times (1)	6 (35.3%)	4 (23.5%)	8 (47.1%)	6 (35.3%)
4 or more times (2)	0 (0%)	0 (0%)	1 (5.9%)	0 (0%)
How many times a week did you eat desserts and other sweets (not the low fat kind)?				
1 time or less (0)	7 (41.2%)	10 (58.8%)	6 (35.3%)	9 (52.9%)
2-3 times (1)	5 (29.4%)	5 (29.4%)	8 (47.1%)	2 (11.8%)
4 or more times (2)	5 (29.4%)	2 (11.8%)	2 (11.8%)	5 (29.4%)
How much margarine, butter or meat fat do you use to season vegetables or put on potatoes, bread or corn?				
Very little (0)	4 (23.5%)	9 (52.9%)	6 (35.3%)	9 (52.9%)
Some (1)	13 (76.5%)	8 (47.1%)	8 (47.1%)	6 (35.3%)
A lot (2)	0 (0%)	0 (0%)	2 (11.8%)	1 (5.9%)
Summary Score (mean; ± SD)				
STC Summary Score	7.35 ± 3.06	4.29 ±2.66	7.25 ± 2.24	5.75 ± 2.08

Figure 3: STC individual questions frequency of selection

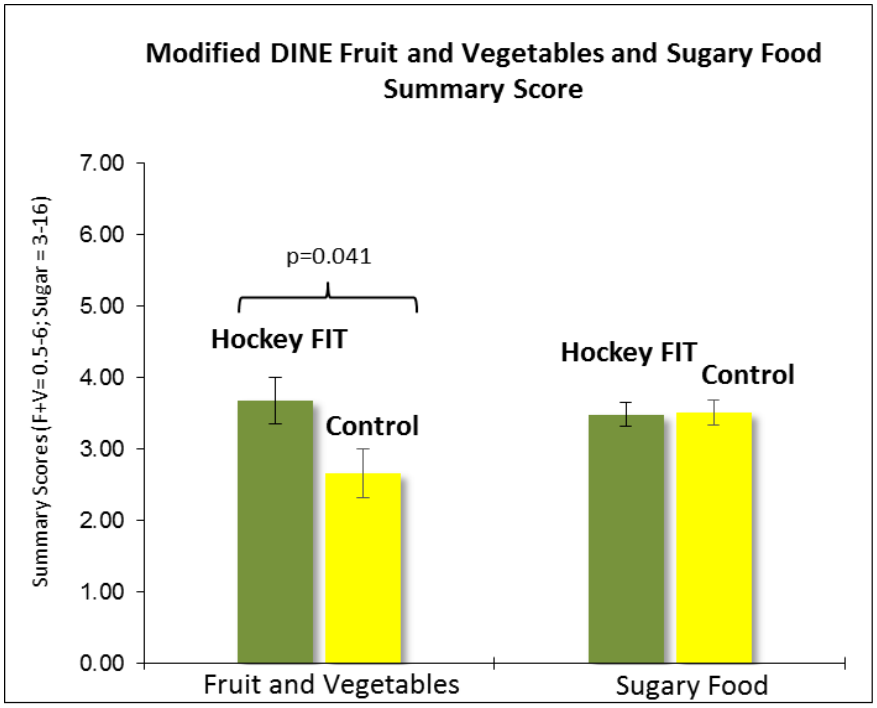


Figure 4: Modified DINE Fruit and Vegetables and Sugary food Summary Scores at 12 weeks post baseline (after 12 weeks of Hockey FIT intervention sessions). ANCOVA showed that the Hockey FIT group displayed significant differences in fruit and vegetable summary score in comparison to the control group (p=0.041). Indicating an increase in fruit and vegetable cconsumption. There was no significant difference between groups in sugary foods summary score.

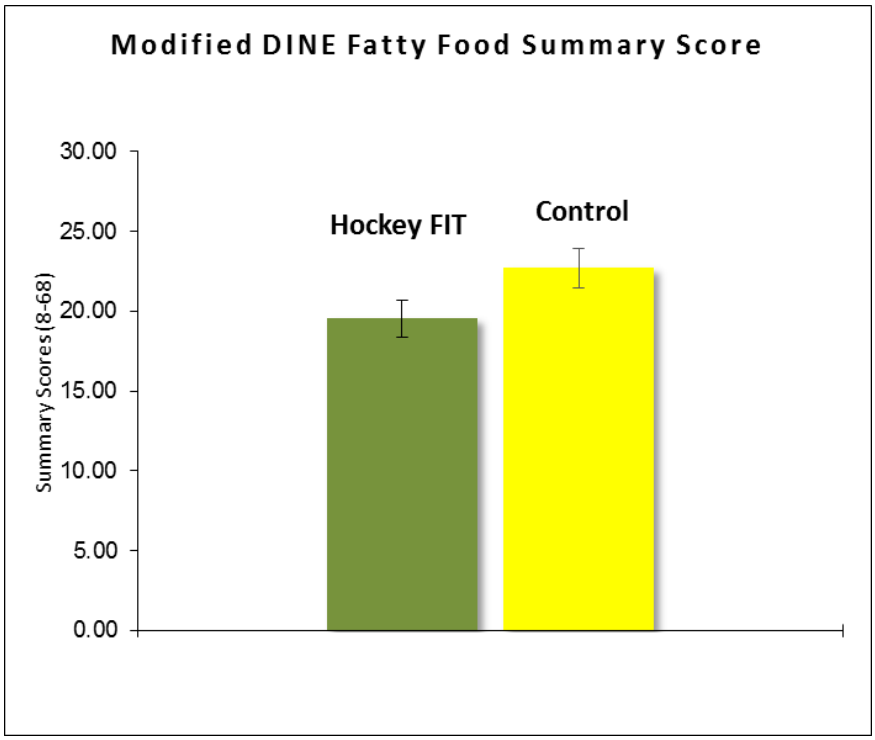


Figure 5: Modified DINE Fatty food score at 12 weeks post baseline (after 12 weeks of Hockey FIT intervention sessions). ANCOVA showed there was no significant difference between groups.

Dietary Instrument for Nutritional Education Score Changes	Hockey FIT Group (n=17)		Control Group (n=15)	
How many times over the last 7 days did you eat/drink a serving of the following…?	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Cheese (any except cottage cheese)				
No times (1 = questionnaire score)	2 (11.8%)	2 (11.8%)	1 (6.7%)	2 (13.3%)
1-2 times (2 = questionnaire score)	1 (5.9%)	4 (23.5%)	4 (26.7%)	3 (20%)
3-5 times (6 = questionnaire score)	13 (76.5%)	9 (52.9%)	5 33.3%)	6 (40%)
6 or more times (9)	1 (5.9%)	2 (11.8%)	5 (33.3%)	4 (26.7%)
Beef burgers or sausages				
No times (1)	0 (0%)	2 (11.8%)	3 (20%)	1 (6.7%)
1-2 times (2)	16 (94.1%)	15 (88.2%)	11 (73.3%)	10 (66.7%)
3-5 times (6)	1 (5.9%)	0 (0%)	1 (6.7%)	2 (13.3%)
6 or more times (9)	0 (0%)	0 (0%)	0 (0%)	2 (13.3%)
Beef, pork or lamb				
No times (1)	2 (11.85%)	0 (0%)	2 (13.3%)	1 (6.7%)
1-2 times (2)	11 (64.7%)	14 (82.4%)	9 (60%)	10 (66.7%)
3-5 times (6)	4 (23.5%)	3 (17.6%)	4 (26.7%)	2 (13.3%)
6 or more times (9)	0 (0%)	0 (0%)	0 (0%)	2 (13.3%)
Fried Food (fried fish, cooked breakfast)				
No times (1)	6 35.3%)	9 (52.9%)	4 (26.7%)	5 (33.3%)
1-2 times (2)	8 (47.1%)	7 (41.2%)	9 (60%)	8 (53.3%)
3-5 times (6)	3 (17.6%)	1 (5.9%)	2 (13.3%)	2 (13.3%)
6 or more times (9)	0 (05)	0 (0%)	0 (0%)	0 (0%)
French Fries				
No times (1)	5 (29.4%)	10 (58.8%)	1 (6.7%)	6 (40%)
1-2 times (2)	12 (70.6%)	7 (41.2%)	13 (86.7%)	9 (60%)
3-5 times (6)	0 (0%)	0 (0%)	1 (6.7%)	0 (0%)
6 or more times (9)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Bacon, processed meat				
No times (1)	4 (23.5%)	4 (23.5%)	2 (13.3%)	4 (26.7%)
1-2 times (2)	10 58.8%)	11 (64.7%)	11 (73.3%)	7 (46.7%)
3-5 times (5)	3 (17.6%)	2 (11.85%)	2 (13.3%)	4 (26.7%)
6 or more times (6)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Pies, quiches, pastries				
No times (1)	10 (58.8%)	17 (100%)	10 (66.7%)	13 (86.7%)
1-2 times (2)	7 (41.2%)	0 (0%)	5 (33.3%)	2 (13.3%)
3-5 times (5)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
6 or more times (8)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

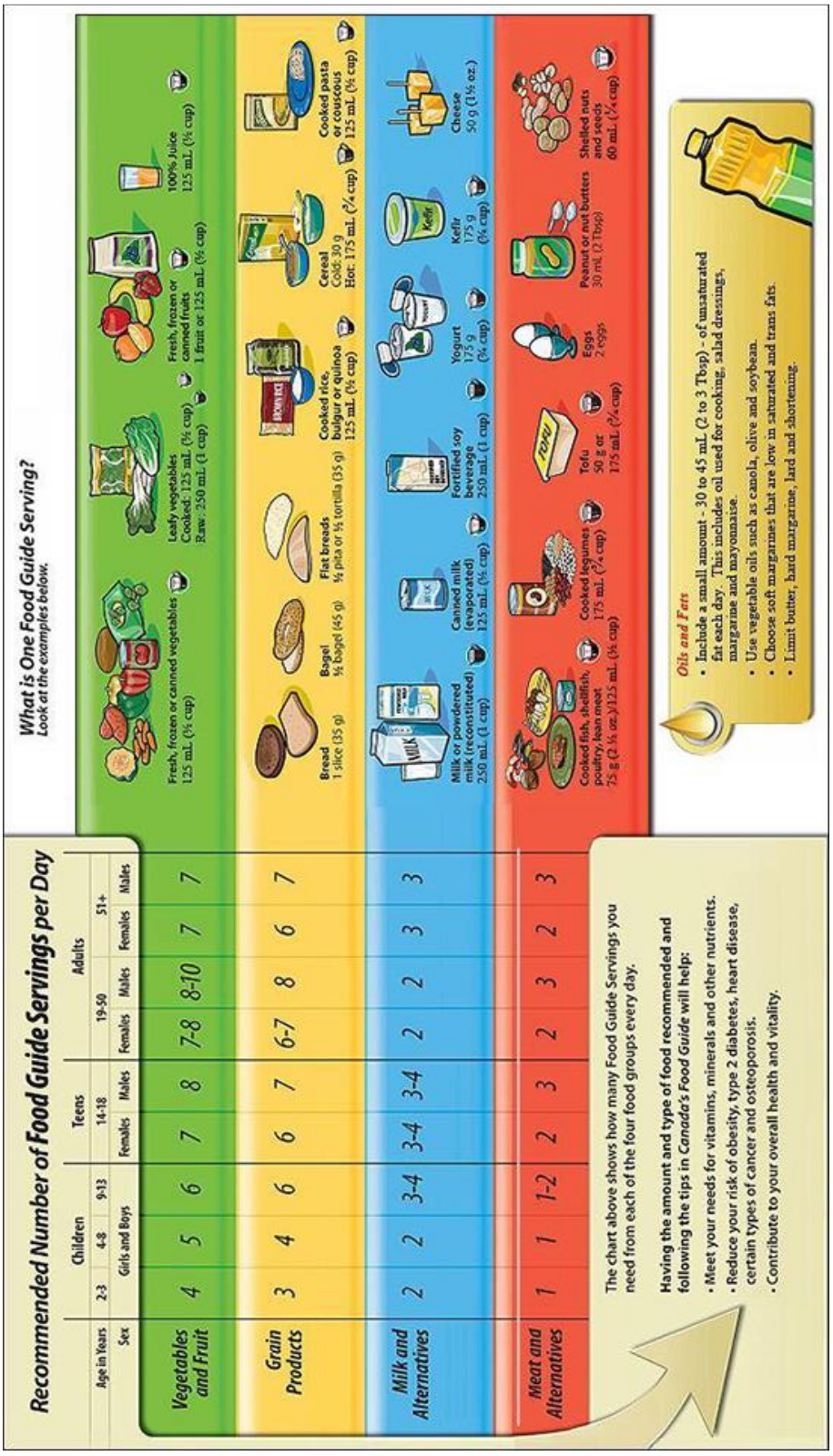
Dietary Instrument for Nutritional Education Score Changes	Hockey FIT Group (n=17)		Control Group (n=15)	
How many times over the last 7 days did you eat/drink a serving of the following…?	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Potato Chips				
No times (1)	8 (47.1%)	9 (52.9%)	7 (46.7%)	4 (26.7%)
1-2 times (2)	8 (47.1%)	8 (47.1%)	6 40%)	10 (66.7%)
3-5 times (5)	1 (5.9%)	0 (0%)	2 (13.3%)	1 (6.7%)
6 or more times (6)	0 (0%)	0 (0%)		
Fast Food (take-out or sit-in)				
No times (1)	2 (11.8%)	8 (47.1%)	3 (20%)	6 (40%)
1-2 times (2)	13 (76.5%)	7 (41.2%)	8 (53.3%)	7 (46.7%)
3-5 times (3)	2 (11.8%)	2 (11.8%)	3 (20%)	0 (0%)
6 or more times (4)	0 (0%)	0 (0%)	1 (6.7%)	2 (13.3%)
Nuts				
No times (1)	4 (23.5%	2 (11.8%)	5 (33.3%)	4 (26.7%)
1-2 times (2)	8 (47.1%)	6 (35.3%)	4 (26.7%)	5 (33.3%)
3-5 times (3)	4 (23.5%	7 (41.2%)	4 (26.7%)	5 (33.3%)
6 or more times (4)	1 (5.9%)	2 (11.8%)	2 (13.3%)	1 (6.7%)
Thinking about the last 7 days, how many times a day did you eat the following…?	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Fruit and Vegetables (not potatoes)				
Less than once a day (0.5)	1 (5.9%)	1 (5.9%)	0 (0%)	1 (6.7%)
1-2 times a day (1.5)	9 (52.9%)	2 (11.8%)	12 (80%)	7 (46.7%
3-5 times a day (4)	7 (41.2%)	12 (70.6%)	2 (13.3%)	7 (46.7%
6 or more times a day (6)	0 (0%)	2 (11.8%)	1 (6.7%)	0 (0%)
Chocolate, sweets				
Less than once a day (1)	10 (58.8%)	14 (82.4%)	8 (53.3%)	10 (66.7%)
1-2 times a day (2)	6 (35.3%)	3 (17.6%)	7 (46.7%)	5 (33.3%)
3-5 times a day (4)	1 (5.9%)	0 (0%)	0 (0%)	0 (0%)
6 or more times a day (6)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cookies				
Less than once a day (1)	14 (82.4%)	16 (94.1%)	9 (60%)	14 (93.3%)
1-2 times a day (2)	3 (17.6%)	1 (5.9%)	6 (40%)	1 (6.7%)
3-5 times a day (4)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
6 or more times a day (6)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Dietary Instrument for Nutritional Education Score Changes	**Hockey FIT Group (n=17)**		**Control Group (n=15)**	
Thinking about the last 7 days, how many times a day did you eat the following…?	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Sugary drinks (fizzy drinks, fruit juice)				
Less than once a day (1)	11 (64.7%)	14 (82.4%)	9 (60%)	13 (86.7%)
1-2 times a day (2)	4 (23.5%)	2 (11.8%)	6 (40%)	2 (13.3%)
3-5 times a day (3)	2 (11.8%)	1 (5.9%)	0 (0%)	0 (0%)
6 or more times a day (4)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Thinking about the last 7 days, how much milk did you use in a day, for drinking or in cereal, tea or coffee?	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Less than half a cup (1)	8 (47.1%)	6 (35.3%)	1 (40%)	5 (33.3%)
About half a cup (2)	3 (17.6%)	3 (17.6%)	0 (0%)	2 (13.3%)
About a cup (3)	2 (11.8%)	5 (29.4%)	7 (46.7%)	2 (13.3%)
Two or more cups (4)	4 (23.5%)	3 (17.6%)	2 (13.3%)	6 (40%)
What kind of milk do you usually use?				
Whole (3.25% milk fat) (3)	0 (0%)	7 (41.2%)	0 (0%)	0 (0%)
Partly skimmed (1% or 2% milk fat) (2)	11 (64.7%)	9 (52.9%)	11 (73.3%)	9 (60%)
Skimmed (0.3% milk fat) (1)	6 (35.3%)	1 (5.9%)	4 (26.7%)	6 (40%)
Summary Scores (mean; ± SD)	**Baseline**	**12-weeks**	**Baseline**	**12-weeks**
Fatty Foods Summary Score (range = 8 – 68) lower scores = healthier food choices	**21.6 ± 6**	**19.4 ± 4.2**	**22.5 ± 6.0**	**22.9 ± 1.2**
Fruit and Vegetables Summary Score (range = 0.5 – 6) higher scores = healthier food choices	**2.5 ± 1.3**	**3.7 ±1.4**	**2.1 ± 1.4**	**2.6 ± 1.4**
Sugary Foods Summary Score (range = 3 – 16) lower scores = healthier food choices	**4.2 ± 1.4**	**3.5 ± 0.9**	**4.3 ± 1.2**	**3.5 ± 0.7**

Figure 6: Modified DINE individual questions frequency of selection

Appendices

Appendix A: Canada's Food Guide



Appendix B: Ethics Approval Form

Western Research

Research Ethics

Western University Health Science Research Ethics Board
HSREB Full Board Initial Approval Notice

Principal Investigator: Dr. Robert Petrella
Department & Institution: Schulich School of Medicine and Dentistry\Geriatric Medicine,Western University

HSREB File Number: 106310
Study Title: An Exercise and Healthy Living Program (Hockey Fans In Training) Delivered Through Hockey Clubs for Overweight and Obese Men: A Pilot Pragmatic Randomized Controlled Trial.
Sponsor: Movember Canada

HSREB Initial Approval Date: April 06, 2015
HSREB Expiry Date: April 06, 2016

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Other	Appendix D: Detailed Timeline	2015/01/27
Other	Appendix L: Attendance Record Sheet	2015/01/27
Instruments	Appendix N: 12 Week 12 Month Participant Focus Group Q	2015/01/27
Instruments	Appendix O: Program Exit Interview Q (Non-Completer)	2015/01/27
Instruments	Appendix P: Coach Interview Guide	2015/01/27
Instruments	Appendix Q: Program Observation Document	2015/01/27
Other	Appendix T: Tyze Data Controls	2015/01/27
Other	Appendix U: Sykes Data Control	2015/01/27
Western University Protocol		2015/03/19
Data Collection Form/Case Report Form	Appendix C: Screening Baseline CRF	2015/03/16
Data Collection Form/Case Report Form	Appendix V: Measurement Sessions CRF	2015/03/16
Letter of Information & Consent	Appendix E: Letter of Information	2015/03/16
Instruments	Appendix F: PAR-Q	2015/03/16
Instruments	Appendix G: Health Care Provider Clearance Form	2015/03/16
Advertisement	Appendix R: Hockey FIT Recruitment Poster	2015/03/16
Other	Appendix S: Telephone Script	2015/03/16
Instruments	Appendix M: Participant Feedback Form	2015/03/16
Other	Appendix J: E-Health Suite	2015/03/16
Other	Appendix K: Outcomes & Assessment Procedures	2015/03/16
Instruments	Appendix Ia: Exercise Rx Form	2015/03/16
Instruments	Appendix Ic: Healthy Eating Rx Form	2015/03/16
Instruments	Appendix H: Participant Log	2015/03/16
Instruments	Appendix Ib: Physical Activity Rx Form	2015/03/16

[redacted]

Other Appendix B: Participant Flow Diagram 2015/03/16

The Western University Health Science Research Ethics Board (HSREB) has reviewed and approved the above named study, as of the HSREB Initial Approval Date noted above.

HSREB approval for this study remains valid until the HSREB Expiry Date noted above, conditional to timely submission and acceptance of HSREB Continuing Ethics Review.

The Western University HSREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use Guideline for Good Clinical Practice Practices (ICH E6 R1), the Ontario Personal Health Information Protection Act (PHIPA, 2004), Part 4 of the Natural Health Product Regulations, Health Canada Medical Device Regulations and Part C, Division 5, of the Food and Drug Regulations of Health Canada.

Members of the HSREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940

[redacted]

Ethics Officer, on behalf of Dr. Marcelo Kremenchutzky, HSREB Vice Chair

Ethics Officer to Contact for Further Information

[redacted]

This is an official document. Please retain the original in your files.

Appendix C: Trial Registration

ClinicalTrials.gov PRS
Protocol Registration and Results System

ClinicalTrials.gov Protocol and Results Registration System (PRS) Receipt
Release Date: 03/18/2015

Hockey Fans in Training (Hockey FIT): A Pilot Pragmatic Randomized Controlled Trial

This study is not yet open for participant recruitment.
Verified by Dr. Robert Petrella, University of Western Ontario, Canada, March 2015

Sponsor:	University of Western Ontario, Canada
Collaborators:	
Information provided by (Responsible Party):	Dr. Robert Petrella, University of Western Ontario, Canada
ClinicalTrials.gov Identifier:	[redacted]

Purpose

The Hockey Fans in Training (Hockey FIT) program aims to improve overweight men's physical fitness, eating habits and health-related lifestyle choices through a lifestyle modification program in collaboration with two Ontario Hockey League teams. In this pilot pragmatic randomized controlled trial, the investigators plan to explore the potential for Hockey FIT to reduce a clinically important amount of weight, increase physical activity levels, and lead to improvements in other health-related outcomes.

Condition	Intervention	Phase
Overweight Obesity	Behavioral: Hockey FIT Program	N/A

Study Type: Interventional
Study Design: Prevention, Parallel Assignment, Open Label, Randomized, N/A
Official Title: Hockey Fans in Training (Hockey FIT): A Pilot Pragmatic Randomized Controlled Trial of an Exercise and Healthy Living Program for Middle-aged, Overweight and Obese Men

Further study details as provided b[redacted]

Primary Outcome Measure:

- Weight loss (absolute and percentage) using digital weight scale [Time Frame: 12 weeks] [Designated as safety issue: No]

Secondary Outcome Measures:

- Weight loss (absolute and percentage) using digital weight scale [Time Frame: 12 months (Hockey FIT group only)] [Designated as safety issue: No]
- Average steps per day using pedometer [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured over a 7-day period using pedometers
- Total physical activity in MET-minutes/week using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  International Physical Activity Questionnaire - Short Version

- Time spent in sedentary activity using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the International Physical Activity Questionnaire - Short Version
- Eating habits: Fatty food score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the modified Dietary Instrument for Nutrition Education
- Eating habits: fruit and vegetable score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the modified Dietary Instrument for Nutrition Education
- Eating habits: sugary food score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the modified Dietary Instrument for Nutrition Education
- Eating habits: Starting the conversation summary score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by Starting the Conversation Dietary Assessment Tool
- Alcohol consumption using recall questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by a 7-day alcohol recall (number of drinks in last 7 days)
- Resting systolic blood pressure using automated blood pressure monitor [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
- Resting diastolic blood pressure using automated blood pressure monitor [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
- Waist circumference using tape measure [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
- Body mass index using height and weight measures [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Height will be measured with a portable stadiometer; weight will be measured with a digital weight scale
- Self-esteem summary score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Summary score from Rosenberg Self Esteem Scale
- Positive affect score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the International Positive and Negative Affect Schedule Short Form
- Negative affect score using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  Measured by the International Positive and Negative Affect Schedule Short Form
- Health-related quality of life: Descriptive health state using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  EQ-5D index measured by EQ-5D-3L
- Health-related quality of life: VAS using questionnaire [Time Frame: 12 weeks (& 12 months - Hockey FIT group only)] [Designated as safety issue: No]
  EQ VAS measured by EQ-5D-3L

Estimated Enrollment: 80
Study Start Date: April 2015
Estimated Primary Completion Date: May 2016
Estimated Study Completion Date: June 2016

Arms	Assigned Interventions
Experimental: Hockey FIT program 12-week active phase - exercise and healthy living program (1x/week; 90 minutes/session); 40-week maintenance phase (individualized approach)	Behavioral: Hockey FIT Program Active phase: a) Classroom-based education on successful weight management strategies and instruction on behaviour change techniques/dietary interventions; promote peer and other forms of social support; and b) Physical activity sessions in aerobic/strength/flexibility exercises. Maintenance phase: Participants independently set new lifestyle

Arms	Assigned Interventions
	prescriptions and goals and track their exercise, physical activity, and healthy eating with the support of a suite of free-of-charge health technology support tools Other Names: Hockey Fans in Training Program Hockey Fans in Training Hockey FIT
No Intervention: Usual-care wait-list control No active intervention (usual care)	

Detailed Description:

In the United Kingdom, the Football Fans in Training (FFIT) program was developed to encourage men to lead a healthier lifestyle through a sport-related medium. FFIT is a gender-sensitized, weight loss and healthy living program developed for delivery to overweight and obese men through professional football clubs. Published results from FFIT show that the program was able to actively recruit and engage men and for the men who participated, sustained weight loss and positive lifestyle change was observed (Hunt et al., 2014).

This study will use a two-arm, pilot pragmatic randomized controlled trial (RCT) design. The invesigators will conduct the study in conjunction with two Ontario Junior A Hockey Clubs. Following assessment of eligibility and baseline measurements, men will be individually randomized (1:1; stratified by club) to either the intervention group (receiving the Hockey FIT program) or to the comparison group (usual care wait-list control). The comparison group will be offered to start the Hockey FIT program after a 12-week delay. All men (both intervention and comparison groups) will receive publicly available healthy eating and physical activity materials at baseline. Measurements will be taken at baseline and 12 weeks (both groups) and again at 12 months (intervention group only).

The results of this study will be used to inform a fully-powered RCT where the primary objective will be to determine whether, compared to the usual care wait-list control group, the Hockey FIT group will lose weight (at least 5% weight loss from baseline) at 12 months.

Eligibility

Ages Eligible for Study: 35 Years to 65 Years
Genders Eligible for Study: Male
Accepts Healthy Volunteers: Yes

Criteria

Inclusion Criteria:

- Objectively-measured body-mass index of at least 28 kg/m2
- Clear Physical Activity Readiness Questionnaire (PAR-Q) (i.e., either by answering "No" to all questions or receiving clearance from a health care provider)

Exclusion Criteria:

- Unable to comprehend letter of information and consent documentation

Contacts and Locations

Contacts

[redacted]

Locations

Canada, Ontario
London Knights
[redacted]
Sarnia Sting
[redacted]

Investigators
Principal Investigator: [redacted]

More Information

Responsible Party: [redacted]

Study ID Numbers:
Health Authority:

Appendix D: Hockey FIT Maintenance Phase

After completion of the 12-week intervention, participants were invited to join an online social network called Tyze. Tyze Personal Networks is a secure, practical, web-based solution that helps connect people around someone receiving care (Tyze Connecting Care - Product, 2015). The men were encouraged to join the network and use the tool for sharing success stories, asking questions and keeping in touch with others in the group, as well as the Hockey FIT coach. External individuals could not be invited into the network. The Tyze platform also gave participants and the coach a platform to share resources such as recipes or goal setting literature. The network was casually used by the participants and coach although standardized messages containing reminders and advice on healthy lifestyle tips and choices were sent out at the following time points post the intervention end: 1, 3, 5, 6.5, 7.5 and 8.5 months.

Six months after the completion of the intervention, participants were invited to attend a Hockey FIT “booster session”. This session took place on a Sunday afternoon for one hour prior to the men attending a London Knights home game at Budweiser Gardens. Within the booster session, the coach reminded the men of some of the key points of maintaining a healthy lifestyle. The session included a refresher on goal setting, stages of change and exercise prescriptions, as well as a physical segment focused on aerobic activities.

Assessments for the Hockey FIT group were conducted 12 months after the start of the intervention, 9 months after completion of the intervention to observe changes post completion of the program.

Appendix E: Canadian Physical Activity Guidelines

Canadian Physical Activity Guidelines

FOR ADULTS - 18 – 64 YEARS

Guidelines

To achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.

It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.

More physical activity provides greater health benefits.

Let's Talk Intensity!

Moderate-intensity physical activities will cause adults to sweat a little and to breathe harder. Activities like:

- Brisk walking
- Bike riding

Vigorous-intensity physical activities will cause adults to sweat and be 'out of breath'. Activities like:

- Jogging
- Cross-country skiing

Being active for at least **150 minutes** per week can help reduce the risk of:

- Premature death
- Heart disease
- Stroke
- High blood pressure
- Certain types of cancer
- Type 2 diabetes
- Osteoporosis
- Overweight and obesity

And can lead to improved:

- Fitness
- Strength
- Mental health (morale and self–esteem)

Pick a time. Pick a place. Make a plan and move more!

- ☑ Join a weekday community running or walking group.
- ☑ Go for a brisk walk around the block after dinner.
- ☑ Take a dance class after work.
- ☑ Bike or walk to work every day.
- ☑ Rake the lawn, and then offer to do the same for a neighbour.
- ☑ Train for and participate in a run or walk for charity!
- ☑ Take up a favourite sport again or try a new sport.
- ☑ Be active with the family on the weekend!

Now is the time. Walk, run, or wheel, and embrace life.

PARTICIPACTION

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www.csep.ca/guidelines

Appendix F: STEP Test Protocol

Protocol for STEP

1. Set up STEP test in front of a wall.
2. Explain the purpose of the test: "The purpose of the STEP test is to give us an idea of how fit you are. We want to know how well your heart, lungs, and muscles work together in order to assign a training intensity that is specific to you. We also use this test to find out if your fitness level improves over the course of the study."
3. Explain the test to the participant: "I am going to ask you to walk up and down these steps at a comfortable pace (not too fast or too slow – about the same as you would normally climb stairs) 20 times. You can hold on to the wall for support and I will count out loud for you so you know when to stop. I will take your pulse before the test and at the end. Please stop if you feel exhausted or unable to complete the test for any reason, or if you have dizziness, or chest pain/pressure".
4. Demonstrate the test for the participant. Emphasize that only one foot goes on the first step, both feet meet on the second step, one foot back down to the first step, and then both feet on the floor. You can talk it through: "Up, up, together. Down, down, together." Tell them to make sure their whole foot (or as much of it as possible makes it up onto the step – try not to leave the heels hanging off the edge).
5. Have them complete two or three practice steps to ensure they understand the rhythm. Correct any stepping or form errors.
6. Explain and show them what RPE is so they can tell you their RPE after the test. (RPE is your rating of perceived exertion. The scale goes from 0-10. 1 would be the equivalent to seated rest and 10 would be maximal exertion, such that you couldn't continue any longer).
7. Take their resting pulse (10s radial palpation), record in CRF.
8. Ask if they have any questions before they start. Have them face the STEP, ready to perform the test. Remind the participant to tell you IMMEDIATELY if they have any chest pain or lightheadedness or if they would like to stop the test for any other reason. Also remind the participant that if they mess up the stepping pattern to just keep going (and you can cue them to try to help them get back on track).
9. When they confirm they are ready to begin, count them in, "Ready, Set, Go." Start timing when the first foot leaves the ground.
10. During the test, count each step cycle out loud as they complete it. Offer encouragement and look for signs of fatigue or balance problems. If they are racing, encourage the participant to slow down.

11. Record reason for stopping if they cannot finish
12. If they complete the test, have them sit and quickly record their post-exercise HR (6s radial palpation). Record in CRF.
13. Ask their RPE (related to the end of the test)
14. Input sex, age, weight (kg), time required to complete the test (in seconds) and heart rate (bpm) immediately following the test into the STEP test VO2max calculation.
15. Assign a target HR based on their cardio-respiratory fitness classification (See chart in spreadsheet)

(Petrella, Koval, Cunningham, & Paterson, 2001)

Appendix G: Lifestyle Prescriptions and Tracking Form

Physical Activity (Step Count) – Prescription (Rx)

It is recommended that we take approximately 10,000 steps per day

1. Identifying the Number of Steps You Should Take Each Day (Physical Activity Rx)

Circle the Program Week that you are currently in:
1 2 3 4 5 6 7 8 9 10 11 12

Baseline Daily Step Count (Average): _____

Each week, try to *increase* your daily step count using the information provided in the table below.

	Increase Baseline Step Count By…
Week 1	Baseline Step Count + 1,500 steps on at least 3 days of the week
Week 2	Baseline Step Count + 1,500 steps on at least 3 days of the week
Week 3	Baseline Step Count + 1,500 steps on at least 3 days of the week
Week 4	Baseline Step Count + 1,500 steps on at least 5 days of the week
Week 5	Baseline Step Count + 1,500 steps on at least 5 days of the week
Week 6	Baseline Step Count + 3,000 steps on at least 3 days of the week
Week 7	Baseline Step Count + 3,000 steps on at least 3 days of the week
Week 8	Baseline Step Count + 3,000 steps on at least 5 days of the week
Week 9	Baseline Step Count + 3,000 steps on at least 5 days of the week
Week 10	Baseline Step Count + 4,500 steps on at least 3 days of the week
Week 11	Baseline Step Count + 4,500 steps on at least 3 days of the week
Week 12	Baseline Step Count + 4,500 steps on at least 5 days of the week

A SAMPLE Physical Activity Rx for Week 1 is provided below.

- **Participant is in Week 1 of the Hockey FIT Program**
- **Their Baseline Daily Step Count = 3300 steps**

Physical Activity Rx:
= BASELINE {3300 steps} + 1500 STEPS on at least 3 days of the week
= 4800 daily steps on at least 3 days of the week and 3300 steps on the other days of the week

Identify YOUR Physical Activity Rx for the given week using the table above. Record it in the box below.

My Physical Activity Rx is:

2. Setting Goals to Achieve Your Physical Activity Rx

In the table below, brainstorm and record your ideas about how you can achieve your Rx and the types of activities you plan on taking part in to do this.

General ideas about how to increase daily step count:
Ideas about HOW YOU will increase YOUR daily step count and achieve your Physical Activity Rx:

Healthy Eating – Prescription (Rx)

1. **Identifying Your Current Eating Habits** *(*refer to Canada's Food Guide and Portion Size Guide Sheet to help you complete this section)*

Place an "X" in the appropriate box for each question. If you're having a hard time remembering the number of servings you usually eat daily – record the number you ate yesterday.

a) **How many pieces or servings of fruits and vegetables do you usually eat in a day?** (Count canned, frozen and fresh fruits and vegetables).

≤ 1	2	3	4	5	6	7	≥ 8

b) **How many pieces or servings of grain products do you usually eat in a day?**

≤ 1	2	3	4	5	6	7	≥ 8

c) **How many pieces or servings of meat and alternatives do you usually eat in a day?**

≤ 1	2	3	4	5	6	7	≥ 8

d) **How many pieces or servings of milk and alternatives do you usually eat in a day?**

≤ 1	2	3	4	5	6	7	≥ 8

e) **How many servings of water do you drink in a day?** (A serving is about 250ml or 8 oz).

≤ 1	2	3	4	5	6	7	≥ 8

f) **How many times a week do you eat a healthy breakfast?** (i.e., includes a balanced breakfast – e.g., a fruit or vegetable; whole grain (e.g. whole wheat cereal or toast); and a protein (e.g. eggs, yogurt, milk, peanut butter, almond butter, cheese, meat).

0	1	2	3	4	5	6	7

2. My Healthy Eating Prescription (Rx)

# Fruit & Vegetables Servings/Day:____	*Canada's Food Guide recommends that adult males eat 8-10 servings of fruits and vegetables per day*
# Grain Servings/Day: ____	*Canada's Food Guide recommends that adult males eat 7-8 servings of grain products per day*
# Meat and Alternative Servings/Day: ____	*Canada's Food Guide recommends that adult males eat 3 servings of meat and alternatives per day*
# Milk and Alternative Servings/Day: _____	*Canada's Food Guide recommends that adult males eat 2-3 servings of milk and alternatives per day*
# Water Servings/Day: ____	*You should aim to drink at least 8 glasses (250 ml/serving) of water per day*
# Healthy Breakfasts/Week: ____	*It is important to eat a healthy, balanced breakfast every day of the week*

Strategies:

- ❑ Shopping list
- ❑ New recipes
- ❑ Canned and Frozen
- ❑ No cut/no peel
- ❑ Non-perishable
- ❑ Plan menus
- ❑ Snacks
- ❑ Eating out (salad, fruit)

Other ideas about HOW YOU will achieve your Healthy Eating Rx:

Exercise – Prescription (Rx)

1. Identifying Your Weekly Exercise Time

During a typical week, how many minutes in total do you spend doing activities that use many muscles and raise your heart rate? Count moderate physical activities (walking, bike riding, housework, gardening, aqua-fit, yoga, gentle swimming) and vigorous physical activities (hockey, basketball, running, aerobic fitness class, fast dancing, x-country skiing or swimming)? You can list them on the back and add up the time. **Place an "X" in the appropriate box.**

< 30	30	45	60	75	90	105	120	135	150	> 150

2. My Exercise Prescription

Target Heart Rate: Beats per minute: ____ Beats per 10 seconds: ____	
Exercise Time: Total Time/Week (mins): ____ Frequency/Week (circle): 1 2 3 4 5 6 7 Time/Session (mins): ____	Canadian Physical Activity Guidelines recommend that adults achieve at least 150 minutes of moderate-vigorous intensity aerobic exercise per week, in bouts of 10 minutes or more
General ideas about how to increase exercise minutes and achieve a target heart rate:	
Ideas about HOW YOU will increase YOUR exercise minutes and achieve your Exercise Rx :	

Healthy Living Tracking Form

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly Totals
Date:	**Date:**	**Date:**	**Date:**	**Date:**	**Date:**	**Date:**	**Accomplishments** *(divide total by # of days tracked)*
Exercise # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Exercise** # Minutes _____ THR Achieved ☐Y ☐N	**Average Daily Exercise Minutes** _______
Physical Activity # Steps _______	**Physical Activity** # Steps _______	**Physical Activity** # Steps _______	**Physical Activity** # Steps _______	**Physical Activity** # Steps _______	**Physical Activity** # Steps _______	**Physical Activity** # Steps _______	**Average Daily Step Count** _______
Healthy Eating (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Healthy Eating** (servings) F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast ☐Y ☐N	**Average Daily Servings** F&V _____ Grains _____ Meat _____ Milk _____ Water _____ Breakfast Everyday ☐Y ☐N
NOTES: (Questions for my coach. Observations about how I'm feeling. What helps keep me on track. Barriers that are getting in my way.)							

THR = Target Heart Rate **F & V = Fruits and Vegetables** **Meat = Meat and Alternatives** **Milk = Milk and Alternatives**

Appendix H: Starting the Conversation (STC) Questionnaire

HEALTHY EATING (1): Starting the Conversation

Please mark only <u>one</u> response for each of the questions in this section.

21. Over the past few months …

a) How many times a week did you eat fast food meals or snacks?	Less than 1 time ☐0	1-3 times ☐1	4 or more times ☐2
b) How many servings of fruit did you eat each day?	5 or more ☐0	3-4 ☐1	2 or less ☐2
c) How many servings of vegetables did you eat each day?	5 or more ☐0	3-4 ☐1	2 or less ☐2
d) How many regular sodas (pop) or glasses of sweet tea did you drink each day?	Less than 1 ☐0	1-2 ☐1	3 or more ☐2
e) How many times a week did you eat beans (like pinto or black beans), chicken, or fish?	3 or more times ☐0	1-2 times ☐1	Less than 1 time ☐2
f) How many times a week did you eat regular snack chips or crackers (not low-fat)?	1 time or less ☐0	2-3 times ☐1	4 or more times ☐2
g) How many times a week did you eat desserts and other sweets (not the low-fat kind)?	1 time or less ☐0	2-3 times ☐1	4 or more times ☐2
h) How much margarine, butter, or meat fat do you use to season vegetables or put on potatoes, bread, or corn?	Very little ☐0	Some ☐1	A lot ☐2

To Be Completed by HOCKEY FIT Assessor:

Starting the Conversation Summary Score = _____

Appendix I: Modified Dietary Instrument for Nutrition Education Questionnaire and Scoring

HEALTHY EATING (2): Modified Dietary Instrument for Nutrition Education

The next section looks at what you may have had to eat or drink over the last 7 days. Please read each question carefully, and *mark only one response for each question.*

22. How many times over the last 7 days did you eat breakfast?

☐1 No times
☐2 1-2 times
☐3 3-5 times
☐4 6 or more times

23. How many times over the last 7 days did you eat/drink a serving of the following…?

	No times	1-2 times	3-5 times	6 or more times
a) Cheese *(any except cottage cheese)*	☐1	☐2	☐6	☐9
b) Beef burgers or sausages	☐1	☐2	☐6	☐9
c) Beef, pork or lamb	☐1	☐2	☐6	☐9
d) Fried food *(fried fish, cooked breakfast)*	☐1	☐2	☐6	☐9
e) French fries	☐1	☐2	☐6	☐9
f) Bacon, processed meat	☐1	☐2	☐5	☐6
g) Pies, quiches, pastries	☐1	☐2	☐5	☐8
h) Potato chips	☐1	☐2	☐5	☐6
i) Fast food *(take-out or sit-in)*	☐1	☐2	☐3	☐4
j) Nuts	☐1	☐2	☐3	☐4

24. Are you a vegetarian?

☐$_1$ Yes
☐$_2$ No

25. Thinking about the last 7 days, how many times a day did you eat the following…?

	Less than once a day	1-2 times a day	3-5 times a day	6 or more times a day
a) Fruit and vegetables *(not potatoes)*	☐$_{0.5}$	☐$_{1.5}$	☐$_4$	☐$_6$
b) Chocolate, sweets	☐$_1$	☐$_2$	☐$_4$	☐$_6$
c) Cookies	☐$_1$	☐$_2$	☐$_4$	☐$_6$
d) Sugary drinks *(fizzy drinks, fruit juice)*	☐$_1$	☐$_2$	☐$_3$	☐$_4$

26. Thinking about the last 7 days, how much milk did you use in a day, for drinking or in cereal, tea or coffee?

☐$_1$ Less than half a cup
☐$_2$ About half a cup
☐$_3$ About a cup
☐$_4$ Two or more cups
☐$_{444}$ Not applicable → skip to question 28

27. What kind of milk do you usually use?

☐$_3$ Whole (3.25% milk fat)
☐$_2$ Partly skimmed (1% or 2% milk fat)
☐$_1$ Skimmed (0.3% milk fat)

To Be Completed by HOCKEY FIT Assessor:

Fatty Food Score = _____

Fruit and Vegetable Score = _____

Sugary Food Score = _____

Scoring for the modified DINE questionnaire.

*** "times" equate to how many times did a participant eat/ drink a serving of…**

**** "day" equates to how many times a day did a participant eat/drink…**

Food Type	**Scoring of Frequencies** *(times* / day**)*
Cheese, beef burgers or sausages, beef, pork or lamb, fries and fried food	0 times = 1 1-2 times = 2 3-5 times = 6 6 or more times = 9
Pies, quiches and pastries	0 times = 1 1-2 times = 2 3-5 times = 5 6 or more times = 8
Bacon or processed meat and potato chips	0 times = 1 1-2 times = 2 3-5 times = 5 6 or more times = 6
Fast food and nuts	0 times = 1 1-2 times = 2 3-5 times = 3 6 or more times = 4
Fruit and Vegetables *(not potatos)*	0 a day = 0.5 1-2 a day = 1.5 3-5 a day = 4 6 or more a day = 6
Chocolate and sweets	0 a day = 1 1-2 a day = 2 3-5 a day = 4 6 or more a day = 6
Cookies	
Sugary Drinks *(fizzy drinks, fruit juice)*	0 a day = 1 1-2 a day = 2 3-5 a day = 3 6 or more a day = 4
Milk amount	Less than half a cup (or none) = 1 About half a cup = 2 About a cup = 3 Two or more cups = 4

Curriculum Vitae

Name: Ashleigh De Cruz

Post-Secondary Education and Degrees:

University of Glamorgan

Wales, U.K.

2009 – 2011 Fnd

Bucks New University

High Wycombe, U.K.

2012 – 2013 B.Sc

Western University

London, ON, Canada

2014 – 2016 M.Sc

Related Work Experience:

Research Assistant

Lawson Health Research

2015 – 2016

Publications / Abstracts:

MA Gregory, DP Gill, H Morton, **A De Cruz**, L Gonzalez, RJ Petrella (2014). The Effects of Mind-Motor and Aerobic Exercise on Cognition and Mobility in Older Adults with Cognitive Impairment but Not Dementia. *The Journal of the Alzheimer's Association, 448-449*

DP Gill, MA Gregory, T Liu-Ambrose, V Hachinski, GY Zou, C Fitzgerald, R Shigematsu, **A De Cru**z, RJ Petrella (2014). A Randomized Controlled Trial to Examine Combined Multiple-Modaility and Mind-Motor Exercise on Cognitive Functioning in Community-Dwelling Older Adults: A Pilot Study. *The Journal of the Alzheimer's Association, 210*

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S Muise, S Sibbald, DP Gill, **A De Cruz**, B Riggin, R Pulford, RJ Petrella (2016). Mens Experiences With The Hockey Fans In Training Physical Activity And Healthy Living Program. *American College of Sports Medicine. Scientific Abstract*

RJ Petrella, DP Gill, **A De Cruz**, B Riggin, S Muise, R Pulford, C Bartol, K Hunt, S Wyke, C Gray, C Bunn, S Treweek, M Zwarenstein, GY Zou, K Danylchuk (2016). Can a Sports Team-based Lifestyle Program (Hockey Fans In Training) Improve Weight in Overweight Men? *American College of Sports Medicine. Scientific Abstract*

DP Gill, **A De Cruz**, B Riggin, S Muise, R Pulford, C Bartol, K Hunt, S Wyke, C Gray, C Bunn, S Treweek, M Zwarenstein, GY Zou, K Danylchuk, RJ Petrella (2016). Impact of Hockey Fans In Training Program on Steps and Self-rated Health in Overweight Men. *American College of Sports Medicine. Scientific Abstract*

Presentations:

A De Cruz, MA Gregory, N Koblinsky, H Morton, L Gonzalez, DP Gill, RJ Petrella (2014). The Effects of a Combined Program of Mind-Motor and Aerobic Exercise on Gait Performance in Older Adults with Cognitive Impairment, but Not Dementia. *Rotman Research Institute Conference, Baycrest. Poster Presentation*

A De Cruz (2015). Hockey FIT. A Healthy Lifestyle Study for Male Hockey Fans**.** *Mens Retirement and Leisure Fair. Community Presentation*

A De Cruz (2016). Exercise and Brain Health in Community-Dwelling Older Adults**.** *South Gate Centre, Woodstock, ON. Community Presentation*

MA Gregory, DP Gill, **A De Cruz**, RJ Petrella (2016). Dual-task gait training and aerobic exercise training improves cognition in older adults with early indications of cognitive impairment*. Alzheimer's Association International Conference*

Related Coaching Licences

UEFA C Coaching badge in Football (Soccer)