EXERCISE LEADER DELIVERY OF A COGNITIVE BEHAVIOURAL-BASED PROGRAM FOR OVERWEIGHT AND OBESE ADOLESCENTS

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Degree of

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DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Richard Mallows

Related Publications and Presentations

Mallows, R., Walkley, J., Taylor, L., Grigg, K., Greenway, K., & Greenwood, K., (2011). Exercise leader led healthy lifestyle intervention for overweight and obese adolescents: 12-month evaluation of a cognitive behaviour therapy based program, [Abstract] *Obesity Research & Clinical Practice* Volume 5, (Suppl)1, Pages [S25]

Mallows, R., Walkley, J., Taylor, L., Grigg, K., Greenway, K., & Greenwood, K., (2010). Exercise leader led cognitive behaviour intervention for overweight and obese adolescents: 6-month evaluation of the your choice program, [Abstract]. *Obesity Research & Clinical Practice* Volume 4, (Suppl)1, Pages [S48]

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Mallows, R., Walkley, J., Taylor, L., Grigg, K., (2010, October). *A two year follow up investigation of course content in relation to behaviour change, overweight and obesity in nutrition, dietetics and exercise leader training courses in Australia*, Paper presented at Australian New Zealand Obesity Society (ANZOS) National Conference, Sydney

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THESIS SUMMARY

This PhD project comprises a series of four original studies linked to the development, implementation and evaluation of a healthy lifestyle intervention in adolescent weight management which was titled Your Choice. This summary presents an overview of the project arrangement and a brief summary of results.

Initially, a comprehensive review of the literature was conducted. This review examined the background information related to adolescent overweight and obesity, approaches to weight management and specifically appraised behaviourally-based approaches that address overweight and obesity in adolescents. The review summarised the limitations of the published research, which provided guidance for the direction of the PhD project.

Study one evaluated the pre-service training of Exercise Leaders in Exercise Prescription courses in Australia. Online investigations of published Australian tertiary education information documents sought evidence of dietary, physical activity and lifestyle behaviour change strategies. A word searchable database was developed and data mining techniques used to evaluate the incidence of key terms in 2008 and 2010. Information gained from the 2008 audit informed researchers on the type of training required for Exercise Leaders to be able to deliver a behaviourally-based intervention. Information from the 2010 audit allowed researchers to conduct a 2-year contrast on information change in the area of behaviour-based training of Exercise Leaders. Data revealed little evidence that the information related to the training of Exercise Leaders in Australia changed across this time period, nor did the evidence support the positions of related professional associations regarding the capacity of graduates to intervene in overweight and obesity (OWOB) or the recommendations of the NH&MRC in respect

to physical activity promotion and behaviourally-based approaches to overweight and obesity remediation.

The main purpose of Chapter 4 (Study 2) was to determine the trainability of Exercise Leaders to apply an adolescent-focussed, healthy lifestyle, weight management program in community leisure centres. Fifteen leisure centre employed Exercise Leaders were recruited and subsequently trained (and retitled) to become Health Coaches through an online and face-to-face program that focussed on the application of a Cognitive Behavioural Therapy (CBT) based, behaviour modification program to overweight and obese adolescents. Trainability was determined by pre- and post-knowledge measures, components of the Revised Cognitive Behavioural Therapy Scale and consumer satisfaction measures. Results from pre- and post-training measures, cognitive behavioural measures and participant feedback suggested that the coaches retained knowledge and guided adolescents to appropriate healthy lifestyle behaviours. Qualitative feedback, in the main, indicated that Health Coaches had sound knowledge, and perceived they were adequately trained to apply such techniques to overweight and obese adolescents.

The purpose of Chapter 5 (Study 3) was to determine the effect of a healthy lifestyle, weight management intervention titled “Your Choice” delivered by trained Health Coaches (Exercise Leaders) to overweight and obese adolescents, accompanied by a supporting parent, in community-based leisure centres. Health Coaches delivered the Your Choice program in eight face-to-face sessions. The intervention was compared to a Standard Treatment fitness program, an approach that is commonly prescribed in community leisure centres. The primary aim of the intervention was to determine if improvements in body composition, dietary and physical activity behaviours and psychosocial characteristics would occur among overweight and obese

adolescents. Measures were taken at four intervals across a 12-month period, and included body composition and dimensions, physical activity, dietary and psycho-social variables. Results showed significant improvements in body composition in the Your Choice group and the Standard Treatment group. Data revealed that the Your Choice group decreased percent body fat from pre- to 12-months (-1.7% change, $p = .017$, $d = 0.11$). There was a non-significant decrease in percent body fat for the Standard Treatment from pre- to 12-months (-1.6%, $p = .014$, $d = 0.13$). Additionally, the Your Choice group had a significant reduction in trunk fat % at 12-months (-2.7%, $p = .009$, $d = 0.15$), whereas the Standard Treatment group had a non-significant change in trunk fat % from pre- to 12-months (-0.56%, $p = >.05$, $d = 0.13$) Significant changes were also evident in anthropometrical, physical activity, dietary, and psycho-social outcomes for both groups. The data showed that Your Choice trained Exercise Leaders were able to deliver a CBT-based lifestyle program that supported overweight and obese adolescents to achieve improved body composition to 12-months post intervention.

To further evaluate the impact of the intervention, study four (Chapter 6) investigated the program's effectiveness on biological, and psycho-sociological variables assessed on the parents of overweight and obese adolescents. Measures taken at the same intervals as the adolescent included body composition, dimensions, and psycho-social items. Results for bioimpedance-derived body composition revealed an increase in the percent body fat for the Standard Treatment group from 8-Weeks to 12-Months ($p = .032$, $d = 0.21$), but showed a non-significant change for the CBT-based Health Coach group across the assessment period ($p > .05$). Significant changes were also evident in other anthropometrical and psychosocial outcomes for both groups.

Overall, the implementation of the Your Choice intervention had several promising outcomes as compared to the Standard Treatment intervention. These results

showed that Exercise Leaders, when given suitable training, are able to make a meaningful impact on both the physical and psychological attributes of overweight and obese adolescents and their parents. Collectively, these four studies make a unique contribution to the body of knowledge relating to the management of adolescent overweight and obesity in community settings and the behavioural training required to do so.

CHAPTER 1

INTRODUCTION

Overweight and obesity (OWOB) is a serious, global health concern. Current statistics from countries with robust population surveillance systems reveal alarming trends in occurrence, severity and prevalence (World Health Organisation, 2011). In Australia, data obtained from 2007 to 2008, revealed 61% of Australian adults were classified as overweight or obese (OWOB). The proportion of men in these categories was significantly higher than that for women (67% of men compared to 50% of women). This difference is most evident in the overweight category, where 43% of men were overweight compared to 31% of women (Australian Bureau of Statistics, 2009). These trends also appear evident in adolescents and children. Data from 4,500 randomly selected Australian children (age 2 to 16 years) identified that 23% of the sample was overweight or obese (Commonwealth Scientific Industrial Research Organisation, 2008). This research was supported by 2009 data, highlighting that 17% of 5 to 17 year old adolescents and children were overweight and 7.8% obese (Australian Bureau of Statistics, 2009). The most recent published data on adolescent Australians aged 12 to 17 years showed that 9% of this age group were obese and 22% were overweight (Australian Institute of Health and Welfare, 2011).

Researchers have postulated that genetic determinants contribute to overweight and obesity, and, although genetic factors help establish individual vulnerability (Brownell, Schwartz et al., 2009), decreases in physical activity and increases in high caloric food consumption are thought to have primarily contributed to this epidemic (Baur, 2002; Saelens, Sallis et al., 2002).

Based on currently available evidence, it is not possible to conclusively identify the specific causes of OWOB. However, there appears to be a combined effect from a cluster of associated behavioural, environmental and genetic factors that play a role in OWOB among adolescents and children (World Health Organisation, 2006). This relationship is made more complex by the interaction of factors influencing intake and expenditure behaviours. In adolescents, these behaviours can be influenced by school, family and community environments.

Overweight and obesity (OWOB) causes adverse consequences in children, adolescents and adults. Regardless of age, OWOB individuals are more likely to develop early signs or manifestation of many co-morbidities, including heart disease, hypertension and Type II Diabetes (Speiser, Rudolf et al., 2005). It has been suggested that OWOB children and adolescents are more likely to develop orthopaedic impairments and problems in their endocrine, neurological and gastroenterological systems, as compared to their non-obese peers (Must & Strauss, 1999). Moreover, many researchers found that obese adolescents were more likely to develop asthma, sleep apnoea and gallstone formation, a view supported by others (Rocchini, 1993; Wabitsh, 2000; Barr, Magliano et al., 2006). Additionally OWOB in adolescence has been linked to many adverse psychological issues (Wadden & Stunkard, 2002; Wadden, Womble et al., 2002).

Apart from these consequences, research suggests that OWOB and its associated health problems in adulthood have tracked into adulthood from adolescence (National Health and Medical Research Council, 2003; Singh, Mulder et al., 2008). Overall, findings showed that obese adolescents were 16 times more likely to remain obese as young adults compared to appropriate weight or overweight adolescents. Additionally, less than 5% of adolescents that were appropriate weight became obese as

adults (The, Suchindran et al., 2010). Combined, the available evidence indicates a tracking phenomenon exists for overweight and obesity, highlighting the need for interventions prior to adulthood.

In addition to the direct health consequences, OWOB has significant financial costs, with current Australian estimates of the cost to the Australian society being between $21 to $37 billion annually, a cost substantially higher than previous estimates (Colagiuri, Lee et al., 2010). Lobstein et al. (2004) suggest that it may be difficult to predict the long-term economic impact of childhood obesity, as indirect costs may be undetectable, and may include hard to detect related costs such as time away from the workplace by parents when they care for their obese children, or those who are unemployable or made redundant due to their excessive weight (Lobstein, Baur et al., 2004).

Interventions in overweight and obesity have focused on assisting children and adolescents to manage their weight using a variety of strategies. These include strict dietary therapy, pharmacological agents or bariatric surgery (Berkowitz, Wadden et al., 2003; Sugerman, Sugerman et al., 2003; Steinbeck, 2005; Richardson, 2010). One of the major considerations in relation to weight management in children and adolescents is adjusting the balance between energy intake and energy output whilst maintaining a diet that provides the essential nutrients for proper growth and function (National Health and Medical Research Council, 2003). Over the past few decades several interventions have been developed to modify health behaviour to achieve improved weight status, and these interventions have at their core the elements of behaviour modification (Tubbs & Whybrow, 2003; Shaw, O'Rourke et al., 2005; Stead & Lancaster, 2005; Bennett & Sothern, 2009). Behaviour modification models use the clinical application of principles, techniques, and procedures in the assessment,

treatment, management, rehabilitation and prevention of physical disease or concomitant behavioural reactions to physical dysfunction; and the validation and refinement of such treatment techniques as applied to medical problems and health related issues through systematic investigations of research (Anderson & Davies, 1999). A commonly used model is Bandura's Social Cognitive Theory, which has proven to be effective when used to underpin behaviour modification interventions in several areas of health (Annesi, 2003; Amsberg, Anderbroa et al., 2009; Brabban, Tai et al., 2009). Weight management studies based on behaviour change models such as the Social Cognitive Theory advocate that parents can play a central role by affecting the social and physical environment around the adolescent, thus providing assistance in learning healthy habits (Braet & Van Winckel, 2000; Vignolo, Rossi et al., 2007).

Specifically, CBT has been utilised in the treatment of depression, anxiety, panic disorder, social phobia, obsessive compulsive disorder, post-traumatic stress, schizophrenia, panic and eating disorders (Butler, Chapman et al., 2006). Additionally, many reviewers promote CBT as being favourable in the treatment of overweight and obesity (Warschburger, Fromme et al., 2001). Several studies have confirmed that family-focused, behaviour modification programs have been successfully delivered to OWOB adolescents by Psychologists. Even so, there is emerging evidence of CBT-based approaches being successfully delivered by non-psychologists (Annesi, 2003; Nansel, Iannotti et al., 2007; Beissner, Henderson et al., 2009). Exercise Leaders represent one such group of non-psychologists that have delivered CBT-based lifestyle modification programs in adults, and more recently in adolescents (Annesi, 2003; Annesi, Walsh et al., 2010).

There currently appears to be a need to develop accessible interventions in adolescent overweight and obesity, particularly as such a problem has significant

individual and population consequences. Interventions that are family targeted, community based and use CBT principles appear to be successful. Furthermore, community-based interventions delivered by non-psychologists, such as Exercise Leaders, have the potential to broaden treatment accessibility. The successful treatment of overweight in adolescents may serve as an effective approach for the prevention of adult obesity and its related morbidity and mortality (Golan, Weizman et al., 1998).

The primary aim of this PhD project was to develop, implement and evaluate an intervention in adolescent weight management. The intervention sought to address a major deficiency in the literature as few studies have explored the effectiveness of weight loss interventions for the adolescent age group (Summerbell, Waters et al., 2005; Oude Luttikhuis, Baur et al., 2009). The intervention incorporated many of the emerging themes in the literature, with a focus on behaviourally-based programs that appear to show promise, combined with a multi-component and parent supported approach that has previously been demonstrated to be successful in children. There was also a need to develop effective weight management interventions that are suitable for delivery in community settings where the vast majority of OWOB adolescents may have improved access and could be treated (Shrewsbury, O'Connor et al., 2009; Nguyen, Shrewsbury et al., 2012). Lastly, the intervention utilised trained Exercise Leaders to deliver the program as there is emerging support for Exercise Leaders as providers of counselling-based support to engage participants in healthy living behaviour (Annesi, Walsh et al., 2010).

Research Questions

In addressing these aims the following research questions were posed:

1. Does the education of Exercise Leaders in Australia include training in behaviour-based approaches to interventions for overweight and obesity?
2. Can a short duration, in-service training program prepare Exercise Leaders to deliver a CBT-based, healthy lifestyle intervention to overweight and obese adolescents?
3. Will a CBT-based, healthy lifestyle intervention delivered by Exercise Leaders to overweight and obese adolescents at a leisure centre result in improvements in biological, psychological, and behavioural characteristics?
4. Will a CBT-based, healthy lifestyle intervention delivered by Exercise Leaders at a leisure centre result in improvements in biological, psychological, and behavioural characteristics of the supporting parent of the overweight or obese adolescent?

CHAPTER 2

REVIEW OF LITERATURE

Structure of the Review

This review of literature has been organised into four sections: 1) background information related to adolescent overweight and obesity; 2) approaches in weight management; 3) behavioural approaches in weight management, and; 4) discussion and conclusions. Section one has addressed the phenomenon of adolescent overweight and obesity, including the aetiology, consequences and cost. Section two provides an overview of current and traditional approaches relating to adolescent weight management. This section has included a review of research focussing on child, adolescent, and adult samples. Section three highlights behaviourally-based research that has been designed to address various health conditions in various groups, with a focus on the application of these approaches to adolescent weight management. In section four, conclusions are presented along with the limitations of published research, and the section finishes with recommendations for future research. This review of literature is not intended to overview every intervention in weight management, rather, it is a review of the major and most recent themes presented in the literature. This approach has provided a context for the exploration and treatment of overweight and obesity in adolescents.

Section 1: Overweight and Obesity in Australia

Adolescents

Adolescent overweight and obesity (OWOB) is a serious, global health concern. Evidence reported over the past three decades indicates a trend toward increased severity and prevalence to around 2010 (World Health Organisation, 2011; Flegal, Carrol et al., 2012), with some evidence emerging of a plateau in some population sub-groups in some countries (Lobstein, 2010; Olds, Tomkinson et al., 2010; Robbins, Mallya et al., 2012). In Australia, the prevalence of adolescent OWOB has increased significantly. Several studies released over the past decade report approximately one in five Australian children and adolescents as either overweight or obese (Baur, 2002; Commonwealth Scientific Industrial Research Organisation, 2008; Haby & Markwick, 2008).

In the preceding years, analysis of data obtained from Australian children and adolescents during the period 1985 to 1995, showed 15% of boys and 15.8% of girls were overweight and 4.5% of boys and 5.3% of girls were classified as obese (Magarey, Daniels et al., 2001). Booth et al. (2003) reviewed Australian childhood data (for age 5 to17 years) collected from population surveys in 1969, 1985 and 1997. It was found that in the years 1985 to 1997, OWOB combined had doubled and that obesity alone had trebled. In comparison, the increase of OWOB between the years 1969 to 1985 was much smaller. It was concluded that significant increases in obesity levels have occurred in the Australian childhood population from the mid 1980's, and that the increase was at the time accelerating (Booth, Chey et al., 2003).

More recently, data from 4,500 randomly selected Australian children (age two to 16 years) identified that 23% of the sample was OWOB (Commonwealth Scientific

Industrial Research Organisation, 2008). This research was supported by 2009 data, highlighting that 17% of 5 to 17 year old children were overweight and 7.8% obese (Australian Bureau of Statistics, 2009). Recent research into 12,188 adolescent secondary school students showed that 23.7% were found to be OWOB (Cancer Council Australia & National Heart Foundation, 2011). The most recent published data of Australian 12 to 17 year-olds showed that 9% of this age group were obese and 22% were overweight (Australian Institute of Health and Welfare, 2011).

It has been predicted that, among OWOB Australians aged 5 to19 years, one-third will be overweight or obese in 2025 (Haby & Markwick, 2008). Olds and colleagues initially held this view, but revised their stance based on a review of 41 studies, including data from 264,905 Australian children aged 2 to 18 years. The researchers identified that a plateau for OWOB had occurred from the years 1985 to 2008 (Olds, Tomkinson et al., 2010; Olds, Maher et al., 2011). Notwithstanding these recent findings, researchers and public health experts remain united in their view that the prevalence of OWOB among young people in Australia is too high (Lobstein, 2010; Olds, Tomkinson et al., 2010).

Adults

The prevalence of OWOB in Australian adults has been steadily increasing over the past three decades. Based on self-reported data from 2001, an estimated 2.4 million Australian adults were obese, of which 16% were men and 17% were women aged 18 years and over. This was a significant increase from the combined 1989 to 1990 period during which 9% of men and 10% of women were obese (Australian Institute of Health and Welfare, 2003). The same report showed that a further 4.9 million Australian

adults were estimated to be overweight, but not obese, of which 42% were men and 25% were women. Between 1980 and 2001, the proportion of men aged 25 to 64 years who were obese rose from 9% to 17%. In the same period, the obesity rate among women of that age more than doubled, from 8% to 20%. Additionally, in data obtained from 2007 to 2008, 61% of Australian adults were classified as overweight or obese. The proportion of men in these categories was significantly higher than that for women (67% of men compared to 50% of women). This difference is most evident in the overweight category, where 43% of men were overweight compared to 31% of women (Australian Bureau of Statistics, 2009). Data from the US shows that, in 2009 to 2010, the prevalence of obesity was 35.5% among adult men and 35.8% among adult women (Flegal, Carrol et al., 2012). The authors found that this was not significantly changed from the years 2003 to 2008. Research suggests that OWOB and its associated health problems in adulthood have tracked from OWOB in adolescence (National Health and Medical Research Council, 2003; Singh, Mulder et al., 2008).

Causes of Overweight and Obesity

Body weight, and its associated body composition, is regulated by several physiological mechanisms that control the balance between energy intake and energy expenditure. Body weight is a direct result of the balance of energy intake and energy expenditure caused by basal metabolism, growth, thermogenesis of food and physical activity (Reilly & McDowell, 2003). Researchers have postulated that genetic determinants contribute to OWOB, and, although genetic factors help establish individual vulnerability (Brownell, Schwartz et al., 2009), decreases in physical activity and increases in high caloric food consumption are thought to have primarily contributed to the epidemic of OWOB (Baur, 2002; Saelens, Sallis et al., 2002).

Based on currently available evidence, it is not possible to conclusively identify the specific contribution that changes in energy intake or energy expenditure have had on the prevalence of OWOB in countries worldwide, or Australia specifically, at the population or sub-population level. Some researchers have noted that lower levels of physical activity, resulting in less energy expenditure than intake, has been reported as the major contributor to the growing prevalence of OWOB in industrialised countries (Lobstein, Baur et al., 2004), while others argue the phenomena results from a complex interaction between both energy intake and expenditure which differs between countries and sub-populations (Swinburn, Caterson et al., 2004).

Causes of Overweight and Obesity among Adolescents and Children

There appears to be a combined effect from a cluster of associated behavioural, environmental and genetic factors that play a role in OWOB among adolescents and children. The fundamental cause of OWOB is an energy imbalance where energy intake is higher than the energy expended (World Health Organisation, 2006). This relationship is made more complex by the interaction of factors influencing intake and expenditure behaviours. In adolescents, school, family and community environments can influence these behaviours.

Physical inactivity appears to be a contributor to the rising levels of OWOB and in Australia. National Physical Activity Guidelines (Commonwealth Scientific Industrial Research Organisation, 2008) have been developed to describe the intensity, duration and frequency of physical activity in sport, free play and active transport that is necessary to obtain health benefits for children and young people(Booth, Okely et al., 2006). Recently published data shows that only 69% of 9 to16 year olds participated in

the recommended amount of 60 minutes of moderate to vigorous physical activity (MVPA) on every day (Commonwealth Scientific Industrial Research Organisation, 2008).

Sedentary behaviour is defined as a distinct class of behaviours (e.g. sitting, watching TV, playing video games) characterized by little physical movement and low energy expenditure (Tremblay, LeBlanc et al., 2011). The availability of sedentary pursuits, including television, video games, computers, and the internet, has been linked to the rise of adolescent OWOB (Ebbeling, Pawlak et al., 2002). Watching television and playing computer/video games (also referred to as small screen recreation (SSR) can influence weight outcomes in a number of ways. Firstly, SSR may substitute for more physically demanding activities thus reducing energy expenditure, and secondly may result in children choosing poor nutritional options due to a greater exposure to food advertising (Crowle & Turner, 2010). Francis et al. (2003) also hold this view, finding that television viewing has been linked to body mass index (BMI) increases in children. Such TV viewing results in reduced energy expenditure, increased exposure to commercials encouraging consumption of foods with high fat, sugar, and salt, and the creation of an environment that encourages frequent snacking of high energy food (Francis, Lee et al., 2003). A 2008 national survey by the CSIRO found that the mean number of daily minutes that 9 to16 year olds spent on SSR was nearly double the recommended Australian guidelines of 120 minutes per day. Only 33% of children spent less than 120 minutes on SSR daily. The report also showed that television viewing peaked at age 12 to14 years (Commonwealth Scientific Industrial Research Organisation, 2008), an age at which young people are both offered, and are exercising, more independent behaviour and choice, including food consumption. Findings reported in 2011from the National Secondary Students' Diet and Activity Survey

showed that 71% of students in years 8 to 11 exceeded the recommended screen time daily, while on weekends 83% exceeded the guidelines. Males were more likely to exceed the recommended screen time than females, on both weekdays (74% and 64% respectively) and weekends (85% and 81% respectively) (Australian Institute of Health and Welfare, 2011). Evidence suggests that children who engage in more than 120 minutes of non-educational screen time per day are more likely to be overweight, less physically active, consume more sugary drinks, snack on foods high in sugar, salt and fat, and have fewer social interactions (Cancer Council Australia & National Heart Foundation, 2011). Overall evidence suggests that too little daily physical activity, too frequent daily sedentary behaviour and too much consumption of high fat and high-energy foods, have all contributed to the development of obesity among paediatric populations (Baur, 2002).

Important factors that have been shown to impact on OWOB development are the influence of the home environment and the behaviour of parents. Studies have shown that an increase in the incidence of OWOB is associated with family-oriented changes (increases) in food supply and caloric intake accompanied by diminishing levels of physical activity (Deckelbaum & Williams, 2001). Moreover, the adolescent's home environment has the potential to alter energy intake and expenditure through observing the roles of the parent. Parents may serve to influence the adolescent's behaviour by exposing family members to better food choices, by allowing certain foods into the house, providing support and encouragement to the child, or by modeling positive eating patterns (Golan & Crow, 2004). Sharma (2010) argued that adolescents are more likely to eat foods they observe their parents consuming, and that access to foods within the home impacts on their overall dietary preference (Sharma & Branscum, 2010). Furthermore, research suggests that food availability in the home is

a predictor of children's dietary intake. For example, when high-energy, nutritionally-sparse snacks are available in the home, children consume more (Gable & Lutz, 2000). Similarly, when fruits and vegetables have high availability it appears to coincide with greater intake (O'Connor, Hughes et al., 2010). Other studies have demonstrated that children who eat dinner with their family regularly consume less fried food and less soft drink (Gillman, Rifas-Shiman et al., 2000). Additionally, those who consume meals at home are less likely to consume fast-food which is typically higher in saturated fat and sodium and contains less fibre and calcium than home prepared food, all of which have influences on weight gain (Bowman, Gortmaker et al., 2004; Swinburn, Caterson et al., 2004). The influence of family meals may also have a lasting effect on the dietary behaviour of adolescents, who were shown to sustain servings of fruit and vegetables into young adulthood when this food type was provided during their formative years (Larson, Neumark-Sztainer et al., 2007).

Parental role modelling also appears important to encourage active lifestyle and physical activity practice for children and adolescents. Epstein and colleagues (1996) state that parents can be pivotal in changing physical activity behaviours by allowing opportunities for movement or passively influencing activity patterns (Epstein, 1996). It has also been shown that children's physical activity levels increase, and measures of body mass such as BMI-*Z* scores decrease, when parents participate in family-based obesity treatments (Wrotniak, Epstein et al., 2004).

The relationship between sweetened beverages and weight status among children and adolescents has been investigated (Bachman, Baranowski et al., 2006). A systematic review on this topic found a significant positive association between sweetened beverage consumption and childhood and adolescent obesity (Malik, Schulze et al., 2006). Further to this, relationships between fast food restaurant and

school location were examined using data taken from 529,367 adolescent students aged 12 to 17 years. The results showed that students with fast food restaurants located within 1.6 kilometres of their school consumed fewer servings of fruit and vegetables, consumed more soda (carbonated sweetened beverage) and were more likely to be overweight (Davis & Carpenter, 2009).

Recently, Moodie & colleagues put forth that transnational corporations are major drivers of non-communicable disease epidemics such as obesity and profit from increased consumption of ultra-processed food and drink (so-called unhealthy commodities). The study further details that the saturation of these products in high income markets leads to the consumption of these energy-dense ultra-processed foods which include sugar-sweetened beverages which is associated with increased rates of obesity and diabetes, childhood obesity, long-term weight gain, and cardiovascular disease (Moodie, Stuckler et al., 2013).

The information presented shows that a lack of physical activity, exposure to poor-quality food options, sedentary activity and family influences each have an important effect on the development of OWOB among children and adolescents.

Definition and Classification Systems

The World Health Organisation (WHO) defines overweight and obesity as "abnormal or excessive fat accumulation that may impair health" (World Health Organisation, 2006),fact sheet 311, (pg 1). Body Mass Index (BMI) is commonly used as the basis for classification systems of overweight or obesity (OWOB), and is defined as weight in kilograms divided by height in metres squared (kg/m^2), and is the most frequently used measure of weight classification. Many authors have described the

disadvantages of this measure (Sweeting, 2007), and the major limitation is that BMI does not differentiate for body composition between fat mass and muscle mass (Lobstein, Baur et al., 2004). Clinically, for adults OWOB are defined by a BMI score of 25.00 to 29.99 kg/m^2 to designate overweight, and a BMI score of 30.00 kg/m^2 and above for obesity (World Health Organisation Consultation on Obesity, 1997). Within child and adolescent populations, BMI categorisation of OWOB change with age due to growth, and differs between sexes (Cole, Bellizzi et al., 2000). Cole and colleagues have established an international standard BMI-based definition for child and adolescent OWOB for those ages 2 to18 years, enabling a BMI score to be aligned with age and gender specific centile curves for clinical use. While it is beyond the scope of this review, it is important to acknowledge that a number of authors have detailed various disadvantages of the use of BMI as classification system for overweight or obesity (Sweeting, 2007; Daniels, 2009). Most often, the major limitation identified is that BMI does not differentiate between fat mass and muscle mass (Ellis, Abrams et al., 1999; Lobstein, Baur et al., 2004), the proportions of which are critical determinants of health in individuals (Baker, Olsen et al., 2007).

A commonly used alternative to BMI with child and adolescent populations is based on BMI percentile scores derived from large population data sets (Huerta, Zarka et al., 2010). Alternatively, adolescents and children are classed as overweight if, for their age group, their BMI score is equal to or greater than the 85th percentile and less than the 95th percentile, with obesity being the classification when the score is equal to or exceeds the 95th percentile (Huerta, Zarka et al., 2010)

Adolescence

Although the definition of adolescence is constantly being challenged (Gentry & Campbell, 2002), the WHO defines adolescence as the transitional stage of physical and mental human development generally occurring between puberty and legal adulthood, but largely characterised as beginning and ending with the teenage stage (World Health Organisation, 2003). Adolescence is a unique period of rapid growth and development, which includes physical growth through puberty, cognitive maturation and psychosocial development (Gallahue & Ozmun, 1995). Such development can occur at varying speeds and proceed at different times (Hofmann & Greydanus, 1997). The interaction of these developmental areas has an impact on behaviour, as adjustments are made to become independent and maintain relationships (Gallahue & Ozmun, 1995). Within OWOB contexts, adolescents are exposed to conditions that exploit their developmental vulnerabilities, promote excess food intake, and discourage physical activity. These conditions are the default for most people, but adolescents may be especially susceptible as the discipline, personal responsibility, and restraint to hold up under such powerful conditions is challenging (Brownell, Schwartz et al., 2009). Adolescents appear as a vulnerable demographic for the development of OWOB.

Consequences of Overweight and Obesity in Children and Adolescents

Overweight and obesity (OWOB) causes adverse consequences in children, adolescents and adults. Regardless of age, OWOB individuals are more likely to develop early signs of, or manifestation of, many co-morbidities, including heart disease, hypertension and Type II Diabetes (Speiser, Rudolf et al., 2005). It has been suggested that OWOB children and adolescents are more likely to develop orthopaedic

impairments and problems in their endocrine, neurological and gastroenterological systems, as compared to their non-obese peers (Must & Strauss, 1999). Moreover, many researchers have found that obese adolescents are more likely to develop asthma, sleep apnoea and gallstone formation (Rocchini, 1993; Wabitsh, 2000; Barr, Magliano et al., 2006).

Biological consequences.

Type II Diabetes is a chronic disease marked by high blood sugar levels, occurring when the body does not produce enough insulin (Schreiner, 2005). In children and adolescents, Type II Diabetes is becoming an increasingly important public health concern with the phenomena becoming more prevalent, as adolescent populations become OWOB (Deckelbaum & Williams, 2001). In the US, 6% of non-Hispanic whites have Type II Diabetes; this figure is more pronounced in African Americans where the prevalence is 33% (Rosenbloom, Silverstein et al., 2009). In an Australian study of 496 adolescents, it was shown that those who were OWOB were more likely to show an increase in blood insulin (Denney-Wilson, Hardy et al., 2008). An earlier Australian study reported that almost one in five 15 to16 year-olds had high insulin concentrations, putting them at risk for the development of Type II Diabetes (Booth, Okely et al., 2006).

Adolescent obesity is further associated with the presence of risk factors which may lead to cardiovascular disease (Freedman, Kahn et al., 2007). These risk factors include high blood pressure, dyslipidemia and insulin resistance (Must & Strauss, 1999). The possession of three or more of these risk factors is associated with the development of metabolic syndrome, inclusive of coronary artery disease, stroke, high

triglycerides, and Type II Diabetes (Schwimmer, Pardee et al., 2008). Overweight and obesity has also been linked to non-alcoholic fatty liver disease (NAFLD) in both children and adolescents (Deivanayagam, Mohammed et al., 2008). This disease, which is the most common cause of liver disease in children, is strongly associated with the development of metabolic syndrome. Evidence of this phenomena is shown in the findings of an Australian study of 496 adolescents for whom blood analysis showed those boys who were obese had a higher proportion of fatty liver enzymes as compared to boys who were an appropriate body size (Denney-Wilson, Hardy et al., 2008).

Orthopaedic consequences.

Orthopaedic ailments within adolescents include the presence of softer and unfused growth plates, thus contributing to permanent damage and long-term abnormalities (Henderson, 1992). Studies detailing these abnormalities show that permanent damage to the femoral head may occur when the femoral growth plate (*capital epiphyses*) dislocates, the incidence of which is reported in approximately 3.4 per 100,000 children, of which 50% to 70% were obese (Must & Strauss, 1999). Bowing of the legs, also known as Blount's disease, is a condition where unequal or excess weight bearing pressure is apparent. Researchers have found that approximately 80% of the children who were affected by this condition were obese (Dietz, Gross et al., 1982). A recent study of 135 obese children and adolescents aged 3 to 18 years found that 61% complained of at least one joint hurting more than once monthly. The research, that included a racially diverse population, used survey information to determine pain to major joints including the back (39%), feet (26%) and the knee (24%). Moreover, pain in the knees and hips were positively associated with an increased BMI (Stovitz, Pardee et al., 2008).

Orthopaedic complications have been linked to OWOB in children. In research investigating plantar foot pressures, Dowling and colleagues, compared matched groups of obese and non-obese children average age 8.3 years (n = 26, 13 per group). Findings revealed examples of flat wide feet with increased plantar pressure, leading to structural change and foot discomfort within the obese sample, compared to their non-obese counterparts (Dowling, Steele et al., 2001). The authors speculated that such orthopaedic ailments may, in turn, result in reduced physical activity (PA), thus limiting the probability of the individual using activity as a viable form of energy expenditure, and weight management. Further to this, the authors speculated that a restriction of PA may lead to a reduction of time for children with this condition to socially interact with their peers, a common by-product of childhood physical activity experiences, which may, in turn, manifest as feelings of isolation and loneliness resulting in diminished self-esteem.

Psychological and sociological consequences.

Researchers have reported that many adverse psychosocial issues can develop in children and adolescents as a consequence of OWOB (Wadden & Stunkard, 2002; Wadden, Womble et al., 2002). Research conducted with a sample of 1,520 obese and non-obese children found no significant difference in self-esteem at ages nine to ten years. However, when re-surveyed in early adolescence at 13 to 14 years, participants who were obese were more likely to experience reduced quality of life through distorted body image and poor self-esteem, evident as loneliness, sadness, and nervousness (Strauss, 2000).

In Australia, a state-wide cross sectional study, utilising random sampling of New South Wales (NSW) primary schools to recruit 2,813 child and young adolescent participants (M = 11.3 years), found that OWOB participants had inferior psychological scores across a range of measures (Franklin, Denyer et al., 2006). Psychosocial measures completed by the participants revealed that, among boys, those who were obese scored significantly lower than their appropriate weight peers on perceived athletic competence, perceived physical appearance and global self-worth. Overweight boys also scored significantly lower on perceived physical appearance and global self-worth compared with appropriate weight boys. The psychological impact on obese girls was more profound. The obese girls differed significantly from their appropriate weight peers in perceived social acceptance, perceived athletic competence, perceived physical appearance, and global self-worth. The same study group concluded that overweight girls had lower self-perception of themselves than overweight boys. Support for this finding has come from Brownell and colleagues who indicate that weight bias may impair social relationships in adolescents, leading to low peer-acceptance and social isolation (Brownell, Schwartz et al., 2009). Existing research further notes that overweight adolescents are less likely to be selected as friends by their peers (Strauss & Pollack, 2003). The most recent research with 416 ninth- through twelfth grade adolescents, 215 girls (51.7%) and 201 boys (48.3%) revealed via the Overt and Relational Aggression/Victimization Questionnaire that adolescents are at greater risk for mistreatment by peers and may have fewer opportunities to develop intimate romantic relationships (Pearce, Boergers et al., 2002).

Economic consequences.

In addition to personal physical and psychosocial costs to individuals, the economic cost of OWOB to individuals and groups has increasingly been highlighted as a major concern, with current Australian estimates determining the cost of OWOB to the Australian society being between $21 to $37 billion annually, which is substantially higher than previous estimates (Colagiuri, Lee et al., 2010). Lobstein et al. suggest that it may be difficult to predict the long-term economic impact of childhood obesity, as indirect costs may be undetectable, and may include hard to detect related costs such as time away from the workplace by parents when they care for their obese children, or those who are unemployable or made redundant due to their excessive weight (Lobstein, Baur et al., 2004). Australian researchers suggest that the costs of treating OWOB accumulate early in adolescence, therefore contributing to an increase in the economic burden. Research conducted using 496 adolescents (*MEAN* age of 15.3 years) analysed risk factors via blood samples and used delivery modelling to predict costs. The study predicted an increase in health care expenditure of 48% for those adolescents who were OWOB, and that failure to intervene would further compound these costs (Booth, Dobbins et al., 2009). The available cost estimates on OWOB display a need to focus on interventions that can manage such a phenomenon.

Tracking of Obesity

In the epidemiological literature, tracking is known as the persistence or relative stability of a health condition, such as overweight or obesity (OWOB), as measured by the relationship between early and later in life population values over time (Singh, Mulder et al., 2008). The tracking of OWOB from childhood and adolescence to adulthood has been demonstrated in recent studies. In a 2008 meta-analysis of 13

studies, Singh et al. reported an increased risk for OWOB youth to remain OWOB in adulthood. The researchers concluded that the probability of obese adolescents becoming OWOB adults was higher than for children and varied between 24% and 90%, based on the detail of the studies that met the selection criteria (Singh, Mulder et al., 2008). In a recent published study, 8,834 normal weight, overweight, and obese adolescents were tracked from adolescence and early adulthood (aged 12 to 21 years) in 1996, and subsequently followed-up when aged 24 to 33 years in 2007 to 2009. Overall findings showed that obese adolescents were 16 times more likely to remain obese as young adults compared to appropriate weight or overweight adolescents. Additionally, fewer than 5% of adolescents who were appropriate weight became obese as adults (The, Suchindran et al., 2010). Combined, the available evidence indicates a tracking phenomenon exists for OWOB, highlighting the need for interventions prior to adulthood.

Section 1: General Summary

The available evidence confirms that OWOB in adolescents is a serious health and economic problem. Moreover, OWOB in adolescence is strongly associated with OWOB in adulthood, which, in turn, manifests as numerous health consequences and impairs quality of life and can lead to increased morbidity and earlier mortality. The causes of OWOB can be influenced by genetic, environmental and biological factors. Reversing these trends is likely to involve a determined multi-faceted approach. These serious health consequences and high economic costs associated with OWOB have led to the development of prevention interventions a priority within public health.

Section 2: Intervention Approaches for Overweight and Obesity

Research in overweight and obesity (OWOB) has focused on assisting children and adolescents to manage their weight using a variety of strategies (Berkowitz, Wadden et al., 2003; Sugerman, Sugerman et al., 2003; Steinbeck, 2005). Typical weight management strategies involve a reduced energy intake with a concurrent increase in energy output (Steinbeck, 2005). The major consideration in relation to weight management in children and adolescents is adjusting the balance between energy intake with energy output whilst maintaining a diet that provides the essential nutrients for proper growth and function (National Health and Medical Research Council, 2003).

Diet

The occurrence of adolescent OWOB may be the result of the cumulative effects of excess daily energy intake. In an effort to support the achievement of a healthy weight, and recognising the need to ensure appropriate nutrient intake to support development, effort has been directed toward the development of weight loss through suitable and safe approaches (Steinbeck, 2005). Dietary management strategies as an aid for weight adjustment among children and adolescents have generally reflected broader adult trends (Swinburn, Caterson et al., 2004). Extensive research has been undertaken on these approaches, with focus on low calorie or nutrient adjustment diets that have an emphasis on foods with a low glycaemic index (GI), which have been suggested as suitable for the adolescent population (Spieth, Harnish et al., 2000; Ebbeling, Leidig et al., 2003).

Children and adolescents.

Typical of dietary interventions in adolescent OWOB is research undertaken by Spieth et al (2000), who compared a low-GI diet to a standard low-fat diet alternative (Spieth, Harnish et al., 2000). In the study, 64 children received a low-GI diet (*M* = 10.6, SD = 4.0 years), and 43 received a low-fat diet (*M* = 10.2, SD = 3.1 years) for 4.3 months. Results showed a significant mean BMI reduction for the low-GI diet group of 1.53 kg/m^2, (*SD* = 0 .82) compared to a non-significant mean BMI reduction of 0.06 kg/m^2 , (*SD* = 0.12) for the low-fat group. The researchers concluded that a low-GI diet may be a favourable alternative to a traditional low-fat diet for children. Later work by Ebbeling et al. (2003) with 16 obese adolescents aged 13 to 21 years, found a low-GI diet resulted in significantly reduced fat mass (*M* = 3.0, SD = 1.6 kg) compared to a reduced fat control diet (*M* = 1.8, SD = 1.0 kg; *p* =.01) (Ebbeling, Leidig et al., 2003). Recently published work by Krebs and colleagues investigated the effect of a high protein and low carbohydrate (HPLC) diet on 46 severely overweight adolescents aged 12 to 18 years. The HPLC group was compared to a low-fat (LF) comparison and results showed that the HPLC group achieved a significantly greater decrease in weight loss (*M* = 6.31 kg) compared to the LF group (*M* =1.41 kg) at 24 weeks. BMI-*Z* scores were found to be reduced significantly at a 36-week followup for both groups (HPLC *M* = 0.14 *SD* = 0.04; *M* = 0.21, *SD* = 0.07 for LF). Additionally, the authors reported, but without accompanying data, that the HPLC group lost significantly more body fat than the LF group, as derived by dual energy x-ray absorptiometry (DEXA). The authors reported that the HPLC group lost significantly more lean body mass (*M* = -1.24kg) compared to the LF group, that had a gain in lean body mass (*M* = 1.25kg) despite the HPLC group receiving a significantly and substantially greater dietary protein intake. The authors concluded that a high protein, low carbohydrate diet should

be considered a safe and effective option for medically supervised treatment of severe obesity in adolescents (Krebs, Gao et al., 2010).

Adults.

As with children and adolescents, researchers have sought to investigate if manipulating the macronutrient composition of dietary intake can be effective in the management of OWOB. Hession and colleagues conducted a systematic review comparing the effects of low-carbohydrate / high-protein (LCHP) diets against low-fat / high-carbohydrate (LFHC) diets for obesity and cardiovascular disease risk (Hession, Rolland et al., 2009). This review focused on randomised controlled trials in adult populations who were aged 18 years and older. Included in the review were 13 trials totalling 1,222 participants published between 2000 and 2007 and which included a follow-up period of at least 6-months. Evidence from this systematic review demonstrated that LCHP diets are more effective than LFHC at 6-months and are as effective, if not more so, as low-fat diets in reducing weight and cardiovascular disease risk up to one-year. The weight change difference between the two groups at 6-months was -4.02 kg in favour of the low-carbohydrate / high-protein group. ($p < .001$). At 12-months, the difference was less and had reduced to -1.05 kg ($p < .05$) during the period from baseline. The authors noted that more evidence and longer-term studies were needed to assess the long-term benefits from the weight loss achieved using these diets (Hession, Rolland et al., 2009). The NHMRC have reported a similar view that diets such as those involving modified fats and increased protein show promise in short-term trials, but long-term data and evidence of efficacy is lacking (National Health and Medical Research Council, 2003).

Physical Activity

Physical activity (PA) involves the physical loading of the body organs and body systems, thus stimulating an adaptation to these physiological variables to create improved function. When the loading stimulus is repeated in suitable frequency, intensity and volume, responses in the loaded organs adaptions can take place in order to better tolerate the loading (Vuori, 2001). Among these responses can be a loss of body fat and a change in body weight. The benefit of physical activity for the maintenance of health, functional capacity and the prevention of many diseases has been extensively documented in the scientific literature (Vuori, 2001; Aittasalo, Miilunpalo et al., 2004). Many experts promote physical activity (PA) as a viable approach to assist in the prevention of overweight and obesity (OWOB), and weight regain (Wareham, van Sluijs et al., 2005; Wareham, 2007; Pearson, Atkin et al., 2009), but available evidence suggests that alone, physical activity is not likely to create a sufficient energy imbalance to achieve better weight among children or adolescents (Council on Sports Medicine and Fitness and Council on School Health, 2006; Dobbins, De Corby et al., 2009; Harris, Kuramoto et al., 2009). In relation to the prevention of OWOB through energy expenditure, physical activity is the only component of energy expenditure that can be altered by behaviour (National Health and Medical Research Council, 2003). Additionally, a decrease of sitting time or sedentary time is also seen as altering one's energy expenditure (Tremblay, LeBlanc et al., 2011).

Children and adolescents.

Lifestyle physical activity (PA) includes PA that occurs during activities of daily living, such as when engaged in through transport (e.g., walking, cycling), work or school, leisure and sport or time at home (Australian Government Preventative

Health Taskforce Australia the Healthiest Country by 2020, 2009). Current National Health and Medical Research Council (NHMRC) guidelines support lifestyle physical activity (PA) as the preferred modality in child and adolescent weight management, highlighting that lifestyle physical activity programs are more likely to promote sustained weight loss in contrast to structured exercise groups (National Health and Medical Research Council, 2003). Evidence in support of the NHMRC recommendation has been gathered by Harris et al. (2009), who reviewed 18 studies involving 18,141 children and adolescents aged 5 to18 years who had undergone a school-based PA intervention. Meta-analysis showed that BMI did not improve following PA intervention when compared to control groups (M = -0.05 kg/m^2, 95% confidence interval (CI) -0.19 to 0.10). It was concluded that school-based physical activity interventions did not improve BMI and school-based interventions alone were unlikely to have a significant effect on decreasing the prevalence of childhood obesity (Harris, Kuramoto et al., 2009). Despite the findings in relation to BMI, the authors emphasised that physical activity should be included and promoted within schools, as it is an important component of a healthy lifestyle and improves many other aspects of health.

A 2009 Cochrane review sought to evaluate the effects of school-based experiences on promoting physical activity and fitness among children and adolescents who were aged 6 to 18 years. The systematic review analysed 482 articles and revealed that positive effects were observed for the duration of physical activity program and improvements in aerobic fitness, and blood cholesterol, but no significant effect was found for BMI, leisure-time physical activity rates, or systolic or diastolic blood pressure (Dobbins, De Corby et al., 2009).

Adults.

The American College of Sports Medicine (ACSM) has recently updated physical activity recommendations based on findings of recent physical activity (PA) trials designed for prevention of weight gain, for weight loss, or prevention of weight regain in adults. This update was undertaken for persons older than 18 years and recommended that moderate-intensity PA between 150 and 250 minutes per week as the required amount to be effective to prevent weight gain. Further to this, amounts of PA greater than 250 minutes per week are stated as being needed to promote clinically significant weight loss (Donnelly, Blair et al., 2009).

Anderson and colleagues conducted a review to investigate the effect of worksite physical activity intervention on the weight-related outcomes of employees aged 18 years and older. This review included 54 randomised control trials with weight control or weight loss as the primary focus and also included worksite interventions aimed at general health promotion and risk reduction (e.g., cardiovascular disease (CVD) risks, diabetes risks). Findings revealed that worksite physical activity programs achieved modest improvements in employee weight status at 6 to12-month follow-up. A pooled effect estimate decrease of 1.3 kg (95% Confidence interval (CI) -4.6, -1.0) was found based in nine random controlled trials (RCT), and a decrease in BMI of 0.5 (95% CI -0.8, -0.2) was found based on six RCT. The findings appear to be applicable to both male and female employees, across a range of worksite settings. The study was limited as it included some interventions where nutritional strategies were implemented, therefore were not exercise-only interventions. Even though the authors reported the existence in the literature they examined of a consistent, but modest, weight loss for participants, incomplete and less-than-transparent study reporting made it difficult to use the full body of evidence to assess program effectiveness (Anderson,

Quinn et al., 2009). The NHMRC suggests that, based on their review of physical activity interventions, exercise is likely to be more effective for weight management when combined with energy restriction. Furthermore, lifestyle-based increases in physical activity, as opposed to a structured exercise program, are likely to be more successful for weight loss in the long-term (National Health and Medical Research Council, 2003).

Pharmacology

The use of pharmacological agents for the treatment of overweight, but mainly obesity, has increased in recent decades (Padwal & Majumdar, 2007; Kanekar & Sharma, 2010). The majority of pharmacological treatments either limit nutrient absorption or suppress appetite (Speiser, Rudolf et al., 2005). Although now withdrawn from sale in Australia and the United States, trials have shown the drug Sibutramine can induce significant weight loss (Berkowitz, Wadden et al., 2003). In adults, pharmacological agents can be a useful adjunct to lifestyle change to induce weight loss in some with a BMI greater than 30 and in others with a BMI greater than 27 with co-morbidities. Like therapy for other chronic disorders such as hypertension, diabetes and dyslipidaemia, the medication is effective only while it is being taken (National Health and Medical Research Council, 2003).

Children and adolescents.

The use of pharmacological aids as an intervention for obesity in adolescents has received recent attention. In a randomised, double-blind, placebo controlled trial, 60 adolescents aged 14 to 17 years who used Sibutramine were found to have lost an average weight of 10.3 kg (SD = 6.6) compared to a group who received a placebo,

who lost 0.9 kg (Godoy-Matos, Carraro et al., 2005). Similarly, in a randomised, double-blind placebo controlled trial, 82 adolescents aged 13 to 17 years who given Sibutramine as an adjunct to a lifestyle program, achieved an average weight loss of 7.8 kg which was significantly more than the weight loss of 3.2 kg for the placebo group. Researchers in a 2005 study investigated the efficacy of lipase inhibitor drug Orlistat, combined with lifestyle behavioural training. In the randomised double-blind study of 539 obese adolescents aged 12 to 16 years, 357 participants received the Orlistat intervention and 182 the placebo intervention. It was revealed that at one-year, the Orlistat group had a significant decrease in BMI (M = -0.55) compared to an increase in the placebo group (M = +0.31, p = .001). Waist circumferences decreased on average, but not significantly, in the Orlistat group (M = -1.33 cm), and increased on average, but not significantly, in the placebo group (M = -0.12 cm). The research revealed the the Orlistat treatment group were more likely to have experienced a gastrointestinal event, on at least one occasion, including fatty or oily stools (34%), faecal urgency (13.6%), and abdominal pain (15.3%) (Chanoine, Hampl et al., 2005).

In a discussion paper detailing the effectiveness of pharmacology to assist adults and children with weight loss, the authors asserted that, while such measures can assist certain individuals, the likelihood of pharmacological strategies being the magic bullet was small (Kopelman, 2005). A 2005 consensus statement into childhood obesity recommended pharmacological treatment be accessed only when a supervised lifestyle intervention had failed (Speiser, Rudolf et al., 2005). Added to this, some researchers note that, although pharmacological treatments do elicit positive responses, wide-spread use of these pharmaceuticals should be sparing until more extensive safety and efficacy data are available (Berkowitz, Wadden et al., 2003; Godoy-Matos, Carraro et al., 2005).

In a recent review (Kanekar & Sharma, 2010), 20 studies that had used pharmacological agents in adolescent OWOB interventions were evaluated. The authors concluded that there was insufficient evidence from the published research to confirm that pharmacological agents alone would cause adequate weight reduction and weight maintenance. Furthermore, the authors cautioned that the use of Orlistat appeared to decrease the absorption of fat soluble vitamins, which may be counterproductive for developing adolescents.

Adults.

A study by Davidson and colleagues showed that Orlistat combined with a low-energy, low-fat diet led to an average weight loss of 8.7 kg (range 6 to 13 kg) in 657 participants compared to a group of 223 participants who received a placebo and lost on average of 5.8 kg after one to two years of treatment ($p < .001$). However, the authors attributed two-thirds of this weight loss to be a result of diet modification (Davidson, Hauptman et al., 1999). As has been shown to occur with adolescents, the major adverse effects of Orlistat use by adults were fatty stools, gastrointestinal discomfort and faecal urgency in 15 to 30% of participants. Padwel and researchers pooled data from three double blind, placebo controlled studies of Sibtramine for 929 adults with results showing a weight reduction of 4.6%. The researchers noted that the efficacy of the pharmaceutical agent is greatly enhanced by lifestyle modification and frequent follow-ups (Padwal & Majumdar, 2007). The NHMRC recommend that pharmaceutical approaches should only be undertaken with careful medical supervision and in the context of a long-term treatment strategy (National Health and Medical Research Council, 2003).

Surgery

Bariatric surgery is the practice of surgical treatment of obesity, for which there are three procedures in use: laparoscopic adjustable gastric banding (LAGB); Roux-en-Y gastric bypass (RYGB); and, biliopancreatic diversion (O'Brien, Brown et al., 2005). These methods limit the overall stomach surface area, thus decreasing absorption rates and stomach capacity (Love & Billett, 2007). Surgery is most often cited as the alternative when traditional weight loss attempts have proven unsuccessful (Inge, Krebs et al., 2004). In adults, surgery has caused weight loss resulting in a marked reduction in the incidence and severity of some of the co-morbidities associated with obesity (particularly diabetes) and improved quality of life (National Health and Medical Research Council, 2003).

Adolescents.

Studies investigating the effect and safety of bariatric surgical interventions with adolescents have increased in the past decade. In a retrospective study, using information available from a database covering the period 1981 – 2000, researchers identified 33 adolescents (range 12 to18 years) who had undergone bariatric procedures. The research showed that surgery resulted in a significant and very large BMI reduction from an average score of 52 (*SD* = 11) at preoperative measurement to a BMI average score of 38 (*SD* = 16) at 14-years follow up (Sugerman, Sugerman et al., 2003). The research identified two deaths among participants at 2 and 6 years post-operation and 21% of participants required additional corrective surgical procedures.

Similarly, Strauss et al. obtained retrospective data on 10 morbidly obese adolescents 17 years and younger at surgery, and for whom data was available at one-year post-surgery follow-up (Strauss, Bradley et al., 2001). Results showed that 9 of the 10 adolescents had weight loss in excess of 30 kg (M = 53.6, SD = 25.6kg). The authors concluded that gastric bypass surgery was an effective method for weight reduction in morbidly obese adolescents, noting the procedure was well tolerated, with few unanticipated side-effects. Even so, the research identified that 5 of the 10 adolescents suffered nutrient deficiency post-surgery, and four of the adolescents required correction procedures due to complications that emerged following the initial surgery. Widhalm et al. completed a four-year follow-up of 10 adolescents (M = 17.3 years, BMI: M = 49.2 kg/m^2) who underwent bariatric surgery (Widhalm, Dietrich et al., 2008). Results showed that the adolescents had a mean BMI decrease of 10.33 (SD = 6.6 kg/m^2) range from 3.3 to 25.07 kg/m^2 at 41 months follow-up. The authors concluded that the weight loss caused by the surgery was not as great as anticipated, with the majority of adolescents who initially lost weight, regaining weight at 41 months. Only three adolescents had sustained weight loss at last follow-up. The authors cited poor postoperative compliance by adolescents as a major contributor to this phenomenon and that attention to compliance and psychological aspects should be given priority.

O'Brien and colleagues have recently published findings of a laparoscopic band intervention, which was compared to optimal lifestyle program. This Australian-based research was conducted with 50 obese adolescents, all of whom had a pre-operative BMI higher than 35 and were aged 14 to 18 years. The results at two years post-treatment showed an average significant weight loss of 34.6 kg for the surgery group (N = 25) (24 completers), compared to average non-significant weight loss of 3.0 kg for

the optimal lifestyle group ($N = 25$)(18 completers). The authors concluded that the surgery was an effective intervention leading to a substantial and durable reduction in obesity (O'Brien, Sawyer et al., 2010). Information reported in the paper described the surgery group as receiving on average 20.4 therapeutic contact visits compared to the lifestyle group, which had an average of 15.5. It was further reported that 13 of the surgery group adolescents experienced side-effects, including reflux, heartburn, or vomiting post-surgery, with eight adolescents requiring corrective surgery. The study did generate criticism in the scientific community, resulting in a letter being published in the same journal, criticising the study design, specifically the management of the lifestyle group, which was allowed a wide variety of diets and had less physician contact. In contrast, the surgery group received specific meal plans and greater physician contact (Richardson, 2010).

In recently published information regarding bariatric surgery for adolescents, Holterman and colleagues completed a longitudinal trial of the safety of laparoscopic adjustable gastric banding for 32 completing morbidly obese adolescents aged 14 to 17 years who at baseline had an average BMI of 50 ($SD = 10$ kg/m^2). At 18 months follow-up, surgery was found to be a favourable adjunct to a comprehensive weight-loss program with an average BMI reduction of 9.4 ($SD = 5.4$ kg/m^2). The study revealed adolescent co-morbidities had also improved, resulting in reductions for hypertension (100%), dyslipidaemia (82%), and insulin resistance (72%). Surgical correction was required for six of the adolescents (Holterman, Browne et al., 2010).

Various authors have expressed concern regarding the use of bariatric surgery for adolescents. In a review by Love and Billet, the authors highlighted the potential for limited nutrient absorption, necessitating lifelong follow-up of haematological parameters to ensure that absorption of essential vitamins and minerals was occurring.

The authors specifically noted the risk of iron deficiency for females who became pregnant, highlighting a case-example of a pregnant female requiring blood transfusion at the third-trimester (Love & Billett, 2007). Similarly, a clinical case review described the experience of a pregnant female who had bariatric surgery. The female became vitamin A deficient and gave birth to an underdeveloped baby that displayed overall body measurements at the lower end of percentile rankings (Smets, Barlow et al., 2006).

Recognising the need for guidance related to bariatric surgery and adolescents, a representative group of the Royal Australasian College of Physicians, the Australian and New Zealand Association of Paediatric Surgeons, and the Obesity Surgery Society of Australia and New Zealand met to formulate selection criteria for adolescents seeking bariatric surgery. The position paper highlighted eight criteria, which, ideally, an adolescent would need to meet prior to bariatric surgery (Australian and New Zealand Association of Paediatric Surgeons the Obesity Surgery Society of Australia and New Zealand and the Paediatrics & Child Health Division of The Royal Australasian College of Physicians, 2010). These eight criteria included the adolescent: (1) to be severely obese (BMI > 40 kg/m^2); (2) have an associated severe co-morbidity; (3) have undertaken a previous six-month attempt at a multidisciplinary weight management approach, including lifestyle modification, that had failed; (4) had an understanding of postoperative treatment and compliance requirements; (5) had the ability to give informed consent; (6) had attained final or near final adult height; (7) had reached a maturation level of Tanner stage of 4 to 5; and, (8) being, desirably, 15 years or older (14 years in extreme cases).

Adults.

Techniques for bariatric surgery in adults are, in principle, the same as in adolescents, with some claiming that these procedures are the only treatment that has achieved major and durable weight loss (O'Brien, Brown et al., 2005). In a major literature review and meta-analysis by Buchwald et al. (2004) of 136 studies that included 22,094 patients (*M* age 39 years; 72.6% women), it was found that the percentage of excess weight loss was 61.2% in all patients (95% confidence interval). The analysis failed to report on complications, follow-up correction procedures or patient side-effects (Buchwald, Avidor et al., 2004). Bariatric surgery is often associated with impaired absorption of micronutrients, which requires lifelong monitoring and, often, folate or vitamin B supplementation (National Health and Medical Research Council, 2003; Kopelman, 2005).

Pinkney et al. argue that bariatric surgery remains a key treatment option for carefully selected patients with obesity. However, bariatric surgery does not eliminate the risk of developing Type II Diabetes, dyslipidaemia and hypertension (Pinkney, Johnson et al., 2010). Additionally, the paper highlighted that surgery was associated with short-term complications including bleeding, infections and bowel obstruction and, in the long-term, may result in hernias, gallstone formation and nausea and vomiting. Research also suggests that physical activity levels should increase post-operatively to ensure long-term weight loss success. Bond et al. (2009) highlighted that individuals who progressed from being inactive before bariatric surgery to being highly active at 1-year following their surgery had better weight loss outcomes than those who continued to be inactive after their surgery (Bond, Phelan et al., 2009). This implies that modifications to lifestyle are required to enhance surgical outcomes.

General Summary

In summary, there is not enough evidence to confirm any single approach as being both successful and safe as a treatment for adolescent OWOB. Physical activity interventions are seen as a conservative approach for this demographic, but available evidence suggests that physical activity alone is unlikely to create a sufficient energy imbalance to achieve better weight among children or adolescents (Dobbins, De Corby et al., 2009). Likewise, dietary treatments usually involve the manipulation of macronutrient composition or energy restriction, but many authors do not support restrictive approaches due to the possibility of inhibiting normal growth and development (Speiser, Rudolf et al., 2005), and this approach has not shown consistent positive results when applied to adolescent OWOB groups. Pharmacological agents appear to be mildly successful when aligned with a lifestyle program, but this approach seems to have a limited role in adolescent obesity reduction due to reported side-effects (Kanekar & Sharma, 2010). Bariatric approaches have been successful in short-term weight loss outcomes, but long-term appraisal is limited (Strauss, Bradley et al., 2001; Zitsman, Fennoy et al., 2011), as is evidence as to the short-term and long-term postoperative complications (Sugerman, Sugerman et al., 2003).

Section 3: Behaviour Modification; Cognitive Behavioural Therapy

Over the past few decades several interventions have been developed to modify health behaviour to achieve improved weight status, and these interventions have at their core the elements of behaviour modification; one such example is Cognitive behaviour therapy (CBT). Cognitive behavioural therapy is one of the most extensively researched forms of psychotherapy. CBT evaluates and acts on a person's cognitions,

assumptions, beliefs, and behaviours (Butler, Chapman et al., 2006) and has been widely used to assist people who exhibit a wide array of health conditions (Gowers, 2006; Eichler, Zoller et al., 2007). CBT employs behavioural therapy (BT) techniques that focus on teaching those receiving therapy to link '*thinking to behaviours'*. Behavioural therapy approaches are used on the assumption that a behaviour can be learnt and therefore can be unlearnt (Coon, 1989). A therapist's aim would be to change a client's thought patterns that have led to maladaptive behaviours, to thoughts that lead to more positive behaviours and feelings (Ollendick & King, 2000). Specifically, CBT has been utilised in the treatment of depression, anxiety, panic disorder, social phobia, obsessive compulsive disorder, post-traumatic stress, schizophrenia, panic and eating disorders (Butler, Chapman et al., 2006). Furthermore, many reviewers promote CBT as being useful in the treatment of overweight and obesity (OWOB) (Warschburger, Fromme et al., 2001). While a strength of trained psychologists (Epstein, McCurley et al., 1990), CBT-based approaches have also been delivered effectively by non-psychologists (Annesi, 2003; Nansel, Iannotti et al., 2007; Beissner, Henderson et al., 2009). Although the basic elements of CBT are commonly agreed, there are a range of specific principles that fall under the greater CBT umbrella (Gaudiano, 2008). The CBT model proposes that psychopathology is the product of incorrect information processing that exhibits itself in distorted and dysfunctional thinking, thus leading to negative thoughts and maladaptive behaviour (Gaudiano, 2008). Typically, a CBT practitioner works with their client to recognise, evaluate and then modify distorted cognitions to produce more realistic adaptive evaluations.

Approaches in Cognitive Behavioural Therapy

Cognitive behavioural therapy is a sufficiently robust therapy to be delivered in a variety of ways by a clinician or team of clinicians, whether to an individual or group, or through bibliotherapy or via remote delivery systems (Warschburger, Fromme et al., 2001; Lyneham & Rapee, 2006; Mohr, D Hart et al., 2006; Vignolo, Rossi et al., 2007). CBT has been applied to address various psychological and physical ailments, including as an approach to address OWOB. Within weight management contexts, CBT has been used with children, adolescents, adults and those from the senior community (Bean, Stewart et al., 2008).

Cognitive Behavioural Therapy for Adolescents and Children

Cognitive behavioural therapy has been found to be successful for the treatment of various health problems in children and young people that include addiction behaviours, depression and eating behaviours (Simons-Morton, Calfas et al., 1998; Goldfield, Epstein et al., 2001; Burke & Fair, 2003; Powers, Jones et al., 2005; Rohde, Feeny et al., 2005; Gowers, 2006; Davis, Gance-Cleveland et al., 2007; Gowers, 2008). CBT was applied to anxiety disordered youth aged 7 to14 years (M = 10.27 years) in research that compared three CBT modalities; an individual, a family-focussed and an education support only intervention with 161 participants. All three intervention groups participated in 16 weekly 60-minute sessions. Among participants, 64% of the individual CBT group and 64% of family-focussed CBT group had significantly improved on anxiety measures at one-year follow-up from post-treatment (p = .02) as compared to 42% improvement for the education support group. In the effort to test CBT in the treatment of Obsessive Compulsive Disorder (OCD), Williams and colleagues compared a 10-session CBT intervention to a 12-week waiting list control.

Twenty-one children and adolescents aged 9 to 18 years were placed into the CBT (N = 11) or wait list group (N = 10). The analysis of the Children's Yale-Brown Obsessive Compulsive Scale (C-YBOCS) data showed a significant improvement from baseline (p = .016) for the reduction of OCD symptoms in the CBT group (Cohen's d = 1.07), as compared to a wait list group at 12-weeks. When treated, the wait list group responded similarly to the CBT program (Williams, Salkovskis et al., 2010).

Remote delivery.

Non face-to-face CBT interventions have been utilised in delivering CBT to people who are unable or unwilling to engage in the therapy when delivered in person. Various remote delivery methods have been used for CBT delivery, including pen-and-paper (i.e., bibliotherapy), but more commonly now through telephonic and internet-based systems.

Children and adolescents.

A unique Australian study involving 100, 6 to12 year old children and their parents utilising email, telephone and associated CBT-based bibliotherapy, resulted in promising findings (Lyneham & Rapee, 2006). The study used parents as the major facilitators of the program, and trained clinicians as a support network for the children, all of whom were experiencing anxiety disorders. Results showed that the participants improved in several areas relating to their anxiety, based on clinician severity ratings, and found 79% of participants anxiety free at 12-month follow-up. The researchers concluded that the CBT approach, combining bibliotherapy, parental support and remotely-delivered clinical support, was effective for this group. The 12-month follow-

up showed gains made during the program were maintained or improved, thus causing the authors to claim the approach was sustainable.

In a similar approach with a group of adolescents and children, a feasibility study assessed the delivery of an interactive tele-video CBT intervention with 28 depressed rural children, aged 8 to14 years (Nelson, Barnard et al., 2006). The findings showed that elements of the CBT program were successfully administered across the intervention group, and were comparable to outcomes in a face-to-face comparison group. An 82% remission of depression symptoms was found immediately post-treatment, and this rate did not significantly differ across groups (χ 2 (N =28) = 2.19, NS). The results enabled the authors to conclude that such innovative approaches had the potential to reduce the barriers to care and offer an innovative way to extend and accommodate best care practices to help bridge the gap between the high need in mental health and low access, particularly for childhood depression.

Adult remote CBT applications.

Non face-to-face CBT provides effective treatment for adults with various health conditions where lack of facility or clinician access is present. Telephony-based CBT interventions have been trialled in the treatment of depression for adults living in geographically dispersed areas (Mohr, D Hart et al., 2006). The intervention was delivered to eight middle-aged adults, average age 56.75 years (SD = 10.1), across 8 weekly 50-minute telephone sessions, resulting in a reduction in depression scores in the eight participants. Results showed a significant decrease in the Beck Depression Inventory-II (BDI-II) from 34.25 at pre-test to 19.25 at post-test, and Hamilton Rating Scale for Depression (HRSD) from 23.75 at pre-test to 16.75 at post-test. Perini and

co-workers have recently published an Australian trial, which involved the targeting of depressed adults using computerised CBT. The study involved a 9-week, clinician-assisted programme, where participants who were aged on average 49.29 years, completed six online lessons, weekly homework assignments and weekly email contact with a clinical psychologist. Participants were further required to contribute to a moderated online discussion forum. At post-treatment, the intervention was shown to be effective (p = .01) in reducing BDI scores as compared to a wait list control. The authors stated that these data provide further support for the development of internet-based treatment for common mental disorders (Perini, Titov et al., 2009).

Adult in person.

In summarising the treatment outcomes and adaptability of CBT in adult applications, Butler and colleagues conducted a meta-analysis of 16 studies published between 1986 and 1993 that involved CBT in the treatment of conditions including anxiety, panic and obsessive compulsive disorders (Butler, Chapman et al., 2006). Results from this analysis revealed that CBT was effective for a wide range of adult psychiatric disorders showing large effect size improvements for unipolar depression, generalised anxiety disorder, panic disorder with or without agoraphobia, social phobia, and post-traumatic stress and anxiety disorders, as contrasted against controls. The comparison-weighted grand mean effect size (ES) for treatment of these disorders when compared to no-treatment, wait-list, or placebo controls was 0.95. The authors concluded that the results provide support for the efficacy of CBT.

Showing CBT applicability to various health issues, a more recent study was undertaken to evaluate CBT in the treatment of Attention Deficit Hyperactivity

Disorder (ADHD) in adults. The research compared a 10-session CBT intervention against a 20-session cognitive training approach; a no treatment control was also included. Clinical Global Impression (CGI) measures, evaluated by an independent assessor, showed that 10 (70%) participants in the CBT group and three of the 10 participants (30%) in the control group improved from baseline to posttreatment, whereas two of the nine (22%) in the cognitive training group improved based on symptom severity measures. Significantly lower scores on the Brown Attention Deficit Disorder Scale (p = .05) were observed in the CBT group versus the control group (Virta, Salakari et al., 2010). This study is supported by an earlier RCT that used CBT with 29 adults with ADHD who had not responded previously to a drug treatment regime. Independent evaluator and self-report behavioural analysis showed a significant difference in response to CBT treatment (p = .02), with 56% of participants showing a positive response to treatment as compared to 13% of participants showing a positive response to a treatment as usual pharmacological control (Safren, Otto et al., 2005). When considered together, these research studies provide support to the effectiveness of CBT in the treatment of mental health conditions when delivered in person to adult populations.

General Summary

The reviewed applications strongly suggest that CBT has robust adaptability using varied delivery approaches, target populations and treatment conditions. More specifically, evidence for long-term effectiveness was found for depression, anxiety, panic disorder, obsessive compulsive disorder, and ADHD. Moreover, many treatment outcomes appear to be maintained beyond the end of treatment. The preceding studies

suggest that CBT can be disseminated and implemented across the community to assist in various health conditions across various populations. Furthermore, Anderson (1998) contends that CBT has a very promising future in domains such as medicine and should not be restricted to psychiatry, thus reinforcing the potential for it to be delivered by various professionals (Anderson, 1998).

CBT in Weight Management

Lifestyle behaviour change approaches to address overweight and obesity (OWOB) among adolescents are widely recommended in the literature (Barlow, Trowbridge et al., 2002; Spear, Barlow et al., 2007; Vignolo, Rossi et al., 2007; Tsiros, Sinn et al., 2008; Madsen, Garber et al., 2009). Successful behaviour modification practice related to OWOB can support adolescents to address lifestyle choices, choices that are primarily implicated in OWOB and include physical inactivity and poor diet (Epstein, Valoski et al., 1990; Epstein, 1996). The National Health and Medical Research Council recommendations indicate that behaviour change strategies that address lifestyle concerns are an integral part of weight management (National Health and Medical Research Council, 2003). In supporting the recommendation for behaviour modification interventions, the NHMRC specifically recommend the need to identify age-appropriate behaviour modification approaches that promote long-term maintenance of weight control in OWOB children and adolescents (National Health and Medical Research Council, 2003). As of the 29th of March 2012, a revised NHMRC document for the Management of Overweight and Obesity in Adults, Adolescents and Children is currently in draft form and, consistent with the 2003 guidelines, behaviourally-based approaches are regarded the first-line approach for assisting OWOB persons.

The structure of CBT-based weight management programs generally focus on the aim to teach clients to self-monitor dietary and physical activity behaviour (Jelalian & Saelens, 1999), identify and challenge unhelpful thoughts (Wisotsky & Swencionis, 2003), develop problem solving skills, and address the circumstances that lead to non-essential eating. Programs of cognitive behavioural therapy for overweight and obesity (OWOB) designed first for adults have been adapted for children and adolescents, and this has been most successful when delivered with family support (Epstein, 1996; Brownell, Schwartz et al., 2009).

Although the basic principles of CBT are well agreed (Gaudiano, 2008), there are several CBT-based principles present within the weight management literature and these are reviewed in detail below.

Self-monitoring.

Self-monitoring is one of the most popular techniques used within behaviourally-based, weight management interventions (Warschburger, Fromme et al., 2001; Epstein, Paluch et al., 2004). Self-monitoring requires a person to observe and record target behaviours. In CBT-based weight management interventions, this would involve the monitoring of food intake and physical activity behaviour so as to raise awareness, track progress, and assist in weekly planning, goal setting and assessment (Wisotsky & Swencionis, 2003). Self-monitoring aids a participant to account for their behaviour, which may help them recognise, precursors and emotions associated with lapses in desired behaviours (Bennett & Sothern, 2009).

Cognitive restructuring.

Cognitive restructuring is the process of learning to identify and then negate cognitive distortions (unhelpful thoughts) or fundamental "faulty thinking," with the goal being to replace these thoughts with more helpful factual and beneficial thoughts (Ellis & Harper, 1975). Successful interventions focus on teaching adolescents to identify and challenge errors in thinking (i.e., cognitive distortions) or overlooking the positive aspects of a situation, which can halt progress (Rohde, Feeny et al., 2005). Cognitive restructuring remains central to the structure of CBT programs (Fabricatore, 2007).

Diet and activity education.

Dietary and physical activity education is necessary to raise awareness in any condition where energy imbalance has led to overweight and obesity (Astrup, 1999). Teaching the energy balance equation, where participants become conscious of the amount of activity required to expend the energy consumed, is a vital component of CBT-based weight management interventions (Rapoport, Clark et al., 2000; Spieth, Harnish et al., 2000). Multidisciplinary models for obesity prevention aim to educate participants about the importance of portion size and nutrient quality, with a major emphasis on the consumption of breakfast and fruit and vegetables (Ross, Kolbash et al., 2010). Furthermore, several studies have outlined the importance of physical activity education in CBT-based adolescent weight management interventions (Mellin, Slinkard et al., 1987; Annesi, Walsh et al., 2010; Butryn, Wadden et al., 2010).

Stimulus control.

The majority of behaviourally-based treatments emphasise the practice of stimulus control, an approach which involves limiting exposure to environmental triggers that lead to unhelpful diet and physical activity behaviours (Tsiros, Sinn et al., 2008). Epstein (1996) noted that stimulus control procedures are designed to arrange environments so as to reduce stimuli to behaviours that are to be decreased, and increase stimuli that facilitate behaviours to be increased. Stimulus control activities within the childhood obesity literature encourage the elimination of high-energy foods from the immediate environment and aim to increase the accessibility of desired activities that expend energy (Goldfield, Epstein et al., 2001; Wisotsky & Swencionis, 2003).

Problem solving and social support.

Problem solving involves identifying high-risk situations which impact on targeted behaviour, and in CBT-based weight management interventions, the targeted behaviours are diet and physical activity. High-risk situations can be emotional or social. For example, being invited to a party may make a person feel anxious due to the anticipated exposure to high-energy food. A problem-solving approach may involve eating soon before the event so as to promote satiety, or ensuring a healthy alternative is available for eating at the event. Conducive to problem solving is social support through which family, friends, and others can encourage or support a person to engage in a targeted behaviour, such as physical activity and dietary choices. Further, social support systems can encourage dietary and physical activity behaviours by the provision of role modelling of these targeted behaviours, thus assisting in negating any barriers to change (Foreyt, 2005). Grey and Berry note that problem solving is a stepped approach whereby the problem is identified, goals are determined, alternative

solutions are generated, consequences are examined, solutions are chosen and outcomes are evaluated (Grey & Berry, 2004).

Goal setting.

Goal setting occurs when new levels of targeted behaviour are identified, and planned to be achieved within a specified time frame (Foreyt, 2005). The process of setting realistic, attainable goals is deemed a critical part of any CBT-based weight management intervention (Costain & Croker, 2005), as the setting of specific behavioural goals provides the impetus for the design of a system for organising nutrition and physical activity information and behaviours into practical and manageable steps (Shilts, Horowitz et al., 2004).

Psychologist Delivered: Peer and Family Interventions

The principles of goal setting, self-monitoring, stimulus control, and problem solving all have a role within CBT-based weight management. In applying these principles within the management of adolescent OWOB, the literature strongly links programs that are delivered by a psychologist and family supported as being the most successful (Epstein, Valoski et al., 1990; Epstein, 1996). In reinforcing this, Bennett and Sothern state that when intervening on OWOB, the intervention should not occur until the parent(s) are ready and accepting of such lifestyle changes (Bennett & Sothern, 2009). Furthermore, Lobstein et al. (2004) highlight that a feature of successful interventions in adolescent OWOB includes the provision of separate sessions for the adolescent and their parent, and include a structured, although flexible, program that encourages sustained modifications in lifestyle, relationships and attitudes (Lobstein, Baur et al. 2004). Available evidence supports altering the family

environment and fostering positive parental influences, which are imperative for supporting an adolescent to achieve long-term, weight-related behaviour modification (Epstein 1996; Golan and Crow 2004; Vignolo, Rossi et al. 2007). In a consensus statement regarding the management of childhood obesity, 65 health professionals agreed that lifestyle interventions should be the first option for children and adolescents, and these are most likely to succeed when diet and activity programs are coordinated with individual and family counselling and behaviour modification (Speiser, Rudolf et al. 2005). According to Bandura's Social Cognitive Theory of thought and action, adopting a new behaviour can be enhanced by the presence of social models (Bandura, 1986). Parents and peers are seen as appropriate facilitators to guide children by modelling appropriate behaviours and by making environmental changes. Consistent with this, family-supported approaches have been an important component of CBT-based weight management in paediatric populations (Vignolo, Rossi et al., 2007). Unless specified otherwise, interventions in the following section were led by psychologists.

Mixed children and adolescent groups.

In a study by Epstein and colleagues, 72 obese, 8 to12-year-old children and their parents were randomly allocated into one of two treatment groups. One group was allocated to a stimulus control intervention with the second group undertaking a reduced sedentary behaviour program. A significant reduction in scores was observed for both groups from baseline to 12-months, with the reduced sedentary behaviour program participants showing a BMI-*Z* score change from 3.2 to 2.6, and the stimulus control group a BMI-Z score change 3.3 to 2.4. The authors concluded that both

approaches were equivalent in effect, with both significantly reducing BMI *Z*-scores (Epstein, Paluch et al., 2004).

Kelly and Kirschenbaum (2010) completed a review of 22 child and adolescent weight management studies, of which 11 programs incorporated a CBT component. These studies were published during the years 1958 to 2008 with the average participant age being 13.8 years. The results showed that CBT-based interventions achieved a mean reduction of 40.32 % overweight, whereas, participants in non-CBT intervention studies achieved a mean reduction of 25.3%. Percent overweight scores were derived by dividing the reported BMI scores by the percentile scores of studied participants. The review further disclosed that participants in CBT-based programs were able to maintain their involvement in the treatment for longer than participants in non-CBT programmes, with the average length of time for these interventions being 17.4 and 8.3 weeks, respectively. The authors concluded that cognitive behavioural therapy was useful as a therapeutic and educational treatment because it helped to develop and reinforce among recipients key self-regulatory skills, such as self-monitoring and may, in turn, reduce negative emotional states and improve psychosocial functioning (Kelly & Kirschenbaum, 2010).

Earlier research by Duffy and Spence (1993), with children aged 8 to13 years, evaluated behaviour therapy with a relaxation placebo against behaviour therapy with a cognitive behavioural therapy (CBT) adjunct. The 27 children, who were predominantly female (*N*=22), were randomly allocated to treatment groups and attended eight, 90-minute, weekly sessions accompanied by a parent. There was a significant reduction in percentage overweight at six months post-intervention of 8.5% overall. However, there were no between group differences. The researchers concluded that CBT as an adjunct to behaviour therapy did not appear to improve

treatment outcome compared to the behaviour therapy combined with relaxation placebo approach. Contrary to predictions the addition of cognitive components did not appear to add significantly to the effectiveness of the standard behavioural approach to treatment of childhood obesity (Duffy & Spence, 1993). Limitations of this study included the absence of direct adiposity measures and the failure to assess pubertal development. Having had12 participants drop out of the study at 6-months and having a mean age of 9 years make these results hard to generalise.

Braet and Van Winkel (2000) completed a 4.6-year follow-up of four weight management programs with 136 children who were aged 7 to 17 years. The four programs included three interventions using CBT, delivered either in a group, individual or a summer camp approach, compared to a fourth group that received an advice-based intervention delivered in one session. No significant percentage weight loss difference between CBT groups was found, but all experienced a weight loss of between 11.0% and 17.26 %. The advice only group experienced a non-significant weight loss of 6.21%. The mean weight loss of the active CBT treatments was also significantly higher than that of the advice-in-one-session at the 1-year follow-up ($p <$ .001), and at the 4.6-year follow-up, ($p < .05$). Percent overweight was derived by using the actual weight divided by the weight for height percentile and expressing the calculation as a percentage. The authors concluded that the participants who received the CBT programs had better outcomes than a those who received the one session comparison (Braet & Van Winckel, 2000). The study was limited, as it was not a RCT, some participants were conveniently placed into groups that suited, and for example, the camp program wasn't suitable for some as families who had pre-engagements. Furthermore, body composition or maturation changes were not assessed during the period.

A large sample of 197 obese children and adolescents was used in a later study by (Warschburger, Fromme et al., 2001) which evaluated a CBT-based exercise and calorie reduction program against a muscle relaxation group with reduced calorie program. Participants were aged from 9 to 19 years old and were required to stay for 6-weeks in a rehabilitation hospital in which the intervention was delivered. Who delivered the program was not clarified, although referencing from the paper suggests the intervention was designed by psychologists. The average age of the CBT participants was 13.8 years ($N = 121$), and for the relaxation group was 13.1 years ($N = 76$). Pre- and post-intervention tests taken at baseline and 6-weeks showed significant improvements in self-reported eating behaviours for the CBT group compared with the relaxation comparison group ($p < .05$), and these changes were independent of age and sex at 6-months. The weight status, measured as the percentage of overweight dependent on height, was reduced in both groups immediately post-intervention and at 6-months follow-up ($p < .01$). Reduction in the percentage of overweight tended to be higher in the CBT group than in the relaxation comparison, (15% versus 10%). Self-reported quality of life, as determined by non-specified measure, increased more in the CBT group from pre-intervention to 6-months follow-up than in the relaxation group ($p = .01$). Self-reported eating measures showed significant improvements in the eating behaviours of the CBT group as compared to the relaxation group from pre-intervention to 6-weeks ($p = .05$), but no age or sex differences were found. It was concluded that both approaches were successful in long-term weight maintenance to 12-months (12-month data not shown), but emphasised that CBT was promising in positively altering obesity-related habits and psychosocial consequences. Several limitations appear present in the study, namely the failure to directly measure body composition and the reliance on local general practitioners to acquire post intervention measures,

questioning reliability. A major practical limitation is the cost of hospitalisation for 6 weeks which may be a financial constraint.

Research by Herrera and colleagues in a for-profit, weight loss centre compared three interventions, which included a CBT-based multi-component lifestyle program, a behaviour therapy (BT) program that had the cognitive elements removed and a standard education program which was indicative of usual care for the facility. Both the CBT and BT programs consisted of 10 weekly sessions with approximately five children and parents per group. The educational program included topics such as reading food labels, portion sizes and nutritional values. Participants in the education group were also encouraged to increase their physical activity through daily living activities. Seventy-five obese children in three groups of 25 met the criteria for the research. Children had a BMI greater than the 97th percentile and had an average age of 11.5 years. The 26 boys and 49 girls were accompanied by a supporting parent and were required to attend weekly sessions. Results showed that mean BMI percentile score declined in each group from baseline to 10-weeks, and was 63.47 to 58.81 for the education group, 68.94 to 63.37 for CBT and 68.94 to 58.95 for BT. The BMI change percentage was created by the subtraction of the post-treatment percentage over ideal BMI. The results indicated that the behavioural intervention (BT) elicited significant BMI change over ideal weight against the cognitive program (CBT) and an education program control (p = .01). There was no significant percentage change for BMI between the CBT and the education group (significance value not shown). The authors commented that the program, which the participants paid for, may not have catered for lower class, low income families, thus limiting generalisation of results. Other limitations include the absence of maturation assessment, direct measurement of adiposity and the failure to use randomisation (Herrera, Johnston et al., 2004).

A more recent study (Sacher, Kolotourou et al., 2010) evaluated a multicomponent, family-based, behaviour change intervention that was delivered in the United Kingdom. The intervention included cognitive strategies, but wasn't defined as CBT. The program randomly allocated 116 children who were aged 8 to 12 years to either a treatment condition or a wait list control. The treatment involved sessions twice each week over a 9-week period, and was complimented with a free 12-week swimming pass. The treatment sessions incorporated the application of cognitive theories with nutritional education and exercise. At 6-months, both waist circumference and BMI were significantly less in the intervention than the control group, adjusted for baseline (−4.1 cm and −1.2 kg/m^2, respectively, or −0.24 and −0.37 waist *Z* scores (all $p < .0001$). Furthermore, at 12-months, children in the intervention group had reduced from baseline their waist *Z*-score by 0.47 ($p < .0001$) and BMI-*Z* scores by 0.23 ($p < .0001$). The authors reported that the program had a high attendance rate and was well received by families. The authors also reported that the intervention was effective in reducing adiposity, although no direct measure of adiposity was used. Methodologically, the absence of a measure to assess maturation change during the trial permits speculation as to the impact of growth among participants on the results. While the authors reported that the intervention was delivered by non-specialists, program leaders were reported to be comprised of teams of health, social, education, and exercise professionals.

In a recent pilot study by Murdoch et al. (2011), a family-based behavioural (but not defined as CBT) program in community settings was evaluated. Recruited to the intervention were 17 obese children, comprising eight boys and nine girls who were aged from 7 to 14 years. Parents and children were required to attend 15 sessions over a six-month period with the program delivered by a team of two Dietitians, two

Psychologists and two volunteers in a local community centre (Murdoch, Payne et al., 2011). Participants completed questionnaires and height weight measures at pre-intervention, post-intervention, and at 6 months. Results showed no significant change in mean BMI-*Z* score from 3.16 to 3.10, while an improvement was found for psychosocial characteristics of depression ($p = .006$). Additional improvements were observed in abnormal dieting behaviour, bulimia and food preoccupation ($p < .05$) as determined by the Children's Eating Attitude Test. There was also a significant increase in the amount of high fibre foods consumed ($p = .02$), as measured by food frequency questionnaire. The authors noted that the observed positive behavioural and psychological results provided support regarding the effectiveness of the intervention. However, generalisation of the program's results is severely limited as there was no control group, a small number of participants undertook the intervention and there was the failure to assess and control for maturational changes among the participants.

In investigating the efficacy of paediatric obesity treatments, Jelalian and Saleans completed a review of 42 well-designed studies. The programs identified involved non-school-based programs, which targeted medically and psychologically healthy children and adolescents who were aged 8 to 18 years. Based on detail from the reviewed literature, the authors found multi-component behavioural interventions (not defined as being CBT) which incorporated techniques such as behavioural contracting, self-monitoring, stimulus control, parental modelling and reinforcement were demonstrated to be superior to comparison interventions, which typically were either placebo or education programs. Although results for individual studies were shown, data for overall sample were not displayed (Jelalian & Saelens, 1999).

Adolescents.

Within adolescent groups, few weight-focussed, psychologist-delivered, cognitive behavioural interventions have been published (Steinbeck, 2005; Oude Luttikhuis, Baur et al., 2009). In a trial by Brennan et al., a clinical psychologist led a CBT program with 63 OWOB adolescents aged 11.5 to 18.9 years (M = 14.3, 46% male),(Brennan, Walkley et al., 2012a). The program included twelve, 60-minute treatment sessions with the participants accompanied by a supporting parent. One treatment session was administered via telephone, and the remainder were delivered face-to-face. Following the treatment phase, a maintenance phase provided an additional eight brief telephone call sessions and two face-to-face maintenance sessions of 60-minutes each. Participants were randomly allocated to either the CBT intervention, or a wait-list control group, who subsequently undertook the intervention after first acting as a no-intervention control for six months. Dual Energy X-Ray Absorbitometry (DEXA) was used to assess body composition at pre-intervention and at 6 months post-intervention. Results showed that the CBT group had a total fat loss of 1.74 kg fat (p = .01), where the control experienced an increase in total body fat of (M = 2.6 kg). Percent body fat decreased significantly in the CBT group (M = -1.92%, p = .04) while the control group experienced an increase (M = + 0.22%). Although no data were provided, the author noted significant changes were also evident in secondary psychosocial, physiological and lifestyle outcomes, thus demonstrating the efficacy of this cognitive behavioural intervention in promoting positive changes in OWOB adolescents. The same intervention protocol was used in a replication RCT study involving 47 OWOB adolescents with a mean age of 14.5 (SD = 1.6) years, although the no treatment control group were not wait-listed, and hence did not receive nor have an expectation of subsequent treatment (Tsiros, Sinn et al., 2008). At 20 weeks post

baseline, the CBT group participants had significantly decreased their BMI (M = 1.3, SD = 0.4, p = .007) compared to control group participants (M = 0.3, SD = 0.3). A similar finding was found for total body fat. The CBT group participants achieved an average decrease of 1.5 kg (SD = 0.9), whereas the control group participants had an average increase of 2.3 kg (SD = 1.0). Analysis of dietary behaviour revealed that the CBT group had a significant reduction in total energy intake from sugared soft drinks (-4.0 %, M = 0.9%) to as compared to control (-0.3%, M = 0.9%, p = .005) for group by time interaction, which was correlated to reductions in weight (r = 0.48, p = .04). The authors concluded that CBT was an effective strategy for supporting improvements in body composition by adolescents through focusing on sustainable lifestyle changes, and may be a useful intervention for treating adolescent obesity.

In research completed by Jelalian et al. (2006), 76 adolescents aged 13 to 16 years were randomly assigned to one of two treatment conditions; a cognitive behavioural treatment with exercise (CBT + EXER) or a cognitive-behavioural treatment with peer-enhanced adventure therapy (CBT + PEAT). The peer-enhanced adventure therapy comprised challenging group tasks to build confidence, trust and enhance risk-taking. Both group interventions included 16 weekly sessions, with parents and adolescents attending separate concurrent meetings, followed by four monthly maintenance sessions. Treatments were conducted by doctoral level psychologists. At 10-months from baseline, both treatment conditions demonstrated significant weight loss over time (p = .01), with a mean loss of 3.20 kg for CBT + EXER and a 5.31 kg loss for CBT + PEAT group. Also observed was a significant age by treatment group interaction, such that older adolescents (aged 14.75 years or older) randomised to CBT + PEAT demonstrated an average weight loss of 7.86 kg, more than four times the weight loss of older adolescents (aged 14.75 years of age or more)

that were assigned to CBT + EXER group who lost on average 1.72 kg by the end of treatment ($p < .05$). The authors concluded that peer-based 'adventure therapy' is a promising adjunct to standard cognitive-behavioural weight control intervention for adolescents, and may be most effective for older adolescents (Jelalian, Mehlenbeck et al., 2006). The study has important limitations, including the failure to assess adiposity and the absence of a maturation measure (Jelalian, Mehlenbeck et al., 2006).

Evans and colleagues conducted an exercise and nutritional support program with 68 adolescents who were aged on average 13.4 years. The program was delivered by a registered Dietitian and behavioural specialist, enlisting behavioural principles consistent with CBT, but was not defined as such. The 6-month program required adolescents to attend weekly aerobic exercise, resistance training, nutritional education and behavioural support sessions of 1.5 hours in duration. Results showed that, at 6-months post-baseline, bio-impedance derived body fat percentage was reduced by 2.6% ($p = .001$), BMI-*Z* score was reduced by 1.2% ($p < .05$), blood cholesterol was reduced by 7.2% ($p = 0.001$), and cardiorespiratory fitness was improved by 10.8% ($p = .001$). Although promising, the intervention was without a control group, failed to assess maturity and had a high dropout of 61.9% thus requiring caution when interpreting the results (Evans, Franco et al., 2009).

General Summary

This section reviewed the limited number of psychologist-led, CBT-based interventions that have been conducted with OWOB children and adolescent populations. Although most primary outcomes appear to have improved compared to controls, many researchers failed to assess maturity and few studies had a follow-up assessment on primary measures after more than 12-months. Intervention length and

primary outcome measures also varied between studies, thus limiting comparison between studies, curtailing generalisations and preventing confirmation of one preferred CBT approach in supporting those who are OWOB. Only two interventions assessed and controlled for maturity in data analysis, and directly measured body composition via DEXA (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). While providing some insight and direction, further development and evaluation of CBT-based programs targeting OWOB are needed.

Non-Psychologists Delivering Cognitive Behavioural Therapy-Based Interventions

The available research provides some evidence that interventions based on behaviour change principles, including CBT, when delivered by psychologists, can create positive health outcomes for participants (Epstein, Paluch et al., 2000; Epstein, Paluch et al., 2004; Brennan, Walkley et al., 2012a). There is emerging evidence that interventions based on behaviour change principles, including CBT, can be successfully delivered by non- psychologists, either in mixed teams or as individual deliverers. Non-psychologist delivered, CBT-based programs have included Exercise Leaders (Annesi, 2003; Annesi, Walsh et al., 2010), Dietitians and Nutritionists (Mellin, Slinkard et al., 1987; Rapoport, Clark et al., 2000) and Medical Doctors (Eichler, Zoller et al., 2007), and all are reviewed in the following section.

Mixed teams.

In order to assess the implementation of a behaviourally-based intervention aimed at increasing levels of physical activity, (Stevens, Hillsdon et al., 1998) conducted a trial with 714 sedentary adults, aged 45 to 74 years. This intervention was

instigated by a General Practitioner and included delivery by an Exercise Development Officer who offered physical activity education and exercise prescription. Over a 10-week period, the intervention group attended two consultations, the first at week one and the second at week 10. The program was designed to increase home-based and leisure centre activities. The control group received an information pack on leisure centre facilities in the post. Based on a self-reported physical activity questionnaire, which was adapted from previous research, the intervention group ($N = 363$) were on average 1.52 times more likely to engage in weekly physical activity, at eight months post-baseline, as compared to an information only control. The authors speculated that while the intervention was General Practitioner led, it could be delivered by existing primary care staff such as community Physiotherapists or practice Nurses.

A recent study by Kallings et al. (2008) sought to investigate if Nurses combined with General Practitioners and Physiotherapists could support 481 participants attending 13 Swedish primary health care units to improve their physical activity behaviour. Participants ranged in age from 12 to 81 years and were prescribed physical activity practices from the guidelines of a scientific handbook titled, ‘‘Physical activity in prevention and treatment of diseases’’ (Yrkesfo¨ reningar fo¨ r Fysisk Aktivitet, 2003). The follow-up rate was 62% at 6-months with intention-to-treat analysis showing a significant increase ($p = .001$) in self-reported physical activity. The authors indicated that this approach of physical activity prescription may be suitable as a conventional treatment in an ordinary health care setting. The major limitation of this study was the absence of a control group, which limits the results (Kallings, Leijon et al., 2008).

In an effort to identify which provider group is most effective in physical activity promotion, Tulloch and collegues conducted a review of 19 physical activity

counselling interventions. Reviewed interventions included research that had been facilitated by either General Practitioners, allied health professionals, including exercise specialists, health educators, exercise development officers, exercise physiologists, exercise consultants, and dieticians/nutritionists, or combined-providers (mixed teams). While some improvements in physical activity behaviour were identified across all provider categories, the authors concluded that allied health professionals as adjuncts or alone appear to produce the best outcomes. The review supported overall delivery concepts, with the authors suggesting that more attention should be given to the training of exercise counsellors as more specialised training is likely to increase the success of the behaviour change and maintenance approach (Tulloch, Fortier et al., 2006).

Nurses and Medical Practitioners.

Due to the distribution of primary care settings throughout communities, and the proximity this offers to the majority of the population who could benefit from lifestyle-focussed, behaviour-based support, primary carers are seen as a likely group who could deliver behaviour-based programs. Within mental health contexts, a study conducted by Eckers and colleagues investigated whether mental health nurses who received CBT training were able to successfully deliver a CBT-based intervention in the treatment of depression. The research involved the facilitation of 12, one-hour, face-to-face sessions to 47 adults with average age of 44.7 years. The RCT trial was delivered by two Mental Health Nurses trained in a behavioural-based approach, which was titled behavioural activation (BA),and 24 participants were allocated to the intervention with 23 participants acting as a treatment as usual control. At post-intervention, control participants were offered the BA treatment as delivered in the intervention group.

Results for psychosocial measures (Beck Depression Inventory-II and Work and Social Adjustment Scale) indicated a significant difference in scores favouring the CBT-based group (p = .001), as compared to participants in a usual care control. The authors concluded that the program was an effective therapy for depression compared with usual care, and could be delivered by generic mental health professionals without previous experience as therapists.(Eckers, Richards et al., 2011). The authors highlighted that limitations included a small sample size and a high dropout in the CBT group (30%) as compared to the control of 8%.

A review by Whitlock and co-workers (2002) supported the implementation of behavioural counselling interventions for people who undertook insufficient physical activity, had poor nutritional behaviour, and a history of alcohol, tobacco and illicit drug use. Findings revealed a reduction in behavioural risk factors across the 11 reviewed studies among participants who had undergone a behavioural counselling intervention. Most importantly, it was found that clinically meaningful changes were observed during brief interventions that were designed to fit into everyday general medical practice (Whitlock, Orleans et al., 2002). A Cochrane review of 31 studies involving nurses as behaviour change agents within smoking cessation programs, found that structured smoking cessation interventions delivered by nurses were more effective than usual care on smoking abstinence (Rice & Stead, 2008).

Diabetes educators.

In an effort to support people living with diabetes, a large body of research has been undertaken, and many studies have evaluated behaviour change based interventions designed to assist diabetics to manage their behaviour and symptoms of

their condition (Kirk, Mutrie et al., 2004; Kirk, Barnett et al., 2007; Nansel, Iannotti et al., 2007; Nansel, Anderson et al., 2009). Similar to the research that has occurred related to obesity management, these studies have typically incorporated aspects of cognitive behavioural strategies, including self-regulation, goal setting, coping skills and problem solving, in order to assist participants to engage in healthy activity and dietary behaviours.

Although most research has evaluated diabetic interventions in adult populations, Nansel and colleagues designed and implemented an intervention targeting behaviour management of diabetic youth. The RCT used non-professionals (Bachelor degree and/or Post-graduate students in health-related professions) (related professions not defined) as practitioners, and conducted the program with 81 adolescents (45 female) with an average age of 13.8 years. The research involved an intervention group (N = 40) that completed a six-session, behaviourally-based, family-supported program. A parent was present at the first intervention session only. An education-only control group (N = 41) received a diabetes educational booklet and standard diabetes care. Results revealed a positive, yet non-significant, change to plasma glucose concentration blood markers, with A_1C improving (p = .06). A high level of acceptance for the intervention was reported by both youth and parents via responses to individual satisfaction items (6-point scale, 6 high) ranging from 4.71 to 5.89 for youth (M = 5.32) and from 4.75 to 5.68 for parents (M = 5.34). At the 12-month follow-up, adolescents in the control group had a mean A_1C concentration of 6.57% greater than baseline (a 0.40 increase in actual A_1C value), while the intervention group mean was 0.19% less than baseline (0.04 decrease in actual A_1C value). A significant intervention by age interaction was observed, indicating a greater effect on A_1C values among older youth aged 14 to 16 years than those youth aged 11 to 13 years (p = .03). Importantly, this

study showed a promising methodological example in which trained non-psychologists were able to apply cognitive behavioural strategies to adolescents resulting in positive lifestyle changes. Researchers reported the view that the intervention could be adapted to suit other environments and health conditions, including being applied in clinical settings (Nansel, Iannotti et al., 2007).

A follow-up study by the same research group investigated the feasibility of a clinic integrated, behavioural intervention that was delivered across multiple sites. A total of 122 families, each with a type-1 diabetic child or adolescent aged between 9 and 14.5 years participated in the trial. Interventionists were specifically trained Health Advisors (who were well-trained, college-educated, research assistants) who facilitated participants during three clinical visits and six telephone calls over the 18 to 24 month intervention period. The Health Adviser group ($N = 60$) involved parental attendance and included training in the processes of problem-solving and goal-related diabetic management. A usual care group ($N = 62$) received standard medical care, participated in measurement, and received clinical preparation, phone calls and medication administration assistance. Qualitative assessment showed good acceptance of the program, with satisfaction measures detailing how parents and children had enhanced ability to work through diabetic issues and solve problems, with 91% of adolescents and 97.7% of parents agreeing or strongly agreeing with the statement that the Health Advisor 'helped us learn new ways to solve problems'. Despite the acceptance of the program by participants, non-significant changes in blood markers were noted for both groups, with mean A_1C increasing from baseline to final assessment by an average of 0.3% in both groups (Nansel, Anderson et al., 2009).

In further investigating the nurse's role in diabetic education, a CBT-based, randomised control trial (RCT) was conducted by Welshcen and colleagues (2007)

Participants were 13 adults, aged 40 to 75 years, with Type II Diabetes. The program compared a multi-component, CBT, healthy lifestyle intervention to standard diabetic practice. Although follow-up detail is yet to be published, the authors have reported that early indications have shown that nurses could implement the program, which showed the potential to improve lifestyle and cardiovascular risk profiles (Welschen, van Oppen et al., 2007).

Physiotherapists.

Physiotherapists represent one health profession that have utilised behaviour change approaches to aid rehabilitation for various musculo-skeletal ailments (Beissner, Henderson et al., 2009). In a review by Harding and Williams, it was noted "that by learning the cognitive behavioural approach and integrating it with their own skills, physiotherapists are making a major contribution to these programs" (p.129), (Harding & Williams, 1995). In a later report, the same authors overviewed the importance of such treatment components as goal setting, client education, pacing, reinforcement and relaxation in rehabilitation treatment, all key elements of CBT interventions (Harding & Williams, 1998). The paper also provided an insight into frequently encountered difficulties, fear and distress factors and how to maintain gains; all concepts central to effective behaviour change. Smeets and colleagues (2006) evaluated the effect of CBT approaches in comparing therapeutic approaches in chronic low back pain. In the research, 233 patients were randomised to one of three treatments, each of which involved participants attending sessions three times weekly for 10 weeks. The interventions included Active Physical Treatment (APT), Cognitive-Behavioural Treatment (CBT), Combined Treatment of APT and CBT (CT), or Wait List (WL). Results derived from self-reported functional reports showed significant reductions in

functional limitations among participants across all three active treatments compared to the wait list control ($p = .01$). The authors concluded that, based on client satisfaction measures, CBT may be preferred when the client has moderate to severe functional limitations (Smeets, Vlaeyen et al., 2006). Similarly, a later RCT evaluated a 3 week, CBT-based, low back intervention against a routine care control. Participants were 37 women and 33 men aged between 27 and 63 years. The data showed that the CBT-based intervention had a positive effect at three months post-treatment on physical capacity as measured by physical function tests ($p = .01$). In contrast, the control group that engaged in ‘‘routine care” did not achieve a significant change in physical capacity. Although both groups reported less pain at three months, no differences in the groups were found ($p = .14$) (Christiansen, Oettingen et al., 2010). Based on published reports, early support for a positive role of CBT in low back pain when delivered by physiotherapists is apparent.

Exercise leaders.

There is a steady growth of literature suggesting the potential for those in the exercise instruction field to enlist behaviour modification techniques in exercise prescription. Cognitive behavioural techniques as delivered by Exercise Leaders have been shown effective in retaining fitness centre patronage (Annesi, 2003; Annesi & Unruh, 2004). This research , titled The Coach Approach, was conducted with adults in exercise facilities in the United States (USA: treatment, $N = 540$; control, $N = 525$), the United Kingdom (UK: $N = 307$ treatment; $N = 291$ control), and Italy ($N = 50$ treatment; $N = 49$ control). The trial integrated the concepts of a six-step cognitive behaviour approach which was titled cognitive behavioural treatment, included goal setting, stimulus control, contracting and self-monitoring, with a traditional exercise

program. Control group participants received a standard exercise program, which included an orientation to exercise apparatus and a program designed using standard guidelines for intensity, duration, and frequency. Attendance was measured via facility tracking records, and participants were classified as drop-outs if four consecutive weeks of absences occurred during the study timeframe (36 weeks). Pooled results of all three studies, from the USA, UK and Italy showed a significantly ($p < .05$) higher attendance (13–30%) and less drop out (30–39%) for the treatment groups, compared to their respective controls (Annesi, 2003). Further reinforcing this, a similar reduction in dropout was observed in a follow-up RCT by the same group, using the same study protocol, whereby dropout was measured at 38.9% for participants who received the cognitive behavioural treatment compared to 62.9% for controls. This research showed that Exercise Leaders could be trained to implement a behaviour change intervention in order to promote attendance and attenuate dropout among exercise facility patrons (Annesi and Unruh 2004).

Within Australia, exercise specialists have been utilised in promoting physical activity (PA) in general medical practice (Halbert, Silagy et al., 2000; Armit, Brown et al., 2005). Halbert et al. (2000) looked to determine if PA advice from an exercise specialist working from a general practice was successful in modifying cardiovascular risk factors among older adults, whose average age was 67.3 years. The study used self-reported PA, as well as blood pressure and blood lipid measures, to compare an intervention group ($N = 149$) with a control group ($N = 150$). The intervention group received one personalised, face-to-face session, which included PA advice and a 3 month exercise plan. The control group received minimal advice delivered in a brief 20-minute session, and received a pamphlet promoting good nutrition for older adults. Results at 12 months showed increases in self-reported physical activity in both groups,

($p < .001$), but was more prominent in the intervention group ($p < .001$), which increased from one to three sessions per week in comparison to the control group that increased from 1 to 1.4 sessions per week. There were no changes in blood pressure or blood lipid measures. Quality of life scores decreased between baseline and 12-month follow-up in both the intervention and control groups, with significant declines in bodily pain ($p = .001$), general health ($p < .001$), physical functioning ($p < .001$) and vitality ($p = .04$).

More recent Australian research has been conducted to explore the success of an Exercise Scientist (ES) in general practice (Armit, Brown et al., 2005). The research recruited participants who were aged 55 to 70 years of age and were randomly allocated to one of three groups. Group one ($N = 9$) received a written physical activity (PA) prescription, an information booklet and brief verbal advice (3 to 5 minutes) from their General Practitioner. Group two ($N = 11$) received individual advice from an Exercise Scientist, and group three ($N = 8$) received the same individual advice from an Exercise Scientist and were allocated a pedometer that was used to self-monitor and set goals for physical activity. The individual advice provided by the Exercise Scientist to both groups two and three took the form of a 15 to 20 minute counselling session, and three follow-up telephone calls that were 12 to 15 minutes in duration. Telephone calls reinforced positive behaviours, re-evaluated goals and discussed compliance issues. Results showed that all three groups significantly increased self-reported PA at 24-weeks post-baseline. *(*$p = .001$), However, there were no between-group differences. ($p = .061$). Although the between group differences were not significant, the authors indicated that individual counselling and telephone counselling, with or without a pedometer, had resulted in substantial changes in self-reported PA levels compared to participants who had received the brief General Practitioner advice.

General Summary

In the domains of primary care and exercise science, available but limited evidence suggests Non-Psychologists can successfully deliver behaviourally-based interventions to adult participants leading to positive outcomes in physical activity behaviour. Nurses have similarly been found to be successful in applying behaviour-based interventions in diabetes management and depression, resulting in improvements to blood markers and psychological well-being. Furthermore, physiotherapist-led, behaviourally-based, pain management programs resulted in improved pain and quality of life scores among adult participants. Overall, although the research is limited, non-psychologist-led behaviour modification interventions show promise.

Non-Psychologists in Weight Management

There is currently an increasing interest among non-psychologists in using psychological approaches in the area of weight management. Psychological models can be applied to the process of dietary and physical activity goal-setting, and for improving psychological well-being, by focusing on the inherent obstacles in the behaviour change process (Rapoport, 1998). Non-psychologist health professionals represent a large proportion of the health workforce who have access to patients, and, therefore, are seen as a desired source of disease prevention information (Petrella, Koval et al., 2003). Examples of non-psychologists to have implemented weight management focussed behaviour modification processes are Medical Doctors, Nurses, Nutritionists, Dietitians and Exercise Leaders.

Medical Practitioner led teams.

In work by Jiang et al. (2005) Paediatricians conducted an in-home, family-oriented, behaviour modification program with obese children and compared this against a no treatment control group. The control group had a normal school and family life and did not receive any special intervention. All children in the study were recruited from the one school, with 36 assigned to a treatment group (M = 13.3 years), and 39 assigned to the control group (M = 13.2 years). Paediatricians visited families monthly for 24 months and, although some CBT principles were used (self-monitoring, goal setting and reinforcement), the intervention wasn't defined as CBT. During the visits, the Paediatricians observed the family environment and looked for where foods were stored, cooking styles, and what kinds of foods were used commonly by the family. Further behavioural and compliance issues were discussed within the cohort. Physical Education Teachers were also required to monitor the exercise outputs of the intervention cohort outside class. Results at two years showed BMI to be significantly reduced in the treatment group from (M = 26.6 9, SD =1.7) to 24.0SD = 0.9), ($p < .05$) but not in the control group (M = 26.1 (1.5) to 26.0 (1.6). Further blood analysis revealed a reduction in blood fat markers (triglycerides) in the treatment group, (M = 0.72 to M = 0.65) compared to no change in the control, (M = 0.73 to M = 0.73). The authors concluded that a family-based, behavioural intervention was feasible to use in decreasing the degree of obesity in Beijing, China. The study has several weaknesses, including a failure to report the allocation procedure of children to groups, reliance on BMI as the single measure of obesity, and no control for any disparity in growth among children across the length of the study (Jiang J X, Xia X L et al., 2005).

Work by Swiss researchers has also examined the effect of a multidisciplinary core of health professionals delivering a 16-session, CBT weight management intervention to OWOB adult patients over a three year period. Physicians, nurses and allied health instructors delivered the program in collaboration with a community partner to 191 adults. Results showed a non-significant median weight loss of 4 kg for the 147 adult completers. Although the authors concluded that the program produced non-significant weight loss with a low attrition rate, generalisation of results is difficult due to the absence of a control group (Eichler, Zoller et al., 2007).

Nutritionists and dietitians.

CBT-based interventions targeting improved adolescent dietary behaviour have been implemented by Nutritionists. In a study by Mellin and colleagues involving 66 adolescents (M = 15.6 years), 37 adolescents undertook a 14-session, CBT-based program, while 29 were randomly assigned to a no treatment control group. During the 90-minute sessions, adolescents were encouraged to make successive, sustainable, small modifications in diet and exercise behaviours. Parents were required to attend two of the sessions where they were instructed on strategies for supporting their adolescents' weight-loss efforts, including altering family dietary and activity patterns. Results showed that participation in the CBT–based program led to a decrease of relative weight on average of 9.9% (SD = 14.9), compared to the control group whose relative weight changed on average by 0.10% (SD = 13.2) ($p < .001$). Relative weight was determined by dividing actual weight by expected weight (taken from growth charts) and multiplying by 100. Psychosocial and knowledge measures showed that treatment was also associated with significant improvement in weight-related behaviour, depression, self-esteem and knowledge of weight management concepts at

post-treatment and at a 1-year follow-up, compared to the no treatment control ($p <$ .05). The researchers further concluded that such interventions could be transferred across a variety of settings (Mellin, Slinkard et al., 1987). This study was limited by its failure to assess maturity and its failure to assess adiposity.

Several reviews have addressed the potential of Dietitians as agents in the delivery of CBT-based interventions to support OWOB populations (Rapoport, 1998; Rapoport, Clark et al., 2000). Rapoport et al. (2000) followed-up their review by implementing both a CBT program and a modified version of this CBT program on 63 overweight women, aged on average 47.5 years. Both treatment programmes involved 10, weekly, 2-hour sessions led by a state registered Dietitian and a Health Psychologist, who had received training and supervision in CBT methods. A clinical psychologist and exercise scientist provided specialist sessions. The CBT program entailed all CBT-based, weight management principles, whereas the modified version of CBT had removed strategies related to weight loss goal-setting. Both groups at the 52 week follow-up had significant weight loss, with the CBT group losing 3.8 kg on average (p = .03) and the modified CBT group losing 2.1 kg on average (p = .02). As determined by psychological measures, both groups experienced significant improvements in self-esteem, (p = .001), stress, (p = .013), depression, (p = .009),, binge eating, (p = .001), body dissatisfaction, (p = .001), and body avoidance (p = .001). Self-reported physical activity also improved significantly in both groups (p = .006).

Later work by Stewart and colleagues evaluated a behaviour modification program against a standard dietetic advice control group delivered to the parents of 17 obese children. The behaviour modification program included self-monitoring, goal setting, motivational interviewing, stimulus control and reinforcement. Standard

treatment consisted of healthy eating and physical activity strategies and goals set by the dietitian. The parents' children were aged from 5 to 11 years and eight parents were allocated to the behavioural treatment group and nine parents randomized to standard dietetic care. Parental perception of weight management treatment was the primary outcome measure. The qualitative evaluation process found that developing a rapport with the Dietitian was significant in the parent's perception of a positive experience. The researchers emphasised the need to train Dietitians in family-based, behaviour change practice, highlighting the emerging requirement to engage families of obese children. Furthermore, the authors indicated that the study illustrated the probable deficiencies in dietetic training and the need for Dietitians to be trained in areas of active listening, empathy, motivational techniques and behaviour change techniques (Stewart, Chapple et al., 2008). This emphasis in regards to the development of such programs is supported by Bathrellou et al., who have developed, and were continuing to evaluate, a Dietitian-delivered healthy lifestyle intervention to treat childhood obesity which included goal setting, self-monitoring, rewarding, problem solving, food-related stimulus control, cognitive restructuring, and relapse prevention. (Bathrellou, Yannakoulia et al., 2010).

Exercise leaders.

Although the Exercise Leader led, CBT-based program, The Coach Approach, was originally designed for adults (Annesi 2003), Annesi et al. 2010 implemented a modified version of the treatment with 64, severely obese, adolescents who had a BMI greater than the 99th percentile and were aged 12 to 17 years (M = 14.1), with 69% being female. The Coach Approach program was abbreviated and then undertaken for 12 weeks at 16 meetings by one group (N = 35), while a second group (N = 29)

undertook the full 24 week, 18 meeting program. During the intervention phase, both groups completed the same 12 week nutrition education component with parental involvement, emphasising increased fruit and vegetable intake and reduced consumption of sweetened beverages. Additionally, the 12-week program incorporated elements of the CBT-based program, the Coach Approach (included elements not described). The 24-week program included the full Coach Approach intervention, which included self-regulatory skill enhancement, contracting, cognitive restructuring and relapse prevention as a compliment to the nutrition education component. Furthermore, only the group with 24-weeks of treatment had a specific amount of weight loss designated as a goal. The Coach Approach elements were delivered by specifically trained YMCA Wellness Staff (Exercise Leaders) as per earlier work conducted by Annesi, (Annesi, 2003), with the nutritional components delivered by state registered Dietitians. Trial measures included food frequency questionnaires, self-reported physical activity surveys, psychosocial evaluation and anthropometric assessment. Both groups demonstrated significant within-group changes in self-reported physical activity (p = .001) and improved physical self-concept (p = .003), general-self (p = .001) , but and overall mood for the 12-week group only (p = .04). There were no significant between group differences. However, both groups failed to demonstrate significant change in self-reported fruit and vegetable consumption (p > .05) or change in BMI from baseline (p > .05). The mean BMI for the 12-week group at pre-test was 36.51 to and at post-test 33.06 and the 24-week group was 38.80 at pre-test 38.35 at post-test. In an analysis of the 24-week treatment only, BMI change from week 12 to week 24 was significantly better than corresponding population norms (p = .003) (Annesi, Walsh et al., 2010).

The authors concluded that nutritional education alone may be insufficient for nutrition behaviour change. Annesi et al. also commented that behavioural treatment lasting longer than 12-weeks and having specific weight-loss goals may be useful for BMI improvements and attention to participants' self-concept and mood may be important treatment considerations. A major limitation of the study was the failure to collect adiposity measures and collect 24-week follow-up data from the 12-week group.

The most recent research is by Wilson and colleagues (2012), where 43 obese children and adolescents (13 male, 30 female), aged 10 to 16 years, completed a 12 week Exercise Leader-led, group-based, cognitive behavioural exercise intervention. This study, which was not defined as CBT, aimed at promoting self-regulation, peer support and goal-setting through team cohesion. Results showed positive psychosocial improvements in barriers, goal-setting, enjoyment and planning ($p < .05$) along with improved body fat percent from ($M = 45.74\%$ (SD =5.09) to ($M = 44.26\%$ (SD = 5.69, $p < .001$) at 24 weeks post-baseline. Significant improvements in self-reported physical activity were also shown at 24 weeks ($p < .001$). The authors concluded that a group-mediated, cognitive behavioural exercise program could be an effective treatment option for obese youth. Limitations of the study included the absence of a no treatment or exercise-only control group and the failure to assess changes in maturation. Additionally, although this was an Exercise Leader-led study, adolescents also had access to a Dietician and Social Worker during the period which may have may have additionally impacted health behaviours (Wilson, Jung et al., 2012).

General Summary

Few non-psychologist-led interventions that incorporate CBT-based strategies to target weight reduction or health markers have been reported. Among those with promising results are the study of Rapoport et al, (2000) who were successful in slowing weight gain in adults, the improvement in psychological characteristics in adolescents by Mellin et al (1987) and the improvement in blood markers in adolescents as found by Jiang and colleagues (2005). Based on available research the role of non-psychologists delivering CBT based weight management interventions appears unclear.

Section 4: SUMMARY AND CONCLUSIONS

This review has considered the phenomenon of obesity, detailing its prevalence, causes and consequences (Speiser, Rudolf et al., 2005; Ogden, Carroll et al., 2006; World Health Organisation, 2006). The review further identified typical weight management approaches in children (Ebbeling, Pawlak et al., 2002), adolescents (Pearson, Atkin et al., 2009) and adults (Aittasalo, Miilunpalo et al., 2004). Separating the effect that these approaches have had on OWOB adolescents is difficult given the common practice of including both children and adolescents in research trials, and reporting the data in an aggregated, rather than separate, manner. Strategies varied from dietary modifications (Ebbeling, Leidig et al., 2005), physical activity interventions (Vuori, 2001), to more invasive practices, such as pharmaceutical approaches (Berkowitz, Wadden et al., 2003) and surgical intervention (Sugerman, Sugerman et al., 2003). Following a comprehensive search of the literature, a limited number of behaviour change interventions with a focus on adolescent weight

management were discovered. Even though behaviour approaches, namely CBT, are empirically supported, only three interventions utilised non-psychologists in an adolescent application (Mellin, Slinkard et al., 1987; Jiang J X, Xia X L et al., 2005; Annesi, Walsh et al., 2010). Despite strong evidence of adolescent obesity tracking into adulthood (Singh, Mulder et al., 2008), the related literature in OWOB- related behaviour modification practice in adolescents is very limited.

Several methodological matters were apparent in the literature reviewed, matters which make the interpretation and application of the results problematic. Central among these methodological matters was the absence of the assessment of biological maturation, which can influence body composition and particularly so during the circum-pubertal period and in adolescence (Morris & Udry, 1980). Moreover, the majority of trials used weight change or BMI as a primary measure of weight change, measures which do not assess adiposity (Daniels, 2009), thus making it impossible to determine what aspect of body composition change was altered through the interventions . Another major limitation of the reviewed studies was the lack of follow-up period in excess of 12-months, with only the Braet and Van Winckel (2000) and Jiang J X, Xia X L et al. (2005) studies having a follow-up in excess of 12 months.

Overall, it was challenging to compare all programs that were reviewed. Very few had similar selection criteria or methodology, and there was a lack of consistency in how overweight or obesity was defined. Limited studies showed some practitioners had developed CBT-based programs to assist behaviour change. Among these was the work of Annesi (2003), who trained Exercise Leaders to create favourable exercise facility attendance in adults (Annesi, 2003), and followed that study more recently with a study of adolescents (Annesi, Walsh et al., 2010). Unfortunately, this later study had several methodological flaws, namely the absence of measures of body composition

and biological maturation. Brennan et al. found positive outcomes occurred for a psychologist-delivered program, applying weekly intervention sessions to OWOB adolescents (Brennan, Walkley et al., 2012a). It was further highlighted that interventions that utilised family involvement were also likely to succeed (Epstein, McCurley et al., 1990; Epstein, 1996). One RCT that demonstrated success was the work of Nansel et al. (2007), where non-psychologists were trained in the lifestyle management of diabetic youth and their supporting parent, utilising a cognitive behavioural approach. This study displayed potential on three fronts, firstly it applied CBT-based lifestyle change practice, secondly the participants were youth aged 11 to16 years, and thirdly non-professionals were trained and successfully delivered the program. These authors concluded that the intervention could be adapted to various environments and health conditions, including clinical settings (Nansel, Iannotti et al., 2007).

Implications for Research

Overweight and obesity management, particularly targeting adolescents, continues to be a great challenge and, to date, successful treatments have been elusive (Jelalian & Saelens, 1999; Stice, Shaw et al., 2006; Oude Luttikhuis, Baur et al., 2009). Current approaches include dietary therapies, interventions targeting increased physical activity, pharmaceutical approaches and surgical interventions. Interventions that include a combination of psychological, family support, dietary and physical activity components show the most promise, as compared to those that focus on a single or small number of these components. The NHMRC recommends that behavioural lifestyle change approaches are integral to weight management, and must be included.

Despite this, few behavioural interventions have been reported in the literature and evidence-based guidance in this area remains scarce (National Health and Medical Research Council, 2003). Many researchers state that the current demand for interventions in the management of adolescent overweight and obesity appears to exceed the supply of health care professionals who are trained to provide it (Lobstein, Baur et al., 2004; Oude Luttikhuis, Baur et al., 2009; Shrewsbury, O'Connor et al., 2009; Nguyen, Shrewsbury et al., 2012).

The review revealed a paucity of interventions targeted to adolescents, in contrast to the more extensive work that has focussed on children and adults (Lobstein, Baur et al., 2004; Steinbeck, 2005). However, the implementation of cognitive behavioural therapy (CBT) in this area shows promise as practical and successful (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). CBT has often been a treatment option for various behaviour related conditions (Peck, 2007; Gowers, 2008), with many reviewers promoting the practical strategies as a key part in the treatment of overweight and obesity (Warschburger, Fromme et al., 2001). While CBT-based programs have commonly been designed for delivery by trained psychologists (Epstein, McCurley et al., 1990), CBT-based programs have been successfully implemented by non-psychologists, but predominately in non-weight management health conditions (Stead & Lancaster, 2005; Smeets, Vlaeyen et al., 2006; Eckers, Richards et al., 2011). The review has identified a lack of RCT's involving non-psychologists delivering CBT-based strategies to OWOB adolescents.

Given that adolescent OWOB obesity has become a major public health problem, the development of behaviour modification interventions addressing this issue are needed. The reviewed literature indicates that various professions have successfully implemented interventions to modify health-related behaviour among people of various

ages. Given that the role of behaviour change has been traditionally the domain of the trained Psychologist, it is encouraging that non-psychologist groups have been active in the design, implementation and evaluation of such initiatives. Equally encouraging is the emerging research in which non-psychologists deliver weight management interventions with adolescents.

The training of non-psychologists as an approach to treating overweight and obesity in adolescent populations shows merit, as it has the potential to both increase health intervention accessibility and to make such programs financially viable. Non-psychologists have been evaluated in the implementation of CBT-based adult weight management practice (Rapoport, Clark et al., 2000; Werrij, Jansen et al., 2009), and more recently, reviews have noted the potential for use within child weight loss strategies (Davis, Gance-Cleveland et al., 2007; Bathrellou, Yannakoulia et al., 2010). Given that there are in excess of 18,000 registered Exercise Leaders in Australia (Fitness Australia, 2009), the training of this group to deliver these interventions could create improved accessibility to the adolescent population.

Although the review could only identify one CBT-based Exercise Leader-facilitated adolescent weight management intervention (Annesi, Walsh et al., 2010), the research by Herrera et al. partially used certified fitness trainers to complement a psychologist-led program (Herrera, Johnston et al., 2004). An opportunity presents to investigate whether Exercise Leaders can be trained in the aspects of CBT-based, adolescent-focussed, weight management program, and whether when trained, can deliver such programs to create a positive effect.

CHAPTER 3

STUDY 1: THE TRAINING OF EXERCISE LEADERS IN IN BEHAVIOURAL TECHNIQUES

Purpose

Tertiary institutions in Australia train students in a diverse range of exercise-related areas, culminating in qualifications at certificate, diploma, degree and post-graduate degree levels. Graduates with these qualifications have been identified as being able to provide services to people seeking to optimise their health (Hunt & Hillsdon, 1996), including those seeking support to achieve a healthier weight (Fitness Australia, 2009). The aim of this study was to determine if training in healthy lifestyle-focussed, behaviour modification principles was present in exercise-related tertiary training information of Australian providers.

INTRODUCTION

Overweight and obesity (OWOB) are linked to adverse health outcomes for individuals (Marchant, 2011) and collectively these outcomes contribute to a heavy economic burden on communities (Colagiuri, Lee et al., 2010; KPMG, 2010). Overall, in developed economies, the prevalence of OWOB has reached a threshold that has resulted in calls for remedial action (World Health Organisation Consultation on Obesity, 1997; World Health Organisation, 2011), and the incidence continues to rise (Ogden, Carrol et al., 2006), although among some population sub-groups this trend may have abated (Olds, Tomkinson et al., 2010; Flegal, Carrol et al., 2012). In Australia, 59% of adults are OWOB, with the prevalence higher for those aged 65 to 74 years, reaching 79% (Australian Bureau of Statistics, 2009). Overall, the Australian prevalence for obesity more than doubled in the period 1980 to 2000 (Cameron, Welborn et al., 2003). Trends for Australia predict OWOB prevalence among adults reaching 83% for males and 75% for females by 2025, representing 16.9 million people (Haby & Markwick, 2008). Additionally, overweight and obesity are major risk factors for a variety of health conditions, including heart disease, hypertension, Type II Diabetes, and certain cancers (Kim & Popkin, 2006). Furthermore, it has been found that those who are obese are more likely to develop orthopaedic impairments and experience elevated psychopathology compared to non-obese peers (World Health Organisation Consultation on Obesity, 1997).

Approaches in the Management of Overweight and Obesity

Multiple strategies have been trialled to address OWOB (Summerbell, Waters et al., 2005; Wareham, van Sluijs et al., 2005; O'Brien, Sawyer et al., 2010; Shrewsbury, Nguyen et al., 2011; Brennan, Walkley et al., 2012a). Broad agreement exists that from

a population health perspective, and as a first stage approach in the absence of co-morbidities, strategies based on behavioural adjustment within a lifestyle context offer an efficacious and cost-effective approach (Boucher, Benson et al., 2008). The National Health and Medical Research Council (NHMRC) recommends behaviourally-based interventions be included in any weight-management program for the overweight or obese, whether child, adolescent or adult (National Health and Medical Research Council, 2003). Apart from being a recommended method to support weight management, lifestyle interventions are purported to be cost effective compared to other approaches (KPMG, 2010). These approaches are supported by the US Department of Health and Human Services who state that most chronic diseases are preventable through dietary and lifestyle modifications (US Department of Health and Human Services; Healthy People 2010, 2000). Likewise, the Standing Committee of Health & Ageing, that undertook the Enquiry into Obesity in Australia, urges that people be directed to services that give practical advice on making long-term, sustained lifestyle changes (House of Representatives Standing Committee on Health and Ageing, 2009). Such services can include advice from physicians, dietitians, nurses, behavioural therapists/ psychologists and exercise experts (Australian Government Preventative Health Taskforce, 2009).

The first line of treatment of OWOB should include behaviour modification interventions inclusive of regular exercise and a well-balanced diet (National Health and Medical Research Council, 2003). Allied health professionals, which include Exercise Prescribers, have been involved in such processes (Annesi, Walsh et al., 2010). With the growing body of research favouring these interventions for the treatment of OWOB, it may become important for OWOB individuals to obtain the services of a professional trained in the modification or perseverance of behaviours

linked to OWOB. In situations where this is limited due to the non-availability of professionals such as psychologists or for financial restrictions (Whitlock, Orleans et al., 2002; Lobstein, Baur et al., 2004; Oude Luttikhuis, Baur et al., 2009), it may be important for the Exercise Prescriber to support people's lifestyles through behaviour modification planning.

Elements of Successful Behavioural Modification Interventions

Considering the complexity of weight management, success may require behaviour modification in conjunction with a structured diet, nutritional education and increased physical activity (Forsyth, Handcock et al., 2005). Behaviour modification programs use the cues that precede a behaviour or the consequences of the behaviour to modify a target behaviour (Powers, Jones et al., 2005). Successful behaviour modification programs have been found to include the implementation of strategies of self-monitoring, relapse prevention and appropriate goal setting (Stice, Shaw et al., 2006; Sharma & Branscum, 2010). Weight management interventions represent a comprehensively studied area, which utilise such behavioural principles, and have been subsequently implemented by a variety of professional groups, which include dietitians (Rapoport, Clark et al., 2000), physicians (Villanova, Pasqui et al., 2006) , and psychologists (Shaw, O'Rourke et al., 2005). In addition to these professions has been the emergence of the exercise profession that have recently embraced behaviour modification approaches to supporting both adolescents and adults to achieve a healthier weight (Halbert, Silagy et al., 2000; Annesi, Walsh et al., 2010). The two main professional bodies for the exercise profession, Fitness Australia and Exercise and Sports Science Australia (ESSA), state that their members can contribute to the design, implementation and evaluation of programs that impact on chronic disease, including

obesity (Australian Association for Exercise and Sports Scientists, 2008; Fitness Australia, 2008).

Definition of Terms

The terms used to identify professionals and practitioners who work in exercise-related areas varies considerably, and this lack of consistent terminology has led to confusion and misattribution. These professionals and practitioners have been variously defined in Australia as Fitness Professionals (Fitness Australia, 2009) or Accredited Exercise Physiologists (Australian Association for Exercise and Sports Science, 2008), and international examples include Exercise Leaders (Annesi, 2003) and Fitness Leaders (Lyon, 2001). The American College of Sports Medicine (ACSM) refers to the practice of designing and implementing exercise-based programs as exercise prescription, and in this study professionals and practitioners who provide exercise-based programs will be referred to as Exercise Prescribers (Donnelly, Blair et al., 2009). The term Exercise Prescription course or Exercise Prescription pathway will be interchangeably used throughout this Chapter. In this instance, a course or pathway will have the same meaning, being an entire program of studies required to complete an Exercise Prescription qualification.

The Role of the Exercise Prescriber

Overweight and obesity is likely to be caused by an excess caloric intake, insufficient physical activity or a combination of the two (Baldwin, 2000). Professionals working in an exercise prescription role support people of divergent needs, including those seeking support for weight management (Hunt & Hillsdon, 1996). The qualified Exercise Prescriber will use standard recommendations learnt

during training to provide correct exercise prescription and dietary advice, and this skill set will promote their employability in a number of settings (Marchese & Hill, 2005; Gledhill & Jamnik, 2009). The nature of professional training for Exercise Prescribers in Australia is diverse, ranging from short courses delivered by registered training organisations (RTO) or Technical and Further Education (TAFE) organisations, to multi-year university undergraduate and post-graduate degrees. Professional accreditation for Exerciser Prescribers is available with various industry groups, and is based upon level of professional training, and, in some cases, experience. Registration with Fitness Australia typically requires completion of at least a short course linked to a relevant national training package, whereas accreditation with Exercise and Sports Science Australia (ESSA; formally Australian Association of Sport and Exercise Scientists (AAESS), requires a minimum degree qualification in a relevant exercise science program. Fitness Australia has approximately 18,500 registered members, and promotes itself as the national fitness industry association working for a fitter, healthier Australia (Fitness Australia, 2008). Similarly, ESSA works to promote excellence in research, training and clinical practice to enhance the health of Australians (Australian Association for Exercise and Sports Scientists, 2008). Specifically, ESSA has promoted itself as having an important role in contributing to health policy, particularly in the area of physical activity and lifestyle interventions for the prevention and management of chronic disease (Australian Association for Exercise and Sports Science, 2008). An ESSA Accredited Exercise Prescriber with a full ESSA membership (described by that organisation as an Accredited Exercise Physiologist) can offer a range of skills and strategies to prescribe exercise to the healthy, unhealthy and rehabilitating person. In March 2012, 1,968 Accredited Exercise Physiologists

were registered with ESSA (Personal Communication, Kirsten Johnson 23rd of March 2012).

Knowledge, Skills and Attitudes of Exercise Prescribers in Weight Management

Several studies have examined the attitudes and perceptions of Exercise Prescribers regarding OWOB (Hare, Price et al., 2000; Chambliss, Finley et al., 2004; Forsyth, Handcock et al., 2005). In an early study by Hare et al. (2000) in the United States (US), 325 Exercise Prescribers were surveyed to assess their perceptions of exercise regarding obesity. Results showed that the majority of Exercise Prescribers believed that normal weight is very important to a person's health, that physical activity is very important in the treatment of obesity, and that they should be role models by maintaining normal weight. The respondents also believed that they were obligated to counsel obese persons concerning the health risks of obesity, and felt very competent to prescribe exercise programs for weight loss. In a later study in the US, Chambliss et al. (2004) studied 246 Exercise Prescribers who were majoring in Exercise Science in three colleges and universities in Texas and Alabama. These students, who were 55% male with a mean age 23.2 years, completed a questionnaire that measured attitudes toward obese individuals. Respondents believed that obese persons had negative attitudes, were lazy, and were not motivated to behave in a way known to contribute to healthier weight; this result was significant ($p < .0001$). The authors concluded that these students from the field of exercise prescription possessed negative attitudes and biases toward obese individuals, and speculated that these beliefs may impinge on how they interacted with people who were obese and seeking assistance from an Exercise Prescriber. In research conducted in New Zealand by Forsyth et al. (2005), ten Exercise Prescribers were interviewed to assess their knowledge about and approaches

toward servicing clients seeking weight loss advice. All participants believed that genetics, psychological issues and lifestyle choices (poor dietary habits, a lack of physical activity, and passive forms of entertainment), contributed in varying degrees to the development of obesity, with the majority of participants believing that lifestyle choices were the main cause of obesity. The authors highlighted that inconsistencies existed in the knowledge, approaches and preparedness of these Exercise Prescribers to service clients who were overweight. The authors concluded that, based on this evidence, clients of these Exercise Prescribers were unlikely to receive consistent or accurate advice regarding weight management.

In more recent research, Robertson and Vohora (2007) recruited 57 Exercise Prescribers (32 males and 25 females, with a mean age of 29.5 years) and 56 regular exercisers who were undergraduate students (22 males and 34 females with a mean age of 20.67 years). The study, based in Central England, primarily assessed the views of these two groups on an obese person's intention and perceived ability to exercise. Both groups completed the Implicit Attitudes Test in which common words were aligned with obesity stereotypes. In addition, explicit attitudes were assessed using a semantic differential scale on which participants were asked to rate their beliefs about 'thin people' and 'fat people' for the attributes 'good' and 'bad' and stereotypes 'lazy' and 'motivated', with responses ranging from one (very bad/lazy) to seven (very good/motivated). Results showed a significantly strong anti-fat bias ($p < .01$) for both Exercise Prescribers and regular exercisers on all implicit and explicit measures, with the bias more pronounced for Exercise Prescribers. The authors concluded that the guidance to support exercise, and combat obesity, may be compromised by the beliefs of those facilitating such programmes (Robertson & Vohora, 2007).

In conclusion, available information indicates that Exercise Prescribers lack OWOB knowledge and may be affected by an anti-OWOB bias. Furthermore, while Exercise Prescribers and regular exercisers have an interest in health and fitness evidence suggests they do not have the knowledge and skills to apply behavioural modification principles so as to adequately counsel those who are OWOB. Combined, it is apparent that training focused on OWOB-related matters and principles is needed within the various Exercise Prescriber pathways in Australia. .

Exercise Prescribers in Behaviour Modification Interventions

Emerging evidence is adding strength to the proposition that Exercise Prescribers can be trained to successfully implement behaviour modification-based interventions designed to assist people who are overweight (OW) or obese (OB) achieve a healthier weight. Annesi (2003) demonstrated that Exercise Prescribers could be trained to administer behaviourally-based interventions designed to improve retention of patrons attending and exercise facility against a standard approach control group. This research, titled The Coach Approach, was conducted with adults in exercise facilities in the United States (USA: $N = 540$ treatment; $N = 525$ control), the United Kingdom (UK: $N = 307$ treatment; $N = 291$ control), and Italy ($N = 50$ treatment; $N = 49$ control). The trial included the training of Exercise Prescribers so that they could apply the concepts of a six-step cognitive behaviour approach, inclusive of goal setting, stimulus control, contracting and self-monitoring, with a traditional exercise program. Pooled results of all three studies, from the USA, UK and Italy showed a significantly higher attendance (13–30%, $p < .05$) and lower drop out (30–39%, $p < .05$) for the treatment groups, compared to their respective controls. The authors concluded that Exercise Prescribers could be trained to implement a behaviour

change intervention in order to promote attendance and attenuate drop-out among exercise facility patrons.

In more recent research by Annesi et al. (2010), a modified version of The Coach Approach was implemented with 64 severely obese adolescents who had a BMI greater than the 99th percentile and were aged 12 to 17 years (M = 14.1 years), with 69% being female. Two treatments were used, an abbreviated 12-week Coach Approach program that included 16-meetings between participant and Coach (brief Coach Approach), and the original 24-week, 18-meeting program (original Coach Approach). Participants were non-randomly assigned to treatments ($N = 35$ Brief CA, $N = 29$ Original CA). During the intervention phase, both groups completed the same 12-week nutrition education component with parental involvement, emphasising increased fruit and vegetable intake and reduced consumption of sweetened beverages. In the 24-week group, a full physical activity support component was instigated, but this physical activity component was abbreviated in the 12-week cohort. Furthermore, only the group with 24-weeks of treatment had a specific amount of weight loss designated as a goal. CBT principles imbedded into both programs included self-regulation, cognitive restructuring, stimulus control, and relapse prevention,

The Coach Approach elements were delivered by specifically trained YMCA Wellness Staff (Exercise Prescribers) as per Annesi (2003), with the nutritional components delivered by state-registered Dietitians. Both groups demonstrated significant changes in self-reported physical activity (p = .001) and improved physical self-concept (p = .003), general-self (p = .001), with no significant between-group differences. Improvements in Total Mood Disturbance scores were significant for both groups (p < .001), with the 12-week group demonstrating significantly greater improvements (p = .04). A planned within-group contrast indicated that physical

activity level at week 24 was not significantly different from that at week 12 for the 24-week group. Both groups failed to demonstrate significant change in self-reported fruit and vegetable consumption ($p > .05$) or change in BMI from baseline ($p > .05$). The mean BMI for the 12-week group at pre was 36.51 and at post 33.06, and for the 24-week group at pre was 38.80 and at post was 38.35. In an analysis of the 24-week treatment only , BMI change from week 12 to week 24 was significantly better than corresponding population norms ($p = .003$) (Annesi, Walsh et al., 2010). Neither group was significantly different in any measure at baseline. Neither study reported by Annesi 2003 and 2010 provided demographic details of the Exercise Prescribers trained for the research. These studies demonstrated that a cognitive behavioural treatment system delivered by Exercise Prescribers was associated with significant improvements in exercise facility attendance in adults, and selected physical activity and psycho-social outcomes in adolescents. The authors did note that that the novelty of delivering such an intervention may have had a motivational effect on the Exercise Leaders which may have affected participants results.

In research conducted in Australia, investigators evaluated an Exercise Prescriber-led, behaviour modification intervention in general practice (Halbert, Silagy et al., 2000; Armit, Brown et al., 2005). In the first instance, Halbert et al. (2000) looked to determine if physical activity (PA) advice from an Exercise Prescriber working from a general medical practice was successful in modifying cardiovascular risk factors and quality of life outcomes among older adults, whose average age was 67.3 years. The study used self-reported PA, as well as blood pressure and blood lipid profile to compare an intervention group ($N = 149$) with a control group ($N = 150$). The intervention group received one 20-minute, personalised, face-to-face session, which included PA advice and a 3-month exercise plan. The control group received a

pamphlet promoting good nutrition for older adults delivered in a 20-minute session. Results at 12 months showed increases in self-reported physical activity occurred within both groups ($p < .001$), but these were more prominent in the intervention group ($p < .001$), which increased from one to three sessions per week in comparison to the control group, which increased from 1 to 1.4 sessions per week. There were no changes in blood pressure or blood lipid measures for either group. Quality of life scores decreased between baseline and 12-month follow-up in both the intervention and control groups, with significant declines in bodily pain ($p = .001$), general health ($p < .001$), physical functioning ($p < .001$) and vitality ($p = .04$).

In a related study, Armit and Brown (2005) recruited adult participants who were aged 55 to 70 years of age and were randomly allocated to one of three groups. Group 1 ($N = 9$) received a written physical activity (PA) prescription, an information booklet and brief verbal advice (3 to 5 minutes) from their General Practitioner. Group 2 ($N = 11$) received individual advice from an Exercise Scientist, and group 3 ($N = 8$) received the same individual advice from an Exercise Scientist and were allocated a pedometer that was used to self-monitor and set goals for physical activity. The individual advice provided by the Exercise Prescriber to both groups 2 and 3 took the form of a 15 to 20-minute counselling session, and three follow-up telephone calls each of approximately 12 to 15 minutes were provided. Telephone calls reinforced positive behaviours, re-evaluated goals and discussed compliance issues. Results showed that all three groups significantly increased self-reported PA at 24-weeks post baseline *(p* = .001), however there were no between group differences ($p = .061$). Although the between group differences were not significant, the authors indicated that individual counselling and telephone counselling, with or without a pedometer, had resulted in

substantial changes in self-reported PA levels compared to participants who had received the brief General Practitioner advice.

These studies demonstrate that Exercise Prescriber-led behaviour modification programs conducted in general practice settings can lead to increases in physical activity and improve quality of life parameters in adults. Overall, the provision of general practice-based physical activity advice was successful in modifying physical activity and cardiovascular risk factors in adults. These studies further demonstrate the ability of Exercise Leaders to deliver behaviour modification programs.

Rationale

There are increasing government policy directives and clinical recommendations promoting behaviour modification as a preferred first stage strategy for the management of OWOB (National Health and Medical Research Council, 2003; Australian Government Preventative Health Taskforce Australia the Healthiest Country by 2020, 2009). Historically, health professionals such as Psychologists and General Practitioners have been largely responsible for the prescription of behaviour modification for OWOB persons (Simons-Morton, Calfas et al., 1998; Bean, Stewart et al., 2008). However, it has been noted that workforce capacity exists among Exercise Prescribers as behaviour change agents, and the use of this professional group to assist those who are OWOB may prove beneficial for individuals and communities (Australian Government Preventative Health Taskforce, 2009).

While evidence is not available to test the presumption, it has been presumed that Exercise Prescribers in Australia have been trained in the skills to promote positive behaviour changes among individuals who are OWOB, leading to a healthier weight (Hunt & Hillsdon, 1996; Powers & Dodd, 2009; Jackson, 2010). It was the primary

aim of this research to investigate the publically available descriptions of training provided in Australia to Exercise Prescribers related to behaviour-based approaches to supporting those who are OWOB to achieve a healthier weight. A secondary aim was to investigate the changes from 2008 to 2010 to this training provided in light of the substantial attention OWOB had received in Australia, and most notably the recommendations of relevant national reviews (Australian Government Preventative Health Taskforce Australia the Healthiest Country by 2020, 2009; House of Representatives Standing Committee on Health and Ageing, 2009).

METHODOLOGY

Sample

Publically available online course information was acquired from University websites identified as training students to prescribe exercise. Competencies from the National Fitness Industry Training Package were also included in the search. All 40 Australian Universities registered within the Australian University Membership Network were searched. This included rural and urban universities in all of Australia's six states and two territories. Competencies searched from the National Fitness Industry Training Package were core units required to graduate with a fitness Diploma or certificate qualification. Registered training providers that deliver competencies from the National Fitness Industry Training Package follow the same delivery and assessment guidelines. All Australian Universities were re-searched in 2010 to establish if new subjects or subject modifications had been occurred since the first review. Please refer to Appendix 1 for detail of training institutions and the training package.

Course Search Strategy

Universities internal search engines were used to find Exercise Prescription related courses. Search terms included Exercise Science, Human Movement, Sports Science and Sports Coaching. Once Exercise Prescription courses were identified they were accessed for subject information related to exercise prescription, diet, fitness, health and psychology. This information was copied and pasted into Microsoft Word table (Microsoft Corporation, Washington), and included a description of the University name, course name (which included preamble), unit name, unit code and

HTML internet link. Content was segregated and colour-coded to avoid accidental in-course duplication and to separate information from the years 2008 to 2010. Please see Appendix 2 for Microsoft Word document construction example.

Data Mining of Key Terms

Once all subject information was captured and the Microsoft Word document (data base) constructed, data mining techniques were used to identify key terms from the database, and therefore identify themes related to behaviour modification in the online information. Data were mined using Microsoft Word find command (Microsoft Corporation, Washington), which highlighted and counted the occurrence of terms in the text. Data mining techniques have been previously used in curriculum audits in information technology and educational studies, and this methodology formed the basis of the strategy used in this study (Srivastava, Cooley et al., 2000; Romero & Ventura, 2007). Key terms were decided based on a comprehensive review of common words and terms used in the research literature that were linked to obesity-related behaviour modification, as well as those embedded in Government reports and recommendations (National Health and Medical Research Council, 2003; National Health and Medical Research Council, 2003). These key terms included counseling, behaviour change, lifestyle change and obesity. The word modification was included in searches as well as change, since these words are synonyms for the word change. Both American and Australian spellings of these words were used in searches

Data Mining of Reference Terms

Due to the size of the database, reference terms were used to contrast against key terms and contextualise the ratio of mined content. Reference terms were

identified by the author as words universally associated to the promotion of exercise prescription. These words were fitness, sport, physical activity and diet. Although the word diet is pertinent to OWOB and maybe considered a key term, within the Exercise Prescriber sciences it was largely associated with sports performance. Both American and Australian spellings of these words were used in searches. The process taken to construct the database is depicted in Figure 1, Construction of 2008 and 2010 data bases.

Statistical Analysis

Statistical analysis was undertaken using SPSS 18.0 for Windows (SPSS Inc., Chicago, USA). To investigate the research question paired-samples *t*-tests were conducted to compare differences between reference terms and key terms from the years 2008 to 2010. Statistical significance was assigned at the 0.05 level of probability. The following interpretations were applied to the effect sizes of the results: < 0.2, small; 0.3 – 0.5, medium; 0.6 – 0.8, large and > 0.9, very large (Cohen, 1988).

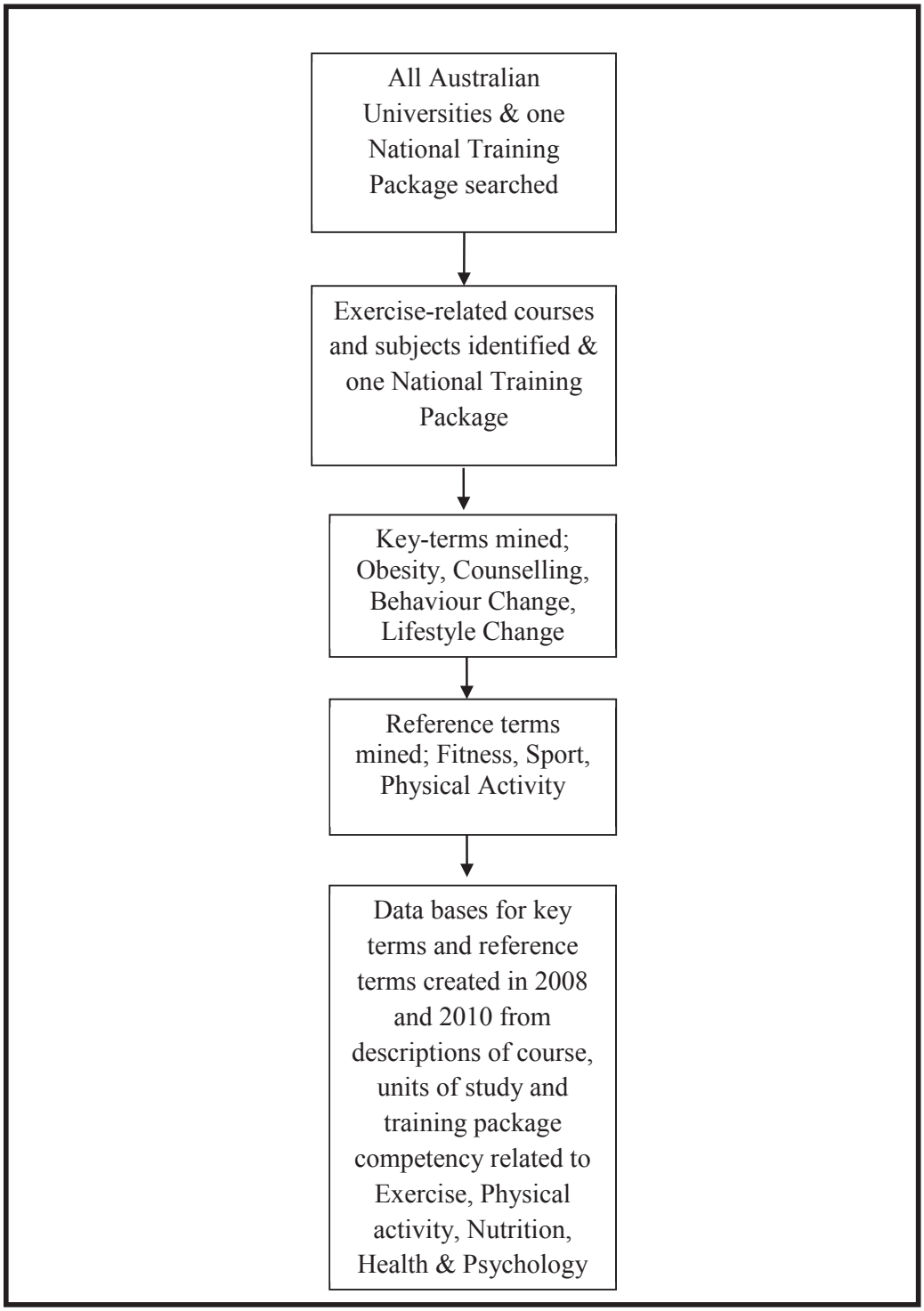

Figure 1. Construction of 2008 and 2010 Data Bases

RESULTS

Twenty-two Australian Universities and one National Training Package were identified as offering related courses, subjects and training (units of study) in April and May 2008, and each of these was comprehensively searched. Out of this search, 145 units of study were identified, and from these sources a 19,400 word database was constructed. In April to May 2010, the same search strategy was undertaken and found that all organisations who had provided units of study in 2008 continued to do so, with the addition of one University. The units of study and database size that merged from these searches are presented in Table 1.

Table 1: *Units of Study and Data Base Size, 2008 to 2010*

Year	*2008*	*2010*	*Total*
Units of study	145	114	259
Words	19,400	17,290	36,690

The findings related to both key terms and reference terms for the 2008 and 2010 searches are presented in Table 2. Descriptively, these results show relatively few occurrences for key terms in 2008 and 2010, and little change occurred across these years for this variable. In contrast the occurrences of reference terms was relatively much higher in both 2008 and 2010, and showed declines in occurrence for the terms ‘fitness’ and ‘physical activity’, and an increase in occurrence for the term ‘sport’.

Table 2: *Key Term Occurrence in Exercise Prescriber Pathways N= 23*

Key terms	*2008*	*2010*
Counsel (ing)	4	8
Behaviour Change	4	7
Lifestyle Change	0	0
Obesity	16	11
Reference terms		
Fitness	103	83
Sport	216	225
Physical Activity	130	108
Diet	73	77

Key term data occurrences found in units of study in 2008 were aggregated and statistically compared to occurrences in 2010. Paired sample *t*-tests were used to analyse differences between key-term occurrence in 2008 and 2010. Paired sample *t*-tests revealed a non-significant ($p > .05$) change across time for key terms with small to moderate effect sizes, $d = 0.01 - 0.69$, as shown in Table 3.

Table 3: *Paired Sample T-tests Key-term Comparison, 2008 to 2010*

Comparison of Key-term	*Mean Difference*	*Std. Error*	*t*	*p*	*d*	*95%CI*
Obesity	0.21	0.15	1.41	0.06	0.29	[-.10082,.53560]
Counseling	-0.26	0.20	-1.29	0.20	0.69	[-.67764,15590]
Behaviour Change	-0.13	0.14	-.90	0.37	0.19	[- 43072, .6985]
Lifestyle Change	0.00	0.00	0.00		0	

Note: The word ‘change’ is used as the synonym for ‘modification’, which was an independently searched key term, but data combined under the word ‘change’.

Reference-term data from universities and training package in 2008 were aggregated and were statistically compared to occurrences in 2010. Paired sample t-tests were used to measure change in occurrence for each reference term between 2008 and 2010. Paired sample t-tests revealed a significant decrease in the reference term

'fitness' across time (p = .017), and showed small effect size of d = 0.19; please refer to Table 4.

Table 4: *Paired Sample t-tests, Reference terms, 2008 to 2010,*

Comparison of Reference Terms	*Mean Difference*	*Std. Error*	*t*	*p*	*d*	*95%CI*
Fitness	1.21	.47	2.59	0.01	0.19	[.24207,2.19271]
Sport	1.30	1.70	0.76	0.45	0.15	[-2.23391, 4.84260]
Physical Activity	0.86	0.62	1.38	0.17	0.2	[.24207, 2.19271]
Diet	0.13	0.66	0.19	0.84	0.1	[-1.25129, 1.51216]

DISCUSSION

Population-wide delivery of behavior modification interventions for the OWOB requires an adequately trained and competent workforce. This study has investigated the occurrence of terms associated with behaviour modification and OWOB in the units of study offered in Australian exercise prescription training pathways. The investigation was conducted during the months of April and May in 2008 and 2010, and the findings can be taken as representation of that time. The findings of this investigation showed a paucity of OWOB related behaviour modification key-term occurrence, and this paucity was particularly evident when contrasted with the higher occurrence of reference terms, for both 2008 and 2010. This evidence contrasts with the claims that people trained to be an Exercise Prescriber has the skills to modify lifestyle behaviours linked to OWOB, and specifically behaviours related to exercise and diet (Hunt & Hillsdon, 1996; Powers & Dodd, 2009; Jackson, 2010). However, findings from this research suggest little training related to behaviour change was included in the training of Exercise Prescribers in 2008, and little change occurred in the 2-year period to 2010, in spite of significant public and scientific commentary and calls for action before and during this period.

Currently, a number of Australian health professional bodies are providing advice about what training content should be implemented in local institutions. The Australian and New Zealand Obesity Societies' (ANZOS) outlook on health promotion is for the need to develop the existing health workforce and educate new professionals with the competencies necessary to effectively treat people with weight problems. ANZOS also suggests that there is a need to implement and evaluate community-based programs that support, rather than inhibit, the necessary changes in dietary and physical

activity behaviours required to bring the population back into energy balance and prevent weight gain (Australian and New Zealand Obesity Society, 2008).

The paucity of behaviour modification themes across Exercise Prescription pathways may also highlight the lack of adherence to government directions and NHMRC guidelines on weight management (National Health and Medical Research Council, 2003; National Health and Medical Research Council, 2003). Fitness Australia, who acts as the registering body for the vocational fitness industry, has addressing the OWOB phenomena as a priority for their organisation's future (Fitness Australia, 2009). Given this priority, Fitness Australia and its' 18,500 registered members could benefit greatly from a re-evaluation of current pre-service training as a paucity of content related to behaviour modification appears to exist. Yancey and colleagues (2007) add strength to this argument by highlighting the need for public health practice to align closely with the needs of the community, disseminating research findings in relation to behaviour change and its practical application (Yancey, Fielding et al., 2007).

Exercise and Sports Science Australia (ESSA) propose that their members possess "the ability to design, deliver and evaluate interventions targeting obesity". (Australian Association for Exercise and Sports Scientists, 2008). ESSA-accredited University courses need to meet the requirements of the National University Course Accreditation Program (NUCAP), which provides a framework to ensure graduate outcomes are aligned with industry requirements. In relation to OWOB, such a program must demonstrate that the accredited Exercise Physiologist has an understanding of behaviour modification and other strategies to help clients to incorporate and adhere to appropriate strategies that support achieving or maintaining a healthy body mass (Exercise and Sports Science Australia, 2011). Universities are

visited by an ESSA site assessment team during which matters relating to unit content and preparation for practicum are discussed. Only programs that comply with NUCAP guidelines as determined by the site visit team will be ESSA accredited.

As of April 2012 there are nine Australian Universities that are ESSA accredited at Exercise Physiologist level, which leaves 13 unaccredited Universities. A further four Universities are currently seeking ESSA accreditation, which may suggest that universities have identified the requirement of exercise in the prevention and treatment of many chronic conditions which includes overweight and obesity. The current study was not intended to focus on the comparison of content from those accredited Universities to those that are not ESSA accredited, but may be a topic for future research.

In the United States, researchers have discussed that even though Exercise Prescribers are keenly aware of the health risks associated with obesity, little formal instruction in degree or continuing education programs is available to provide training in physical activity promotion and exercise prescription for obese individuals (Chambliss, Finley et al., 2004). Additionally, several authors have highlighted a deficiency of OWOB knowledge in Exercise Prescribers in the United States, United Kingdom and New Zealand (Chambliss, Finley et al., 2004; Forsyth, Handcock et al., 2005; Robertson & Vohora, 2007). Additionally, Marchant (2011) argues that anti-obesity attitudes may impact the design and implementation of interventions, suggesting that stigma attached to excessive weight may prove to obstruct attempts to engage with regular exercise by obese individuals, in particular those who have made those steps to take part in regular exercise in exercise setting (Marchant, 2011). From a training viewpoint, Robertson and Vohora (2008) have suggested a need for Exercise Leader training to focus on obesity-related issues and evaluate behavioural

interventions, and their impact on the client (Robertson & Vohora, 2007). Given the results of the current study, Australian graduates may also have a lack of obesity-related skills and knowledge.

Limitations

This analysis reviewed the behaviour modification themes derived from online information related to OWOB, thus providing some insight into the construction of Exercise Prescription pathways in Australia. The research did have its limitations. As the research assessed only online course information, it was difficult to conclude absolutely the amount of behaviour modification content delivered in exercise prescription pathways. The investigator concedes that training institutions would be unlikely to supply all course intelligence online and there may be delays in updating website information due to staff turnover and or course changes. Additionally, data mining in itself may have its own limitations, as discussed in a report to the United States Congress. Seifert (2004) highlighted that, although data mining can help reveal patterns and relationships in data, it does not tell the user the value or significance of these patterns. Adding that these types of determinations must be made by the user (Seifert, 2004). Notwithstanding these limitations, the investigator, along with the research group, considered the information a reasonable representation of current behaviour modification training in exercise prescription pathways in Australia.

Although some studies identified the training, knowledge and attitudes of Exercise Prescribers and their role in the prevention and management of OWOB (Hare, Price et al., 2000; Forsyth, Handcock et al., 2005; Stacey, Hopkins et al., 2010), no study was found that specifically investigated OWOB-related behaviour modification training in exercise prescription courses. This therefore makes it difficult to contrast this study against others. Even so, the author believes the search strategies and data

mining techniques used represented a reasonable attempt to identify lifestyle behaviour modification themes in the Exercise Prescription online information.

Although beyond the scope of the current study, future research could aim to investigate such training by separate interviewing and questionnaire-based assessment of selected samples of undergraduate students and their lecturers. Such methodology has been used in previous research (Chambliss, Finley et al., 2004; Forsyth, Handcock et al., 2005). This research would be difficult and time-consuming, but a clearer understanding of these practices may be realised.

Implications for the Current Research Project

The investigator gained a clearer understanding of the behavioural change themes present in Exercise Prescriber pathways in Australia from information gleaned in the 2008 audit, and this was reinforced in 2010. Given the lack of information related to OWOB management, and considering that the research plan is to up-skill Exercise Prescribers (Exercise Leaders) to manage these conditions with OWOB adolescents, the research group have since incorporated behavioural change principles consistent with evidence-based research in the training of our Exercise Prescriber cohort. Currently, OWOB behaviour modification practice has been successfully delivered by exercise leaders (Annesi, Walsh et al., 2010), nutritionists (Mellin, Slinkard et al., 1987), and psychologists (Brennan, Walkley et al., 2012a). Additionally, the research group was buoyed by the fact that several researchers have previously up-skilled lay facilitators using evidence-based strategies in the lifestyle-related behavioural management of OWOB children and adolescents (Rudolf, Christie et al., 2006; Nansel, Iannotti et al., 2007).

CONCLUSIONS

Physical activity and dietary assisted behaviour change techniques can play a vital part in weight management, and, therefore, public health. However, this study revealed a low occurrence of online lifestyle-focussed behaviour modification themes in Exercise Prescription pathways in Australia

This study further highlights the need for the development of effective widespread implementation of a healthy lifestyle-focussed overweight and obesity training for Exercise Leaders. Adoption of such techniques may improve the workforce capacity in OWOB management in the future. In doing so, Exercise Leaders could contribute OWOB levels in Australia.

CHAPTER 4

STUDY 2: THE TRAINABILITY OF EXERCISE LEADERS IN COGNITIVE BEHAVIOURAL THERAPY (CBT)-BASED APPROACHES FOR OVERWEIGHT AND OBESE ADOLESCENTS

INTRODUCTION

The purpose of this chapter was to determine the trainability of Exercise Leaders to deliver a cognitive behavioural therapy (CBT), healthy-lifestyle, weight management program to overweight and obese OWOB adolescents in community leisure centres. The program included evidence-based strategies, consistent with cognitive behavioural principles, identified in the literature as being efficacious when applied to the adolescent demographic (Epstein, 1996; Vignolo, Rossi et al., 2007; Brennan, Walkley et al., 2012a). Despite a comprehensive review of the literature, only one research investigation using Exercise Leaders to deliver a CBT-based program to OWOB adolescents was found (Annesi, Walsh et al., 2010).

Practitioners in Behaviour Change

In Australia, leading health agencies have published guidance related to best practice weight management for children and adolescents, including use of behaviourally-based approaches to support healthy living practices (National Health and Medical Research Council, 2003; National Health and Medical Research Council, 2009). While acknowledging the worth of this guidance, medical practitioners and

allied health professionals report feeling ill-prepared and lacking sufficient time to use behaviourally-based interventions when treating OWOB children and adolescents (Bull, Schipper et al., 1997; Story, Neumark-Stzainer et al., 2002; Cameron, Welborn et al., 2003). Among all health practitioners, Psychologists are reported to be the best trained and most experienced to offer behaviourally-based interventions to support lifestyle modifications targeting improved weight status (Gaudiano, 2008). While a range of approaches are available for Psychologists to use when supporting a person to address a health behaviour where Cognitive Behavioural Therapy can be used (Annesi, 2003; Amsberg, Anderbroa et al., 2009; Brabban, Tai et al., 2009).

Historically, CBT has been the specialist area of the trained psychologist (Epstein, McKenzie et al., 1994; Powers, Jones et al., 2005; Vignolo, Rossi et al., 2007), but recently a body of literature has emerged that reports on non-psychologists as delivery agents for cognitive behavioural-based programs in many areas, including pain management (Harding & Williams, 1995; Harding & Williams, 1998), smoking cessation (Rice & Stead, 2008), schizophrenia (Sensky, Turkington et al., 2000) and diabetic management (Ismail, Thomas et al., 2008). The training of non-psychologists to deliver behaviourally-based programs has received support as a strategy to broaden both the access and financial viability of this form of health care (Nansel, Iannotti et al., 2007; Shrewsbury, O'Connor et al., 2009). Examples of non-psychologists being engaged to implement a CBT-based adult weight management intervention have been reported (Rapoport, Clark et al., 2000; Werrij, Jansen et al., 2009), and, more recently, recommendations have been made to extend this to child and adolescent populations seeking weight management support (Davis, Gance-Cleveland et al., 2007; Bathrellou, Yannakoulia et al., 2010). However, little research has evaluated the effect of Exercise Leaders in the area of adolescent weight management (Annesi, Walsh et al., 2010).

Furthermore, it remains unclear as to the type and amount of training required to prepare non-psychologists to successfully deliver CBT-based weight management programs (Lih-Mei Liao, 2000).

The Your Choice Program

The CBT-based program developed for the current study was titled Your Choice. The intervention included specific support to facilitate the development of self-management skills among adolescents to encourage habitual lifestyle changes to dietary and physical activity behaviours. Embedded within the program were CBT-based principles shown through previous research to be conducive to weight management, and these included goal setting, self-monitoring, managing risky situations and assertiveness training (Wisotsky & Swencionis, 2003; Shilts, Horowitz et al., 2004; Foreyt, 2005; Rohde, Feeny et al., 2005). Detailed information on the specific intervention is included in Appendix 3.

Research Question

Effective interventions targeting OWOB adolescents are needed, and CBT-based interventions delivered by health professionals other than psychologists have been proposed as offering a promising approach to meet this need. No published research was found regarding how best to train Exercise Leaders to deliver a healthy lifestyle weight management program to OWOB adolescents. Therefore, the research question is 'Can a short duration, in-service training program effectively prepare Exercise Leaders to deliver a CBT-based healthy lifestyle intervention to OWOB adolescents?'

METHODS

Research was approved by the RMIT Human Research Ethics Committee, project number 10/07, titled 'The treatment of overweight adolescents using CBT delivered by Exercise Leaders'. Exercise Leaders were recruited to be trained and deliver the program to OWOB adolescents at leisure centres in Melbourne, Australia.

Recruitment of Exercise Leaders

Support for the project was obtained from senior management of Belgravia Leisure Pty Ltd (Belgravia Leisure, 2012), a company that provides leisure centre management services throughout Australia. Belgravia Leisure senior management initially contacted the Managers of leisure centres indicating company support for the project. Seven leisure centres expressed interest to Belgravia senior management in being involved in the project, representing a dispersed distribution of locations as described in Table 5 and corresponding map (Figure 2).

Contact was then made by the research team with these leisure centres, explaining the project, and seeking an opportunity for members of the research team to meet with key leisure centre personnel, including staff who were interested in being trained to deliver the intervention component of the project. Managers of leisure centres were informed of the inclusion criteria for Exercise Leaders to be involved in training and delivery of the program, which was continuous employment with the leisure centre for at least the past 6 months, and having a current fitness qualification, and the support of the management of the leisure centre.

Table 5: *Participating Centres*

Suburb	Centre Number	Distance and Orientation from Melbourne Central Business District
Bundoora	1	16 Kilometres North
Diamond Valley	2	23 Kilometres North East
Essendon	3	10 Kilometres North West
Hoppers Crossing	4	29 Kilometres West
Melton	5	35 Kilometres West
Monbulk	6	42 Kilometres East
Yarra Junction	7	55 Kilometres East

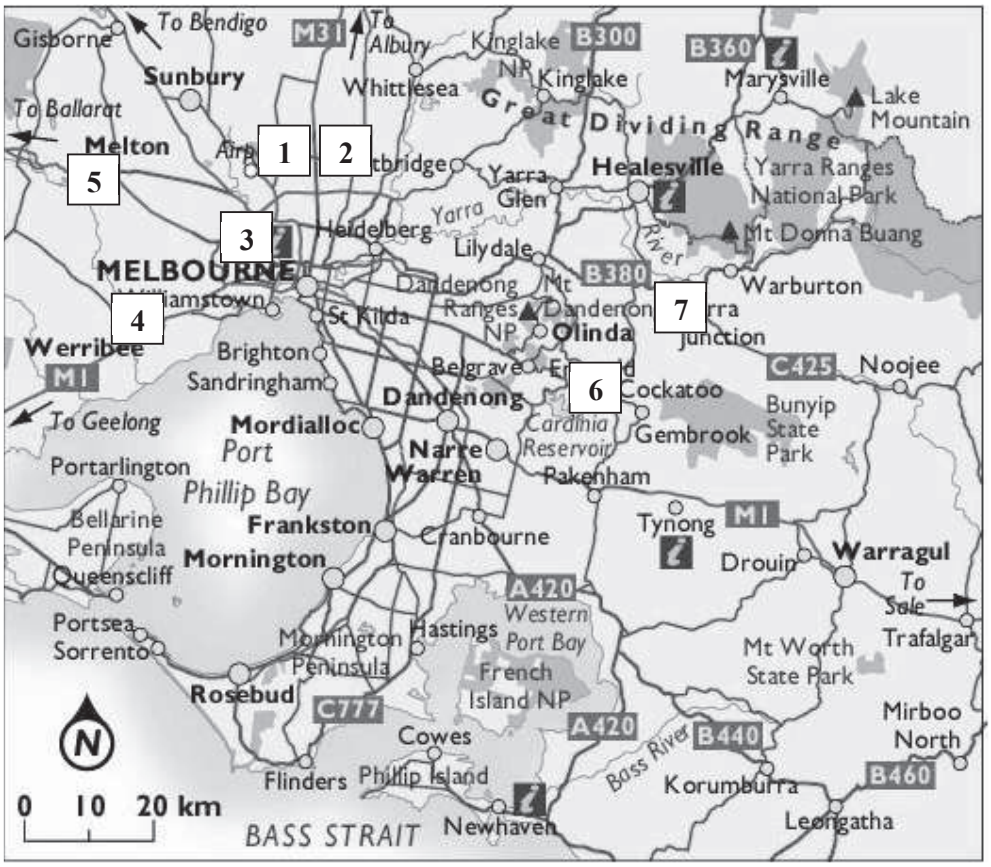

Figure 2. Location of Participating Centres

Location source, Australian Bureau of Statistics; (2006 Census)

Meetings were scheduled at each leisure centre with key personnel (e.g., Leisure Centre Manager and/or Fitness Centre Manager) and Exercise Leader staff during May to June 2009. During meetings, attendees received a presentation that informed them about the project, inclusion criteria for Exercise Leaders, training and the time commitment. At each meeting an opportunity was provided for questions and responses. At the conclusion of the meeting, attendees were asked to consider the project and required commitment, and if interested in being involved in the project and meeting the inclusion criteria, to inform the research team via email within two weeks of the meeting having occurred. Exercise Leaders who expressed interest, were then

provided an information statement about the project and a consent form, which was to be completed and returned to the research team to confirm participation in the project. The Exercise Leaders were paid for the training and the delivery of the program. An overview of recruitment and training is presented later in the Chapter 5 (Figure 3).

Figure 3, Recruitment and Training

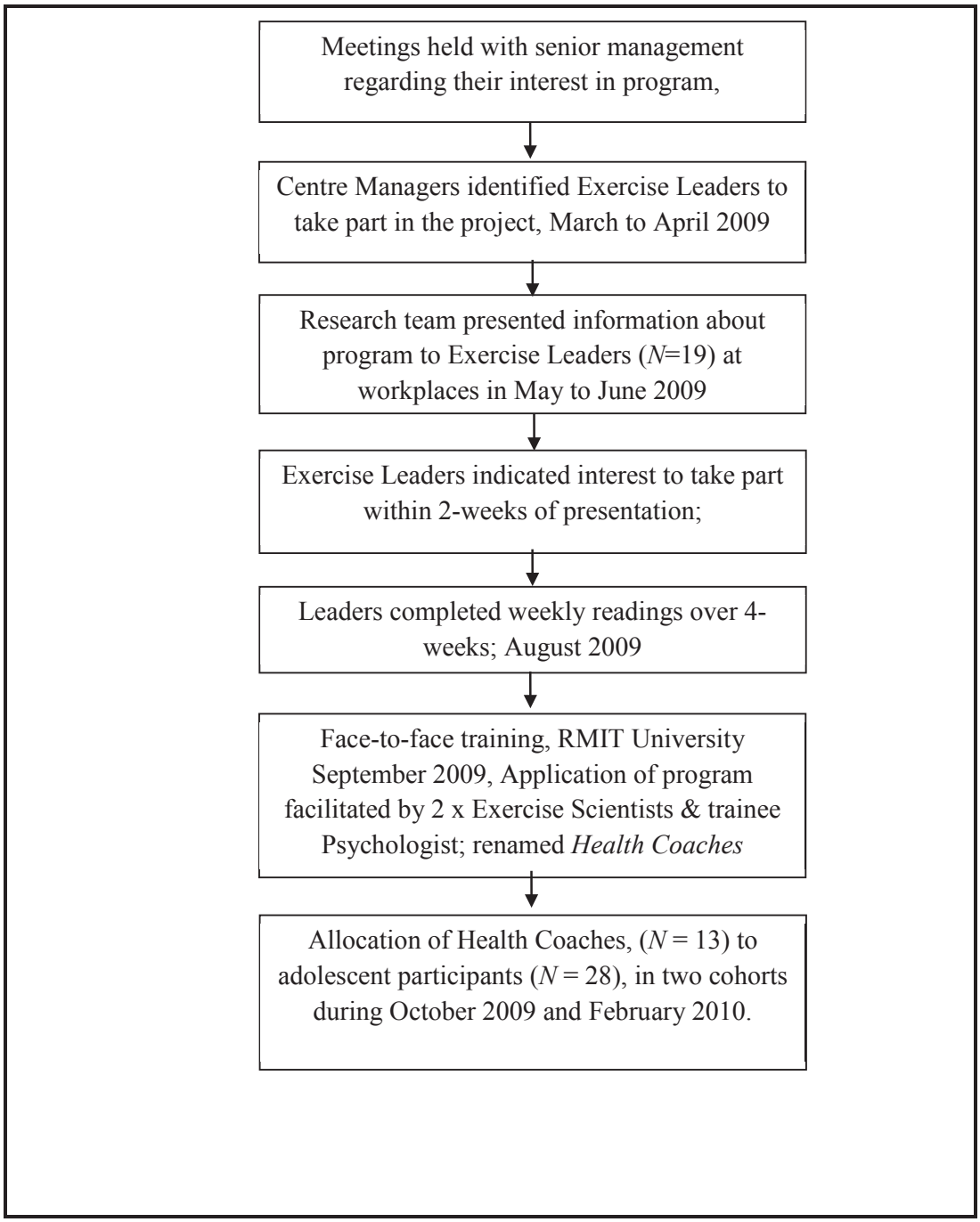

Figure 3. Recruitment and Training

Health Coach

In consideration of the support-based role that Exercise Leaders would take with OWOB adolescents in the project, the title Health Coach was used as the name for Exercise Leaders when involved in the study. The title Health Coach was chosen as the term 'coach' confers a role that focuses on providing support, offering guidance and developing abilities among others (Williams, 2007), a central responsibility of clinicians who were to be trained to deliver the Your Choice program to OWOB adolescents. The expanded term Health Coach describes the practice of health education and health promotion within a coaching context, designed to enhance the well-being of individuals to facilitate the achievement of health-related goals (Tubbs & Whybrow, 2003). This title contrasts with that of Exercise Leader, Fitness Leader and Fitness Instructor, which are titles widely used in the fitness industry that have a common understanding among the public as being associated with fitness, exercise and drill activities (Lyon, 2001), a function that was counter to the role planned for Health Coaches in the study who were to provide a guidance, support and nurture adolescent decision making, a phenomena at odds with the typical prescriptive approach used in the fitness industry.

Tertiary Training Characteristics of the Health Coaches

All Health Coaches that met the inclusion criteria had qualifications in exercise prescription, including either a Certificate 3 in Fitness (Gym Instructor), Certificate 4 in Fitness (Personal trainer), Bachelor of Human Movement, or equivalent, as determined by Fitness Australia registration.

Reading Prior to Training

In order to prepare Health Coaches for training, a series of key readings were distributed weekly over a four-week period in August 2009, the month immediately prior to training in September 2009. Topics covered by these key readings included adolescent obesity, cognitive behaviour therapy, principles of behaviour change, eating disorders, family based approaches and healthy eating recommendations related to weight management for OWOB adolescents (Table 7).

Table 6: *Weekly Content of Reading Prior to Training*

Week	*Content*
Week 1	Cognitive-behavioural approaches in the management of obesity; Case studies
Week 2	Family-based behavioural approaches in adolescent overweight & obesity
Week 3	Identification of disordered eating
Week 4	Healthy eating recommendations

Face-to-Face Training

Health Coach training took place in September 2009 at the Bundoora Netball and Sport Centre, a community leisure centre located in Bundoora, a northern suburb of Melbourne, Australia, that is managed by Belgravia Leisure on behalf of the owner, RMIT University. Training was provided in 18 sessions, distributed over three days during a 2-week period (two days during week one, one day during week two), encompassing 18 hours of face-to-face training. Each Health Coach was provided with a training manual that served as a resource for referral during and after sessions for all content covered during training. Session content included information about adolescent overweight and obesity, working with adolescents, counselling skills and cognitive

behavioural therapy. Cognitive behavioural training included information and strategies related to goal setting, stimulus control, problem solving, relapse prevention, and cognitive restructuring. Information related to healthy eating, physical activity and adolescence was a key part of the training program. A summary of training session structure and content is provided in Table 7, and a detailed explanation of session content is provided in Appendix 3. So as to optimise the training program, key principles of adult training were used, including active learning through role playing, group discussion, brain-storming, questioning, video clip appraisal, and the regular use of learning task activities (e.g., listing key points, writing responses to questions). This approach was supplemented by direct learning experiences (e.g., presentations) and peer evaluation and feedback. Trainers (N= 3) involved in the delivery of the program, had backgrounds in either exercise science (N = 2), adolescent behaviour (N = 2) or psychology (N = 1), and two had additional experience in the professional development of adults. All 15 Health Coaches in attendance completed the training.

Table 7: *Structure and Content of Health Coach Training Program*

Session	*Session Content*
	Day 1
1.	Outline of Training Days
2.	Overview of the Your Choice Program
3.	Adolescent Overweight and Obesity
4.	CBT and the Treatment of Adolescent Obesity
5.	Working with Adolescents
6.	Overview of Study Design and Assessment
7.	Counselling Skills
	Day 2
8.	Goal Setting and Self-Monitoring
9.	Eating Habits
10.	Opportunities for Activity & Time Management
11.	Food Choices & Healthy Eating Education
12.	Physical Activity & Problem Solving
13.	Coping Strategies; Thoughts, Feelings and Behaviours
	Day 3
14.	Identifying Barriers and Managing High Risk Situations
15.	Phone Calls - Maintaining Change
16.	Results, Maintenance and Relapse
17.	Managing Process Issues; Administration
18.	Session Summary/Close

Counselling Styles and Role-Playing

In order to support Health Coaches to develop appropriate counselling styles, participants first watched then discussed video recordings that demonstrated optimal body language, facial expressions and seating techniques for use when counselling adolescents. This learning activity was then extended to include the viewing and discussion of video clips of genuine counselling sessions involving adolescents, their parent and a trainee psychologist that demonstrated likely counselling events, such as pauses in conversation, interruptions, off task conversation and non-responding. Each video clip was subsequently analysed, discussed and participants offered their views on how a Health Coach could behave in such a situation. To further extend the training, Health Coaches role-played relevant counselling session scenarios, which provided the

opportunity to practise of techniques involving using appropriate body language, active listening and effective questioning. Counselling exercises were observed by the trainers, who, along with peers, provided feedback using a structured peer evaluation (Appendix 4).

The Your Choice Manual

Each Health Coach was provided a manual, which provided a copy of all information covered during training, as well as training worksheets. Included in the manual was a step-by-step program for use by the Health Coach during sessions with an adolescent and supporting parent. Manual-based approaches are commonly used when non-psychologists have been engaged to provide CBT-based, health-related interventions (Ismail, Thomas et al., 2008). A manual-based approach permits the standardisation of program content, and was used in this study to promote quality control, inter- and intra-Health Coach reliability, and a reduction of workload for Health Coaches. Adolescents were supplied with corresponding "adolescent" manual, which acted as a resource for use in counselling sessions and provided explanations of homework tasks as well as activity sheets to be completed in session or as homework.

Health Coach to Participant Allocation

Upon completion of training, the process of allocation of adolescent participants and supporting parents to Health Coaches was undertaken. A detailed description of the recruitment of adolescent participants is presented in Chapter 5. Health Coaches were to be allocated a maximum of two adolescents per cohort with whom to work, but due to insufficient adolescents being initially recruited, a two-stage recruitment process

occurred. A description of Health Coach to adolescent allocation is included in Table 8. Adolescent participants undertook the eight face-to-face sessions in the Your Choice program at one of seven leisure centres. Three phone call sessions between the Health Coach and adolescent participant occurred, one during the interval between the seventh and eighth face-to-face sessions, with others scheduled 4 and 8 weeks after completion of the face-to-face sessions. Health Coaches were offered telephone and email support from the research team during the intervention phase of the research.

Table 8: *Health Coach to Adolescent Allocation*

Location and Health Coach Number	Cohort 1, Number of Adolescents Allocated	Cohort 2, Number of Adolescents Allocated
Bundoora 1	1	1
Bundoora 2	2	1
Diamond Valley 1	2	1
Diamond Valley 2	2	1
Essendon 1	2	1
Essendon 2	2	1
Essendon 3	*	
Essendon 4	*	
Hoppers Crossing 1	1	
Hoppers Crossing 2	1	1
Hoppers Crossing 3	1	1
Melton 1	1	1
Melton 2	1	
Monbulk 1	2	
Yarra Junction 1	1	

Not allocated participant *

Evaluation of the Training

During training, Health Coaches were required to evaluate individual sessions using the Your Choice individual session evaluation questionnaire. The 30-item self-report tool, modified from previous research (Brennan, Walkley et al., 2012a), uses a 5-point (1 = strongly disagree to 5 = strongly agree) Likert scale with questions designed to check respondent understanding of the training content and their perception of the suitability of the training. This tool was reviewed by two content-related experts and deemed to have adequate face validity for the purposes of the study. Health Coaches additionally completed a multiple-choice, pre- and post-training knowledge questionnaire in areas of healthy eating, food preparation, energy expenditure through physical activity, health issues and cognitive behavioural therapy.

Cognitive Measures

An assessment of Health Coach goal setting ability was done retrospectively using Item 12 (Homework Setting) of the Cognitive Therapy Scale-Revised (CTS-R) (Blackburn, James et al., 2001). The item was scored using a 6-point Likert scale ranging from (1) Incompetent to (6) Expert, and applied to the weekly target sheets completed by adolescents during the eight face-to-face sessions of the intervention, which were collected from adolescents when they returned their adolescent manual at the post-intervention physical assessments.

Health Coach Satisfaction Measures

At the conclusion of the 8-session, face-to-face intervention period, coaches rated their experiences using the Health Coach Satisfaction Survey. The questionnaire used a 5-

point Likert scale with 1 = strongly disagree to 5 = strongly agree response range, and required Health Coaches to provide a rating for their view of the suitability of the training they had received, how comfortable they felt during the intervention sessions, their perception of the suitability for adolescents and if they would recommend training to others. Likert Scales have been used previously to subjectively evaluate respondents level of agreement to a statement (O'Connell & Velicer, 1988). The second component of the survey used visual analogue scales (VAS) to measure how the individual intervention sessions were accepted by the adolescents. A visual analogue scale (VAS) is a psychometric response measurement instrument for subjective characteristics or attitudes that cannot be directly measured (Bragard, Etienne et al., 2010). Coaches were also asked to provide comment, via open-ended questions, on major details learnt from the program and changes they would make to the program. Examples of open ended questions were; What parts of the Your Choice program would you change? And : What major things have you learnt from your experience of delivering the Your Choice program ? The Health Coach Satisfaction Survey was specifically developed for the Your Choice program and is included in Appendix 5.

Statistical Analysis

Statistical analysis was completed using SPSS version 18.0. A senior statistician was consulted on the design and application of data analysis, as well as the interpretation of results. Statistical significance was assigned at the 0.05 level of probability. The following interpretations were applied to the effect sizes of the results: < 0.2, small; 0.3 – 0.5, medium; 0.6 – 0.8, large and > 0.9, very large (Cohen, 1988)

RESULTS

Fifteen Health Coaches were trained in the Your Choice program, eight female (53.3%), and seven male (47.7%). Pre-service training qualifications of the Health Coaches were diverse. The majority of Health Coaches had as their minimum qualification a Certificate 3 or 4 in Fitness (73.3%), with 47.7 % having a Bachelor's degree in Human Movement, Exercise Science or equivalent. The majority of individuals were full-time employees of the leisure centres (53.3%), 6.6 % were part-time and 40% were casually employed, but on a regular basis. Thirteen of the 15 Health Coaches subsequently conducted the program. One Health Coach could not deliver the program due to changes in employment, and the other could not be contacted after the training. Please refer to Table 9 for Health Coach characteristics.

Table 9: *Health Coach Characteristics*

Participant ID	*Gender*	*Bachelor Degree*	*Certificate 4*	*Certificate 3*	*Part Time*	*Full Time*	*Casual*
HC 1	F		√				√
HC 2	F		√			√	
HC 3	F	√					√
HC 4	M	√				√	
HC 5	F	√		√			√
HC 6	F	√	√			√	
HC 7	M	√				√	
HC 8	M		√				√
HC 9	M		√			√	
HC 10	F		√		√		
HC 11	F	√	√				√
HC 12	M		√			√	
HC 13	F		√			√	
HC 14	M		√				√
HC 15	M	√				√	

Pre- and Post-Training Knowledge of Health Coaches

Health Coaches completed knowledge tests immediately before and at the conclusion of training (Appendix 6). Minor changes in the knowledge of Health Coaches were identified, with 87.9% of the answers by Health Coaches to questions being scored as correct prior to training, and 88.3% scored as correct following training (Table 10).

Table 10: *Pre- and Post-Knowledge Test*

Questions (*N = 30)*	Pre	Post
Correct	87.9 %	88.3 %
Incorrect	12.1 %	11.7 %
Didn't Answer	2.6%	1.7%

Health Coach Satisfaction with Training Measures

Health Coach satisfaction of the 3-day training was measured using responses on a 1 to 5 Likert scale ("strongly disagree" to "strongly agree"). A standard set of four questions was asked of Health Coaches for each of the major elements of the training. These questions sought to determine Health Coach understanding of the content, and their views on the familiarity, relevance and helpfulness of information. The questionnaire was completed by all Health Coaches, and results (Table 11) revealed that sessions received moderate ratings for questions related to content familiarity and high and very high ratings for the remaining sections of the questionnaire. The lowest mean score response was 2.6, which occurred for the questionnaire items related to the training section that addressed background information concerning adolescent OWOB.

This finding indicates Health Coaches had less familiarity with important background information related to adolescent OWOB, which included topics covering incidence and aetiology. In relation to the understanding of the content, the highest mean scores were observed for counselling skills (4.6), physical activity (4.6), and thoughts and behaviours (4.6). High levels of variability were found among Health Coaches in respect to their familiarity with the concepts of goal-setting and self-monitoring (*SD* = 1.12), telephone-call sessions (*SD* = 1.05), eating cues/ stimulus control (*SD* = 1.03), counselling skills (*SD* = 0.97) and sedentary behaviour (*SD* = 0.97). Overall, the results revealed that the Health Coaches were satisfied with their training.

Table 11: *Training Session Evaluation*

Background Information to adolescent Overweight and Obesity	M / (SD)
I understood the content in this session	4.5 (0.51)
I can see how this material was relevant to treating obesity in adolescents.	4.7 (0.45)
This information was new to me.	2.6 (0.81)
This information will be helpful in preparing me for the coaching of adolescents.	4.5 (0.63)
Basic Counselling Skills	
I understood the content in this session	4.6 (0.50)
I can see how this material was relevant to treating obesity in adolescents.	4.6 (0.50)
This information was new to me.	3.3 (0.97)
This information will be helpful in preparing me for the coaching of adolescents.	4.6 (0.48)
Goal Setting & Self-Monitoring	
I understood the content in this session	4.4 (0.63)
I can see how this material was relevant to treating obesity in adolescents.	4.5 (0.51)
This information was new to me.	3.6 (1.12)
This information will be helpful in preparing me for the coaching of adolescents.	4.5 (0.51)
Eating Cues / Stimulus Control	
I understood the content in this session	4.4 (0.63)
I can see how this material was relevant to treating obesity in adolescents.	4.4 (0.63)
This information was new to me.	3.7 (1.03)
This information will be helpful in preparing me for the coaching of adolescents.	4.6 (0.63)
Addressing Sedentary Behaviours	
I understood the content in this session	4.5 (0.51)
I can see how this material was relevant to treating obesity in adolescents.	4.5 (0.51)
This information was new to me.	3.3 (0.97)
This information will be helpful in preparing me for the coaching of adolescents.	4.6 (0.48)
Healthy Eating Habits	
I understood the content in this session	4.4 (0.51)
I can see how this material was relevant to treating obesity in adolescents.	4.6 (0.50)
This information was new to me.	2.9 (0.88)
This information will be helpful in preparing me for the coaching of adolescents.	4.6 (0.50)

Training Session Evaluation (Continued)

Physical Activity	
I understood the content in this session	4.6 (0.50)
I can see how this material was relevant to treating obesity in adolescents.	4.6 (0.50)
This information was new to me.	2.8 (0.91)
This information will be helpful in preparing me for the coaching of adolescents.	4.4 (0.74)
Thoughts & Behaviours	
I understood the content in this session	4.6 (0.50)
I can see how this material was relevant to treating obesity in adolescents.	4.7 (0.45)
This information was new to me.	3.7 (0.70)
This information will be helpful in preparing me for the coaching of adolescents.	4.6 (0.48)
High Risk Situations / Problem Solving	
I understood the content in this session	4.5 (0.51)
I can see how this material was relevant to treating obesity in adolescents.	4.6 (0.50)
This information was new to me.	3.3 (0.81)
This information will be helpful in preparing me for the coaching of adolescents.	4.5 (0.51)
Telephone Call Sessions	
I understood the content in this session	4.2 (0.59)
I can see how this material was relevant to treating obesity in adolescents.	4.4 (0.51)
This information was new to me.	3.4 (1.05)
This information will be helpful in preparing me for the coaching of adolescents.	4.4 (0.51)
Review Results of Physical Assessment / Maintaining Change	
I understood the content in this session	4.4 (0.50)
I can see how this material was relevant to treating obesity in adolescents.	4.4 (0.50)
This information was new to me.	3.5 (0.91)
This information will be helpful in preparing me for the coaching of adolescents.	4.5 (0.51)

Use of Post-Intervention Data

To further evaluate the training of the Exercise Leaders, data were collected post-intervention (refer Chapter 5). The use of post-intervention data which included satisfaction and compliance measures complimented post-training measures, therefore allowing a greater understanding of the training program's effectiveness.

Goal-Setting and Lifestyle Transferability Measures

Goal-Setting worksheets were collected from adolescent participants at post-intervention physical assessments. These sheets contained a record of the goals set by the adolescent participant during the intervention, and served to provide a measure of the interaction between the adolescent and the Health Coach. This information was used to measure the ability of the Health Coach to provide weekly goal-setting guidance, facilitation for these weekly goals and the transfer of these weekly goals during the program into the adolescent's lifestyle. This approach to assessing the ability of Health Coaches to support goal-setting and transfer was chosen by the research group, as, despite a comprehensive search, no validated tool was discovered for this population. Therefore, Goal-setting worksheets were assessed independently by two members of the research team, using a Likert scale response approach derived from The Revised Cognitive Therapy Scale, which has a score range from 0 (Incompetent) to 6 (Expert) (Blackburn, James et al., 2001). Competence levels are listed in Appendix 7. Health Coaches scored a mean of 3.88 (SD = 0.70) for goal-setting guidance, 2.70 (SD = 0.91) for goal facilitation and 2.90 (SD = 1.2) for transferability into lifestyle tasks.

Health Coach Satisfaction with Intervention Experience

Various approaches were used to measure the satisfaction of Health Coaches with the experiences they had during delivery of the intervention. These approaches included two questionnaires, one which used a Likert scale, the other which used a Visual Analogue (VAS) scale, and supplementing each of these with written responses to questions. Health Coaches were additionally asked to make any additional comments about the program during a face-to-face interview.

The views of Health Coaches about their satisfaction with their experiences during implementation of the intervention were sought, and responses were made using 5-point Likert scale ("strongly disagree" to "strongly agree") by eight of the thirteen Health Coaches who completed the intervention (61.5%). Results are shown in Table 12, and indicate at least a high rating for program flow and structure, enjoyment delivering the program, perception of how the training had assisted in program delivery, and recommendation of the intervention to others. Only one item, related to the number of sessions in the program, scored below a high rating (3.8). The highest standard deviation of 1.16 was shown for the facilities allowing adequate time to effectively deliver the program.

Further results showed high mean values ($M > 4.6$, $SD = 0.46$) for the Health Coach enjoying the delivery of the program, feeling that they were adequately trained and feeling that the program has a role in supporting healthy lifestyle in adolescents.

Table 12: *Health Coach Satisfaction with Intervention Survey*

Survey Questions	*M / (SD)*
I feel as though I was well trained to deliver the Your Choice program	4.7 (0.46)
I enjoyed delivering the Your Choice program	4.7 (0.46)
I had enough time each week to prepare for delivering the Your Choice program	4.5 (0.75)
Facilities at my work place allowed me to deliver the Your Choice program to the best of my ability	4.2 (1.16)
I felt comfortable supporting an adolescent during the delivery of the Your Choice program	4.7 (0.46)
I felt comfortable supporting the parent of an adolescent during the delivery of the Your Choice program	4.2 (0.88)
The Your Choice program had an appropriate number of sessions	3.8 (0.83)
The Your Choice program covered appropriate topics	4.3 (0.51)
I feel that the Your Choice program can play a role in supporting adolescents to develop a healthy lifestyle	4.6 (0.51)
The experience of delivering the Your Choice program will help me when I work with adolescents in the future	4.5 (0.53)
The experience of delivering the Your Choice program will help me when I work with adults in the future	4.1 (0.64)
I would recommend the Your Choice program to adolescents and their families who are seeking support to develop a healthy lifestyle	4.5 (0.53)
I would recommend Belgravia Leisure include the Your Choice program as a service for adolescents and their families who are seeking support to develop a healthy lifestyle	4.3 (0.74)
I would recommend other exercise leaders undertake the training to become a Your Choice Health Coach	4.5 (0.53)

In addition to this approach, a visual analogue scale (VAS) approach was used to measure Health Coach satisfaction with session flow and session suitability. The VAS scale used a horizontal line, 100 mm in length, requiring the Health Coach to mark the line at the point that they felt represented their perception with each session

(Appendix 5). Results displayed in Table 13 show mean ratings across all sessions ranged from a score of 46.1 (Thoughts & Behaviours) to 60.6 (Healthy Eating Behaviours). Similar to the results for the Training Session Evaluation, Health Coaches reported highest confidence and less response variability with physical activity and healthy eating, and least confidence with areas linked to counselling matters. Noteworthy was the finding that the greatest response variability (standard deviation) was observed for the addressing sedentary behaviour session and the telephone call session.

Table 13: *Health Coach Satisfaction Survey (VAS)*

Health Coach Survey	*M / (SD)*
Session 1: Goal Setting & Self-Monitoring	48.3 (16.2)
Session 2: Eating Cues / Stimulus Control	48.9 (12.3)
Session 3: Addressing Sedentary Behaviours	52.5 (23.8)
Session 4: Healthy Eating Habits	60.6 (12.6)
Session 5: Physical Activity	59.4 (8.9)
Session 6: Thoughts & Behaviours	46.1 (15.2)
Session 7: High Risk Situations / Problem Solving	49.6 (14.1)
Session 8: Telephone Call Session	49.9 (18.5)
Session 9: Review Results of Physical Assessment / Maintaining Change	54.7 (12.1)

Written responses were sought from Health Coaches using a set of questions designed to determine what aspects of the Your Choice program they would change and what they had learnt from the experience of delivering the program (Appendix 5).

Responses revealed themes around re-ordering the sessions, including moving the session on healthy eating support to earlier in the program.

Further data related to Health Coach satisfaction was obtained through individual face-to-face interviews, with all Health Coaches participating (N =13) (100%). Health Coaches were asked to provide comment about their experience in the trial via a semi-structured interview. Two Health Coaches from one centre felt that they weren't allocated enough time to deliver the program, but this was not a view expressed by other Health Coaches. One Health Coach had minor difficulties relating to a parent's (participant number YC0280306) involvement in the session and another had difficulty effectively communicating with a family of Sri Lankan origin (participant number YC0310307). One Health Coach had challenges making contact with participants to start the trial, whereas another participant travelled overseas immediately post-intervention and could not be contacted at the appropriate time for telephone call sessions. As previously reported from the questionnaire, several of the Health Coaches made suggestions to reorder and/or reduce sessions.

In the main, Health Coaches appeared pleased to be given the opportunity to participate in the program and learn from the experience. Two of the Health Coaches had used goal-setting in their role of personal trainers with their own clientele and had requested permission to use Your Choice intervention worksheets. One Health Coach used the experience of the Your Choice intervention as impetus to apply and gain referral into a behavioural-focused exercise science Honours placement, and has successfully been admitted into the program.

DISCUSSION

The information collected about the training of Exercise Leaders to become Health Coaches and deliver a cognitive behavioural therapy-based health lifestyle weight management program to OWOB adolescents reveals overall satisfaction. Researchers in post-intervention interviewing found that some coaches were using communication and goal-setting components from the program within their usual work environment. Additionally, satisfaction measures showed that Health Coaches felt comfortable supporting adolescents, felt that the Your Choice intervention has a role in adolescent lifestyle behaviour modification, thought that they were well trained to deliver the intervention and enjoyed doing so.

Being a multi-site intervention, the investigator was interested in the role of management in supporting coaches to facilitate the program. Post-intervention satisfaction measures and comments suggested that management support was neutral in limited cases, neither agree or disagree, with two of the Health Coaches emphasising that the time allowed by management was inadequate to properly deliver the program, but high variability relating to this question was found and this suggests managerial support was not uniform. Although concerning, negative feedback was rare across the data collected. Researchers also observed process issues, such as delays in making contact between Health Coaches to participants, and that some intervention periods were delayed or extended due to tardy communication. However, this was limited and may be a consequence of the part-time or casual employment situation of some of the Coaches.

The investigator was particularly interested in the results relating to behavioural training. Pre-intervention measures showed that Health Coaches had a strong

familiarity with counselling, thoughts and behaviours, stimulus control and problem solving, showing high mean scores for understanding of the content and showing that this information was not new to them. These scores were comparable to their scores for familiarity with physical activity and healthy eating; however at post-intervention scores relating to behaviour modification were lower than those relating to physical activity and healthy eating. This may indicate that Health Coaches overestimated their knowledge of behaviour modification prior to training. This is consistent with the research which has identified overestimates of cognitive therapy competence made by less competent therapists (Brosana, Reynolds et al., 2008).

Findings in the study relating to the pre-service training of Exercise Leaders in Australia (Chapter 3) showed much evidence of fitness, physical activity and diet content, yet behavioural modification training appeared limited. This finding appears consistent with previous reports that Exercise Leader training had a strong emphasis on exercise prescription rather that behaviour change (Lyon, 2001). Results in this study found diversity across the Health Coaches in respect to their knowledge related to stimulus control / self-monitoring, counselling skills and goal-setting, suggesting that some Health Coaches did not realistically rate their initial competence in these areas, and re-appraised their rating of their own competence following training. As yet there are no validated measures to evaluate the training of Non-Psychologists in CBT-based interventions and this is a limitation to the evaluation of the training of Health Coaches in this research. Coaching satisfaction measures taken at post-training and post-intervention were positive about the program, but the investigator notes that Health Coaches may be hesitant to be critical of the training because of the relationship gained with the research group, as has been found in past research (Kearley & Croft, 2010).

CONCLUSION

The evidence suggests that the training of Exercise Leaders as Health Coaches to deliver a CBT-based for program with OWOB adolescents in community leisure centre settings was successful. Multiple sources of evidence indicate that the Health Coaches retained knowledge, developed high levels of perceived competence and the expressed satisfaction with key features of the CBT-based approach and materials, and used this training and materials appropriately when working with OWOB adolescents.

CHAPTER 5

STUDY 3: THE IMPLEMENTATION AND EVALUATION OF A COGNITIVE BEHAVIOURAL THERAPY-BASED PROGRAM IN ADOLESCENT WEIGHT MANAGEMENT

General Introduction

This study evaluated the effectiveness of a healthy lifestyle program, using the principles cognitive behavioural therapy (CBT), delivered by Exercise Leaders in community leisure centres to treat overweight and obesity (OWOB) in adolescents. The primary aim was to determine if the CBT-based healthy lifestyle program could result in improvements in body composition among OWOB adolescents. Secondary aims included whether the CBT-based healthy lifestyle program altered dietary and physical activity behaviours and selected psychosocial characteristics of OWOB adolescents. Parents were required to support adolescents during the trial; the outcomes related to parent participation in the study are discussed in Chapter 6. In this chapter, a detailed description of the recruitment, measures, testing protocols and interventions related to adolescents is provided.

Rationale

Recent published data on Australian 12 to 17 year-old adolescents showed that 9% were obese and 22% were overweight (Australian Institute of Health and Welfare, 2011). Family oriented interventions that include a combination of physical activity and dietary behavioural modification components show the most promise in altering the OWOB-related behaviours of adolescents (Brennan, Walkley et al., 2012a). Further, it

is known that non-psychologists such as Nurses can be trained to effectively deliver CBT-based interventions to address health issues (Sensky, Turkington et al., 2000). There is emerging support for Exercise Leaders as providers of counselling-based support to engage participants in healthy living behaviour (Annesi, Walsh et al., 2010). Exercise Leaders represent a group of people who are accessible by the community and have sound exercise prescription skills (Fitness Australia, 2009). Therefore, this study was undertaken to determine if an Exercise Leader-led, CBT-based healthy lifestyle weight management program could improve the dietary and physical activity behaviours of OWOB adolescents, leading to improvements health characteristics.

Research Question

Interventions targeting adolescent OWOB are necessary, and with CBT-based programs showing promise in other health areas, this approach may be effective when applied to weight management. Therefore, the research question for this study was: Will a CBT-based healthy lifestyle intervention delivered by Exercise Leaders to OWOB adolescents at a leisure centre result in improvements in biological, psychological, and behavioural characteristics?

Research Ethics

The research was approved by the RMIT Human Research Ethics Committee; project number 10/07 titled, “The treatment of overweight adolescents using CBT delivered by Exercise Leaders”. Please refer to Appendix 8 for more information.

METHODOLOGY

Recruitment of Participants

A targeted approach was adopted to recruit participants in close proximity to the participating leisure centres. Adolescents and parents were recruited via a range of methods. The RMIT University Media Communication unit was enlisted to assist with dissemination of recruitment information, and approach state-wide and local newspapers with a press release about the project. Subsequently, journalists contacted the research team and articles were published in local suburban and state-wide newspapers. Numerous radio interviews occurred as a result of the print publicity, and this served as another recruitment strategy. Further recruitment strategies included the distribution of study descriptions on flyers, posters, and websites and via email to leisure centre members and users at those leisure centres that had agreed to participate in the research (Appendix 9).

Local government organisations, youth clubs, swim schools, and netball clubs and tertiary education institutions were contacted and asked to disseminate information through email lists and newsletters, and to display information posters and flyers about the project. Families who had contacted the research group related to other projects, and had registered their interest in being contacted when new projects were recruiting participants, were also contacted.

Eligibility

Participants were eligible to be included in the study if four conditions were met: (1) aged 12 to 16 years; (2) overweight or obese adolescent, as determined by the criteria proposed by Cole and colleagues (2000); (3) had the support of a parent or caregiver with whom they lived the majority of their time; and, (4) able to attend

physical assessments and protocols and attend a local leisure centre to undertake an intervention for the program. Participants were excluded if they were currently involved in weight management programs, were pregnant, or had an illness or disability that would prevent adherence to the program. A participant demographics table is included in Appendix 20.

Initial Contact

Researchers received most telephone and email contact from interested parents and carers seeking study information. Two adolescents directly contacted recruiters; those adolescents were directed to inform parents to contact the researchers. Interested parents and carers were briefed on the study, particularly the commitment involved, and the location of participating leisure centres where the program would be conducted. If requested, participants were sent a plain language statement, consent form and a recruitment questionnaire, as well as a postage-paid envelope for return of the forms. The plain language statement provided participants with a comprehensive description of the study, including background information, potential benefits to participants from taking part in the study, and full descriptions of the procedures, measures and program involved. These forms are presented in Appendix 10. After forms were returned and evaluated, participants who self-reported they had met the eligibility criteria were invited to a physical assessment during which their eligibility was confirmed, pre-test assessment completed, and then random allocation to a group was conducted (Figure 4. Recruitment Flow). Those not eligible for the project were sent information regarding healthy eating and physical activity (Appendix 11).

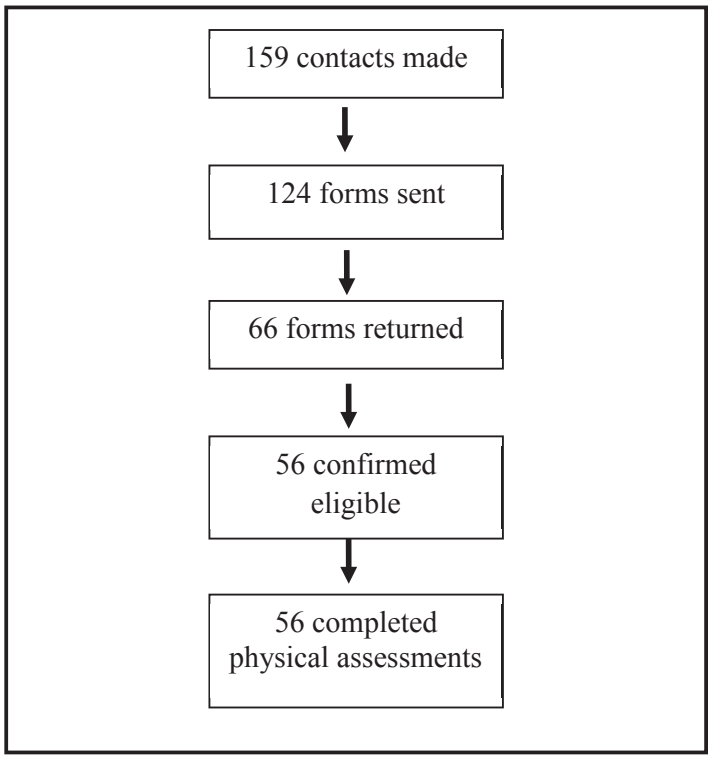

Figure 4. Recruitment Flow.

Withdrawal

All participants were informed that participation was voluntary, and that they were not obliged to complete the trial and withdrawal from the study could occur at any time.

Allocation

A clustered, random allocation approach was implemented using a random sequence generator. Seven leisure centres, each with a fitness centre, were involved in the study. Participants nominated the preferred leisure centre closest to their home, with most participants living within a few kilometres, and the furthest within 10 kilometres. Each leisure centre nominated employees to be trained as Health Coaches

and to deliver the intervention, as well as nominating an equal number of leisure centre employees to be available to offer a standard treatment. Each Health Coach was to be randomly allocated a maximum of two adolescents with whom they would implement the treatment. The number of Health Coaches available at each centre therefore determined the total number of participants able to be allocated to each leisure centre, with half the participants randomly allocated to receive the CBT-based intervention, and half randomly allocated to receive a standard treatment. This approach meant that within each leisure centre, approximately equal numbers of participants were undertaking the intervention and the standard treatment at the same time, but between leisure centres, the participant numbers were different. Participants were randomly allocated using this strategy at the completion of the baseline assessment.

Phasing of Treatment

Participants were randomly allocated to an intervention or standard treatment group in two phases, the first in October 2009, and the second in February 2010. The phasing of recruitment occurred since approximately 50% of the total sample was recruited as a result of the initial recruitment drive, and a subsequent recruitment drive resulted in further participants. Complete details are provided in Figure 5 Allocation, Treatment and Assessment Flow.

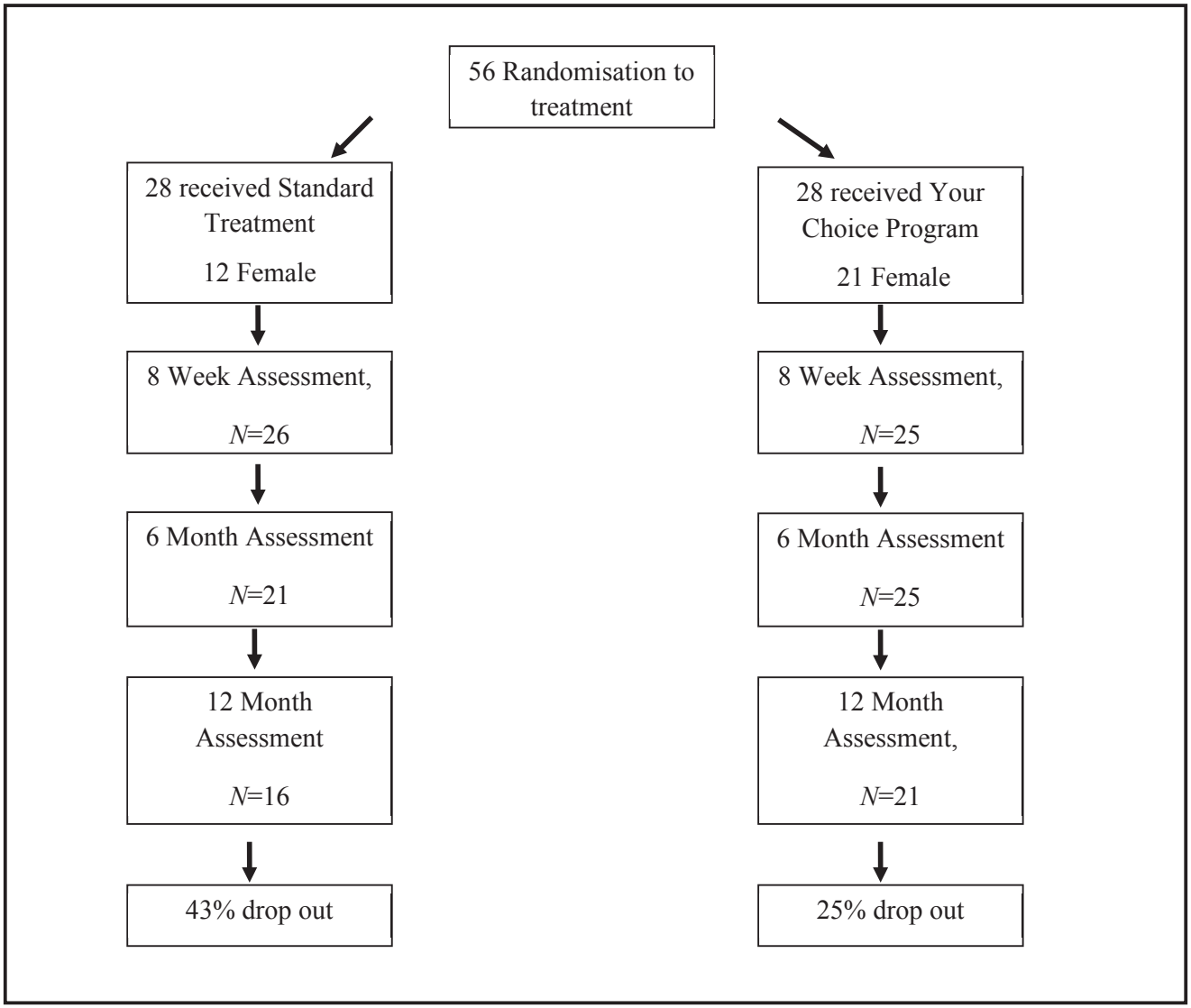

Figure 5. Allocation, Treatment and Assessment Flow.

Physical Assessments

The primary outcome measures for this project were focused on the adolescent body composition items of muscle mass, fat mass and derivations thereof. Secondary outcome measures included a set of anthropometric items and psychosocial characteristics. Adolescents undertook physical assessments over approximately one hour at 4 data collection periods commencing at baseline (Pre), and then post (eight-

weeks), six-months and 12-months. Measures were taken by a trained anthropometrist. Along with the anthropometrist, a research assistant was present during all physical assessments. Measurement techniques followed established procedures, using calibrated equipment, and were the same as those published in research studies examining the effect of CBT interventions delivered by psychologists on OWOB adolescents (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). A description of the adolescent assessment measures is provided in Table 14. Appendix 13 contains the physical assessment record.

Table 14. *Physical Assessment*s

Anthropometry
Height
Weight
Circumferences
Hip
Waist
Body Composition
Dual energy X-ray absorptiometry (DEXA)
Physical Activity
Accelerometer
Physical Maturation
Tanner Scale

Height.

Height was recorded on a calibrated, wall-mounted stadiometer, (Heightronics, Quick Medical, Issaquah, USA) with participants having shoes and socks removed, and standing straight with their heels together and buttocks and thoracic spine touching the wall. Two measures were taken, with the mean calculated as the final score.

Additional measures were taken if measurements were not within five millimeters, with the two closest scores used to calculate the average.

Weight.

Body mass was measured to the nearest 100 grams using calibrated digital scales (TANITA, Wedderburn BWB-620). Participants removed shoes and socks, and wore light clothing. Two measures were taken, with the mean calculated as the final score. Additional measures were taken if measurements were not within 100 grams, with the two closest scores used to calculate the average.

Body composition.

Body composition was measured using Dual-energy X-ray absorptiometry (DEXA). DEXA provides measures of body fat, bone and lean tissue, and has been validated against known, established standards (Goran, Gower et al., 1998). To complement total body composition examinations, additional measurements from DEXA were derived to determine regional adipose tissue, as used in previous research (Lohman, Tallroth et al., 2009).

The Lunar® DEXA bone densitometer provides a non-invasive, painless, rapid and accurate determination of body composition. Dual-energy x-ray absorptiometry was originally developed for the measurement of bone density. Along with the evolution of sophisticated software, DEXA is also suitable for estimation of body composition in terms of evaluating the ratio between fat, muscle, and bone in different parts of the body (Lohman, Tallroth et al., 2009). The DEXA emits minimal X-Ray dose that is within recommended National Health & Medical Research Council limits. Trained operators, with a current license to operate ionizing radiation apparatus, carried

out the procedure. Participants were required to lie on a padded bench in light clothing for a seven to twenty minute period in the Bone Densitometry Laboratories (Buildings 213 and 203, Bundoora West Campus).

Due to circumstances outside the research group's control, two DEXA bone densitometers were used during data collection, a GE Healthcare, General Electric, Lunar Prodigy®, and a Lunar DPX-IQ®. Two units were used as a consequence of the temporary (one-month) withdrawal of permission to use the Lunar Prodigy when it was found that the required authority to operate the unit had not been obtained by RMIT University, unbeknown to the researchers. As this occurred following commencement of the baseline assessment period of the first intake of participants, and eight participants had been scanned using the Lunar Prodigy, the remaining participants commencing during intake one were scanned using the Lunar DPX-IQ®. To maintain consistency and control for inter-instrument measurement variability, participants were assigned to the same DEXA unit for each assessment. The allocation of participants to each densitometer is provided in Table 15.

Table 15: *Participant Allocation to Bone Densitometer*

Bone Densitometer	*N*
General Electric Lunar Prodigy	36
Lunar DPX-IQ	22

Regular Quality Assurance tests (QA tests) were conducted to check that each DEXA met operating specifications, component tolerances and X ray detector outputs. Following manufacturer's recommendations, a bone mineral density Phantom spine and QA calibration block containing bone equivalents were utilised. Phantom spine measures were conducted 3-times weekly, whereas, calibration quality assurance was carried out daily. The importance of daily Phantom spine analysis is highlighted

elsewhere (Binkovitz & Henwood, 2007). Further calibration measures and DEXA maintenance were carried out by authorized DEXA technicians at regular manufacturer intervals. An independent medical physicist confirmed radiation dose and accuracy outputs. This included assessing the accuracy of laser light positioning, accuracy of scan line and step spacing, accuracy and reproducibility of indicated scan time, free air entrance exposure dose and skin entrance dose.

To minimise participant anxiety, the operator familiarised the adolescent with the procedure. Additionally, a parent and research assistant were present at all times. Female adolescents were privately asked of the possibility of being pregnant and the time of their last menstruation, where possible by a female research assistant. The discussion took place in a separate room away from the parent. Parents were privately informed of this procedure, and informed of the reason (fetal radiation exposure). No female participant reported being pregnant, and all reported having a regular menstrual cycle, with the last occurring within the previous four weeks. Participants were asked to remove any metal wherever possible (e.g., jewelry, earrings, studs, piercing, zippers, hair ties, fasteners, bras containing wire). Participants were placed on the padded mat with hips and shoulders adjusted to allow correct alignment of the spine. Where possible, participants were wrapped in a towel to prevent arm movement, and a Velcro strap was used to secure participants ankles to keep legs stationary. After the participant was comfortable, they were instructed not to move until the procedure was completed. Appendix 13 contains the physical assessment record.

Biological maturation.

Biological maturation was self-assessed using the Tanner scale. The Tanner scale is a subjective measure of biological maturation in children, adolescents and

adults. The scale defines physical measurements of development based on external primary and secondary sex characteristics, such as the size of the breasts, genitalia, and development of pubic hair, first identified by British pediatrician James Tanner and validated in the broader literature (Morris & Udry, 1980).

Research indicates that body composition varies with sexual maturation (Morris & Udry, 1980). When assessing treatment-induced changes in body composition, it is important to assess stage of sexual development at each assessment and to use it as a covariate in the analyses (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). The Tanner scale comprises five drawings of the developmental change in scrotum and testes (for males) and breasts (for females), pubic hair and genitalia. Participants were provided with line drawings of the Tanner Scale and asked to assess their own sexual maturation. The Tanner scale is the only self-assessment tool available to define puberty, as direct evaluation was ethically improper for this study. Copies of the Tanner scales for girls and boys are included in the Appendix 14.

Physical activity monitoring.

Physical activity was measured by a small, lightweight, self-contained, non-invasive uni-axial accelerometer. The Actigraph® (MTI Health Services, Florida, USA, model GTX 1 and 3) was used, and these devices have been validated in previous research with various populations, including adolescents (Corder, Brage et al., 2007; Aadland & Anderssen, 2012; Dinesh & Freedson, 2012). Accelerometers are frequently used in research and assess vertical plane movements of the trunk, and using proprietary algorithms, calculate movement time and intensity for user determined epochs for several days (Puyau, Adolph et al., 2002).

The accelerometers were affixed above the iliac crest of the right hip with an elastic belt. Participants were carefully instructed on how to wear the device by the research assistant, and a simulation of its application and removal were provided. Furthermore, a handout was supplied to provide extra information, which included limitations of the device, for example (not to be worn in water). Contact details were provided on the device and in the instruction sheet if further detail were required. A daily motion sensor activity diary was provided so participants could list times worn and reasons for removal. The motion sensor diary is included in Appendix 15. Participants were required to wear the accelerometer for eight consecutive days.

Actigraph® data were downloaded using the Actisoft® software (MTI Health Services, Fort Walton Beach, Florida, USA). For the data to be included in analyses, a cut-point of at least 3000 counts for each hour of data had to be available, and any hour with less than this value was deemed to be non-wear time (Sasaki, Dinesh et al., 2011). Eligible data were identified upon export into Microsoft data base file (Microsoft Corporation Pty. Limited, Redmond, Washington, USA) then reduced to average counts per hour per day. For the data to be included in analyses, at least 10 hours of data had to be available for four of the five weekdays. Weekend data was included when both days were included. Average weekday and weekend counts per hour were then calculated separately and averaged to provide an indication of overall total week activity. Data were then categorised into Total Light-Intensity, Total Moderate-Intensity, Total Vigorous-Intensity and Total Week Activity.

Psychosocial Measures and Questionnaires

Adolescent participants completed a set of questionnaires at each data collection point (Table 17). Questionnaires gathered information regarding participant

demographic characteristics, cognitions, knowledge and beliefs, psychological wellbeing, intervention acceptability, eating disorder risk, body image, motivation to change, sleep patterns, social relationships and diet. Questionnaires are included in Appendix 12. As some questionnaires were used for related studies, only selected questionnaires were used in this study, and these are listed in Table 16.

Table 16: *Questionnaire Allocation to Adolescent*

Psychological Wellbeing
Impact of Weight on Quality of Life
Disordered Eating
Eating Disorders Inventory- 3
Acceptability
Consumer Satisfaction Survey
Drop Out and Completion Surveys
Diet
Victorian Cancer Council Food Frequency Questionnaire

Impact of weight on quality of life (IWQOL).

The impact of weight on quality of life (IWQOL) is a 74-item, self-report, obesity-specific measure of obesity-related quality of life (IWQOL) that consists of a total score and scores on each of five scales including, body esteem, physical comfort, family relations, social life and total quality of life. This measure exhibits strong psychometric properties (Kolotkin, Head et al., 1997). Adolescents completed questionnaires at each of the four data collection periods commencing at baseline (Pre), and then post (eight-weeks), six-months and 12-months.

Disordered eating.

Eating disorder pathology was measured using the Eating Disorder Risk Composite (EDRC) of the Eating Disorder Inventory – 3 (EDI-3). The measure contains 91 items divided into twelve subscales rated on a 0 to 4 point scoring system. Three items are specific to eating disorders and nine are general psychological scales, which, while not specific, are relevant to eating disorders (Garner, 2005). Eating disorder assessment has been used previously in research with adolescents seeking help for weight management (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a).

Acceptability

Feedback was gathered on the acceptability of the interventions. In addition, information was collected from those who dropped out of the study via mail-administered survey. Adolescents and parents in the program completed a consumer satisfaction survey assessing their satisfaction with the Health Coach and intervention. Participants responded to questions regarding perceived usefulness of the intervention, its application to their lifestyle, and the helpfulness, friendliness and knowledge of the Health Coach on a 1 to 5 Likert scale ("strongly disagree" to "strongly agree"). Acceptability questionnaires were completed at eight-weeks, six-months and one year. Questionnaires at 6-months assessed the Health Coaches' follow-up abilities and ongoing support of the adolescent. Surveys at the12-month follow-up investigated if participants re-joined the recreation facility in the previous six months. Qualitative feedback was analysed in the form of customer satisfaction comments. The Your Choice drop-out survey, modified from work completed by Brennan et al. (Brennan, Walkley et al., 2012a) was used to collect data pertaining to drop out, with respondents

rating statements on 1 to 5 Likert scales ("strongly disagree" to "strongly agree"). Qualitatively, respondents were also asked to provide suggestions for how the program could be improved. A copy of the consumer satisfaction surveys is provided in Appendix 7.

Dietary Intake / Behaviour

To gather information on dietary behaviours, dietary intake was measured using the Victorian Cancer Council Food Frequency Questionnaire (FFQ). A supplementary question was included to assess soft drink consumption. The FFQ consisted of 74-items, grouped into four categories: 1) cereal foods; sweets and snacks; 2) dairy products, meats and fish; 3) fruit; and, 4) vegetables. A separate set of questions covered intake of alcoholic beverages. Adolescents were asked to rank how regularly they consumed each food item since the last assessment. Participants chose from 10 responses ranging from never, up to three or more times per day. Photographs of food portions were incorporated to aid participants in estimating portion size. The tool has been validated for use in epidemiological studies (Hodge, Patterson et al., 2000), and, more recently, to compare group means in a short-term intervention CBT trial with OWOB adolescents (Tsiros, Sinn et al., 2008). A copy of the FFQ is included in Appendix 17.

Interventions

A cognitive behavioural therapy (CBT) based program was developed titled 'Your Choice'. The program was designed to support lifestyle change in adolescents, aged 12 to16 years, and a supporting parent. The intervention was conducted in one of seven community leisure centres in Melbourne, Victoria, Australia by Exercise Leaders

trained to deliver the program. The program addressed several factors known to contribute to overweight and obesity (Bathrellou, Yannakoulia et al., 2010). During the multi-session program, each Exercise Leader used CBT-based principles to support healthy thinking, healthy eating, and healthy activity. The recruitment and training of the Health Coaches has been described in Chapter 3. The intervention was delivered within the 10-weeks of a school term. A detailed intervention synopsis is included in the current chapter under the heading "The Intervention Sessions".

The Intervention Sessions

The Your Choice program was developed in response to the need to create an intervention that was accessible, serviced the needs of adolescents and could be delivered by Exercise Leaders (called Health Coaches) trained in the use of cognitive-behaviour therapy techniques. The common elements within this multi-component approach aimed to assist in the promotion of positive dietary and physical activity change, with a major emphasis on implementing cognitive strategies to support in this process. Consistent with previous healthy lifestyle support programs (Brennan, Walkley et al., 2012a), the intervention was divided into sessions and delivered to the adolescent and their supporting parent. Although not directly involved in the facilitation of the session, it was intended that the parent would take on a support role. This approach recognised the adolescent both lived with and was influenced by their family unit, and is recommended in the literature (Vignolo, Rossi et al., 2007). The parent or caregiver was required to attend the first five sessions with the adolescent; however from session six onwards, the adolescent had the choice to attend the session alone or have their parent included. This approach was implemented to transition the

adolescent toward greater control for their choices and to promote self-determination. The majority of the adolescents chose to have their parent attend all sessions.

The meeting environment and program implementation.

The meeting of the Health Coach, adolescent and supporting parent in each leisure centre took place in a room separate from, but adjacent to, the fitness centre. Health Coaches were trained to focus on the adolescent, including sitting facing the adolescent unimpeded by a desk or bench, with the parent positioned to the side and taking on a passive and supportive role. Health Coaches were trained to deflect any non-relevant comment from either the adolescent or parent, and used a session plan to schedule discussion and activities. The sessions adopted a self-directive, worksheet-based format to elicit thinking and conversation that helped adolescents to consider and make small changes to their current lifestyle behaviours. The session length was up to one hour in duration, but if participants were late, only the balance of the allocated time was utilised. This rule reinforced the importance of punctuality and emphasized the importance of planning ahead.

Typically, each meeting began with an overview of the session content and objectives, and concluded with a summary of the material covered. Following sessions commenced with a review of homework tasks completed. Outlines of the sessions are provided below.;

Session 1: goal setting and self-monitoring.

The session provided an opportunity for the Health Coach to develop rapport with the adolescent and parent, with an initial emphasis on learning about current lifestyle habits and opportunities for change. Checklist-based worksheets were used to

measure knowledge of overweight and obesity, and provided an opportunity for questioning and goal setting guidance. Self-directed strategies, which incorporated the use of motivation interviewing (MI) worksheets, were implemented, so as to direct the adolescent to set behavioural goals, such as "Walk to and from school on each day" or "Reduce my soft drink consumption by 10%". Participants were required to self-monitor behaviours in weekly target sheets (Appendix 3), and were also required to note what challenges they encountered during the week that impeded their behaviour change, and what new behaviours they found fulfilling and enjoyable. Target sheets were reviewed weekly to provide the adolescent with a record of behaviour change, and to act as a support for adolescent compliance with the intervention. Behaviour targets were adjusted, and new ones created so as to align with each session's focus and theme. Health Coaches were provided with resources to collect information regarding eating and physical activity behaviours, and information about the home and school environment and general background, and this information was used in target sheets across various sessions where applicable. The information collected during sessions and recorded on target sheets was used as evidence when investigating the effectiveness and acceptability of the Health Coach delivery of the intervention.

Goal setting and self-monitoring is a core feature of the majority of behaviour change programs (Lih-Mei Liao, 2000; Cooper, Fairburn et al., 2003; Shilts, Horowitz et al., 2004; Costain & Croker, 2005; Foreyt, 2005). Shilts et al. (2004) state "that setting specific goals provides a potential strategy for organising nutrition and physical activity information and skills into practical and manageable steps" (pg. 82), whereas self-monitoring refers to the observing and recording of some aspects of behaviour (Wisotsky & Swencionis, 2003). Self-monitoring has been implemented successfully with diabetic youth to apply self-regulation skills in enhancing favourable lifestyle

adaptions (Nansel, Iannotti et al., 2007). To formalise the arrangement, participants completed a contractual agreement as part of the first session, and this enabled the parent, adolescent and Health Coach to confirm their commitment to each other, and highlighting to the adolescent that others would support them to achieve goals set by them. Behavioural change contracting has been widely used in the modification of eating and physical activity habits within the child and adolescent weight management literature (Jelalian & Saelens, 1999).

An underlying theme for the session was for the Health Coach to establish and develop practical behaviour change strategies for the overall intervention. Throughout the program the Health Coach was encouraged to assess behavioural barriers and practical resources available to the participants. Consideration was also given to cultural eating practice and current dietary knowledge. Spear and colleagues highlighted that clinicians that become familiar with patient influences and perceptions will be best placed to tailor recommendations (Spear, Barlow et al., 2007).

Session 2: eating cues and stimulus control.

Stimulus control training was implemented to help the adolescent to modify or eliminate the cues in their environment that they linked to inappropriate eating. The literature supports the idea that the control of environmental cues may assist with unhelpful behavioural patterns (Costain & Croker, 2005). A series of worksheets were used to help the adolescent to identify the emotions, environments, situations or activities, collectively called ‘cues’, that were linked to occasions when they had engaged in unhealthy eating (Appendix 3). Using this information, the adolescent was guided to formulate strategies to reduce exposure to these cues, or plan behavioural responses that would be used to prevent or reduce the behaviours that were not wanted. Epstein et al. (1996) indicated that stimulus control was important in reducing exposure

to cues linked to undesired behaviours, and facilitated exposure to cues linked to be behaviours to be increased (Epstein, 1996). Stimulus control strategies were included within weekly target sheet activities; subsequent weekly evaluation took place to measure appropriateness and effectiveness of these approaches.

Session 3: addressing sedentary behaviours.

This session focused on identifying sedentary behaviours and creating opportunities for physical activity, a concept consistent with empirical recommendations (Baur, 2002; Swinburn, Caterson et al., 2004; Steinbeck, 2005; Oude Luttikhuis, Baur et al., 2009). In preparation for the session, the adolescent was required to complete a modified version of the Adolescent Sedentary Activity Questionnaire (ASAQ) (Hardy, Booth et al., 2007) (Appendix 3). The ASAQ collected information regarding the adolescent's small screen viewing, computer use, methods of travel, hobbies and social activities. This tool was used to acquire information specific to the adolescents' inactive pursuits and to devise strategies to negate and replace these. Information gained from the ASAQ was integrated into a time management timetable, with the Health Coach highlighting examples of when and where the possibility for physical activity existed. A collaborative effort was then enlisted to integrate lifestyle activities, such as walking (active transport), helping with household chores or source opportunities for unstructured play, each of which are regarded as crucial to decrease sedentary time (Steinbeck, 2005).

Session 4: healthy eating habits.

The session comprised addressed an educational theme, primarily focusing on the energy expenditure equation and its relevance to achieving a healthy weight. Energy intake and expenditure form a considerable focus in the majority of weigh management interventions for children and adolescents (Doak, Visscher et al., 2006; Resnicow, Davis et al., 2006; Brennan, Walkley et al., 2009). In the lead-up to the session, adolescents completed a seven-day diet diary from which dietary trends were derived and formed the basis for conversation and strategising. Participants were guided to compare their diet habits against current recommendations, using the Australian Guide to Healthy Eating (AGHE) (Australian Government, 1998). Depending on each individual diet, the adolescent was supported to set targets related to a decrease intake of energy dense and salty foods, an increase in fruit and vegetable consumption, and a decrease in foods that were high in saturated fats. The adolescent and parent were reminded that the Your Choice program was not supportive of a calorie restricted diet, but of behavioural adjustments to increase consumption of AGHE recommended foods and decrease consumption of energy dense foods.

In a novel aspect of the session, the adolescent was required to estimate how far they would need to walk to expend certain energy dense 'popular' foods (see Appendix 3.) This further emphasised the energy balance equation as it provided a readily understood and practical way to reinforce the concept. To assist in the identification of energy elements of foodstuffs, adolescents completed traffic light identification tasks as homework. Traffic light food identification was developed to provide an easy to understand system for controlling energy intake (Epstein, 1996).

Session 5: physical activity.

The session centered on increasing energy expenditure through increasing physical activity. Physical activity education is regarded as essential in any intervention designed to support a healthier weight (Baur, 2002; Kirk, Mutrie et al., 2004; Foreyt, 2005; Kirk, Barnett et al., 2007; Hawley & Dunstan, 2008), and is a readily modifiable part of the energy balance equation (Dobbins, De Corby et al., 2009). Participants were guided to list the benefits of physical activity, including physical, social and psychological benefits, and discuss ways in which their own physical activity could be increased so as to realise some of these benefits. Adolescents were further introduced to a range of activities that were available to them, including activities in the leisure centre facility that could be a viable, but self-determined, option for themselves. Barriers to physical activity were also discussed, and known barriers including lack of time, insufficient motivation, access and cost, were considered as were strategies considered to be of assistance in overcoming these difficulties. Identifying and addressing physical activity barriers have been identified as key concepts within the preventative disease literature (Yancey, Fielding et al., 2007). To emphasise time management, which may in fact be a surrogate for insufficient motivation, timetabling was introduced to assist adolescents to schedule opportunities to engage in physical activity.

Session 6: thoughts and behaviours.

Cognitive strategies used during the session were based on Bandura's social cognitive theory, which posits that the interaction between the person and behaviour involves the influences of a person's thoughts and actions (Bandura, 1986). The benefit of adding cognitive strategies within conventional behavioural programs for the

treatment of child and adolescent weight management was promoted as advantageous by Epstein et al. (1990) and confirmed since by additional research (Jelalian & Saelens, 1999; Brennan, Walkley et al., 2012a).

During the session the Health Coach introduced participants to the cognitive behaviour model by overviewing how thoughts, feelings and behaviours interact, and if negative thoughts are not challenged and replaced with positive thoughts, less desirable behaviours linked to diet and physical activity could occur. The adolescent was guided to identify some negative thoughts they had experienced, and was then helped to identify alternative positive thoughts as well as strategies to manage the negative thoughts (Appendix 3.) This approach to managing thoughts can be explained by a scenario whereby an adolescent may initially think "This is all too hard, I'm never going to get anywhere", but then replace that negativity with a more positive thought such as "I'm doing my best, if I stick with it, things will progress."

In cognitive behaviour therapy (CBT), a fundamental intervention focus is teaching adolescents to identify and challenge errors in thinking (i.e., cognitive distortions). Certain cognitive styles or maladaptive patterns of thinking (e.g., overlooking the positive aspects of a situation) can halt treatment progress (Rohde, Feeny et al., 2005). Therefore, it was necessary to teach adolescents how to identify and then to correct negative irrational thinking patterns.

In alignment with typical cognitive training, and in challenging irrational beliefs, the adolescent was required to think through typical unhelpful cognition examples (Appendix 3). Using these examples, the adolescent was required to challenge these thoughts, by questioning what evidence is there to support this thought, what evidence is there to challenge this thought and put forth examples of what their friends would say if they knew I was thinking this way (Appendix 3). Rational

thinking approaches and exercises are consistent teachings within paediatric CBT contexts (Ellis & Harper, 1975; Rohde, Feeny et al., 2005)

In an addition to the use of cognitive techniques, participants were introduced to the concept of assertive communication, a strategy commonly used within the weight management literature (Zirkel, 1984; Wisotsky & Swencionis, 2003; Vignolo, Rossi et al., 2007). Assertiveness is the ability to honestly communicate your opinions, feelings and attitudes in a way that doesn't infringe on the rights of other people (Gervasio, 1987). Adolescents were introduced to a range of assertive statements and were guided to highlight occasions in which unhelpful comments were communicated (Appendix 3). Statements based on experiences were role-played, and cue cards developed with examples of potential options to respond to or manage non-helpful situations.

Session 7: high risk situations and problem solving.

Problem solving for goal attainment is central to Bandura's social cognitive theory (Nansel, Anderson et al., 2009), and aligns with standard cognitive strategies. Throughout the sessions, weekly target sheets were evaluated so as to identify problems encountered and difficulties faced, and a focus of this session was to develop approaches to dealing with these matters. The foundations for effective problem solving, supported in the literature (Burke & Fair, 2003; Wisotsky & Swencionis, 2003; Costain & Croker, 2005; Nansel, Iannotti et al., 2007; Murawski, Milsom et al., 2009), were used to guide the adolescent to identify the problem, consider as many solutions as possible, note the merits and factors associated with implementing each solution, choose a solution, implement the strategy and re-evaluate. Session worksheets overviewed problematic barriers associated with high risk situations and divided these into four categories: (1) thoughts; (2) environment; (3) behaviours; and, (4) networks,

(see Appendix 3). The adolescent was supported to develop strategies to counteract barriers, with the adolescent implementing the strategies and assessing viability over the following weeks.

Session 8: difficulties, maintaining change and relapse prevention (telephone call session).

This telephone call session was designed to direct the adolescent away from face-to-face contact, develop a sense of confidence, and to provide a convenient mechanism to collaborate on topics already covered. Telephone sessions have been previously used to complement or strengthen CBT interventions in the paediatric CBT literature (Golley, Hendrie et al., 2011; Brennan, Walkley et al., 2012a). The session predominantly reviewed difficulties and successes of the program, how relapse could be prevented and built on strategies to maintain change. The Health Coach and adolescent had previously settled on an appropriate time for contact, with the adolescent assigned homework from the previous week, (Appendix 3). Homework sheets guided the adolescent to think of solutions to problems, with the Health Coach assisting in the process, via a corresponding running sheet (Appendix 3). Adolescents were also asked to acknowledge what they had learnt from the program, including their desired form of physical activity, eating strategy, as well as what assertive strategies they had used and linked healthy thinking alternatives to negative thoughts.

Session 9: physical assessment results and maintaining change.

Prior to the ninth session, the adolescent and supporting parent had completed a physical assessment. During the ninth session the adolescent and Health Coach reviewed these assessment results, noting any changes, if any, from baseline measures

in key body composition (e.g., whole body and regional fat tissue, whole body and regional lean tissue, percent body fat) and body size (e.g., hip and waist circumferences) measures. The remaining time focused on addressing issues around relapse and generalising newly developed skills to situations of high risk, such as birthday parties, outings with friends or celebrations. Participants were supported to consider the probability of relapse, to realise this was a possible scenario, and to consider what support strategies could be implemented and how these could be sustained. Attending parents were also invited to provide input, given that formal face-to-face meetings were concluding, and access to ongoing support would be a priority for the adolescent as they developed independence.

Post intervention follow-up telephone calls.

In the order to support adolescent independence and the transfer of primary support away from the Health Coach, Health Coaches conducted follow-up telephone calls at 4-weeks and 8-weeks post intervention to monitor and evaluate the adolescent's progress. During the telephone call, a review of strategies was initiated, with adolescents encouraged to discuss obstacles and successes experienced in the preceding weeks. Collaborative brainstorming was instigated to examine relapse and re-evaluate plans. Telephone call sessions were aimed at lengthening client-practitioner contact, but additionally, served to transition away from regular contact with, and reliance on, the Health Coach.

Disordered Eating

Past interventions that have utilised similar multi-session formats delivered by psychologists (Cooper, Fairburn et al., 2003; Tsiros, Sinn et al., 2008; Brennan,

Walkley et al., 2012a) have additionally addressed disordered eating within the program. In the current study, the research group deemed it inappropriate to address these conditions, as the Health Coach cohort was not trained to intervene should evidence of disordered eating become apparent. Rather, as part of the training provided by the investigation team, Health Coaches were trained to identify signs and symptoms of eating disordered thought and behaviour and were directed to contact the research manager immediately if participants exhibited these characteristics for referral to appropriate professional support.

Standard Treatment

To compare the effectiveness of the intervention, a group of participants were randomly assigned to a standard treatment condition. Participants allocated to this group undertook a standard treatment with a focus on weight management, as is commonly prescribed in fitness centres and following the guidelines of the Australian fitness industry framework (Marchese & Hill, 2005). The Standard Treatment was delivered by an employee of the fitness centre who was a qualified fitness leader, but who had not undergone training in the delivery of the CBT-based treatment described in previous chapters. The standard treatment included an initial interview between an exercise leader and the adolescent participant, during which treatment goals, exercise history, and orientation and safe use of fitness equipment occurred, followed by an assessment of fitness parameters and the development of a written six-month exercise plan. The exercise plan included guidelines for exercise intensity, duration, and frequency. The adolescent was informed that support and advice was available on an 'as needed' basis, as is standard industry practice, and periodic re-assessment of fitness

would occur at approximately four week intervals. Standard treatment has previously been used as a comparison treatment to CBT-based Exercise Leader delivered interventions (Annesi, 2003; Annesi & Unruh, 2004). The schedule of standard treatment activities is set out in Table 17.

Table 17: *Standard Treatment Protocol*

Step	Element
1	Orientate adolescent to the facilities
2	Advise adolescent on the benefits and procedures of fitness appraisal and exercise prescription
3	Deliver and process a basic health screening questionnaire
4	Determine the fitness goals and current physical activity patterns of the adolescent
5	Conduct a basic fitness appraisal
6	Consider the exercise environment to ensure adolescents' safety
7	Interpret and apply the results of a fitness appraisal to the fitness program for the adolescent
8	Use clear and structured forms when writing exercise plans and exercise program
9	Develop a program with an appropriate balance of resistance, cardiovascular and flexibility training
10	Demonstrate correct technique of standard fitness exercises to adolescents
11	Supervise fitness activities in a manner that makes the adolescent feel at ease, safe and motivated
12	Advise adolescent of the preferred minimum thrice weekly exercise session frequency
13	Review and adapt the adolescent's exercise program in accordance with their progress

Statistical Analysis

Statistical analysis was conducted using SPSS version 18.0. A senior statistician was consulted on the design and application of data analysis, as well as the interpretation of results. Prior to conducting analysis, data were screened and cleaned by trained research assistants, data not within the range of possible scores were corrected and re-entered as required. Where missing values existed for measures due to

equipment malfunction, equipment limitations, participant non-completion of items or procedures, values were accounted for using Maximum-Likelihood estimation within the Linear Mixed-Models Approach.

The analysis for group and time variables were completed using a 4 x 2 linear mixed model/split plot approach. Multivariate analyses were used to minimise Type 1 error. The two-factor design represented time, which had four levels (pre-, 8-weeks, 6-months, 12-months) and group, which had two levels (Health Coach and Standard Treatment groups). Statistical significance was assigned at the 0.05 level of probability. The following interpretations were applied to the effect sizes of the results: < 0.2, small; 0.3 – 0.5, medium; 0.6 – 0.8, large and > 0.9, very large (Cohen, 1988) to-treat (ITT) analyses were conducted to carry forward values for participants who had withdrawn from the study after baseline, 8-weeks, or 6-months, respectively. Intention-to-treat analyses were conducted to avoid the effects of dropout and preserve power in analyses, and is well represented in randomised control trials within the human sciences (Saelens, Sallis et al., 2002; Resnicow, Taylor et al., 2005; Williamson, Walden et al., 2006).

RESULTS

A range of outcome measures was employed to measure, body composition, physical activity, psycho-sociological status and nutritional behaviours. It is beyond the scope of this project to report the results for all measures. Therefore, only the results most directly linked to the research question are shown in this chapter, all other results are included in Appendix 19.

Body Composition

Fifty-six adolescents completed baseline assessments, 28 were randomly assigned to either Health Coach or Standard Treatment condition. A 4 (time) x 2 (group) mixed / split plot linear mixed model ANCOVA was used to evaluate differences for measures across the adolescent groups. Due to the limited scanning area of the dual energy X-ray absorptiometry, some truncations of upper body limbs were noted. Total body measures were excluded in these examples. Trunk values remained unaffected. The Tanner scale, a validated measure of biological maturation (Morris & Udry, 1980) was used as a covariate in the analysis. The Tanner Scale has been used as a covariate in adolescent and children trials where maturation was a consideration (Huang, Johnson et al., 2002; Maffeis, Corciulo et al., 2003).

Fat mass.

Descriptive statistics for kilograms of total fat mass, total lean mass and percent body fat are presented in Table 18 for the Standard Treatment group and Table 19 for the Health Coach group. The groups were not statistically different at pre-test for total

fat mass, total lean mass and percent body fat. There was a very small, but significant, increase in total fat mass for the Standard Treatment group from pre- to 12-months (p= .003, d = 0.07), 95 % CI [-.321,-.065] and from 8-weeks to 12-months (p = .003, d = 0.09), 95 % CI [-.329 ,-.069]. The Health Coach group had a significant increase in total fat mass from 6-months to 12-months (p= .042, d = 0.11), 95 % CI [-.233,-.004], and from 8-weeks to 12 months (p = .027, d = .33), 95 % CI [-.261, -.016]. Standard Treatment displayed a significant increase in total fat mass over time (p = .008, r^2 = 0.09). The Health Coach group had a non-significant change in fat mass over time (p > .05).

Lean mass.

There was a significant increase in total body lean for the Standard Treatment group from pre- to 12-months (p < .01, d = 0.28), 95 % CI [-.538, -.224], from pre to 6-months (p = .027, d = 0.41) , 95 % CI [-.345, -.022], from 8-weeks to 12-months (p = .01, d = 0.19) , 95 % CI [-.428, -.109] and from 6-months to 12-months (p = .016, d = 0.23) , 95 % CI [-.358, -.037]. The Health Coach group increased lean significantly from pre to 12-months (p < .01, d = 0.52) , 95 % CI [-.534, -.250], from pre to 6-months (p = .002, d = 0.26) , 95 % CI [-.369, -.085], from 8-weeks to 12-months (p = .001, d = 0.45) , 95 % CI [-.465, -.164] and from 6-months to 12-months (p = .021, d = 0.17) , 95 % CI [-.305, -.025]. Both the Standard Treatment and Health Coach group significantly increased lean mass over time; Standard Treatment (p = .001, d = 0. 26), Health Coach (p = .001, d = 0.41).

Total percent body fat.

There was a significant decrease in percent body fat for the Health Coach group from pre- to 6-months (p = .014, d = 0.13) , 95 % CI [.042, .369]. Likewise, there was a significant decrease in percent body fat for the Health Coach group from pre- to 12-months (p = .017, d = 0.11) , 95 % CI [.036, .363]. There was a non-significant change in total body percent fat for the Standard Treatment group across the assessment periods (p > .05).

Table 18: *Descriptive Statistics for Total Body Composition, Standard Treatment*

Measure	*N*	*M*	*SD*
Pre			
Fat (Kg)	24	34.75	9.40
Lean (Kg)	24	42.30	7.92
Percent Fat	24	43.49	5.33
8-Weeks			
Fat (Kg)	24	34.72	9.57
Lean (Kg)	24	42.96	8.19
Percent Fat	24	42.96	5.24
6-Months			
Fat (Kg)	24	34.27	8.45
Lean (Kg)	24	42.62	7.17
Percent Fat	24	42.90	5.51
12-Months			
Fat (Kg)	24	35.40	7.96
Lean (Kg)	24	44.54	8.22
Percent Fat	24	42.78	5.96

Table 19: *Descriptive Statistics for Total Body Composition, Health Coach*

Measure	*N*	*M*	*SD*
Pre			
Fat (Kg)	27	32.77	9.43
Lean (Kg)	27	39.94	5.43
Percent Fat	27	43.05	6.94
8-Weeks			
Fat (Kg)	27	30.58	6.36
Lean (Kg)	27	39.96	6.04
Percent Fat	27	41.78	6.23
6-Months			
Fat (Kg)	27	32.79	9.44
Lean (Kg)	27	41.58	6.81
Percent Fat	27	42.28	6.76
12-Months			
Fat (Kg)	27	33.81	9.91
Lean (Kg)	27	42.79	7.81
Percent Fat	27	42.31	7.33

Trunk fat mass.

Descriptive statistics for kilograms of trunk fat mass, trunk lean mass and percent trunk fat are presented in Table 20 for the Standard Treatment group and Table 21 for the Health Coach group, respectively. Neither group was statistically different at pre-test. There was a significant increase in trunk fat mass for the Standard Treatment group from pre- to 12-months (p = .002, d = 0.14) , 95 % CI [-.266, -.059], and from 8-weeks to 12-months (p = .001, d = 0.26) , 95 % CI [-.279, -.069]. The Standard Treatment group displayed a significant increase in trunk fat mass over time (p = .004, d = 0.13). There was no significant change in trunk fat for the Health Coach group (p > .05).

Trunk lean mass.

There was a significant increase in trunk lean mass from pre- to 12-months (p = .001, d = 0.34) , 95 % CI [-.455, -.166], from 8-weeks to 12-months (p = .005, d = 0.18) , 95 % CI [-.356, -.063] , and from 6-months to 12-months (p = .002, d = 0.33) , 95 % CI [-.394, -.093] , for the Standard Treatment group. The Health Coach group significantly increased trunk lean mass from pre- to 12-months (p = .001, d = 0.33) , 95 % CI [-.409, -.122], pre to 6-months (p = 0.018, d = 0.20) , 95 % CI [.030, .317], and from 8-weeks to 12-months (p = .003, d = 0.25) , 95 % CI [.079, .379]. Both the Standard Treatment and Health Coach group significantly increased lean mass over time; Standard Treatment (p = .001, d = 0.30), Health Coach (p = .001, d = 0.29).

Trunk percent fat.

The Health Coach group significantly decreased percent trunk fat from pre- to 12-months (p = .009, d = 0.15), 95 % CI [.068, .471]. Furthermore, the Health Coach group significantly reduced trunk percent fat over time (p = .044, d = 0.15). There was a non-significant change in percent trunk fat for the Standard Treatment group (p > .05).

Table 20: *Descriptive Statistics for Trunk Composition, Standard Treatment*

Measure	*N*	*M*	*SD*
Pre			
Fat Trunk (Kg)	28	18.34	6.59
Lean Trunk (Kg)	28	20.47	4.53
Percent Fat	28	45.61	6.49
8-Weeks			
Fat Trunk (Kg)	28	18.34	6.42
Lean Trunk (Kg)	28	21.08	4.70
Percent Fat	28	44.96	6.24
6-Months			
Fat Trunk (Kg)	28	17.54	4.97
Lean Trunk (Kg)	28	20.32	4.71
Percent Fat	28	44.65	5.73
12-Months			
Fat Trunk (Kg)	28	19.23	6.08
Lean Trunk (Kg)	28	21.99	5.17
Percent Fat	28	45.35	6.56

Table 21: *Descriptive Statistics for Trunk Composition, Health Coach*

Measure	*N*	*M*	*SD*
Pre			
Fat Trunk (Kg)	28	16.76	6.58
Lean Trunk (Kg)	28	19.14	3.74
Percent Fat	28	44.57	7.98
8-Weeks			
Fat Trunk (Kg)	28	16.12	5.84
Lean Trunk (Kg)	28	19.29	4.10
Percent Fat	28	43.80	7.26
6-Months			
Fat Trunk (Kg)	28	16.65	6.42
Lean Trunk (Kg)	28	19.96	4.16
Percent Fat	28	43.68	7.37
12-Months			
Fat Trunk (Kg)	28	17.24	6.54
Lean Trunk (Kg)	28	20.38	4.36
Percent Fat	28	43.36	7.69

Bone mass.

Descriptive statistics for total bone mass are presented in Table 22. Neither group was significantly different at pre-test. Both groups experienced a significant increase in total bone mass from pre- to 12-months ($p < .001$). Expressed in terms of percent change, the Health Coach group had an increase of 6.7% ($d = 0.39$), 95 % CI [-.530, -.213], and the Standard Treatment group had an increase of 7.5%, ($d = 0.42$) , 95 % CI [-.670, -.320].

Table22: *Descriptive Statistics for Bone Mass*

Group / Time	*N*	*M (Kg)*	*SD (Kg)*
Standard Treatment			
Pre-	24	2.39	.43
8-Weeks	24	2.44	.43
6-Months	24	2.45	.40
12-Months	24	2.57	.35
Health Coach			
Pre-	27	2.36	.41
8-Weeks	27	2.33	.40
6-Months	27	2.39	.39
12-Months	27	2.52	.45

Body mass index.

Descriptive statistics for BMI-Z scores are presented in Table 23. Neither group was significantly different at pre-test. The Health Coach group experienced a significant decrease in BMI-Z score from pre to 12-months ($p = .03$, $d = 0.77$), 95 % CI [.005, .101], and from pre to 6-months ($p = .039$, $d = 0.71$), 95 % CI [.003, .099]. There was a non-significant change in BMI-Z score for the Standard Treatment group ($p > .05$).

Table 23: *Descriptive Statistics for BMI-Z scores*

Group/Time	*N*	*M*	*SD*
Standard Treatment			
Pre-	24	2.02	.08
8-Weeks	24	2.00	.08
6-Months	24	1.98	.08
12-Months	24	2.00	.08
Health Coach			
Pre-	27	1.91	.07
8-Weeks	27	1.87	.07
6-Months	27	1.86	.07
12-Months	27	1.85	.07

Physical Activity

A 4 (time) X 2 (group) mixed/split plot linear mixed model ANOVA was used to evaluate physical activity differences across the adolescent groups. Physical activity was assessed by uni-axial accelerometers. Data were collected from both groups at pre-, 8-weeks, 6-months and 12-months. Intention-to-treat analysis was used to account for missing data for participants that withdrew from the study after completion of at least pre-assessment. ITT was not considered when preceding data set was not available. For the data to be included in analyses, at least 10 hours of data had to be available for four of the five weekdays. Weekend data was included when both days were included. Average weekday and weekend counts per hour were then calculated separately and averaged to provide an indication of overall total week activity. Data downloaded from accelerometers were subsequently reduced and expressed as minutes per hour.

Total light-, moderate- and vigorous-intensity total week activity.

Descriptive statistics for total week and weekday physical activity are presented in Table 24 for the Standard Treatment group and Table 25 for the Health Coach group. Descriptive statistics for total weekend physical activity are presented in Table 26 for the Standard Treatment group and Table 27 for the Health Coach group. Neither group was significantly different at pre-test. Data showed a non-significant difference in light-intensity weekday activity between Health Coach and Standard Treatment groups at pre, 8-weeks, 6-months and 12-months. The Standard Treatment group experienced a significant reduction in light-intensity weekday activity from pre- to 12-months (p = .008, d = 2.71), 95 % CI [48.223, 430.967]. There was a non-significant change in total moderate-intensity week activity for both groups ($p > .05$). The Health Coach group significantly increased total week vigorous-intensity activity from pre- to 6-months (p = .002, d = 0.61), 95 % CI [-15.545, -3.598], and decreased vigorous-intensity activity from 6-months to 12-months (p = .019, d = 0.35), 95 % CI [1.193, 12.808]. There was a non-significant change in vigorous-intensity week activity for the Standard Treatment group across assessment periods. The Health Coach group had a significant change in vigorous total week activity over time (p = .016, d = 0.14).

Light-, moderate- and vigorous-intensity weekday activity.

Data analysis showed a significant decrease in weekday light activity for the Standard Treatment group from pre-to 12-months (p = .015, d = 1.5) , 95 % CI [48.223, 430.967], and a non-significant change in light-intensity weekday activity for the Health Coach group across assessment periods ($p > .05$). The Standard Treatment group showed a significant increase in weekday moderate activity from 8-weeks to 12-

months (p = .044, d = 0.40), 95 % CI [-84.574,-1.210]. The Health Coach group showed a non-significant change in weekday moderate-intensity activity across the assessment periods (p > .05). The Health Coach group showed a significant increase in weekday vigorous-intensity activity from pre- to 6-months (p= .001, d = 1.53) , 95 % CI [-12.958, -3.262], and 8-weeks to 6-Months (p = .047, d = 0.96) , 95 % CI [-11.284, -.073], but decreased vigorous-intensity activity from 6-months to 12-months (p= .030, d = 0.31) , 95 % CI [.509, 9.945]. There was a non-significant change in vigorous-intensity weekday activity for the Standard Treatment group across assessment periods (p > .05). The Health Coach group had a significant change in vigorous weekday activity over time (p = .012, d = 0.39).

Light, moderate and vigorous-intensity weekend activity.

There was a non-significant change in light-intensity weekend activity for the Standard Treatment and the Health Coach group across the assessment periods. Moderate-intensity weekend activity significantly increased in the Standard Treatment group from pre- to 8-weeks (p = .001, d = 0.65), 95 % CI [-67.424, -19.749], and from pre to 6-months (p = .012, d = 0.47), 95 % CI [-52.843, -6.626]. There was a significant decrease in moderate-intensity activity for the Standard Treatment group from post to 12-months (p = .002, d = 0.35), 95 % CI [10.122, 44.840]. The Standard Treatment group had a significant change in weekend moderate intensity activity overtime (p = .001, d = 1.23). There was a non-significant change in moderate-intensity weekend activity for the Health Coach group across the assessment periods (p > .05). Vigorous-intensity weekend activity data showed no significant change for the Standard Treatment and Health Coach groups across the assessment periods (p > .05).

Table 24: *Descriptive Statistics for Physical Activity, Standard Treatment, Week, Weekday*

Minutes	*N*	*M*	*SD*
Pre-			
Light Week	6	5307.33	161.20
Moderate Week	6	278.00	150.78
Vigorous Week	6	4.67	6.50
Light Weekday	6	3577.67	189.54
Moderate Weekday	6	228.17	115.28
Vigorous Weekday	6	4.17	6.11
8-Weeks			
Light Week	11	5026.18	348.64
Moderate Week	11	260.73	152.14
Vigorous Week	11	4.00	5.29
Light Weekday	11	3448.27	248.79
Moderate Weekday	11	186.64	123.59
Vigorous Weekday	11	3.27	4.19
6-Months			
Light Week	12	4936.58	396.12
Moderate Week	12	287.92	163.22
Vigorous Week	12	10.50	15.38
Light Weekday	12	3329.25	271.90
Moderate Weekday	12	212.08	122.17
Vigorous Weekday	12	8.67	13.91
12-Months			
Light Week	16	4870.44	463.87
Moderate Week	16	292.75	168.84
Vigorous Week	16	8.06	8.49
Light Weekday	16	3278.38	330.02
Moderate Weekday	16	235.81	142.64
Vigorous Weekday	16	7.06	8.88

Table 25: *Descriptive Statistics for Physical Activity, Standard Treatment, Weekend*

Minutes	*N*	*M*	*SD*
Pre-			
Light Weekend	6	1729.67	130.31
Moderate Weekend	6	49.83	37.07
Vigorous Weekend	6	.50	.54
8-Weeks			
Light Weekend	11	1577.91	172.04
Moderate Weekend	11	74.09	42.08
Vigorous Weekend	11	.73	1.55
6-Months			
Light Weekend	12	1607.33	158.89
Moderate Weekend	12	75.83	61.40
Vigorous Weekend	12	1.83	4.87
12-Months			
Light Weekend	16	1592.06	198.14
Moderate Weekend	16	56.94	51.97
Vigorous Weekend	16	1.00	1.31

Table 26: *Descriptive Statistics for Physical Activity, Health Coach, Week, Weekday*

Minutes	*N*	*M*	*SD*
Pre-			
Light Week	22	5215.73	411.30
Moderate Week	22	206.36	104.27
Vigorous Week	22	5.18	13.59
Light Weekday	22	3484.95	292.79
Moderate Weekday	22	161.55	90.60
Vigorous Weekday	22	2.59	5.13
8-Weeks			
Light Week	22	5277.85	188.77
Moderate Week	22	198.92	123.70
Vigorous Week	22	6.31	7.98
Light Weekday	22	3550.15	178.74
Moderate Weekday	22	156.15	103.59
Vigorous Weekday	22	4.46	6.24
6-Months			
Light Week	22	5232.60	330.93
Moderate Week	22	238.05	120.56
Vigorous Week	22	13.35	18.10
Light Weekday	22	3564.10	229.85
Moderate Weekday	22	175.45	75.83
Vigorous Weekday	22	10.45	14.57
12-Months			
Light Week	22	5070.12	395.93
Moderate Week	22	237.79	113.10
Vigorous Week	22	7.08	11.24
Light Weekday	22	3424.96	299.97
Moderate Weekday	22	174.13	77.58
Vigorous Weekday	22	5.92	10.17

Table 27: *Descriptive Statistics for Physical Activity, Health Coach, Weekend*

Minutes	*N*	*M*	*SD*
Pre-			
Light Weekend	22	1730.77	172.20
Moderate Weekend	22	44.82	29.93
Vigorous Weekend	22	2.59	11.04
8-Weeks			
Light Weekend	22	1727.69	124.17
Moderate Weekend	22	42.77	32.82
Vigorous Weekend	22	1.85	4.27
6-Months			
Light Weekend	22	1668.50	208.75
Moderate Weekend	22	62.60	63.31
Vigorous Weekend	22	2.90	8.13
12-Months			
Light Weekend	22	1645.17	164.38
Moderate Weekend	22	63.67	55.95
Vigorous Weekend	22	1.17	4.06

Nutritional Intake

Descriptive statistics for daily energy intake, saturated fat and glycaemic load are presented in Table 28 for the Standard Treatment group and Table 29 for the Health Coach group. Neither group was significantly different at pre-test. Nutritional intake was assessed using the Victorian Cancer Council Food Frequency Questionnaire. A 4 (time) x 2 (group) mixed/split plot linear mixed model ANOVA was used to evaluate nutritional intake differences across the adolescent groups. Nutritional analysis was undertaken to measure dietary food quantity and quality. Adolescent dietary behaviours were included in session four of the Health Coach intervention.

Total energy, saturated fat and glycaemic load intake.

Analysis of the data showed a significant decrease in total energy intake for the Standard Treatment group from pre- to 8-weeks (p = .048, d = 0.45), 95 % CI [7.689, 2235.297]. There was a significant increase in energy intake for the Health Coach group from 8-weeks to 12-months (p = .036, d = 0. 10), 95 % CI [-2068.540, -73.135]. Analysis of saturated fat intake showed that the Standard Treatment had not significantly changed consumption across the assessment periods (p > .05). In contrast, the Health Coach group significantly decreased saturated fat intake from pre- to 8-weeks (p = .017, d = 0.55), 95 % CI [1.138, 11.603]. Analysis of glycaemic load for the Standard Treatment group showed a significant decrease from pre- to 8-weeks (p = .005, d = 0.37), 95 % CI [6.375, 35.037], and from pre- to 6-months (p= .025, d = 0.51) , 95 % CI [2.063, 30.933]. The Standard Treatment group had a significant change in glycaemic load over time (p = .034, d = 0.39). There was a non-significant change in glycaemic load for the Health Coach group across the assessment periods (p > .05).

Table 28: *Daily Intake of Energy, Saturated Fat and Glycaemic Load, Standard Treatment*

Nutrient	*N*	*M*	*SD*
Pre-			
Energy-kJ/day	19	8.15	3.66
Saturated Fat-g/day	19	34.41	17.73
Glycaemic Load	19	112.57	52.11
8-Weeks			
Energy-kJ/day	19	6.37	2.45
Saturated Fat-g/day	19	26.52	13.58
Glycaemic Load	19	83.26	28.65
6-Months			
Energy-kJ/day	19	6.04	1.71
Saturated Fat-g/day	19	23.25	11.44
Glycaemic Load	19	84.77	24.68
12-Months			
Energy-kJ/day	19	6.50	2.48
Saturated Fat-g/day	19	25.22	13.18
Glycaemic Load	19	93.44	35.71

Glycaemic load = (Glycaemic Index times the amount of available carbohydrate) divided by 100

Table 29: *Daily Intake of Energy, Saturated Fat and Glycaemic Load, Health Coach*

Nutrient	*N*	*M*	*SD*
Pre-			
Energy-kJ/day	24	7.70	3.23
Saturated Fat-g/day	24	32.39	14.82
Glycaemic Load	24	100.15	40.49
8-Weeks			
Energy-kJ/day	24	6.64	2.11
Saturated Fat-g/day	24	24.21	9.00
Glycaemic Load	24	93.48	37.16
6-Months			
Energy-kJ/day	24	6.57	3.30
Saturated Fat-g/day	24	25.92	15.93
Glycaemic Load	24	90.62	45.08
12-Months			
Energy-kJ/day	24	6.85	3.43
Saturated Fat-g/day	24	24.95	15.60
Glycaemic Load	24	92.30	39.96

Glycaemic load = (Glycaemic Index times the amount of available carbohydrate) divided by 100.

Daily intake of calcium, magnesium, potassium, sodium and vitamin-C.

Descriptive statistics for daily intake of calcium, magnesium, and potassium are presented in Table 30 for the Standard Treatment and Table 31 for the Health Coach group. Descriptive statistics for daily intake of sodium and vitamin-C intake are presented in Table 32 for the Standard Treatment and Table 33 for the Health Coach group. Neither group was significantly different at pre-test. The analysis of daily calcium, potassium, sodium and vitamin-C intake revealed a non-significant change for the Standard Treatment and Health Coach groups across the assessment period ($p >$ .05). Analysis of magnesium consumption revealed a significant decrease in intake for the Standard Treatment group from pre- to 8-weeks (p = .016, d = 0.57), 95 % CI [8.293 78.935], and from pre- to 6-months (p= .046, d = 0.57), 95 % CI [.597, 71.734].

There was a non-significant change in magnesium consumption across the assessment periods for the Health Coach group ($p > .05$).

Table 30: *Daily Intake of Calcium, Magnesium and Potassium, Standard Treatment*

Nutrient, (Milligrams)	*N*	*M*	*SD*
Pre			
Calcium	19	1000.01	301.11
Magnesium	19	293.74	105.97
Potassium	19	2.79	1.02
8-Weeks			
Calcium	19	927.72	435.73
Magnesium	19	235.05	79.95
Potassium	19	2.35	893.05
6-Months			
Calcium	19	837.33	207.41
Magnesium	19	233.12	44.97
Potassium	19	2.29	522.22
12-Months			
Calcium	19	734.75	272.11
Magnesium	19	233.56	75.85
Potassium	19	2.31	833.91

Table 31: *Daily Intake of Calcium, Magnesium and Potassium, Health Coach*

Nutrient, (Milligrams)	*N*	*M*	*SD*
Pre			
Calcium	24	875.81	319.07
Magnesium	24	274.61	117.08
Potassium	24	2.71	908.27
8-Weeks			
Calcium	24	760.33	268.63
Magnesium	24	252.04	79.51
Potassium	24	2.44	710.24
6-Months			
Calcium	24	686.45	346.13
Magnesium	24	233.98	100.35
Potassium	24	2.37	992.75
12-Months			
Calcium	24	781.70	375.74
Magnesium	24	244.00	99.93
Potassium	24	2.42	950.85

Table 32: *Daily Intake of Sodium and Vitamin-C, Standard Treatment*

Nutrient, (Milligrams)	*N*	*M*	*SD*
Pre			
Sodium	19	2.68	1.20
Vitamin-C	19	110.81	62.06
8-Weeks			
Sodium	19	2.12	737.04
Vitamin-C	19	103.90	80.45
6-Months			
Sodium	19	2.05	612.27
Vitamin-C	19	105.36	62.70
12-Months			
Sodium	19	2.24	889.35
Vitamin-C	19	108.65	72.72

Table 33: *Daily Intake of Sodium and Vitamin-C, Health Coach*

Nutrient, (Milligrams)	*N*	*M*	*SD*
Pre			
Sodium	24	2.75	1.33
Vitamin-C	24	114.91	58.10
8-Weeks			
Sodium	24	2.44	1.32
Vitamin-C	24	102.08	40.89
6-Months			
Sodium	24	2.38	1.31
Vitamin-C	24	113.67	53.98
12-Months			
Sodium	24	2.47	1.43
Vitamin-C	24	104.46	44.58

Soft drink.

Descriptive statistics for soft drink consumption are presented in Table 34. Soft drink consumption was measured via a separate question attached to the food frequency questionnaire. Neither group was significantly different at pre-test. Analysis showed the Health Coach group significantly increased their soft drink intake from pre- to 6-months (p = .043, d = 0.39), 95 % CI [-1.166, -.020], from pre- to 12-months (p= .04, d = 0.50), 95 % CI [-1.413, -.270], and from 8-weeks to 12-months (p = .024, d = 0.14), 95 % CI [-1.298, -.093]. There was a non-significant change in soft drink consumption for the Standard Treatment groups across the assessment periods (p > .05).

Table 34: *Daily Consumption of 187.5 millilitre units of Soft Drink*

Time	*N*	*M*	*SD*
Standard Treatment			
Pre	25	3.80	2.27
8-Weeks	25	3.76	2.29
6-Months	25	3.46	2.37
12-Months	25	3.82	2.34
Health Coach			
Pre	27	3.19	1.03
8-Weeks	27	3.37	1.52
6-Months	27	3.78	1.88
12-Months	27	4.00	2.03

Impact of weight on quality of life (IWQOL).

The IWQOL comprises five subscales including body esteem, physical comfort, family relations, social life and total quality of life. A 4 (time) x 2 (group) mixed/split plot linear mixed model ANOVA was used to evaluate change in quality of life scores.

Descriptive statistics for physical comfort body esteem and social life are presented in Table 35 for the Standard Treatment group and Table 36 for the Health Coach group. Neither group was significantly different at pre-test. Analysis of the data showed no change in physical comfort or for both Standard Treatment and Health Coach groups across the assessment periods ($p > .05$). Scores for body esteem revealed a significant increase for the Standard Treatment group from pre- to 12-months ($p = .038$, $d = 0.34$) , 95 % CI [-13.301, -.386], with the Health Coach group significantly increasing body esteem scores from pre- to 8-weeks ($p = .028$, $d = 0.39$) , 95 % CI [-14.174, -.839], and from pre- to 12-months ($p = .026$, $d = 0.30$) , 95 % CI [-13.501, -.890]. Social life scores showed increases for the Health Coach group from pre- to 8-weeks ($p = .043$, $d = 0.39$), 95 % CI [-10.684, -.165], pre- to 6- months ($p = .002$, $d = 0.40$), 95 % CI [-13.008, -3.041], and from pre- to 12-months ($p = .017$, $d = 0.29$) , 95 % CI [-11.058, -1.108]. There was a non-significant change in social life scores for the Standard Treatment group across the assessment periods. The Health Coach group had a significant change in social life over time ($p = .013$, $d = 0.27$).

Table 35: *Descriptive Statistics for Physical Comfort, Body Esteem and Social Life, Standard Treatment*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Physical Comfort	25	84.00	19.86
	Body Esteem	25	63.16	27.29
	Social Life	25	81.33	23.96
8-Weeks				
	Physical Comfort	25	88.10	17.97
	Body Esteem	25	70.88	23.07
	Social Life	25	81.83	24.05
6-Months				
	Physical Comfort	25	87.50	19.79
	Body Esteem	25	66.66	20.48
	Social Life	25	84.29	23.37
12-Months				
	Physical Comfort	25	87.79	19.99
	Body Esteem	25	71.03	21.25
	Social Life	25	84.52	22.39

Table 36: *Descriptive Statistics for Physical Comfort, Body Esteem and Social Life, Health Coach*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Physical Comfort	27	86.69	13.95
	Body Esteem	27	53.36	25.97
	Social Life	27	80.24	23.95
8-Weeks				
	Physical Comfort	27	88.55	11.24
	Body Esteem	27	63.08	23.77
	Social Life	27	86.37	17.59
6-Months				
	Physical Comfort	27	89.47	10.73
	Body Esteem	27	59.67	25.84
	Social Life	27	88.27	15.80
12-Months				
	Physical Comfort	27	87.32	17.68
	Body Esteem	27	61.11	25.94
	Social Life	27	86.60	20.20

Descriptive statistics for family relations and total quality of life scores are presented in Table 37 for the Standard Treatment group and Table 38 for the Health Coach group. Neither group was significantly different at pre-test. Total quality of life scores showed significant increases for the Standard Treatment group from pre- to 12-months (p= .046, d = 0.30) , 95 % CI [-8.463, -.084]. Additionally, there were increases in total quality of life scores for the Health Coach group from pre- to 8-weeks (p = .035, d = 0.22) , 95 % CI [-8.865, -.337], and from pre- to 6-months (p = .025, d = 0.34) , 95 % CI [-8.810, -.608]. There was no significant change in family relations scores across the assessment periods for both the Standard Treatment and Health Coach groups (p > .05).

Table 37: *Descriptive Statistics for Family Relations and Total Impact of Weight on Quality of Life (IWQOL), Standard Treatment*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Family Relations	25	87.66	19.26
	Total (IWQOL)	25	77.30	18.76
8-Weeks				
	Family Relations	25	89.74	15.51
	Total (IWQOL)	25	81.83	15.18
6-Months				
	Family Relations	25	90.86	14.24
	Total (IWQOL)	25	80.59	13.58
12-Months				
	Family Relations	25	91.66	14.87
	Total (IWQOL)	25	82.34	14.48

Table 38: *Descriptive Statistics for Family Relations and Total Impact of Weight on Quality of Life, Health Coach*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Family Relations	27	94.59	8.78
	Total (IWQOL)	27	75.90	14.68
8-Weeks				
	Family Relations	27	92.53	14.06
	Total (IWQOL)	27	81.27	13.44
6-Months				
	Family Relations	27	95.43	10.15
	Total (IWQOL)	27	80.60	12.55
12-Months				
	Family Relations	27	91.66	18.53
	Total (IWQOL)	27	79.40	17.05

Eating disorder inventory – 3 (EDI 3).

A 4 (time) X 2 (group) analyses of variance (ANOVA) was conducted to assess changes in eating disorder risk for the adolescent groups. Subscales analysed were drive for thinness, bulimia, and body dissatisfaction. Descriptive statistics for drive for thinness, bulimia and body dissatisfaction are presented in Table 39, Table 40 and Table 41 respectively. There were no significant reductions in change for drive for thinness, bulimia and body dissatisfaction scores for across the assessment periods for both the Standard Treatment and Health Coach groups ($p > .05$).

Table 39: *Descriptive Statistics for EDI – 3: Drive for Thinness*

Time	*N*	*M*	*SD*
Standard Treatment			
Pre	28	9.07	6.17
8-Weeks	28	9.32	6.27
6-Months	28	8.50	6.43
12- Months	28	8.32	6.70
Health Coach			
Pre-	28	10.46	6.42
8-Weeks	28	9.43	6.42
6-Months	28	8.79	7.50
12- Months	28	9.00	7.59

Table 40: *Descriptive Statistics for EDI – 3: Bulimia*

Time	*N*	*M*	*SD*
Standard Treatment			
Pre-	28	4.79	3.40
8-Weeks	28	3.96	3.73
6-Months	28	3.43	3.36
12- Months	28	2.79	3.41
Health Coach			
Pre-	28	5.68	4.81
8-Weeks	28	4.14	4.10
6-Months	28	2.82	3.11
12- Months	28	3.61	3.88

Table 41: *Descriptive Statistics for EDI – 3: Body Dissatisfaction*

Time	*N*	*M*	*SD*
Standard Treatment			
Pre-	28	22.36	10.22
8-Weeks	28	20.68	10.09
6-Months	28	19.64	9.91
12- Months	28	18.21	10.90
Health Coach			
Pre-	28	25.29	9.80
8-Weeks	28	22.36	10.79
6-Months	28	21.21	10.67
12- Months	28	21.14	11.13

Program Satisfaction Measures

A 3 (time) X 2 (group) analyses of co-variance (ANCOVA) was conducted to assess changes in program satisfaction for the adolescent groups. Motivation and convenience of centre location was chosen as a covariate in the analysis. Participants completed consumer satisfaction questionnaires to measure program acceptance at all time points (except baseline). Satisfaction questionnaires differed for both adolescent groups as the interventions they underwent differed and required a question related to each intervention. Satisfaction measures for the Standard Treatment group aimed to assess the experiences of the adolescent when using the fitness centre environment, support received from staff and its suitability for their situation. Given that there have been no validated measures to assess such an intervention, customer satisfaction measures were created by the researchers or modified from previous work (Brennan, Walkley et al., 2012a). Participants responded to a set of questions on a 5-point Likert scale (1 = “strongly disagree”, 2 = “disagree”, 3 = “neither agree or disagree”, 4 = “agree” and 5 = “strongly agree”). Satisfaction measures for the Health Coach group

aimed to assess the acceptability of the Health Coach as a supportive agent and the usefulness of the intervention strategies.

Satisfaction measure: standard treatment.

Descriptive statistics for the Standard Treatment group satisfaction with treatment are presented in Table 42. Inspection of the satisfaction questionnaire data revealed Standard Treatment participants initially reported their satisfaction of the fitness centre and staff with the treatment to be high, with a trend toward diminishing satisfaction associated with increasing variability in satisfaction. Analysis for change over time revealed a non-significant change for the Standard Treatment group F (1, 40.48) = 0.86, p = .43, d = 0.94).

Table 42: *Treatment Evaluation, Standard Treatment*

	N	*M*	*SD*
8-Weeks			
	23	4.16	.59
6-Months			
	20	4.06	.68
12-Months			
	23	3.60	.74

Satisfaction measures: health coach.

Participants in the Health Coach intervention completed two separate satisfaction measures; one related to their satisfaction with the treatment program, and another related to their satisfaction with the Health Coach who delivered the treatment program to them. Descriptive statistics for the Health Coach group satisfaction with

treatment measure are presented in Table 43. Analysis for change over time revealed no significant change in the satisfaction with treatment (F (1, 43.28) = 3.09, p = .056, d = .17. With regard to the satisfaction of Health Coach group participants with the Health Coach who delivered the treatment to them, analysis for change over time revealed no significant change (F (1, 43.28) = 3.09, p = .056, d = 0.18).

Table 43: *Treatment Evaluation, Health Coach*

Measure	*N*	*M*	*SD*
	8-Weeks		
Health Coach	19	4.54	.52
Program	20	3.35	.55
	6-Months		
Health Coach	22	4.66	.57
Program	23	3.44	.44
	12-Months		
Health Coach	21	3.50	.89
Program	25	3.25	.56

DISCUSSION

The Your Choice program was designed to provide a community-based intervention in adolescent weight management. In this study, the effect of an Exercise Leader (Health Coach) led, CBT-based program on physical and behavioural attributes of OWOB adolescents aged 12 to16 years was investigated. The Health Coach delivered Your Choice intervention was compared to a Standard Treatment intervention. A comprehensive review of the literature was unable to identify a program where Exercise Leaders, as sole delivery agents, had previously implemented a CBT-based program; therefore this research appears to be the first to investigate this approach.

Body composition.

Body composition change was the primary outcome measure for this research. Given that the Your Choice intervention targeted both dietary and physical activity behaviours, which in turn were likely to change both lean and fat mass body composition, Dual-energy X-ray Absorptiometry (DEXA) was chosen to provide an objective reference of body fat, bone density and muscle mass. DEXA had previously been used with adults and adolescents (Goran, Gower et al., 1998; Eissa, Dai et al., 2009; Lohman, Tallroth et al., 2009).

In this investigation, percent total body fat reduction across 12-months was significant for the Health Coach group, showing a 1.7 % decrease. Whereas, the Standard Treatment group showed a non-significant reduction of 1.6% over 12-months. In contrast, percent trunk fat change across 12-months was significantly reduced in the Health Coach group (-2.7%), and a non-significant reduction in the Standard Treatment

group (-0.57%). Therefore, percent fat loss was more pronounced in the Health Coach group, which may indicate a greater compliance to the Your Choice CBT-based program as compared to compliance with the Standard Treatment program. Alternatively, it may be that the foci of the Health Coach, whereby elements of healthy activity, healthy eating coupled with adolescent management of behaviour with the support of their family, proved a more salient intervention than the exercise focussed approach encouraged by the Standard Treatment program. The positive central adiposity decrease achieved by the Health Coach group is meaningful, as this reduction may lower the risk for adolescents of developing Type II Diabetes, dyslipidaemia and cardiovascular disease, as has been recently proposed (Foster, Linder et al., 2010; Garnett, Baur et al., 2011).

During the initial eight weeks of the intervention, the percent total fat decrease in the Health Coach group was 3.0%, with some of this improvement in body composition not being retained through to 6-months, at which time the percent total fat decrease from pre to 6-months was 1.8%. A possible explanation for this may be associated with the regular weekly contact between the adolescent and their supporting parent with the Health Coach, and heightened motivation toward engaging in healthy eating and healthy activity behaviours during the early phase of the intervention. Additionally, the adolescent was also likely to feel a level of responsibility toward the Health Coach, which could explain compliance to healthy behaviours which in turn may have contributed to improved total percent fat. This explanation is plausible given that contact was restricted to two follow-up telephone calls after the initial eight face-to-face meeting period and through to the 6-month assessment, at which time a rebound was observed. An interesting finding was that stabilisation of total percent fat occurred after 6-months, with the change from pre-intervention assessment in total percent fat at

6-months and at 12-months being very small and non-significant (+0.03%). This finding is suggestive of stability in relation to behaviour related to healthy activity and healthy eating, and likely indicates the retention of newly acquired healthier behaviours be adolescents had occurred as a result of the Your Choice program.

Although total body and trunk percent fat was non-significantly changed for the Standard Treatment group over 12-months, its downward trend is a matter for discussion. The non-significant decrease in total percent body fat may be the result of less one-on-one contact the adolescent received while undertaking the intervention in a fitness centre, as is typical of standard treatment in the fitness industry. Alternatively, this result may reflect the 'energy expenditure through exercise' feature of Standard Treatment in the fitness industry that places less emphasis on the role of healthy eating and reductions in sedentary behaviour throughout each day. At 12-months percent total fat decrease from pre-assessment was similar but significant for the Health Coach (1.72%) and non-significant for the Standard Treatment groups (1.63%). A variety of explanations may account for this finding. It may be that energy imbalance was achieved in the Standard Treatment group through an increased energy expenditure associated with exercise training during fitness centre visits, which may have been supplemented by the participants by other exercise-related activities at other times and places. Further, the Standard Treatment group may have received nutritional and physical activity advice from staff, or been exposed to promotions or resources linked to nutritional advice, at the fitness centre they attended. In research involving free living participants, influences such as these are not able to be controlled, and these matters may have had an impact on the results achieved in this research.

Combined, the total percent fat decrease achieved by the Health Coach group is noteworthy, and contrasts with related research yet adds support to the findings of

similar research. In a study by Luban's et al (2012), a 10.6% change increase in percent total body fat had occurred at 12-months in a school-based behavioural trial with 12 to 14 year old adolescent girls. In the same trial, the control group experienced a 15% increase in total body fat, although generalisation to the current research could be considered limited as body fat was derived by bioelectrical impedance, and comprised a female only cohort (Lubans, Morgan et al., 2012). Additionally, percent total body fat did not significantly change during a community-based family-oriented weight loss trial involving 116 children aged 10.3 years at 6-months (Sacher, Kolotourou et al., 2010) .

Significant percent total fat loss has previously been observed at comparable time points in similar interventions that included a CBT-base and when led by psychologists (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). In the current study, total body fat percent reduction for the Health Coach group was 1.8% at 6-months, whereas, the work by Brennan and co-workers showed a percent total fat decrease of 8% across the same period, and Tsiros and colleagues achieved a 7.6 % decrease in total body fat at 5-months. The superior percent total fat decrease achieved in these psychologist led studies could be attributed to a various phenomenon, including: (1) intervention sessions being conducted on a University campus which necessitated and likely accentuated the motivation toward the program required of participants and their parents; (2) the advanced training of the psychologists that implemented the interventions (all of whom had completed or were undertaking post-graduate training in psychology); (3) close supervision and weekly debriefing from a highly experienced supervising psychologist regarding intervention adherence and procedures in the Brennan et al study; and (4) the additional contact with the adolescent and their supporting parent, which was12 face-to-face sessions, and seven telephone

calls for the work of Brennan et al and 10 face-to-face sessions, and five telephone calls for Tsiros et al study.

Although not a direct measure of adiposity, age and sex derived BMI-Z scores are largely used to estimate trends in epidemiology studies with children and adolescents who are OWOB (Olds, Tomkinson et al., 2010; Shrewsbury, Nguyen et al., 2011). In the current study BMI-Z scores decreased non-significantly from 2.02 to 2.00 for the Standard Treatment group and significantly from 1.91 to 1.85 for the Health Coach group. Therefore, this gradual reduction in BMI-Z may indicate that the Health Coach led intervention can lead to a sustained improvement in the physical characteristics of OWOB adolescents. These results contrast with the work by Epstein and colleagues (2004) who showed a significant reduction of BMI-Z of 3.2 to 2.4 at 12-months in OWOB children aged 8 – 12 years, whereas the work by Murdoch in a family-supported behavioural study showed no significant change in BMI-Z of 3.16 to 3.10 in children aged 7 – 14 years at 6-months follow-up (Murdoch, Payne et al., 2011). Another study by Sacher et al investigated the impact of a group-delivered, parent-supported CBT-based program. The intervention comprised eighteen 2-hour group sessions, with an additional 12 free access sessions to a leisure centre. BMI-Z was reduced significantly from 2.77 to 2.47 after 6-months (Sacher, Kolotourou et al., 2010), although this study didn't account for changes in physical maturation over this time.

Positive BMI-Z and body composition changes for the Health Coach group across 12-months and the stabilization of BMI-Z in the Standard Treatment group across 12-months show that undertaking either intervention had an important effect. The importance of this outcome becomes apparent when comparison is made to similarly aged adolescents who have acted as no-treatment controls in studies where

BMI-Z was measured. One example is a recent study of 357 adolescent girls aged 12 to 14 years which found the control group across twelve months experienced a 0.8% increase in BMI-Z (Lubans, Morgan et al., 2012). Likewise, a study that included 29 adolescents aged 17.3 years who acted as a no treatment control group, BMI was observed to have increased from pre- to 8-months by 2.0%, and from pre- to 44-months by 5.51% (Weeks & Beck, 2012).

In summary, positive change in total body and trunk percent fat and in BMI-Z scores provides evidence in support of the Health Coach-delivered CBT-based program delivered to OWOB adolescents as compared to a standard treatment. DEXA derived results were supported by anthropometric measures which demonstrated significant reductions in BMI-for-age Z-score for the Health Coach group. While these results are promising, insufficient evidence exists to confidently conclude the effect of the approach, and further research will be required to resolve this matter.

Physical activity.

Physical activity can assist in the prevention of OWOB and weight regain (Wareham, van Sluijs et al., 2005; Wareham, 2007; Pearson, Atkin et al., 2009). In part, the research question asked if a CBT-based intervention when delivered by Health Coaches could result in improvements to the physical activity behaviours of OWOB adolescents. Therefore, physical activity behaviour was monitored by multi axial accelerometers (Actigraph®), across the assessment periods. The Actigraph® is a widely used accelerometer in physical activity research, and has been proved to be a valid measure in children, both in a controlled laboratory environment and during free-living (Corder, Brage et al., 2007; Dinesh & Freedson, 2012). Accelerometers

measured light, moderate and vigorous physical activity across weekday and weekend activities.

Amongst the main findings were initial significant improvements in vigorous weekday and vigorous total week activity for the Health Coach group during the first 6-months. However these levels returned to pre-intervention values at 12-months. A possible explanation for this may be the contact with the Health Coach over the initial eight weeks, where an emphasis on healthy physical activity being incorporated into daily living (e.g. across the total week) was promoted, led to early but non-sustained change in physical activity behaviour. Furthermore, two follow-up telephone calls post-intervention at three and four months post, may have served to remind adolescents of the importance of and motivate them to engage in physical activity, and could have acted to sustain this behaviour over the first six months of the study. With no Health Coach contact after six months, no prompt was available to reinforce physical activity behaviour, and as a consequence a decrease in physical activity occurred. Research by Hay and colleagues showed that accelerometer-derived vigorous physical activity was consistently associated with lower BMI-Z scores in a cross sectional study of 605 youth aged 9 to 17 years (Hay, Maximova et al., 2012). This finding supports the outcomes achieved in this study, and offers a plausible explanation for the BMI-Z reduction in the Health Coach cohort for whom vigorous physical activity had improved to 6 months, and coinciding with a BMI-Z decrease of 2.6% for the group.

In the Standard Treatment group moderate weekend activity increased from pre- to 6-months, neither weekday nor total week physical activity increased in the same timeframe. However, these increases had abated to baseline levels at 12-months. This could possibly be explained by the 6-months free access adolescents had to the leisure facility, which could have acted as an inducement to engage in physical activity during

periods of greater time availability, which for most adolescents would be during weekends. Additionally, there was no significant change in vigorous weekend or weekday physical activity for the Standard Treatment group, and this may have occurred for this group as the group did not receive as part of the intervention guidance and support to engage in physical activity as part of daily living (e.g. across the total week). It is important to highlight that only six adolescents (21%) of the Standard Treatment group complied with instructions to wear the accelerometer on seven consecutive days during each hour awake, and this poor compliance and limited data in turn limits generalisations and interpretations that can be made.

While very limited, some others have undertaken research whereby Exercise Leaders delivered a CBT-based intervention and improvements in physical activity occurred at 6-months (Annesi, Walsh et al., 2010). However, 12-month data was not collected from the adolescent cohort, and disconcertingly the study used self-reported physical activity measures and failed to report the accuracy of the approach, including physical activity intensity. Hence, caution is warranted when interpreting the results of the Annesi et al study, and comparison to the present study is problematic. One Australian study led by Tsiros et al. (2008) that used similar a physical activity measurement approach and psychologist delivered a CBT-based intervention to OWOB adolescents as the current study, found a non-significant change in accelerometer derived physical activity scores as compared to a no-treatment control at 20-weeks (Tsiros, Sinn et al., 2008). A recent Australian study by Luban's and colleagues showed non-significant changes in physical activity levels at 12-months for 12-14 year old adolescent girls involved in a multi-component school-based obesity prevention program (Lubans, Morgan et al., 2012). The Luban's et al. (2012) study offers a more appropriate comparison for the current study as the same accelerometers were used to

measure physical activity component and the intervention incorporated lifestyle behaviour modification, inclusive of the promotion of physical activity behaviour. In summary, improvements in physical activity were found for the initial six months among participants in the Health Coach group, but were not sustained through to twelve months.

Dietary intake.

Dietary intake plays a critical role in energy balance and can be manipulated to achieve effective weight management (Epstein, 1996; Swinburn, Caterson et al., 2004; Steinbeck, 2005). As the current study aimed to modify the dietary (healthy eating) behaviours of OWOB adolescents, it was important to monitor dietary intake, and this was achieved by the completion of the Victorian Cancer Council Food Frequency Questionnaire (FFQ) across the assessment periods.

Dietary intake data analysis was specifically focussed on identification of any change in total energy, saturated fat and glycaemic load across the assessment periods. The Standard Treatment group significantly reduced total energy intake from pre to 8-weeks and maintained this change until 12-months. In contrast, there was a significant increase in total energy intake from 8-weeks to 12-months for the Health Coach group. Subsequent analysis of saturated fat consumption showed a non-significant reduction for the Standard Treatment group across assessment points whereas the Health Coach group significantly decreased saturated fat intake from pre- to eight weeks and maintained that change to 12-months. Given that saturated fat has a high probability of contributing to OWOB (Davis & Carpenter, 2009) it was encouraging that both groups had either decreased (Health Coach) or not significantly changed consumption

(Standard Treatment) over the period. The analysis of glycaemic load data was undertaken to show the quality and quantity of carbohydrate, which in turn shows a relationship to blood glucose values (Kirk, Mutrie et al., 2004). Data analysis showed a decrease in glycaemic load for the Standard Treatment group from pre to 8-weeks and a further significant reduction from 8-weeks to 12-months. This finding is difficult to explain, but could be due to the adolescent's exposure to the fitness centre and its' employees through which nutrition-related advice could have been accessed. The non-significant decrease in glycaemic load and decrease in saturated fat for the Health Coach group could in part be due to the training of the Health Coaches who were encouraged to support adolescents to decrease energy dense foods and drinks (occasional foods), increase fruit and vegetable intake and decrease salty foods. Apart from a decrease in magnesium consumption for the Standard Treatment group from pre to 6-months, all remaining micronutrient levels were non-significantly changed for both groups across the assessment periods. This decrease in magnesium is difficult to explain but given the remaining micronutrient variables remained stable it may be due to the nature of FFQ assessment which is unable to detect small changes in diet (Kristal, Peters et al., 2005).

Even though the analysis showed decreases of FFQ derived saturated fat and glycaemic load over time for the Health Coach and Standard Treatment group respectively, many authors have argued that blood analysis offers a more robust approach to establishing macronutrient intake (Nansel, Iannotti et al., 2007; Nansel, Anderson et al., 2009). Even so, the FFQ is one of the most common methods used for large epidemiological studies (Hodge, Patterson et al., 2000), was used in a similar study to the current study (Tsiros, Sinn et al., 2008), and appeared appropriate for the

current research given the challenges and costs associated with blood collection and analysis for an adolescent cohort.

To further measure dietary behaviour a supplementary question was added to the FFQ regarding soft drink consumption. The results showed that a reduction in adiposity was associated with an increase in soft drink consumption in the CBT-oriented Health Coach cohort. An explanation for this may be the inability or unwillingness of adolescents to recall or accurately account for dietary (drink) consumption, a well-known limitation of self-reported dietary measures (Ludwig, Peterson et al., 2001). These results were interesting given that soft drink consumption has been associated with childhood and adolescent obesity in large epidemiology studies (Gill, Rangan et al., 2006; Malik, Schulze et al., 2006; Ebbeling, Feldman et al., 2012; Qi, Chu et al., 2012; Santaliestra-Pasias, Mouratidou et al., 2012). Additionally, Tsiros and colleagues found that a reduction in soft drink consumption was associated with decreases in DEXA derived body fat in adolescents in their psychologist-led CBT-based trial (Tsiros, Sinn et al., 2008). Such a finding was not evident in the current research. The non-significant change in soft drink consumption for the Standard Treatment group may suggest that admission to this program is unlikely to change soft drink consumption; this finding is consistent with the non-significant change in trunk fat and BMI-Z scores.

In summary, even though there were periodic changes in the consumption of energy intake, saturated fat intake, glycaemic load, and soft drink consumption all these changes appear inconsistent with adiposity analysis. This may suggest that participants did not accurately report dietary change or did not change their eating habits as represented on the FFQ. Another explanation may be that the FFQ and incorporated soft drink question was not sensitive enough to identify changes in this research.

Psycho-sociological measures.

To asses psychosocial well-being participants completed the Impact of Weight on Quality of Life (IWQOL) assessment tool, which assessed body esteem, physical comfort, family relations, social life and total quality of life. Results showed that body esteem increased in both Health Coach and Standard Treatment groups with social life scores increasing in the Health Coach group. Health Coach group social life increases may be due to the confidence gained interacting with Health Coaches or facility patrons. Social life increases may also be due to a decrease in weight and therefore an increase in confidence. Family relations did not change for either group over time, an interesting finding given that participants in the Your Choice program attended sessions with their parents, and therefore were more likely to receive greater parental support, advice and/or interaction throughout the program. Even so, the parents may have largely left the healthy lifestyle guidance to the Health Coach. Previous research has shown strong parental influence including modelling, arranging the environment and reinforcing positive behaviours play a significant role in family oriented CBT-based interventions (Epstein, McKenzie et al., 1994; Epstein, 1996). However, family relations scores in the current study did not reveal such interaction occurred.

Increased body esteem scores in both groups may be due to the adolescent becoming familiar with attending the leisure centre and therefore becoming comfortable with their own self-image. Further increases in social life for the Health Coach group could be a result of interaction with the Health Coach and the confidence gained from the tasks conducted during the face-to-face sessions.

Research conducted with 197 children and adolescents aged 9 to 19 years by Warschburger et al. (2001) showed that quality of life scores positively increased for a CBT-based weight management program as compared to a relaxation comparison

group. In contrast, the work by Luban's et al. (2012) showed no change in physical esteem or global esteem using the Physical Self-description Questionnaire with 12-14 year old adolescent girls (Lubans, Morgan et al., 2012). The current results are pleasing when contrasted against Luban's work given that body esteem improved for both Standard Treatment and Health Coach groups, and are suggested that when supported to engage in health-related activities, adolescents make positive gains in body esteem. However, it is important to note that caution must be exercised when generalising these results with these studies due to variations in measures, cohorts and intervention types.

Eating disorder evaluation.

Evaluation was sought to assess eating disorder pathology as concern exists with the implementation of weight management programs in adolescents. Some experts have commented that such interventions may create risky dietary behaviours, resulting in harmful eating practices, body image and weight concerns ultimately leading to disordered eating (Cooper, Fairburn et al., 2003; O'Dea, 2005; Cooper, Doll et al., 2010). The data showed non-significant reductions in eating disorder risk for drive for thinness, bulimia and body dissatisfaction in both groups. Additionally, Health Coaches were trained to observe eating disorder risk symptomology in the Health Coach group, and no such traits were identified. In an Australian study with clear similarities to the present study, Brennan et al. (2012b) found no significant change in bulimia, drive for thinness and body dissatisfaction for 63 treatment seeking OWOB adolescents aged 12-18 years (Brennan, Wilks et al., 2012b).

In contrast, the results of the current study are inconsistent with the outcomes of the work of Mehlenbeck et al.(2009) who observed a significant reduction in binge eating symptomology for 194 adolescents following a 16-week behavioural weight control intervention (Mehlenbeck, Jelalian et al., 2009). Likewise, the work of Bonich and colleagues showed significantly reduced eating disorder pathologies for 112 OWOB adolescents aged 12 to 18 years who undertook a psychologist delivered CBT-based healthy lifestyle program (Bonich, Greenwood et al., 2010). Adolescents in the current program were encouraged to make realistic and sustainable dietary modifications in alignment with the Australian Guide to Healthy Eating. The absence in any adverse change in eating disorder risk profile may be an outcome of the non-emphasis on restrictive dieting. Restrictive dieting approaches in adolescent focussed obesity interventions have been previously linked to self-induced vomiting, use of diet pills, laxatives, and diuretics at 5 years follow-up (Neumark-Sztainer, Wall et al., 2006). The finding in the present study of no deterioration in eating disorder risk pathologies offers some assurance that engaging adolescents in a healthy lifestyle program does not promote harmful psychological by-products.

In summary, results show that admission to either program did not negatively affect eating disorder pathologies or quality of life characteristics for OWOB adolescents in the current trial. These results, when combined with similar research, refute the notion that engaging adolescents in programs linked to the promotion of healthy lifestyle, and healthy weight, expose participants increased risk of eating disorder (O'Dea, 2005).

Program Satisfaction Measures

During the data collection periods participants completed a consumer satisfaction questionnaire to measure program acceptance. Satisfaction measures for the Standard Treatment group aimed to assess the adolescents experiences when using the fitness centre environment and its' suitability for their situation. Whereas, satisfaction measures for the Health Coach group aimed to assess the suitability of the Health Coach as a supportive agent and the program's effectiveness, this measure showed a reduction in the parents' perception of the program's effectiveness over time. Pleasingly, there was no significant change in program satisfaction for the Health Coach or Standard Treatment groups over the intervention period. This satisfaction to either interventions shows that participants were pleased with either environment or treatment modality. Even so, it is worth noting that satisfaction measures which comprised a 1 to 5 Likert scale had not been validated, potentially limiting its effectiveness in such a trial. Given that all other variables were not significantly changed could also suggest that such measures are not sensitive enough to highlight changes in consumer satisfaction in these programs.

Strengths and Limitations of the Study

The study had several strengths. Rigorous research requires adherence to the principles of randomisation (Oude Luttikhuis, Baur et al., 2009; Shrewsbury, O'Connor et al., 2009), and the current study included the random allocation of an adolescent and supporting parent cohort to one of two interventions at seven community locations. Furthermore, the study was unique in that it engaged Exercise Leaders (Health Coaches) who were trained to deliver an intervention using evidenced-based approaches to achieve successful outcomes for participants. This in turn aligns with

calls for improved workforce capacity to address the increasing incidence of overweight and obesity among people in Australia, with those in the exercise professions being identified as a viable source to be trained as behaviour change agents (Australian Government Preventative Health Taskforce, 2009). A further strength was the use of Dual Energy X-Ray Absorptiometry (DEXA) to measure body composition. This is important particularly as DEXA is deemed an objective direct measure for body composition, and promotes greater accuracy and compartmentalisation of body composition. This contrasts with the majority of studies that rely on anthropometrical variables, all of which rely on predictions to estimate body composition, which can be imperfect, as they require a number of assumptions (Goran, 1998). A further strength of the study was 12-months follow-up; long term follow-up is a major limitation of the current literature (Jones, Sinn et al., 2011), with only one CBT-based, adolescent focussed study identified as having follow-up of at least 12-months (Braet & Van Winckel, 2000).

From a community-health viewpoint there are important practitioner contributions that can be attributed to the present study. To the knowledge of the investigator, this was the first study that solely combined Exercise Leader-led family-oriented community-based intervention in adolescent weight management. The interventions aim was largely to improve adolescent's behaviours in the home and community environment for the promotion of healthy lifestyle, leading to a healthier weight. Therefore, important information about the effectiveness and feasibility of such an intervention in a community setting has been obtained. Such information can now be used to design and implement comparable interventions in the future.

One of the major the limitations of the study was the dropout of participants at different assessment points, (refer to Figure 4, Allocation, Treatment and Assessment

Flow). There was a 25% dropout in the Health Coach and 43% dropout in the Standard Treatment group from pre- to 12-months; even so, participant dropout is generally expected in human trials. Dropout has been reported to be range between 35.5% (Vignolo, Rossi et al., 2007) and 83% (Savoye, Nowicka et al., 2011) in children and adolescent focussed obesity management programs. Although intention to treat analysis was used to account for dropout, participant attrition remains a constraint on the generalisation of findings of the study. The phenomenon of dropout in the current research was likely to leave this study statistically underpowered. Due to the limited research in this area, variation in comparisons and outcomes, the sample size was determined by comparable studies (Vignolo, Rossi et al., 2007; Tsiros, Sinn et al., 2008; Murdoch, Payne et al., 2011; Brennan, Walkley et al., 2012a). Such a problem has been reported in previous Cochrane reviews (Summerbell, Waters et al., 2005; Oude Luttikhuis, Baur et al., 2009), and with an increasing number of similar studies being completed on this topic, a priori statistical power analysis using the obtained effect and sample size data can now be considered.

An additional limitation of the study was the use of self-report measures, which can be susceptible to social desirability response bias whereby participants attempt to present themselves in more favourable light (Podsakoff & Organ, 1986; Rodriguez, Retton et al., 1994). In particular, self-report measurement of dietary intake behaviours appeared unreliable, particularly when aligned with objective body composition assessment. For example, an increase of soft drink consumption appeared to lead to a decrease in per-cent body fat for the Health Coach group. This is interesting seeing that the group were most likely guided to make decisions that limited this consumption, or at least to switch to a lower energy form of drink. Furthermore, the Standard Treatment group decreased overall total energy intake as compared to the Health Coach group, yet

analysis showed the Health Coach group had a greater positive reduction in BMI-Z score and overall percent total body fat over the 12-months. Generalisation of soft drink consumption is severely limited as the type of soft drink and therefore energy consumption was not measured in the Food Frequency Questionnaire. Future consideration may be given to the measurement of dietary change via blood analysis, thus providing another objective measure of dietary behaviour change (Nansel, Iannotti et al., 2007), yet this seems problematic in this population. Although physical activity was measured objectively by multi-axial accelerometers, compliance was needed for adolescents to wear the device and to correctly log times when the device was removed and replaced. Additionally, accelerometer data was only considered when certain cut-offs for use were obtained, this included data from four week days and two weekend days. The adolescent was also relied upon to not wear the device in water, even so, research staff detected some devices had become wet and affected by water. Incorrect placement of the device would also further corrupt useable data, however this was difficult to determine by viewing the data; problems with accelerometer compliance have been noted in previous research (Lubans, Morgan et al., 2012). Further consideration should be given to strategies of increasing adolescent compliance on wearing this measurement device, particularly as the current study showed 21 % of the Standard Treatment and 78% of the Health Coach cohort started with full datasets. Poor compliance of wearing accelerometers makes generalising of these results difficult.

Another methodological limitation of study was the absence of a no-treatment control group. The governing human research ethics committee considered it unethical to have a non-treatment control group, and the use of a 12-month weight listed control group was beyond the available resources, thus the CBT program was compared to a

Standard Treatment. Although a no-treatment control group would have been highly desirable and allowed greater generalisations, similar research with children and adolescent in lifestyle modification interventions have shown treatment is generally superior to no treatment control conditions, and no treatment control participants continue to experience deterioration in body composition status (Oude Luttikhuis, Baur et al., 2009). The Standard Treatment condition also yielded several positive physical and psycho-sociological outcomes. Additionally, Standard Treatment group body composition outcomes were pleasing showing that fat gain was overall abated at 12-months follow-up. Baur (2004) suggests that ideal intervention outcome is weight change but it may be necessary to only stop or reduce the rate of weight gain as a first step (Baur & O'Connor, 2004), and this is what occurred in the current study for the Standard Treatment group.

Of great interest was the attendance of the groups to the leisure centre. The Standard Treatment group were allocated to a fitness program, whereas the Your Choice intervention group were allowed non-compulsory access to such a program if desired. To measure attendance, participants were allocated membership swipe cards and it was intended this data be readily collected and accessed via the leisure centre recording systems. The limited amount of attendance data made available to researchers could not be considered for analysis. Many challenges prevented total access to the collection of this data; these included the ability for participants to bypass card-swipe terminals, the delay in card allocation and inability to obtain data from administration staff. Given that in previous research, facility access was measured in adults (Annesi, 2003) a complete set of attendance data may have allowed a greater understanding of adolescent behaviour. Future consideration could be given to how attendance could be effectively monitored in future community-based trials.

The CBT-based approach had a more positive effect on body composition of OWOB adolescents than did the Standard Treatment. However, it is unclear what aspects of the CBT-based approach were successful given that various CBT principles and linked activities were embedded within the intervention sessions. Firstly, the researchers were reliant on the Health Coaches to confirm adolescent-parent attendance at sessions as part of compliance. Additionally, researchers relied on the completion of adolescent worksheets to subjectively measure Health Coach support and guidance. Health Coaches were also provided with checklist and sequentially ordered work sheets as a means to monitor program adherence but some worksheets were only partially completed. There were also three Your Choice (Health Coach) manuals that were misplaced (and replaced) with associated loss of record sheets over the course of the intervention, which further limited the researcher's judgement on session compliance and implementation of CBT principles and linked activities. Previous research has used video camera technology to record and thus offer an objective compliance measure (Brennan, Walkley et al., 2012a). However, given the resources available to the study, and noting the widely dispersed locations at which the intervention was delivered, it was neither feasible nor practical to use this approach in this study. This phenomenon has been reported before, whereby videorecording of CBT interventions has been deemed non-feasible in geographically-dispersed community-based trials for similar reasons (Barrington, Prior et al., 2005). Future consideration could be given to how program implementation compliance could be effectively monitored in future community-based trials.

Such is the nature of implementing geographically-dispersed community-based trials, the researchers experienced several challenges. Firstly, due to recruitment difficulties, the intervention implementation ensued over two time-frames, being

September 2009 and February 2010, therefore making it difficult to account for seasonal effects over the intervention and preceding follow-up period. Secondly as assessment periods occurred over pre-determined school holiday blocks, it was challenging to asses all participants in this time due to holiday commitments. This created occurrences of participants being assessed 2-weeks from desired time points.

Although the use of DEXA was considered a major strength of the trial, this device did have a limitation when measuring OWOB adolescents. Despite the densitometer operators best efforts some adolescents were unable to fit on the scanning bed. Therefore, five truncations were noted at pre-test which is a further limitation. Larger scanner areas could be a future consideration to eliminate such problems in OWOB research.

During the recruitment and subsequent training of the Health Coaches, researchers sourced interest from prospective parties. During recruitment, 19 Exercise Leaders were interested in being trained for the study, that numbers dropped to 15 at training, however, only 13 were available for the intervention implementation, refer to Figure 3, Recruitment and Training. This created difficulties when trying to forward-plan for Health Coach and participant random allocations.

All the challenges confronted during this research project represented an opportunity to learn about research in community leisure settings. Most of all, it was learned that Exercise Leaders (Health Coaches) could be trained and therefore apply a CBT-based lifestyle program to OWOB adolescents, yielding many favourable outcomes, made more remarkable seeing that adolescents can be a challenging group to work with (Shrewsbury, Nguyen et al., 2011). For the Health Coaches the project offered an opportunity for behavioural training that of which didn't appear present in

Australian tertiary training (See Chapter 3). For the adolescents, the program offered a series of evidence-based steps to improve several OWOB outcomes.

CONCLUSIONS

In the main, the implementation of the Your Choice program appeared to have achieved several promising outcomes. The results show that Exercise Leaders, when given suitable training, can make a meaningful impact on the body composition of OWOB adolescents from the delivery of eight 1-hour per week sessions of a CBT-based healthy lifestyle program in an accessible community setting local to the participants. This achievement occurred concurrently with short term improvements in physical activity, and alongside no deterioration in eating disorder risk profile, and improvements in body esteem. The study makes a unique contribution to the body of knowledge relating to the management of adolescent overweight and obesity in community settings.

CHAPTER 6

STUDY 4: THE IMPLEMENTATION AND EVALUATION OF A CBT-BASED PROGRAM IN ADOLESCENT WEIGHT MANAGEMENT AND ITS IMPACT ON SUPPORTING PARENTS

General Introduction

The major emphasis of this study was to evaluate the effectiveness of a cognitive behavioural therapy (CBT)-based program delivered by Exercise Leaders in community leisure settings to treat overweight and obesity (OWOB) in adolescents. Parents were also required to accompany adolescents in the trial, and this chapter provides a description of the measures, testing protocols and treatment outcomes related to the parent participants.

The prevalence of OWOB in children and adolescents has increased rapidly in past decades (Booth, Chey et al., 2003; Olds, Tomkinson et al., 2010). OWOB adolescents face a multitude of medical, social and psychological problems, and include Type II Diabetes, cardiovascular disease and depression (Must & Strauss, 1999; Lobstein, Baur et al., 2004). The treatment of adolescent OWOB is one of the most difficult challenges that health care providers face, with several strategies emerging to nullify or reduce its' impact (Mellin, Slinkard et al., 1987; Strauss, Bradley et al., 2001; Widhalm, Dietrich et al., 2008; Oude Luttikhuis, Baur et al., 2009; Kanekar & Sharma, 2010; O'Brien, Sawyer et al., 2010). Importantly, strategies found most successful with adolescent populations characteristically incorporate parental, family and home environment support mechanisms and alterations (Saelens, Sallis et al., 2002; Swinburn, Caterson et al., 2004; Magarey, Perry et al., 2011).

The home environment has the potential to alter family energy intake and expenditure in a variety of ways. Parent support mechanisms may serve to influence the children's behaviours by exposing family members to better food choices, by allowing certain foods into the house, providing support and encouragement to the child, or by modeling positive eating patterns. This was shown by (Golan & Crow, 2004) who demonstrated superior child weight loss in a parent-child weight loss group as compared to a child only weight loss group in 60 children. Epstein and co-workers in a review of four 10-year follow-up family-based weight loss interventions on children stated that parents can be pivotal in changing physical activity behaviours by allowing opportunities for movement or passively influencing activity patterns (Epstein, 1996). Additionally, Sharma and colleague in a literature review note that adolescents are more likely to eat foods they observe their parents consume, and that access to foods within the home impacts overall dietary preference and consumption (Sharma & Branscum, 2010).

Australian research has shown in cross-sectional study including 347 adolescents aged 12 to 13 years using Food Frequency Questionnaire and self-report measures showed that mothers, either as models for eating behaviors or as the providers of food, influenced the intake of high-energy fluids ($p = .003$), sweet snacks ($p = .010$), savory snacks ($p = .008$), and take-out food ($p = .007$) in adolescent boys. In addition, mothers' intake of high-energy fluids was positively associated with daughters 'consumption of these drinks ($p = .025$). Furthermore, availability of unhealthy foods at home was positively associated with girls' sweet snack ($p = .001$), girls' savory snack ($p < .001$), boys' savory snack ($p =0.002$) (Campbell, Crawford et al., 2007). Although these studies imply the impact to the child as influenced by the parent, the impact on the parent remains unclear.

Parent Supported Behavioural Approaches in Weight Management

Cognitive behavioural therapy (CBT)-based, family supported approaches in weight management appear to have been successful with children (Jelalian, Lloyd-Richardson et al., 2010), but few of these approaches have been conducted with adolescents (Oude Luttikhuis, Baur et al., 2009). In a number of parent involved interventions, clear benefits to adolescent groups have been demonstrated (Jelalian, Mehlenbeck et al., 2006; Tsiros, Sinn et al., 2008). While this is encouraging, few studies have investigated whether health benefits occurred among the parenting cohorts, and of those that have, were in mixed adolescent children samples (Wrotniak, Epstein et al., 2004; Epstein, Paluch et al., 2008). In one investigation, Wrotniak et al (2004) targeted the families of 142 children, aged eight to 12 years who were above the 85th BMI percentile. Families were taught the benefits of healthy diet via a color coded food system and were encouraged to decrease sedentary behaviour or increase physical activity. Results showed that parent BMI-Z change significantly predicted child BMI-Z change from baseline to 6-months ($p < .001$), and from baseline to 24-months ($p < .009$). The authors concluded that parent BMI-Z change is an independent predictor of obese child BMI-Z change in family-based behavioral treatment, and children benefit the most from parents who lose the most weight in family-based behavioral treatments. In a later study by Epstein et al. (2008), 41 OWOB children aged eight to12 years were randomly assigned to one of two 24-month family-based behavioural treatment programs, that either targeted increasing fruits and vegetables and low-fat dairy in one group or a group that reduced the intake of energy-dense foods. The results showed that children in the healthy food group showed greater reduction in BMI-Z compared to children in the reduction of high energy-dense food group at 12-months (−0.30 BMI-Z units vs. −0.15 BMI-Z units, $p = .01$) and 24-months (−0.36 BMI-Z units vs. −0.13

BMI-Z units, $p = .04$). Furthermore, parent BMI-Z change followed the same pattern as did child changes, and parent and child BMI-Z changes were correlated ($p < .001$). Although these studies were behaviorally-based neither was defined as CBT and both were conducted using children eight to12-years.

Within the family-focused behaviorally-based weight management literature few adolescent only interventions have been reported (Tsiros, Sinn et al., 2008; Brennan, Walkley et al., 2012a). Among those that did, none acquired a comprehensive battery of health-related measures from parents, therefore, no studies have reported the effect on supporting parents of OWOB children and adolescents engaged in a CBT-based healthy lifestyle focused weight management intervention. Consequently, given the absence of data on the outcomes for parents from supporting an adolescent in a healthy lifestyle intervention, the focus of this study was to investigate whether change occurred in selected health-related measures among such a parent cohort.

Purpose

The purpose of this Chapter is to report on the effects of the Your Choice program on the biological, psychological and psychosocial effects on the parents.

Research Question

It is known that parents influence the physical activity and dietary habits of their child by changing their own behaviour (Wrotniak, Epstein et al., 2004). Therefore, our research question is: Will a parent-supported, OWOB adolescent-focused CBT-based

healthy lifestyle intervention delivered by Exercise Leader's at a leisure centre result in improvements in biological, psychological, and behavioural characteristics of parents?

Overview of Intervention

The Your Choice program is an eight session face-to-face CBT-based healthy lifestyle weight management intervention for 12 to 16 year old OWOB adolescents. During the intervention, OWOB adolescents are supported by a parent. The intervention was delivered by Exercise Leaders trained in the lifestyle modification principles consistent with recommendations from the cognitive behavioral weight management literature. The program was delivered at seven community leisure centre facilities in the Melbourne region of Victoria, Australia. The Your Choice intervention was compared to a standard treatment program, which was representative of a standard fitness industry exercise program commonly prescribed to individuals seeking weight management advice and intervention.

METHODOLOGY

Methodology for the Your Choice intervention has been described in Chapter 5; this chapter will only provide a methodological overview.

Statistical Analysis

Statistical analysis was completed using SPSS version 18.0. A senior statistician was consulted on the design and application of data analysis, as well as the interpretation of results. Statistical significance was assigned at the 0.05 level of probability. The following interpretations were applied to the effect sizes of the results: < 0.2, small; 0.3 – 0.5, medium; 0.6 – 0.8, large and > 0.9, very large (Cohen, 1988). Please refer to Chapter 5 "*Statistical Analysis*" for full description.

Recruitment

Fifty six adolescents and their supporting parents were recruited to the research project. Recruitment strategies included information posted in newspapers, flyer distribution at participating leisure centers or electronically through email and website posts. Parent and adolescent participants were excluded if they had any condition that prevented adherence to the program, and had to be able to attend the intervention sessions and physical assessments nominated over the study period.

Allocation

Parents and adolescents were randomly allocated to either a Your Choice intervention or a Standard Treatment group. A clustered, random allocation approach

was implemented using a random sequence generator. Seven leisure centres, each with a fitness centre, were involved in the study. Participants nominated the preferred leisure centre closest to their home, with most participants living within a few kilometres, and the furthest within 10 kilometres. Each leisure centre nominated employees to be trained as Health Coaches and to deliver the intervention, as well as nominating an equal number of leisure centre employees to be available to offer a standard treatment. Each Health Coach was to be randomly allocated a maximum of two adolescents with whom they would implement the treatment. The number of Health Coaches available at each centre therefore determined the total number of participants able to be allocated to each leisure centre, with half the participants randomly allocated to receive the CBT-based intervention, and half randomly allocated to receive a standard treatment. This approach meant that within each leisure centre, approximately equal numbers of participants were undertaking the intervention and the standard treatment at the same time, but between leisure centres, the participant numbers were different. Participants were randomly allocated using this strategy at the completion of the baseline assessment.

Your Choice Intervention

Allocation to the Your Choice program required the supporting parent to accompany the adolescent for one-hour weekly sessions at their nominated leisure centre. Parental attendance was compulsory for the first six sessions and optional for the final two sessions. Topics covered during the program included dietary guidance, physical activity education, self-monitoring, problem solving, relapse prevention and cognitive restructuring.

Standard Treatment Intervention

Adolescents allocated to the Standard Treatment group were prescribed an exercise program at their nominated leisure centre setting. Fitness centre employees prescribing exercise programs were not trained in the Your Choice concepts; this was to avoid any therapeutic effect being applied incidentally to the adolescent. Parental support was not compulsory as is typical of this form of Standard Treatment; however parents had the option of using the facility along with their adolescent if desired.

Physical Assessment

Trained researchers obtained weight, height, waist and hip circumferences and bio-impedance body composition measures at four data collection periods during the trial; pre-, 8-weeks, 6-months and 12-months. A description of assessment measures are listed in Table 44. Refer to Appendix 13 for a physical assessment record.

Table 44: *Physical Assessment Allocation*

Physical Assessment Measure
Anthropometry
Height
Weight
Circumferences
Hip
Waist
Body Composition
Bio-impedance (Hand-held & Scales)

Height.

Height was recorded on a calibrated wall-mounted stadiometer, (Heightronics, Quick Medical, Issaquah, USA, or SECA 22, Hamburg, Germany). Participants

presented with shoes and socks removed, and stood upright with their heels together and buttocks and thoracic spine touching the wall. Two measures were taken, with the mean calculated as the final score. An additional measure was taken if the original measurements were not within 5 millimeters, and the closest two measures then used to determine a mean, which was used as the score for the participant.

Weight.

Parents body mass was measured to the nearest 100 grams using calibrated digital scales (TANITA, Wedderburn BWB-620). Participants removed shoes and socks, and wore only light clothing. Two measures were taken, with the mean calculated as the final score. An additional measure was taken if measurements were not within 100 grams, and the closest two measures then used to determine a mean, which was used as the score for the participant.

Circumferences.

Hip and waist circumferences are indirect measures of adiposity (National Health and Medical Research Council, 2003). Measures were taken with a steel measuring tape, and for the waist this occurred at the narrowest circumference between the 10th rib and the tip of the iliac crest, and for the hips at the widest circumference around the hip and buttocks. Measures were taken over light clothing. Two measures were taken, with the mean calculated as the final score. An additional measure was taken if measurements were not within five millimeters, and the closest two measures then used to determine a mean, which was used as the score for the participant.

Body composition.

Evaluation of body composition was supplemented by the use of Bio-impedance (BIA). Bio-impedance provided a non-invasive, painless, rapid determination of body composition through the use of hand-held (ORMON, Body Logic, HBF 302W, Tokyo, Japan) and foot scale apparatus (TANITA, BC- 541Tokyo, Japan). Studies have shown BIA to be a sound method of evaluating body composition (Sampei & Sigulem, 2009). BIA measures the impedance or electrical resistance to an electrical signal travels from electrode to electrode, either opposing foot planters or palm to palm. Percentage body fat is derived using a proprietary algorithm based on resistance of the electrical signal as it passes through fat and muscle tissue. BIA has been used previously as a surrogate to other body composition measures (Pietrobelli, Andreoli et al., 2003). Participants removed shoes and socks, and wore only light clothing during use of both the hand-held and foot scale bio-impedance apparatus. For both devices, two measures were taken, with the mean calculated as the final score.

Psycho-Sociological Measures

Parents completed a comprehensive battery of questionnaires at each data collection point, pre-, 8-weeks, 6-months and 12-months. Questionnaires gathered information regarding participant demographics, body esteem, physical comfort, family relations, and social relationships. A background to questionnaire justification is detailed in Chapter 5.

Impact of weight on quality of life (IWQOL).

The impact of weight on quality of life (IWQOL) is a 74-item, self-report, obesity-specific measure of obesity-related quality of life (IWQOL) that consists of a total score and scores on each of five scales including, body esteem, physical comfort,

family relations, social life and total quality of life. This measure exhibits strong psychometric properties (Kolotkin, Head et al., 1997).

Acceptability

Feedback was gathered on the acceptance of the program; alternatively, participant dropout information was collected via mail administered survey. Both parents and adolescents in the Your Choice group completed consumer satisfaction surveys assessing their satisfaction with the Health Coach and program. Participants responded to questions regarding perceived usefulness of the intervention, its' application to their lifestyle, and helpfulness, friendliness and knowledge of the Health Coach on a 1 to 5 Likert scale ("strongly disagree" to "strongly agree"). Satisfaction measures for the Standard Treatment group aimed to assess the parent's perceptions of the adolescents experiences when using the fitness centre environment, support received from staff and its suitability for their situation.

Questionnaires were completed at 8-weeks, 6-months and 12-months. Questionnaires at 6-months assessed the Health Coaches follow-up abilities and ongoing support of the adolescent. Surveys at 12-months investigated if participants re-joined the recreation facility post six months. Qualitative feedback was analysed in the form of customer satisfaction comments. The Your Choice drop out survey (please refer Appendix 18), modified from work completed by Brennan and colleagues (Brennan, Walkley et al., 2009) was used to collate data pertaining to drop out. Respondents were asked to rate statements on a 1 to 5 Likert scale ("strongly disagree" to "strongly agree"). Qualitatively, respondents were asked to provide suggestions about how the program could be improved. A copy of the consumer satisfaction survey is included in the Appendix 16.

RESULTS

A range of outcome measures was employed to measure, body composition, psycho-sociological status and program satisfaction. It is beyond the scope of this project to report the results for all measures. Therefore, only the results most directly linked to the research question are shown in this chapter, all other results are included in Appendix 19.

Parents completed four assessments across a 12-month period, at pre-, 8-weeks, 6-months, and 12-months. Parent data was collected during the same visit as the adolescent assessment, (Standard Treatment N = 26 female, 2 male), (Health Coach, N = 27 female, 1 male). A 4 (time) x 2 (group) mixed/split plot linear mixed model ANOVA was used to evaluate differences across groups. Statistical significance was assigned at the 0.05 level of probability. The following interpretations were applied to the effect sizes of the results: < 0.2, small; 0.3 – 0.5, medium; 0.6 – 0.8, large and > 0.9, very large (Cohen, 1988). Outliers were identified, checked and replaced as required. Intention-to-treat (ITT) analyses were conducted to carry forward values for participants who had withdrawn from the study after baseline, 8-weeks, or 6-months, respectively. Intention-to-treat analyses were conducted to avoid the effects of dropout and preserve power in analyses; such a technique is well represented in randomised control trials within the health sciences (Saelens, Sallis et al., 2002; Resnicow, Taylor et al., 2005; Williamson, Walden et al., 2006).

Body Composition

Percent body fat was measured using both hand-held and foot-scale bio-impedance apparatus. Please refer to "*Physical Assessments*", for more information regarding this procedure.

Bio-impedance

Descriptive statistics for total percent body fat are presented in Table 45 for the Standard Treatment group and Table 46 for the Health Coach group. Groups were not significantly different at pre-test. Results for hand-held bio-impedance revealed a significant decrease for the Standard Treatment group from 8-weeks to 6-months (p = .016, d = 0.22), 95% CI [.196, 1.897], but showed a non-significant change for the Health Coach group across the assessment periods (p > .05). Results for foot scale bio-impedance revealed a significant increase in the Standard Treatment group for total percent body fat from 8-weeks to 12-months (p = .032, d = 0.21), 95% CI [-3.578, -.164], but showed a non-significant change for the Health Coach group across the assessment periods (p > .05).

Table 45: *Descriptive Statistics for Total Body Percent Fat, Standard Treatment*

Time	*N*	*M*	*SD*
	Hand-held		
Pre-	26	36.21	6.72
8-Weeks	26	36.83	6.23
6-Months	26	35.26	7.63
12-Months	26	36.62	8.03
	Foot Scale		
Pre-	26	37.75	10.17
8-Weeks	26	36.65	10.36
6-Months	26	37.89	10.04
12-Months	26	38.67	8.98

Table 46: *Descriptive Statistics for Total Body Percent Fat, Health Coach*

Time	*N*	*M*	*SD*
	Hand-held		
Pre-	28	35.93	5.65
8-Weeks	28	35.32	5.79
6-Months	28	35.63	6.13
12-Months	28	35.60	5.22
	Foot Scale		
Pre-	28	37.88	7.67
8-Weeks	28	37.67	6.86
6-Months	28	37.70	7.93
12-Months	28	38.81	8.02

Anthropometrical Measures

Parents underwent a battery of anthropometry measures during the assessment periods. Parents underwent assessment for height and weight, from which body mass index (BMI) was derived. Hip and waist circumference were also obtained during the assessment periods.

Height, Weight and Body Mass Index (BMI)

Descriptive statistics for height, weight and BMI are presented in Table 47 for the Standard Treatment and Table 48 for the Health Coach group. Neither the Standard Treatment nor Health Coach groups significantly changed height over the assessment periods ($p > .05$). The Standard Treatment group had a significantly greater weight at pre-test ($p = .020$, $d = 0.53$). Further analysis of weight showed a non-significant change for the Standard Treatment group across the assessment periods. In contrast, the Health Coach group decreased weight significantly from pre- to 8-weeks ($p = .007$,

d = 0.10), 95% CI [.353, 2.243], but increased weight from 8-weeks to 12-months (*p* = .002, *d* = 0. 11), 95% CI [-2.477, -.587], and from 6-months to 12-months (*p*= .027, *d* = 0.05), 95% CI [-1.962, .119]. The Standard Treatment group had a significantly greater BMI at pre-test (*p* = .047, *d* = 0.46). Results for BMI showed a non-significant change for the Standard Treatment group across the assessment periods (*p* > .05). The Health Coach group significantly decreased BMI from pre- to 8-weeks (*p* = .017, *d* = 0.10), 95% CI [.077, .784], but increased BMI from 8-weeks to 12-months (*p* = .003, *d* = 0.11), 95% CI [-.895, -.188], and from 6-months to 12-months (*p*= .024, *d* = 0.06), 95% CI [-.743, -.053]. The Health Coach group had a significant change in BMI over time (*p* = .009, *d* = 0.54).

Table 47: *Descriptive Statistics for Height, Weight and Body Mass Index, Standard Treatment*

Time	*N*	*M*	*SD*
	Height (cm)		
Pre-	28	1.65	.075
8-Weeks	28	1.65	.075
6-Months	28	1.65	.074
12-Months	28	1.65	.073
	Weight (Kg)		
Pre-	28	95.27	28.72
8-Weeks	28	95.40	29.03
6-Months	28	90.94	25.23
12-Months	28	95.24	28.85
	BMI		
Pre-	28	34.47	9.29
8-Weeks	28	34.48	9.40
6-Months	28	32.96	8.21
12-Months	28	34.54	9.47

Table 48: *Descriptive Statistics for Height, Weight and Body Mass Index, Health Coach*

Time	*N*	*M*	*SD*
	Height (cm)		
Pre-	28	1.62	.065
8-Weeks	28	1.62	.069
6-Months	28	1.62	.065
12-Months	28	1.62	.065
	Weight (Kg)		
Pre-	28	79.89	18.18
8-Weeks	28	78.03	18.02
6-Months	28	79.09	18.83
12-Months	28	80.13	19.94
	BMI		
Pre-	28	30.20	6.21
8-Weeks	28	29.57	6.12
6-Months	28	29.91	6.54
12-Months	28	30.31	6.97

Waist and Hip Circumferences

Descriptive statistics for waist and hip circumferences are presented in Table 49 for the Standard Treatment group and Table 50 for the Health Coach group. Data from the Standard Treatment group revealed a non-significant change in waist circumference across the assessment periods ($p > .05$). The Standard Treatment group had a significantly greater waist at pre-test ($p = .009$, $d = 0.61$). Results for the Health Coach group showed a significant decrease from pre- to 8-weeks ($p = .032$, $d = 0.15$), 95% CI [.101, 2.276], and from pre- to 6-months ($p = .009$, $d = 0.05$), 95% CI [.352, 2.473]. The Health Coach group showed a significant change in waist over time ($p = .048$, $d = 0.71$). Measures of hip circumference showed a non-significant change across the assessment periods for the Standard Treatment group. In contrast, for the Health Coach group, hip circumference significantly decreased from pre- to 8-weeks ($p = .014$, $d = 0.13$) , 95% CI [.205, 1.787], and from pre- to 6-months ($p = .043$, $d = 0.06$) , 95% CI

[.025, 1.568], but increased from 8-weeks to 12-months (p= .04, d = .14), 95% CI [-1.966, -.384], and from 6-months to 12-months (p= .014, d = 0.07), 95% CI [-1.747, -.203],. The Health Coach group showed significant change in hip circumference over time (p = .006, d = 0.013).

Table 49: *Descriptive Statistics for Waist and Hip Circumferences, Standard Treatment*

Time	*N*	*M*	*SD*
	Waist (cm)		
Pre-	28	99.85	17.51
8-Weeks	28	99.56	17.84
6-Months	28	96.54	16.06
12-Months	28	99.65	18.19
	Hip (cm)		
87654321Pre-	28	119.67	18.94
8-Weeks	28	119.78	18.93
6-Months	28	116.41	16.41
12-Months	28	119.75	18.87

Table 50: *Descriptive Statistics for Waist and Hip Circumferences, Health Coach*

Time	*N*	*M*	*SD*
	Waist (cm)		
Pre-	28	89.17	11.99
8-Weeks	28	87.39	11.96
6-Months	28	87.76	12.26
12-Months	28	88.56	12.81
	Hip (cm)		
Pre-	28	111.82	13.53
8-Weeks	28	110.10	13.07
6-Months	28	111.03	13.98
12-Months	28	112.00	14.47

Psycho-Sociological Measures

Instruments to measure impact of weight on quality of life (IWQOL) were used to determine change over the assessment period. Please refer to Chapter 5 for more information on this measure.

Impact of Weight on Quality of Life (IWQOL)

The IWQOL comprises five sub-scales including body esteem, physical comfort, family relations, social life and total quality of life. Descriptive statistics for physical comfort, body esteem and social life are presented in Table 51 for the Standard Treatment and Table 52 for the Health Coach group. Analysis of the data showed a significant increase in physical comfort for the Standard Treatment group from pre- to 6-months (p = .037, d = 0.22), 95% CI [-5.905, -.182]. There was a non-significant change in physical comfort for the Health Coach group over the assessment time (p > .05). Furthermore, scores for body esteem revealed a non-significant change for both the Standard Treatment and the Health Coach group across the assessment period (p > .05). The Standard Treatment group significantly increased social life scores from pre- to 6-months (p = .011, d = 0.23), 95% CI [-5.025, -.657], and from pre- to 12-Months (p = .034, d = 0.06), 95% CI [-4.541, -.179]. There was a non-significant change in social life scores for the Health Coach group across the assessment time (p > .05).

Table 51: *Descriptive Statistics for Physical Comfort, Body Esteem and Social Life, Standard Treatment*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Physical Comfort	25	81.16	23.72
	Body Esteem	25	61.29	29.02
	Social Life	25	88.97	15.99
8-Weeks				
	Physical Comfort	25	83.00	22.94
	Body Esteem	25	68.88	28.76
	Social Life	25	92.67	13.76
6-Months				
	Physical Comfort	25	86.31	21.25
	Body Esteem	25	67.56	28.24
	Social Life	25	92.43	14.05
12-Months				
	Physical Comfort	25	81.93	22.82
	Body Esteem	25	64.78	31.09
	Social Life	25	90.00	16.09

Table 52: *Descriptive Statistics for Physical Comfort, Body Esteem and Social Life, Health Coach*

	Sub-Measure	*N*	*M*	*SD*
Pre				
	Physical Comfort	25	87.30	17.43
	Body Esteem	25	69.22	19.17
	Social Life	25	94.10	11.51
8-Weeks				
	Physical Comfort	25	88.15	16.83
	Body Esteem	25	72.41	24.63
	Social Life	25	96.70	7.67
6-Months				
	Physical Comfort	25	86.12	16.25
	Body Esteem	25	67.22	25.50
	Social Life	25	94.87	10.62
12-Months				
	Physical Comfort	25	87.47	19.05
	Body Esteem	25	70.56	24.85
	Social Life	25	95.53	11.83

Descriptive statistics for family relations and impact of weight on quality of life scores are presented in Table 53 for the Standard Treatment and Table 54 for the Health Coach group. Groups were not significantly different at pre-test. There was a significant increase in family relations scores for the Standard Treatment group from pre- to 6-Months (p = .027, d = 0.14), 95% CI [-4.488, -.281], but not across and time points in the Health Coach group (p > .05). Total IWQOL scores significantly increased for the Standard Treatment group from pre- to 6-months (p = .028, d = 0.33), 95% CI [-5.986, -.347], and from pre- to 12-months (p = .018, d, = 0.18), 95% CI [-6.062, -.581]. Total IWQOL scores did not significantly change for the Health Coach group (p > 0.05).

Table 53: *Descriptive Statistics for Family Relations and Total Impact of Weight on Quality of Life (IWQOL), Standard Treatment*

	Sub-Measure	*N*	*M*	*SD*
Pre-				
	Family Relations	27	93.56	12.58
	Total (IWQOL)	27	77.09	21.57
8-Weeks				
	Family Relations	27	93.40	11.71
	Total (IWQOL)	27	80.76	21.14
6-Months				
	Family Relations	27	95.19	10.52
	Total (IWQOL)	27	83.41	16.75
12-Months				
	Family Relations	27	94.19	11.80
	Total (IWQOL)	27	80.69	18.94

Table 54: *Descriptive Statistics for Family Relations and Total Impact of Weight on Quality of Life (IWQOL), Health Coach*

	Sub-Measure	*N*	*M*	*SD*
Pre-				
	Family Relations	27	94.87	12.87
	Total (IWQOL)	27	84.66	13.11
8-Weeks				
	Family Relations	27	95.83	9.82
	Total (IWQOL)	27	86.53	13.57
6-Months				
	Family Relations	27	94.39	12.96
	Total (IWQOL)	27	83.61	15.17
12-Months				
	Family Relations	27	93.89	14.32
	Total (IWQOL)	27	85.06	16.02

Program Satisfaction Measures

During the 8-week, 6-month and 12-month data collection periods participants completed a consumer satisfaction questionnaire to measure program acceptance. Satisfaction questionnaires differed for both groups; refer Appendix 16. Satisfaction measures for the Health Coach group aimed to assess the parents' perception of the Health Coach as a supportive agent and the usefulness of the intervention. Satisfaction measures for the Standard Treatment group aimed to assess the parents' perception of the adolescent experiences when using the fitness centre environment and its' suitability for their situation. Given that there have been no validated measures to assess such an intervention, customer satisfaction measures were created by the researchers or modified from previous work (Brennan, Walkley et al., 2012a). Participants responded to a set of questions on a 5-point Likert scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither agree or disagree", 4 = "agree" and 5 = "strongly agree"). A 3 (time) X 2 (group) analyses of co-variance (ANCOVA) was conducted to assess changes in program satisfaction for the parent groups. Motivation and convenience of centre location was chosen as a covariate in the analysis.

Satisfaction measure, standard treatment group.

Descriptive statistics for satisfaction measures for the Standard Treatment group are presented in Table 55. Analysis of the satisfaction questionnaires showed the parents perception of the centre was initially high at post (M= 4.11), remained so at 6-months (M= 4.03), followed by a decline at 12-months (M = 3.48). Analysis for change over time revealed a non-significant change of the parents satisfaction of the leisure centre F (1, 41.43) = 0.09, p = 0.9), d = 0.98).

Table 55: *Centre Evaluation, Parent, Standard Treatment*

N	*M*	*SD*
8-Weeks		
23	4.10	.61
6-Months		
20	4.03	.65
12-Months		
23	3.48	.90

Satisfaction measures, health coach group.

Descriptive statistics for the Health Coach group are presented in Table 56. Analysis of the satisfaction questionnaires found that the parents perception of the Health Coach was high at both post (M= 4.55) and at 6-Months (M= 4.67), and then declined at 12-Months (M = 3.51). Analysis for change over time revealed a non-significant change of the parents perception of the Health Coach, F (1, 15.44) = 0.14, p = .87). Analysis of the perception of program effectiveness was shown to be moderate at post (M= 3.36) followed by a small decline at both 6-Months (M = 3.44) and at 12-Months (M = 3.25). Analysis for change over time revealed a significant decrease in parents perception of the program effectiveness F (1, 38.73) = 4.68, p = .015, d = 0.16).

Table 56: *Parent Evaluation, Health Coach*

Measure	*N*	*M*	*SD*
	8-Weeks		
Health Coach	19	4.51	.63
Program	20	3.36	.48
	6-Months		
Health Coach	23	3.54	1.53
Program	23	3.44	.44
	12-Months		
Health Coach	21	3.51	1.17
Program	25	3.25	.59

DISCUSSION

This chapter evaluated the effects of the Health Coach-delivered Your Choice healthy lifestyle and Standard Treatment interventions on the biological and psycho-sociological attributes of the parents who undertook a support role to their adolescent child during the interventions. Main findings included a statistically significant reduction in body weight and BMI from baseline to 8-weeks for the Health Coach intervention group.

Several family-based weight management programs generally involve both the obese child and their parents (Campbell, Waters et al., 2002; Oude Luttikhuis, Baur et al., 2009; Sacher, Kolotourou et al., 2010). The current program differs from conventional approaches where a trained Exercise Leader (Health Coach) applied a sequenced CBT-based healthy lifestyle program to an OWOB adolescent cohort in community leisure centres. Several researchers have concluded that family-based programs are more successful compared to child-only interventions (Epstein, Valoski et al., 1990; Oude Luttikhuis, Baur et al., 2009). Even so, few interventions were identified where both parent and child outcomes were measured (Golan, Weizman et al., 1998; Wrotniak, Epstein et al., 2004). Golan and colleagues found that children along with their fathers in a lifestyle group lost significantly more weight as compared to a control ($p < .05$). Wrotniak and colleagues found that parental weight loss was highly predictive of child weight loss to 24-months ($p < 0.05$). However, these studies differed from the current research as they included children who were aged 6 to 12 years and the parents were the major target of the program. Therefore, the current research was especially interesting as it investigated whether any effects of a healthy lifestyle targeted toward an adolescent would transfer to the parent.

Body Composition

Bio-impedance derived body composition was the designated body composition measure for parents participating in this research. The measure was chosen as it has previously been used with adults, and found to be a valid measure for estimating total percent body fat (Jaffrin, 2009). Both hand held and foot scale bio-impedance measurement apparatus was used. Results showed a transitory decrease in total percent fat for the Standard Treatment group from 8-weeks to 6-months, and when measured by foot scale, a significant increase in total percent body fat occurred from 8-weeks to 12-months. In contrast, the corresponding adolescent group showed a non-significant reduction in total percent body fat over the intervention period. Additionally, the parent Health Coach group showed a non-significant change in total body percent fat over the assessment period which is converse to the corresponding adolescent cohort which reduced total body percent fat. A possible explanation for this is that body composition measures were derived differently in the adolescent groups (Dual Energy X-Ray Absorptiometry, DEXA), which relies on different calculations, and therefore estimations as compared to bio-impedance, so it is difficult to draw any strong conclusion with respect to the adolescent and parent percent fat results. In a 2006 study by Williamson and colleagues, parents that acted as controls in an adolescent-parent focused internet-based lifestyle study experienced a DEXA derived total body fat increase of 0.510 kg as compared to the lifestyle group which also gained 0.360 kg at 24-months (Williamson, Walden et al., 2006). Bio-impedance results in the current study are favorable when contrasted against Williamsons work, but caution must be exercised in contrasting this work a differing measures and follow-up periods occurred.

Anthropometrical Measures

Height and weight derived BMI scores showed a non-significant change for the Standard Treatment group but showed a significant decrease from pre- to 8-weeks for the Health Coach group. In contrast, the adolescent groups BMI-Z scores were non-significantly changed in the Standard Treatment group and significantly reduced in the Health Coach group from pre- to 8-weeks and these results align with the results for respective parent groups. This may indicate that parents in the Health Coach group who participated as a support to their adolescent also adopted healthy lifestyle behaviours which lead to BMI reduction. Reductions in BMI have been previously found in lifestyle-focused behavioural programs where both parents and children showed a 12% decrease at 6-months (Wrotniak, Epstein et al., 2004). The superior BMI reduction in the Wrotniak study is explainable through parents being the target of the intervention and was delivered in a paediatric obesity research clinic where only full data sets were considered for analysis. The work of Williamson et al (2006) showed a parental BMI decrease of $0.55kg^2$ at 2-years for parents involved in an internet-based healthy lifestyle intervention involving 57 overweight adolescent girls aged on average 13.2 years (Williamson, Walden et al., 2006). As to the work of Williamson and co-workers, the current research showed a similar BMI reduction at 6-months of $0.63kg^2$ for the Health Coach group, however differences in follow-up periods used across the studies makes generalisation difficult.

To further complement bio-impedance and BMI, measures of hip and waist circumference were acquired. Waist and hip measures have been previously relied upon to provide a rapid and reliable assessment of central adiposity (Chen, Rennie et al., 2007). Results showed a non-significant change for the Standard Treatment group over the assessment period. The Health Coach group showed a significantly decreased

waist of 2% from pre- to 8-weeks and a reduction of 1.78 cm from pre- to 6-months, similarly in the Health Coach adolescent group a significant reduction in DEXA derived body fat was observed during the same period. Additionally, hip measurements were significantly decreased by 1.72 cm from pre- to 8-weeks and by 0.79 cm from pre- to 6-months for the Health Coach group; however these values returned to near baseline values at 12-months. These results are consistent with BMI reductions during the same timeframes, indicating that participation in the Health Coach intervention led to positive initial changes in parental anthropometry. Studies detailing changes in body circumferences for adolescent and parent cohorts could not be identified, therefore limiting discussion on this measure. Even so, an initial reduction in waist and hip measures for the parent Health Coach group may indicate a positive influence of the Your Choice program as compared to Standard Treatment where waist and hip measures were not significantly changed.

Psycho-Sociological Measures

To assess psychosocial well-being, parents completed the Impact of Weight on Quality of Life (IWQOL) assessment tool, which measures body esteem, physical comfort, family relations, social life and total quality of life. Results showed an increase in physical comfort and social life in the Standard Treatment group from pre- to 6-months and pre- to 12-months. However, there was a non-significant change to IWQOL scores for the Health Coach group. Increased physical comfort scores as shown in the Standard Treatment group are indicative of a better quality of life whereas a non-significant change as shown in the Health Coach group indicates no change. The Health Coach group had a significant change in waist and BMI measurements which has previously shown to positively improve IWQOL scores in 1,987 adults with a mean

age of 46.6 years from a cross-section of weight management studies (Kolotkin, Head et al., 1997; Kolotkin, Crosby et al., 2001). However, this was not found in the present study, possibly due to the parent not knowing their waist circumference status until after they had completed the IWQOL measure. Difficult to explain was the improved physical comfort and social life scores for the Standard Treatment parent seeing they were not a focus of the intervention, this may be a consequence of social desirability, in which persons attempt to present themselves in more favourable light (Podsakoff & Organ, 1986; Rodriguez, Retton et al., 1994).

Program Satisfaction Measures

During the data collection periods participants completed a consumer satisfaction questionnaire to measure program acceptance. Satisfaction measures for the Standard Treatment group aimed to assess the parents' perception of the adolescent experiences when using the fitness centre environment and its' suitability for their situation. The satisfaction measures for the Health Coach group aimed to assess the parents' perception of the Health Coach as a supportive agent and the program's effectiveness, this measure showed a reduction in the parents' perception of the program's effectiveness over time. This could be explained by the systematic and planned withdrawal absence of Health Coach contact (support) during the 4-months following post-assessment, with mean scores at 6-months were $M = 3.41$ and at 12-months $M = 3.25$. Furthermore, leisure centre membership expired at 6-months for adolescent participants which could also have influenced the decline in perception of support from Health Coaches. Further, it is important to note that the satisfaction measures had not been psychometrically evaluated, with this potentially limiting its' effectiveness in such a trial. An alternative explanation for the findings is that the

measures were not sensitive enough to detect changes in consumer satisfaction in these programs.

As this was one of the few adolescent-focused healthy lifestyle weight management studies which has evaluated parent and adolescent change, little comparative research is available from which to contrast these results. Based on the current findings it was promising that anthropometrical, psychological, and body composition measures were either improved across some assessment periods or did not significantly worsen decline from baseline values. These findings are of note as the parent was not directly targeted during the Your Choice intervention, and those in the Standard Treatment group were unlikely to receive any healthy lifestyle advice at all, unless this occurred incidentally through attendance by their adolescent at a fitness centre. A non-significant increase in adult weight status over the 12-month follow-up period is especially pleasing considering the upward trend in Australia, with recent data indicating 61% of adults as overweight or obese (OWOB) (Australian Bureau of Statistics, 2009). Additionally, research shows that free living adults not exposed to any intervention are likely to gain weight as compared to experimental groups over a 12-month period (Donnelly, Blair et al., 2009).

The study of the effects on parents was limited as unlike with the OWOB adolescent cohort, Dual-energy X-ray absorptiometry (DEXA) was not used to estimate body composition in the parent cohort. This would have enabled a clearer adolescent-parent comparison and therefore greater understanding of parental outcomes. DEXA measurement of the parent cohort was considered likely to be confronting for parents, thus limiting parent involvement and cascading to limit recruitment of OWOB adolescent participants. Even so, bio-impedance measurement has been found a reliable and valid method of body composition evaluation among adults, and therefore

was considered an adequate approach to evaluate change in total percent body fat in this study.

Another measure which may have allowed a greater understanding of parental behaviour is the Food Frequency Questionnaire (FFQ). Such a tool may have allowed a clearer understanding of adolescent-parent dietary patterns. Previous research has shown that parental modeling of eating behaviours leads to an increase in fruit, vegetable and breakfast consumption (Larson, Neumark-Sztainer et al., 2007). It would have been desirable for the adults to complete the full range of measures as the adolescent; however access to resources and recruitment limitations restricted this.

Overall, comparison of the current study with results from other family-focused behaviorally-based adolescent studies is limited by variations in treatment conditions, follow-up periods, and outcome measures. Furthermore the majority of supporting parents in the study were female ($N = 53$) with only three males which may also limit generalization of the results. Even so, this study adds valuable information and contributes to the dearth of literature evaluating parental changes in adolescent weight management.

CONCLUSIONS

Very few community-based adolescent-focused weight management interventions have evaluated the effects on participating parents who undertook a support role for their child. The results showed modest yet transitory improvements in body composition for the Standard Treatment group and anthropometrical measures in the Health Coach group, but did attenuate any decline in these measures across twelve months, which is not typical of what happens in free living adults not involved in an intervention. Further, participation in either intervention did not appear to negatively impact the physical or psychosocial variables of the parents. This is noteworthy as adolescent-parent discord may be accentuated when adolescent behaviour change is a focus within a family, and that this did not lead to any adverse outcomes is important. The information collected during this study can contribute to the development of future parent-supported interventions in adolescent overweight and obesity.

CHAPTER 7

SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

Summary

This research program evaluated the effects of a Cognitive Behaviour Therapy (CBT)-based healthy lifestyle weight management program on (OWOB) adolescents delivered by Exercise Leaders in a community leisure centre setting. This study was designed with a major focus of developing an adolescent-focussed healthy lifestyle intervention that could be delivered by Exercise Leaders, and this is the first program that has used Exercise Leaders as sole agents to deliver such a program. Additionally, the multicomponent intervention was developed to test its' feasibility in an accessible community setting. Lastly, the intervention sought the involvement of a supporting parent and utilised behavioural modification techniques as recommended in the literature (Epstein, 1996; Brennan, Walkley et al., 2012a).

To complete the research program, a number of linked investigations were undertaken. The first investigation was an evaluation of the training undertaken by Exercise Leaders in Australia related to the principles that underpin interventions designed to support behaviour change. This evaluation showed limited training in behavioural modification was presented in the course and subject descriptions of Exercise-related training programs that were available through the websites of universities and a vocational training package. Although this study revealed very limited behaviour modification content was included in these training programs, this in itself does not confirm that graduates of these programs do not develop relevant skills to support others to modify their behaviour to improve healthy living, but it does

confirm that most training organisations do not commonly highlight nor promote this area in their publically available information sources.

Study two sought to determine the trainability of Exercise Leaders to apply a behaviourally-based lifestyle program to adolescents. Multiple sources of evidence collected during this study indicate that the Exercise Leaders developed competence and satisfaction with key features of the CBT-based approach, and this occurred as a result of training and after delivery of the program to OWOB adolescents.

The third investigation involved OWOB adolescents and their parent's in a study that compared the effect of a CBT-based intervention with a standard treatment intervention on adolescents. The primary outcome measure for this study was body composition, with several secondary outcomes which included body mass index (BMI), physical activity and dietary behaviour. Supplementing this data was a range of psycho-sociological measures. Results showed improvements in body composition in the CBT-based intervention group through to one-year after initiation of treatment as compared to Standard Treatment which showed no significant change. The study also demonstrated improvements in some dietary measures for adolescents in both groups, and select psycho-sociological attribute improvements for the Health Coach group.

Study four ran concurrently with study three, which differed in the target group (parents, not adolescents) and range of measures completed. Data obtained from the parents showed -modest yet transitory improvements in bio-impedance-derived percent total body fat and waist, hip and BMI measures in both groups. Additional psycho-sociological improvements were also found in the Standard Treatment group. Noteworthy was the finding that parents in these groups did not have significant

adverse change in any measure of body composition, as often occurs during adult years among people not exposed to any intervention.

As should occur with human randomised trials, generalisations should be considered in light of participant dropout; even so participant loss during the adolescent study was lower than what has been previously reported (Savoye, Nowicka et al., 2011), and was statistically managed through an intention-to-treat data analysis approach. Other limitations included the use of self-report measures which lends itself to responses influenced by social desirability (Rodriguez, Retton et al., 1994), and the absence of a no-treatment control which was deemed ethically-unsuitable for this study. Strengths of the study included the use of novel delivery agents (i.e. Exercise Leaders), randomised allocation (Shrewsbury, Nguyen et al., 2011), and the use of Dual Energy X-Ray for body composition appraisal among the adolescent participants (Goran, 1998).

Recommendations

This study showed that trained Exercise Leaders were able to deliver a CBT-based healthy lifestyle program with beneficial body composition outcomes, and no detrimental psychological outcomes, to the adolescents and supporting parents. Given that training measures showed Exercise Leaders developed competence and satisfaction with the delivery of the Your Choice program such training may be warranted in Exercise Leader training. Such an intervention may also be suitable for use by relevant community-based organisations as an approach to support OWOB adolescents to manage body composition. Further, given the success of Exercise Leaders in this

intervention, its transfer to other allied health practitioners such as School Nurses, Dietitians and Counsellors may be warranted.

If such a trial were considered in the future many recommendations should be considered. Like similar trials (Lubans, Morgan et al., 2012), the current trial noted the lack of compliance to wearing accelerometers to objectively measure physical activity behaviour. Future research could investigate strategies or incentives to improve monitor wearing. Incentives such as small token rewards or minimal reimbursement could be considered for adolescents that produce full accelerometer data sets. Alternatively, researchers could enlist mobile phone technology to gather such data, as is the case with Kwapisz and colleagues, who have used the evolution of Smart Phones to perform activity recognition in participants during walking, jogging and stair climbing activities (Kwapisz, Weiss et al., 2010), but this raises significant issues associated with privacy and would need to be carefully considered. Adolescents may be comfortable in carrying mobile phones as opposed to conforming to accelerometer procedures given that mobile phone usage for this age group is socially accepted, and very high. As of 2012, 91% of Australians aged 14 to 24 were using mobile phones (Roy Morgan Research, 2012), whereas in 2009 an estimated 841,000 children (31%) aged 5 to 14 years had access to their own mobile phones (Australian Bureau of Statistics, 2012).

Nutritional behaviour in the current study was evaluated by food frequency questionnaire which some authors site as ineffective (Ludwig, Peterson et al., 2001). Future research could again implement the use of mobile phones whereby photographs are taken of meals and sent to researchers for analysis. Photographic techniques have been used previously to identify nutritional quality and the social contexts of consumption in children aged 10 to 11 years (Husby, Heitmann et al., 2009). This

could also be a more accurate method to evaluate soft drink consumption as proved problematic in the current research. Short message service (SMS; text messaging using mobile phones) has been postulated for the evaluation of nutritional behaviours in previous research where children aged 5 to 13 years where more than twice as likely to adhere to SMS messaging (43%) to self-monitor as compared to paper diaries (19%) (Shapiro, Bauer et al., 2008).

In the current study, leisure centre attendance was measured via swipe cards allocated to the adolescent. However, many problems were encountered when trying to either access or gather this information. Amongst the main problems was that adolescents were found to have not swiped cards or the allocation of cards was not timely. Consideration could be given to monitoring leisure centre attendance with incentives for those to adhere to swipe card protocols, leisure centres making it harder to bypass entry terminals, or through access to Global Positioning System (GPS) data linked to mobile (Smart) phones.

In the effort to evaluate the sustainability of adolescent behaviour change interventions, periodic long-term follow-up is highly desirable (Oude Luttikhuis, Baur et al., 2009). The current study had a follow-up period of 12-months which exceeds the timeframe of several researchers (Tsiros, Sinn et al., 2008; Evans, Franco et al., 2009; Brennan, Walkley et al., 2012a) but may but not be sufficient enough to detect the long-term dietary and physical activity outcomes of OWOB adolescents. Although several promising physiological and psychological results were present at 12-months, the effects of this intervention long-term are unknown. In the effort to evaluate the behaviours of OWOB adolescents several years' post-intervention, and indeed into adulthood, future studies should be designed to accommodate the long term collection of data. Long-term appraisal of body composition and behavioural status of OWOB

adolescents may provide evidence of when to intervene, thus preventing these behaviours tracking into adulthood.

CONCLUSIONS

The Your Choice program had several positive outcomes. The results show that trained Exercise Leaders made a meaningful impact on the physical and psychological characteristics of OWOB adolescents via the delivery of a CBT-based healthy lifestyle program in a community setting. Overall, the data shows that adolescents involved in the Exercise Leader-delivered Your Choice intervention experienced a significant improvement in total percent fat to 12-months following commencement of intervention as compared to Standard Treatment. Further, both the Exercise Leader-delivered Your Choice intervention and the Standard Treatment intervention did not experience an increase in total percent body fat or eating disorder pathology to 12-months following commencement of intervention. The study makes a unique contribution to the limited body of knowledge relating to the management of adolescent overweight and obesity in community settings and the behavioural training required to do so. Important information about the effectiveness and feasibility of such an intervention in a community setting has been obtained. Such information may now be used to design and implement comparable interventions in the future.

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APPENDICES

Appendix 1: Training Providers Included in Training Audit, 2008 and 2010

Training Providers Included in Training Audit, 2008 – 2010 Universities

Universities	
1	Deakin University
2	RMIT University
3	University of Ballarat
4	Victorian University
5	Australian Catholic University
6	Monash
7	Southern Cross
8	Griffith University
9	University of QLD
10	Edith Cowan University
11	Charles Sturt University
12	University of Canberra
13	University of Newcastle
14	University of Sydney
15	Bond University
16	Queensland University of Technology
17	University of Sunshine Coast
18	University of Central QLD
19	University of South Australia
20	University of Western Australia
21	University of Tasmania
22	Charles Darwin University
*	University of New England (New to 2010, Not Included in statistical analysis)
Vocational Training	
1	National Fitness Training Package

Appendix 2: Data Base Construction Template

University/ RTO	Course	Relevant Subject (s) / Unit (s)
The Bachelor of Exercise and Sport Science is designed to equip students with the professional careers in the exercise and sport science fields. The broad educational aims to provide students with a sound foundation of theoretical and applied skills in the sports sciences and allied fields; and to develop in students the necessary competencies to become professional leaders in the selected exercise and sport science fields. The course offers the opportunity to study the biological, sociological and behavioural bases of exercise and sport science.		
Bachelor of Exercise and Sport Science	http://www.001.edu.au/future-students/courses/course.php?course=H343&stutype=local&continue=Continue#CRS-STRUCTURE-UNITS	
HBS107 Understanding Health This interdisciplinary unit examines the diversity of media and other images of health and meanings attributed to health; the complex range of interactions that influence the health of individuals and populations; the determinants of selected health issues in urban and rural Australia, as well as in global contexts; and, explores a range of models and approaches and their impact on health outcomes. Topics include: contemporary understandings of health; social, biological, natural environments and employment and education as determinants of health; understanding health research; indigenous health; the evolution of health promotion; illicit drugs exclusion and healthy ageing; mental health.		
HBS110 Health Behaviour The impact of behavioural health issues including tobacco smoking, alcohol use and abuse, healthy and disordered eating, weight management and exercise on health and chronic disease the influence of psychological and biopsychosocial factors and stress on health and health behaviour, and the efficacy of cognitive approaches and coping strategies in addressing these a critical examination of the impact of the physical environment, cultural practices and legal policies on health behaviours the prevention, behavioural factors and management of chronic disease including heart disease, diabetes and cancer		

HSE203 Exercise Behaviour This unit focuses on health-related physical activity and exercise. It examines the fundamental issue of why people exercise, including how exercise participation varies according to factors such as age and gender. The unit also considers sedentary behaviour and physical inactivity, and provides an introduction to theory and concepts important for understanding participation in physical activity at the individual and population level.
HSE302 Exercise Programming This unit is designed to enable students to further develop the principles of exercise prescription introduced in HSE301 and to apply these principles in various training situations. Particular emphasis will be given to providing practical opportunities for students to implement exercise programs for all components of fitness, in particular strength and conditioning, as well as developing a range of interpersonal and communication skills that are required to conduct safe, functional and effective exercise programs for improving both performance. In addition, students will have the opportunity to review and discuss practical exercise programming literature during weekly tutorial classes.

Appendix 3: Health Coach Manual

Your Choice

RMIT UNIVERSITY

YOUR CHOICE

A Program to Support Healthy Lifestyle

Financially supported by *The Shepherd Foundation*

Resource support by *Belgravia Leisure*

Introduction to the concepts of YOUR CHOICE

The Health Coach led YOUR CHOICE program is aimed at supporting adolescents and parents in lifestyle modification for positive health outcomes, in this example a focus weight management. The program utilizes cognitive behavioural based strategies to promote positive lifestyle change for the participants.

Cognitive Behavioural Therapy (CBT) assists individuals engaging in maladaptive (unhelpful) information processing that exhibits itself in distorted and dysfunctional thinking, thus leading to negative thoughts and maladaptive behaviour, in our example poor health choices that lead to overweight or obesity. The Health Coach will assist their clients to recognise, evaluate and modify distorted thoughts to produce more realistic, adaptive evaluations and behaviours. Behavioural analyses are also used to test out the validity of client's assumptions and predictions. The concepts of CBT as applied in the YOUR CHOICE program are described below.

The YOUR CHOICE behavior change intervention includes a number of CBT based strategies, including goal setting, self-monitoring, stimulus control, cognitive restructuring, social support, rewards, problem solving, relapse prevention and physical activity and diet education. These concepts make it easier for the adolescent and parent to understand how and why they need to change their behavior.

Self-monitoring

Self-monitoring—the observing and recording of behavior patterns is very important for the success of the YOUR CHOICE program. This enables accurate feedback for the Health Coach & adolescent to act on. New goals can then be set based on the dietary and activity behavior the parent & adolescent are participating in. Participants will keep a written diary of all food that is consumed and physical activity undertaken. The primary goal of self-monitoring is to serve as a reminder of one's eating and activity patterns. Results of such record keeping are clear: people who self-monitor lose more weight than those

who do not. Self-monitoring is an integral part of the physical activity and diet education sessions: sessions 3 & 4.

Stimulus control

Stimulus control involves identifying the major barriers that are associated with unhealthy eating habits and sedentary patterns. Modifying these barriers by controlling environmental stimuli can help persons manage their weight-control behaviors. For example, one may want to eat whilst watching TV, the TV is the stimuli to eat, although it may be difficult to prevent television viewing we may work on replacing food with a bottle of water. Common stimulus-control strategies include avoiding high-risk places (such as a fast-food restaurant) and removing high risk foods from the house. Stimulus control strategy is an integral part of session 2.

Cognitive Restructuring

Cognitive restructuring means changing the way people think about themselves and their environment. For example, some people think that they can lose weight quickly, such as 10 kilograms in a month. Cognitive restructuring involves helping people set more realistic behavioral goals, such as becoming more active and focusing on quality of life and improved health, not just cosmetic goals such as looking better. Furthermore, Cognitive restructuring involves helping persons change the way they think about themselves in more positive, realistic manner. Persons can develop self-enhancing, self-affirming thoughts and beliefs, which can help them stay focused. Cognitive restructuring methods include establishing a focus on behaviour changes, rather than on weight loss that can have a destructive consequence, which is a more beneficial.

Social support

The **YOUR CHOICE** program enlists the help of a parent to support the adolescent through their behavior change actions. Strong support from the parent and the Health Coach is seen as the vital link in the young person's health management. Concurrently, the parent is also motivated to act on their own

situation so to act as a role model for the child. This is seen as an ideal support system for the parent and adolescent to overcome the barriers to change.

Problem solving / Barriers to healthy habits

Problem solving involves identifying and correcting high-risk situations involving one's eating and activity habits. High-risk situations are usually emotional or social. For example, being invited to a restaurant may make a person feel anxious. A problem-solving approach may involve calling the restaurant ahead of time and asking for healthy alternative. Bringing alternative healthy food to a party may make it easier to stay away from the high-calorie fried food. Problem solving means planning ahead for high-risk situations, all of which forms the basis for session 7.

Disordered Eating

Although not addressing disordered eating in any of the sessions we need to be aware of its signs and symptoms. Although the participants are already screened for such a disorder before the program, it is important that we recognize the physical signs and behaviors so if these do arise, the participant can be referred onto the appropriate support services.

Disordered eating habits can be a negative side effect of focused attention on eating habits and body weight and shape. However, there is no evidence of this with previous **YOUR CHOICE** based studies. As such, we as Coaches of a healthy lifestyle program, must be aware of the signs and symptoms of disordered eating in clients. A basic knowledge of the behavioural and physical symptoms of eating disorders, specifically Bulimia and Anorexia Nervosa, can assist in ensuring we can identify any maladaptive behaviour patterns which may develop as a result of participating in a weight loss intervention. Behavioural and Physical signs of disordered eating include but are not limited to:

Behavioral:

- Excessive exercise
- Severely restricted food intake
- Episodes of binge eating
- Preoccupation with energy content of food
- Preoccupation with body shape/weight
- Constant body checking behaviours
- Irritability and unusual mood swings
- Impaired concentration

Physical:

- Rapid and dramatic weight loss
- Appearance of downy hair covering body
- Scars/Scabs/Sores on backs of hands
- Bad breath
- Excessive sensitivity to cold
- Swollen glands particularly around face and jaw (“Chipmunk Face”)
- Thinning hair/excessive hair loss
- Brittle fingernails

For further information please refer to the Fairburn and Harrison 2003 article in the Pre-reading

Health Coach Pre-Reading 1, 19/8/09

This first reading summarizes the various approaches in adolescent weight management, with an emphasis of Cognitive Behaviour therapy CBT. CBT represents the basis of the YOUR CHOICE health coaching model we will use for our adolescent group.

Please use the following checklist when reading this document. This will help you understand the needs and application of lifestyle modification programs for this group.

After this reading you will gain an understanding of the following.

√

1. The incidence of childhood obesity in the western world
2. The environmental factors that lead to obesity
3. The role physical activity plays in weight management
4. The psychological consequences the obese child is likely to suffer
5. The role nutrition plays in weight management
6. An understanding of the basics of Cognitive Behaviour Therapy
    a. Self monitoring
    b. Stimulus Control
    c. Behaviour Contracts
7. The general role of the Health Coach in modifying the adolescent's behaviour
8. A general insight to what is expected and achieved through the Health Coaching Model, using the case studies, (turning research into practice)

Cognitive-Behavioural Approaches in the Management of Obesity

Willow Wisotsky, PhD. And Charles Swencionis, PhD.

Obesity is a complex, Multifactorial disease that develops from the interaction between biology and the environment. Our understanding of how and why obesity occurs is incomplete; however, it involves the integration of social, behavioural, cultural, physiological, metabolic, and genetic factors. Each year, obesity alone causes at least 300,000 excess deaths in the U.S., and health care costs of American adults with obesity amount to approximately $70 billion, of 7% of health care expenditures. Adult obesity is defined as a body max index (BMI) of >30 kg/m and is related to increased morbidity and mortality. In Western industrialized nations, obesity is considered to be one of the last major unresolved public health issues and the most important nutritional disease. As a major cause of preventable death in the United States today overweight and obesity pose a major public health challenge.

Childhood Obesity

The incidence and prevalence of obesity and overweight are increasing despite efforts to prevent and treat these conditions. Thirteen percent of children between the ages of 6 and 11 years and 14% of adolescents between 12 and 19 years were overweight based on 1999 data. Over the past 20 years, the percentage of overweight children has almost doubled from 7% to 13%, and the percentage of overweight adolescents has nearly tripled from 5% to 14%.

Background and Goals of Treatment

Obesity represents one of the most frustrating and difficult diseases to treat. In many obese people, the roots of their disorder can be traced back to childhood. Treatment of obesity in children is important for several reasons. First, it offers the best hope for preventing disease progression with its associated morbidities into adulthood. Second, although genetic and hormonal causes of obesity are not as common as behavioural habits or patterns, they do warrant consideration in obese children. In addition, obesity has a negative impact on self-esteem of children and adolescents, which may have significant implications for long-term happiness and success in life.

Eating Behaviour

The early experience of dietary intake by an infant is shaped by the dietary patterns of the mother and provides the child with the basis for food acceptance. Through repeated exposure, the child may develop similar dietary preferences to the parent and the residing environment. In particular, repeated exposure and experience with foods high in energy can enhance children's preferences for those foods via associative conditioning. In this form of learning, flavours in foods become associated with satiation cues involved in digestion and absorption of high-energy foods.

The social factors that contribute to a child's eating behaviour may be the influence from other peers, siblings, role models, advertisement cues, or social occasions. The identification of social influences on the child's eating preferences can increase the likelihood for expanding the food selection and increasing the availability of nutrient-dense foods. Therefore, there is a need for increased awareness and increased functional modelling behaviours in the social environment of a child to decrease any dysfunctional modelling behaviour.

Obesity and the risk of becoming obese are greatest among children who have two obese parents. This may be due to powerful genetic factors or parental modelling of both eating and exercise behaviours, indirectly affecting the child's energy balance.

To design effective preventative interventions, we need to examine eating behaviours associated with environmental, social, and family factors. Environmental factors may include the time allotted in a day for sedentary activities, such as television watching. Television watching provides the child with an extensive selection of role models and food-related messages that may lead to future food preferences and activity patterns, thus increasing the likelihood of weight gain and excess body fat, excess body fat results from the body's inability to balance caloric intake with energy expenditure.

Physical Activity Behaviour

Exercise may affect weight control by six possible mechanisms: (1) increased lean body mass increases metabolic rate; (2) exercise itself raises metabolic rate during and for some period after exercise; (3) energy expenditure during exercise; (4) psychological effects of exercise; (5) exercise affects food intake; and (6) exercise affects macronutrient balance.

Psychological factors associated with physical activity in youth include, confidence in one's skills and self-efficacy. Physical and environmental factors play a crucial role in the duration and likelihood of increased physical activity. For example, availability, and appropriateness of the exercise environment are critical components to activity and exercise patterns in the household.

The treatment of childhood overweight and obesity should involve changing the energy expenditure through increased exercise. Therefore, the goals of a successful weight-loss program for children and adolescents should be to explore any barriers to increased physical activity and any behavioural patterns that encourage sedentary activities, and to maintain a partnership with the child and the family to increase the likelihood of overcoming such barriers and patterns.

Self-esteem, Self-image, and Social Development

Children and adolescents who are obese appear to be at greater risk for the development of poor self-concept (self-image, self-esteem, and self-concept are used interchangeably in the literature) and body image. There is an association between overweight children and decreased self-concept and lower body image than reported by the normal-weight children. Strauss reports that decreasing self-esteem in obese children significantly affects the child emotionally, demonstrated by elevated levels of loneliness, sadness and nervousness. Therefore, because childhood and early adolescence is a crucial period for the development of self-esteem and body image, it is important for the family to encourage opportunities for praise to enhance the likelihood of improved social development.

Treatment

The common components designed to promote dietary change in individuals, promote weight loss, and maximise maintenance involve a multidisciplinary effort from disciplines such as medicine, nutrition, and psychology. The first component of treatment for dietary change is an assessment of the adolescent's health risk status from a physician. The adolescent and the family learn to focus on improvements in these health parameters, rather than focus on an ideal body weight that may or may not be attainable. Improvements in health complications could be discussed on an ongoing basis, which many patients find as a helpful motivator.

Improving Nutrition

Improving nutrition for the management of obesity entails dietary interventions with individuals or groups to explore nutrition education and dietary therapy. Nutrition education may include recommendations regarding foods to eat and foods to avoid or information about portion sizes. Dietary therapy includes instructing adolescents in the modification of their diets to achieve a decrease in caloric-fat intake.

Cognitive Therapy Methods

Cognitive methods help patients adopt a more healthful diet and modify attitudes about eating and body image. Cognitive-behaviour therapy focuses on the patient's attitudes and beliefs about weight loss, builds a partnership with the patients, sets achievable behavioural goals, and assists the patients to modify current behaviours. This may include discussions about self-esteem and body image and about how to cope with the societal pressure to reduce to an unrealistic weight.

The "starting point" refers to identifying the patient's readiness to make dietary changes, therefore, designing an appropriate intervention. The patient's readiness can be described by the stage model, which proposes that behaviour change occurs in stages: **precontemplation (**not considering behaviour change); **contemplation** (thinking about behaviour change); **preparation (**planning to change); **action** (initiating behaviour change); and **maintenance** of behaviour change.

Cognitive restructuring is used to identify and modify dysfunctional thoughts and attitudes about weight regulation. Social relationships are addressed in order to cope with specific triggers for overeating and to increase social support for weight control. Finally, relapse prevention strategies are used to promote the maintenance of weight loss. Cooper and Fairburn's cognitive-behavioural approach focuses on identifying and modifying patients' concepts about weight.

Body image concerns can include topics such as social pressures to be thin, body checking and avoidance behaviour, and negatively biased thoughts and attributions about their appearance. The primary goal of this intervention, are the goals patients hope weight loss will bring them. They may include changing appearance, self-confidence, interpersonal functioning, and fitness. These become treatment goals in their own right but do not supersede weight loss and maintenance.

Behaviour Therapy Methods

The next component to a successful approach of the management of obesity incorporates behavioural methods. They focus on changing behaviour related to eating and physical activity and involve self-monitoring, stimulus control, improving nutrition, and behavioural contracting to promote a reward system.

The most common behavioural techniques for weight control include self-monitoring, stimulus control, and a reward system.

Self-monitoring- refers to observing and recording some aspects of behaviour. It provides the information that allows one to monitor food intake and exercise, track progress, assist in awareness and planning, and assess daily or weekly goals.

Stimulus control- is another self-regulatory strategy, designed to limit exposure to cues that prompt overeating. Most behavioural treatments will emphasise the practice of stimulus control to encourage the establishment of new routines and behaviours.

Behavioural contract system- monitors behavioural goals which are developed by the adolescent with or without parents (as appropriate) to assist in the reinforcement and identification of behaviour change and weight loss. A contract should be written document containing the weekly goals, and a reward system should be indicated and signed by both the adolescent and parent (as appropriate).

Reward system- should be developed to encourage attainment of behavioural goals, especially those that have been difficult to reach. The reward system is to encourage and enhance the exchange of praise from parent and child, leading ultimately to a behaviour change. An effective reward is something that is desirable, timely, and contingent to meeting the goal.

Therapeutic Relationship

The therapist (Health coach) should keep his or her expectations realistic, regard each case individually based on the diet history and attitudes of change, and begin to build a partnership with the patient. Building a partnership with the patient increase the empathetic style of the therapist and enables the patient to be an active partner in setting goals for behaviour change.

Summary

The comprehensive nature of a cognitive-behavioural weight-management program is of value in modifying behaviours that are linked to adverse health effects and psychological distresses, without necessarily causing a drastic weight lose in obese individuals. The behavioural treatments for overweight and obesity directly modify behaviours that bear on health and illness, such as improving dietary choices, decreasing sedentary behaviours, and increasing habitual physical activity, and exercise. Cognitive-behavioural treatment can be used to help overweight adolescents become more assertive in coping with adverse social stigma of being overweight, in enhancing their self-esteem, and in reducing their dissatisfaction with body image regardless of their weight loss.

Health Coach Pre-reading: week 2; 26/8/09

This second reading summarizes the work of Leonard Epstein, who has a long history of adolescent behavior change practice, in relation to weight management. This paper gives a ten year insight into Epstein's research work, which predominantly focuses on altering the home environment and how important that is to the success of such programs. I have omitted some pages of the original document.

Please use the following checklist when reading this document. This will further help your understanding of the role of the family involvement in adolescent lifestyle change. This reading will act as reinforcement from last week's reading.

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1. By reading the **Introduction (page1)**, be aware of the parenting influences on adolescents._____

2. Overview the **Components of behavioral family based intervention (page 2)**, paying particular attention to the Traffic Light Diet concepts mentioned._____ 
3. Overview **Behavior Change Techniques (page3),** similar to last week, taking into consideration the concept of **Social reinforcement** and **Modeling of social skills.**_____**-**_____ 
4. Read the **Discussion (final Page)** to further enhance your understanding of the area_____ 

All information adapted from Wisotsky, W., & Swencionis, C. (2003). Adolescent Medicine, 14, 37

Epstein, 1996.

SUMMARY: The family environment can contribute to the development of obesity. Parenting styles may influence the development of food preferences and the ability of a child to regulate intake. Parents and other family members arrange a common, shared environment that may be conducive to overeating or a sedentary lifestyle. Family members serve as models, and reinforce and support the acquisition and maintenance of eating and exercise behaviours. Family-based interventions are needed to modify these variables in treating obese children. We have made significant progress in developing interventions that target obese 8–12 year-old children, completing four 10-year follow-up studies that provide support for two factors that are useful in childhood obesity treatment. First, our research suggests that the direct involvement of at least one parent as an active participant in the weight loss process improves short- and long-term weight regulation. Second, our research suggests that increasing activity is important for maintenance of long-term weight control. Correlational analyses on the 10-year database suggest that family and friend support for behaviour change are related to long-term outcome. Family-based obesity treatment provides interventions for both children and their parents, but children benefit more from treatment than their parents. These positive results provide an encouraging basis for optimism that further development of interventions, based on newer research on family processes and behaviour change, can be useful in treating childhood obesity.

Childhood obesity is a prevalent disorder with one quarter of all children in the USA classified as obese.[1] Obesity tracks during development, and the relative risk of an obese 10–13 year old becoming an obese adult is six to seven times greater than that of his/her nonobese peers.[2,3] Obesity in childhood and adolescence is associated with the development of risk factors for cardiovascular and metabolic diseases.[4,5] In addition, obesity in adolescence is associated with increased morbidity and mortality after a 50-year follow-up, independent of adult body weight.[6]

A risk factor for the development of childhood obesity is parent obesity. Epidemiological data suggests that parental weight is cross-sectionally and prospectively related to the development of their child's obesity during infancy, childhood, adolescence and adulthood.[9–12] One way parental obesity may be involved in the development of obesity is by the facilitation and maintenance of the sedentary lifestyle that is involved in the development of obesity. Griffiths and Payne[13] showed lower activity-induced energy expenditure in normal weight children of obese parents than in normal weight children of nonobese parents. Parental obesity is associated with decreased physical activity in their children.[14,15] Likewise, less active parents, who are often obese, have less active children.[16] Parents can also model eating[17,18] and exercise habits,[19] and provide prompts and reinforcement for patterns of eating or activity.[20–22] Parents respond differently to child physical activity as a function of the degree of child obesity, with parents of obese children providing fewer prompts and less reinforcement for being active than parents of lean children.[20] Parents may even actively suppress or punish vigorous physical activity in their obese children.[21] Finally, parents can teach children to override satiety signals by exerting excess control over the child's feeding practices.[23]

Psychosocial factors may also influence development of obesity. Some research suggests socioeconomic level influences development of obesity, but this literature is inconsistent.[24] However, a consistent body of research does suggest that the quality of the home environment and parent–child relationships, rather than simply socioeconomic status (SES), profoundly affects the risk of developing adult obesity.

Components of behavioural family-based intervention

Structure of treatment

Parents and children are generally seen in 60 min group treatment sessions. The treatment length has varied from 8 to 26 weeks, as research on adults has shown improved treatment effects with longer treatments.[7] Families are seen at 6 and 12 months and at different follow-up intervals dependent upon the individual study. Each treatment meeting includes a weigh-in for the overweight child and overweight parents who are attempting to lose weight, administration of information quiz and review, review of habit books for self-monitoring of eating and activity and homework assignments by individual therapists, and separation of family members into parent and child classes for presentation of information.[31] The information acquisition is primarily by use of the personalized instruction modules, with weekly group and individual meetings for problem solving discussions of how to carry out changes in eating and exercise behaviours.

Diet

All families are provided the Traffic Light Diet, to reduce energy intake and improve nutrient density.

Activity program

We have tested two activity programs, a lifestyle activity program and an aerobic exercise program.[38,39] In the current lifestyle program parents and children are provided a list of activities and their associated energy expenditure in terms of METS, or multiples of resting metabolite rate, based on the compendium of physical activity.[40]

The other type of exercise program we have studied is a more traditional aerobic exercise program, that is similar in most respects to the lifestyle program with the exception that the types of activities that are provided to the families are only aerobic exercises such as walking, running, bicycling or swimming, and the exercises must be done at aerobic intensities and for at least 20–30 min. The activity programs are isoenergetic, with the differences between the programs being exercise intensity, choice and exercise accessibility. The points that children earn for either type of activity can be used to fulfill contracts as specified below.

Behaviour change techniques

Self-monitoring

Children and parents record their eating and activity throughout treatment in specially prepared habit books. They are instructed to record immediately after the behaviour whenever possible. Children and overweight parents also record their daily weights on a weight graph that provides space for one month of daily weights.

Social reinforcement

Parents are taught two positive social reinforcement techniques to help their children learn new behaviours and maintain these changes: praise and contracting. Parents learn to be very specific in stating what the praise is for, and to be consistent in the use of praise.

The second positive social reinforcement procedure the families learn to use is contracting.[44] Children review lists of possible activities and privileges they would like to earn by meeting the eating and/or activity limits. The parent must agree to each chosen reinforcer.

Stimulus control

Stimulus control procedures are designed to arrange environments that are conducive to behaviour change and maintenance. Stimulus control is important in reducing access to behaviours to be decreased and facilitate access to behaviours to be increased.

Modeling and social skills

Parents in each group are informed about the importance of modeling in changing child behaviour. They are instructed not to do things in front of their children that they do not want the child to imitate, and to model behaviour that they want their child to repeat. Parents and children are taught social skills to use when interacting with family and friends to facilitate program adherence. Special attention is paid to holidays like Easter, Halloween, Thanksgiving and Christmas when controlling eating and exercising is often more difficult.

Child *vs* adult weight loss

Recent research has shown maintenance of weight regulation for obese preadolescent children over five- and 10-year intervals, while studies on adults consistently show they fail to maintain weight loss. The use of family-based interventions provides the opportunity to directly compare percent overweight changes in parents and children.[5]

Significant differences in child and parent percent overweight change were observed after six months and 10 years. Children and parents display a similar pattern of overweight change. Both children and parents show a treatment effect from entry to six months and a decrement in response to treatment from six months to five years. At 5 years children stabilized their relative weight change, while parents continue to increase in weight from 5 to 10 years.

Discussion

These studies provide the first indication that children can make changes in eating and exercise behaviours resulting in long-term improvement in relative body weight.[59] They also provide ideas about mechanisms that may be important for long-term weight regulation. The improved child outcome when both parents and children are targeted for behaviour change suggests factors common to the shared family environment, including changes in parent–child interactions that encourage and support new eating and exercise habits. These factors are important for success in behaviour change.[21,23,25,27,47,60] In addition, the improved long-term success for children in physical activity programs suggests increased activity is critical to long-term success in weight control.[30]

The differences in child and adult weight loss and maintenance may represent the more advantageous effects of family processes for children than for adults. Parent involvement in child weight control involves facilitating changes in the eating and exercise environment, which includes serving as a model for behaviour change and providing social reinforcement for change. This environment may be more supportive of change than the environment in which adults are attempting to make changes. There has been extensive laboratory research on the influence of parental influences on child eating and exercise behaviours,[21,46,61] which provides support for the potential of family-based interventions. The best methods for including parents in family-based interventions have been studied.[30,62–64]

In summary, this paper provides the basics of family-based behavioural weight control, and documents the effects of treatment variables on long-term outcome. In addition, the paper provides the first systematic evidence that it may be easier for children to lose and maintain weight than adults. Further research is needed to capture the influence of familial variables on child weight control, and to then develop interventions that enhance the potential for familial support, while minimizing disruptive effects that may also be operating within families.

All information adapted from Epstein, 1996, International Journal of Obesity, 20, Suppl. 1

Case 1

A 12-year-old adolescent female weighing 225 pounds at 5 ft, 4 in presents to the office accompanied by her mother, who is concerned about the girl's weight. She has not attempted other weight loss programs before. She has been gaining significant amounts of weight over the past 3 – 5 years. She is a quiet, shy, and nonactive child. She has not reported interest or motivation for weight loss. She was about to enter a new school, and her mother had suggested that she join a behavioral weight-management program. She was unmotivated to participate, but her mother insisted that she attend treatment.

Following the initial medical and nutritional evaluation, the adolescent was still unmotivated for change and was referred for behavioral intervention. As part of the initial behavioral assessment, the practitioner required that the adolescent do a food diary for 3 days to a week and make a pro and con list for weight loss. The purpose of such tasks is to create awareness, find patterns of eating, and determine the readiness for change. After a week passed, the adolescent returned with her assignment and a desire to listen further about change. She realized that her pro list was longer than her cons and that she just needed some direction and encouragement. Following the meeting, the adolescent was able to move into the readiness for change stage and the family began to learn new strategies to change their lifestyle and patterns or weight gain.

The family involvement is imperative in this case and nearly all others regardless of the stage of change that the adolescent is in. The parents exert a powerful influence on the eating and physical activity

patterns of their children. The family can make lifestyle changes with the adolescent by shopping for foods that are recommended by the nutritionist and by reducing the stimuli in the household to decrease sabotage (e.g.,cakes, cookies candy). The parents should become involved in the weight-management program and help to develop and implement the behavioral contract to encourage praise, privilege, and responsibility. When parents praise and do not assume all responsibility for their child's weight, the child can begin to develop his or her own sense of responsibility which will then allow for increased ability in problem solving and awareness of his or her body.

The adolescent returned for the next meeting and lost 1 pound. She felt discouraged that all of her hard work resulted in just 1 pound lost, but through additional skills training, education, support, and praise she was able to continue with a slow, but lasting weight loss. Over the next 6 months of monthly visits, despite ups and downs in motivation, she was able to sustain healthier eating and physical activity patterns. She lost an additional 22 pounds and 2 dress sizes.

CASE 2

A 14-year-old adolescent male presented to a cognitive-behavioral weight-management treatment program. The adolescent reported that he was unhappy with is excess weight and was ready to make changes. At 14 years of age, he weighed 232 pounds at 5 ft, 5 in, and has bee unsuccessful with other weight-loss programs in the past. He reports feeling lethargic, unable to participate in sports, and socially "left out." After a medical examination, the adolescent met with a nutritionist to get guidance on his meal plans. The motivated adolescent was asked to do a pro and con list to demonstrate his views on change, assess his current stage of change, and complete a food and activity diary to identify patterns of eating and physical activity.

Feeling very motivated, he was eager to comply with his food diary and lean what he needed to make changes.

At the next meeting, the adolescent boy was able to start identifying patterns and feelings he had surrounding food and eating. Through this exploration the adolescent was able to challenge his behaviour from past unsuccessful weight-loss attempts. He also was able to increase his awareness, a key step in changing habits. He began to take responsibility for his habits and his food and exercise behaviors, although he did still need assistance of his family, who had been involved from the first meeting. This was a new venture for this family and a challenge. They began to make lifestyle changes together and develop a contract system for the household, which enabled the entire family to receive praise and privilege. The family became active with one another and participated in exercise, meanwhile increasing

their time spent together. Through the course of treatment and ongoing cognitive, behavioral, and nutritional training, the adolescent and family were able to learn and develop a new lifestyle that encouraged weight loss and maintenance for the entire family.

Health Coach Pre-reading: week 3; 1/3/09

This reading summarizes and classifies eating disorders so that you are aware of the physical signs and symptoms. Although not addressing disordered eating in any of the sessions we need to be aware of its signs and symptoms. Although the participants are already screened for such a disorder before the program, it is important that we recognize the physical signs and behaviors so if these do arise the participant can be referred onto the appropriate support services.

Disordered eating habits can be a negative side effect of focused attention on eating habits and body weight and shape. However, there is no evidence of this with previous Your Choice based studies. As such, as Coaches of a healthy lifestyle program, the Health Coach must be aware of the signs and symptoms of disordered eating in clients. A basic knowledge of the behavioral and physical symptoms of eating disorders, specifically Bulimia and Anorexia Nervosa, can assist in ensuring we can identify any maladaptive behavior patterns which may develop as a result of participating in a weight management program

Please use the following checklist when reading this document. This will further help your understand the signs and symptoms of disordered eating.

1. By reading (**page 1**) be aware of the following
    a. Definition of an eating disorder, _____
    b. Classification of anorexia nervosa_____
    c. Classification of Bulimia Nervosa._____
2. Overview the main physical symptoms of anorexia **(page 2, panel 2)**_____
3. Overview Bulimia nervosa, **(starting page 2)** paying particular attention to binge eating.& binge eating disorder **(Page3)**_____
4. Read the main risk factors anorexia nervosa and bulimia nervosa, **(page 3 panel 3)**_____

Read the current knowledge of binge eating, **(page 3 panel 4)** paying attention to its association to obesity._____

Fairburn and Cooper 2003.

Eating disorders are an important cause of physical and psychosocial morbidity in adolescent girls and young adult women. They are much less frequent in men. Eating disorders are divided into three diagnostic categories: anorexia nervosa, bulimia nervosa, and the atypical eating disorders. However, the disorders have many features in common and patients frequently move between them, so for the purposes of this Seminar we have adopted a transdiagnostic perspective. The cause of eating disorders is complex and badly understood. There is a genetic predisposition, and certain specific environmental risk factors have been implicated. Research into treatment has focused on bulimia nervosa, and evidence-based management of this disorder is possible. A specific form of cognitive behaviour therapy is the most effective treatment, although few patients seem to receive it in practice. Treatment of anorexia nervosa and atypical eating disorders has received remarkably little research attention.

Their cause is elusive, with social, psychological, and biological processes all seeming to play a major part, and they are difficult to treat, with some patients actively resisting attempts to help them.

Classification and diagnosis

The classification of the eating disorders and their principal diagnostic criteria are shown in panel 1. Note that in addition to anorexia nervosa and bulimia nervosa, there is a third diagnostic category, atypical eating disorders,3 the equivalent American term being "eating disorders not otherwise specified".1 A further eating disorder has also been proposed, termed binge eating disorder.1 Since this condition is somewhat different in nature to the other three diagnostic groups we will discuss it separately later.

Panel 1: Classification and diagnosis of eating disorders

Definition of an eating disorder

There is a definite disturbance of eating habits or weight-control behaviour
Either this disturbance, or associated core eating disorder features, results in a clinically significant impairment of physical health or psychosocial functioning (core eating disorder features comprise the disturbance of eating and any associated overevaluation of shape or weight)
The behavioural disturbance should not be secondary to any general medical disorder or to any other psychiatric condition

Classification of eating disorders

Anorexia nervosa

- Overevaluation of shape and weight—ie, judging self-worth largely, or exclusively, in terms of shape and weight
- Active maintenance of an unduly low bodyweight—eg, body-mass index _17·5 kg/m2
- Amenorrhoea in postmenarcheal females who are not taking an oral contraceptive. The value of the amenorrhoea criterion can be questioned since most female patients who meet the other two diagnostic criteria are amenorrhoeic, and those who menstruate seem to resemble closely those who do not

Bulimia nervosa

- Overevaluation of shape and weight—ie, judging self-worth largely, or exclusively, in terms of shape and weight
- Recurrent binge eating—ie, recurrent episodes of uncontrolled overeating
- Extreme weight-control behaviour—eg, strict dietary restriction, frequent self-induced vomiting or laxative misuse
- Diagnostic criteria for anorexia nervosa are not met

Atypical eating disorders (or eating disorder not otherwise specified: EDNOS)

- Eating disorders of clinical severity that do not conform to the diagnostic criteria for anorexia nervosa or bulimia nervosa

Panel 2: Main physical features of anorexia nervosa

Physical symptoms

- Heightened sensitivity to cold
- Gastrointestinal symptoms—eg, constipation, fullness after eating, bloatedness
- Dizziness and syncope
- Amenorrhoea (in females not taking an oral contraceptive), low sexual appetite, infertility
- Poor sleep with early morning wakening

Physical signs

- Emaciation; stunted growth and failure of breast development (if prepubertal onset)
- Dry skin; fine downy hair (lanugo) on the back, forearms, and side of the face; in patients with hypercarotenaemia, orange discolouration of the skin of the palms and soles
- Swelling of parotid and submandibular glands (especially in bulimic patients)
- Erosion of inner surface of front teeth (perimylolysis) in those who vomit frequently
- Cold hands and feet; hypothermia
- Bradycardia; orthostatic hypotension; cardiac arrhythmias (especially in underweight patients and those with electrolyte abnormalities)
- Dependent oedema (complicating assessment of bodyweight)
- Weak proximal muscles (elicited as difficulty rising from a squatting position)

Anorexia nervosa

In anorexia nervosa, the pursuit of weight loss is successful in that a very low weight is achieved. This loss of weight is primarily the result of a severe and selective restriction of food intake, with foods viewed as fattening being excluded.

In most instances there is no true anorexia as such. In some patients, the restriction over food intake is also motivated by other psychological processes, including asceticism, competitiveness, and a wish to punish themselves. Many patients engage in a driven type of over exercising, which can contribute to their low weight. Self-induced vomiting and other extreme forms of weight-control behaviour, such as the misuse of laxatives or diuretics, are practised by a few individuals. Some patients have times when they lose control over eating, although the amounts eaten are often not large.

Symptoms of depression and anxiety disorders, irritability, liability of mood, impaired concentration, loss of sexual appetite, and obsessional features are frequent accompaniments. Typically these features get worse as weight is lost and improve with weight regain. Interest in the outside world also declines as patients become underweight, with the result that most become socially withdrawn and isolated. This feature too is reversible.

Bulimia nervosa

The main feature that distinguishes bulimia nervosa from anorexia nervosa is that attempts to restrict food intake are punctuated by repeated binges (episodes of eating during which there is an aversive sense of loss of control and an unusually large amount of food is eaten).

The amount consumed in these binges varies, but is typically between 4·2 MJ (1000 kcals) and 8·4 MJ (2000 kcals). In most instances, binge eating is followed by compensatory self-induced vomiting or laxative misuse, but there is a subgroup who do not purge. The combination of under eating and binge eating results in bodyweight being generally unremarkable, providing the other obvious difference from anorexia nervosa. Most patients with bulimia nervosa are distressed by their loss of control over eating and ashamed of it, which makes them easier to engage in treatment than those with anorexia nervosa, although there is typically a delay of many years before they seek help.

Symptoms of depression and anxiety disorders are often prominent and, as in the case of anorexia nervosa, there is a subgroup who engage in substance misuse or self-injury, or both. This subgroup is probably over-represented in specialist treatment centres.

Atypical eating disorders

Most atypical eating disorders closely resemble anorexia nervosa and bulimia nervosa, and many are as severe and long lasting. Some are virtually identical to the two prototypical disorders, but do not meet their precise diagnostic criteria. For example, the patient's weight might be just above the diagnostic threshold for anorexia nervosa or she might still be menstruating. In others, the picture is mixed. For instance, there could be extreme dietary restraint, pronounced over exercising, occasional binge eating, and a low-to-normal weight. Many such patients have had anorexia nervosa or bulimia nervosa in the past.

Over evaluation of shape and weight is present in most, although in some the focus is primarily on maintaining strict control over eating.

Development and subsequent course

Anorexia nervosa typically starts in mid-teenage years with the onset of dietary restriction, which proceeds to get out of control. In some instances the disorder is short-lived and self-limiting, or only requires a brief intervention. These instances are most typical of young individuals with a brief history. In others, the disorder becomes entrenched and necessitates more intensive treatment. In 10–20% of individuals, the disorder proves intractable and unremitting.

Anorexia nervosa is the one eating disorder to be associated with a raised mortality rate, the standardised mortality ratio over the first 10 years from presentation being about 10.

Bulimia nervosa has a slightly later age of onset than anorexia nervosa.37 It usually starts in much the same way as anorexia nervosa—indeed, in about a quarter of cases, the diagnostic criteria for anorexia nervosa are met for a time. Eventually, however, episodes of binge eating begin to interrupt the dietary restriction and, as a result, bodyweight rises to normal or near normal levels.

No consistent predictors of outcome have been identified, although there is evidence that childhood obesity, low self-esteem, and personality disturbance are associated with a worse prognosis.

Binge eating disorder

By comparison with anorexia nervosa and bulimia nervosa, little is known about binge eating disorder. Although it shares with bulimia nervosa the symptom of binge eating, its overlap with the other eating disorders is limited. For example, the condition seems to primarily affect an older age group, its sex ratio is less uneven, the binge eating occurs against the background of a general tendency to overeat rather than dietary restraint (which probably accounts for its strong association with obesity), and the fact that findings from natural history studies and drug trials both suggest that there is a high spontaneous remission rate at least in the short-term. Panel 4 summarises current knowledge about the disorder.

Panel 3: Main risk factors for anorexia nervosa and bulimia nervosa

General factors

- Female
- Adolescence and early adulthood
- Living in a Western society
- Individual-specific factors

Family history

- Eating disorder of any type
- Depression
- Substance misuse, especially alcoholism (bulimia nervosa)
- Obesity (bulimia nervosa)

Premorbid experiences

- Adverse parenting (especially low contact, high expectations, parental discord)
- Sexual abuse
- Family dieting
- Critical comments about eating, shape, or weight from family and others
- Occupational and recreational pressure to be slim

Premorbid characteristics

- Low self-esteem
- Perfectionism (anorexia nervosa and to a lesser extent bulimia nervosa)
- Anxiety and anxiety disorders
- Obesity (bulimia nervosa)
- Early menarche (bulimia nervosa)

Panel 4: Current knowledge about binge eating disorder.

Definition:

- Recurrent episodes of binge eating in the absence of extreme weight-control behaviour1

Clinical features:

- Frequent binge eating, much as in bulimia nervosa, but against the background of a general tendency to overeat.
- Strong association with obesity.
- By definition, self-induced vomiting and laxative misuse are not present or only occasional.
- Depressive features and dissatisfaction with shape common, although these features tend to be less severe than in bulimia nervosa

Distribution:

- Patients typically present in their 40s and as many as a quarter are male.
- Prevalence in the community has not been satisfactorily established.
- Present in 5–10% of those seeking treatment for obesity

All information adapted from Fairburn and Cooper, THE LANCET • Vol 361 • February 1, 2003 • www.thelancet.com

Further-Pre Reading

To further your knowledge of the intervention and the concepts overviewed it is encouraged that you read the following papers.

Pre Reading
Your Choice Manual\Your Choice Resources\Fairburn & Harrison 2003.pdf
Your Choice Manual\Your Choice Resources\Costain 2005.pdf
Your Choice Manual\Your Choice Resources\Foreyt 2005.pdf
Your Choice Manual\Your Choice Resources\Wisotsky summary PDF.pdf
Your Choice Manual\Your Choice Resources\Shilts 2004.pdf
Your Choice Manual\Your Choice Resources\Epstein 1996.pdf

The Program

Session 0	**Contact Clients and schedule appointments for upcoming week**
Session 1	**Goal setting & self-monitoring**
Session 2	**Eating cues / Stimulus control**
Session 3	**Addressing sedentary behaviours**
Session 4	**Healthy Eating Habits**
Session 5	**Physical Activity**
Session 6	**Thoughts & Behaviors**
Session 7	**High risk situations / problem solving**
Session 8	**Phone call session: Difficulties, Maintaining change & Relapse prevention**
	Physical Assessments at RMIT
Review Session 9	**Review results of physical assessment / Maintaining Change**
Phone call	**Phone call session (4weeks after review) – review & reinforce strategies**
Phone call	**Phone call session (8 weeks after review) – review & reinforce strategies**

Your Role as a Health Coach

The role you take as a YOUR CHOICE trained Health Coach will be similar to the one in which you're already trained to do. This includes, helping your client reach their goals through support, education and advice. However, the way that you do this will be different from the way you may have been trained. This manual contains a process of how to guide and support the adolescent to make lifestyle choices, which may equate to better health outcomes.

From a client interaction viewpoint the participants should be treated no differently to any client that you are working with. Please treat them as your client and not a participant in a study. A major part of the program is getting participants comfortable and familiar with the leisure centre environment. All participants will receive six months membership, so it is important that the experience is a beneficial and rewarding one.

In regards to initial client contact, we will supply contact details of the participant late September, when assessments have been carried out.

Your role from there will be to;

- Contact the client and arrange to meet at a mutually convenient time; likely to be in the after school period, weekdays
- Step through the sessions as you have been trained
- If clients are late, use the balance of the 1 hour only
- If clients miss a session, ring them, reschedule if possible, avoid getting sessions out of sequence. Allow at least 48 hours between sessions, if rescheduled.

You are only expected to do your best during the program; if you have ongoing difficulties with clients please contact Richard or Jeff. We may be able to offer solutions to problems, or deal with the clients separately.

A guide for worksheet identification and application;

Worksheet color	**Application**
WHITE	Health coach
YELLOW	Adolescent, given out weekly
BLUE	Adolescent contract, to be referred back to when necessary
PINK	Adolescent phonecalls & session 9
GREEN	Adolescent, Weekly Targets

Session 1: Goal Setting & Self-Monitoring

Upon meeting the adolescent & parent, physical assessments and associated screening will have already been completed by RMIT University. The task for you will be to firstly get to know the participants and then determine reasons and the needs for persons to alter their current behaviors.

Getting to know and developing a rapport with the participant is integral to the success of the program. Similarly to how we get to know anyone, you can start off by asking what the person does, what are they interested in and where they live etc. Within this conversation you can make participants aware that you are also keen to help with their lifestyle and that you are committed to making the sessions enjoyable and educational.

The interviewing process will be nonjudgmental, empathetic, and encouraging. This means that we are not to make judgment on how the adolescent became unhealthy in the first place. We as Health Coaches establish a non-confrontational and supportive climate in which the adolescent and parent feel comfortable expressing both positive and negative aspects of their current behaviour. The Health Coach will help participants think about and express via the worksheets what their own reasons for and against change, as well as how their current behaviour or health status affects their ability to achieve their life goals. Furthermore, to achieve these goals you will rely heavily on reflective listening and the re statements of what has been communicated

To start off the session, the Health Coach will request the participants complete the checklist worksheets 1.0 and 1.1 this promotes good discussion and thoughts and assists greatly with the flow of the session. These checklists act as an introductory example of some of the negatives and positives of leading a healthy lifestyle. From there the participants will be better positioned to complete the following worksheets. Example worksheet 1.2 will act as a reference for you only whilst worksheet 1.2 will be completed by the participants. The ruler work sheets1.3 (& example) will assist in gaining an insight as to what extent the persons want to change. Example worksheets 1.3 will act as a reference whereas worksheet 1.3 will be completed by the participants using knowledge gained from worksheet 1.2.

Note: Both parents and adolescents are required to attend sessions 1 – 5 together, however sessions 6 & 7 and phone call sessions can be an adolescent only session. Please ask the adolescent what they would prefer after week 5 if they would like a parent present.

Goal Setting

Upon getting to know the participants and understanding their unique situations you will be able to set realistic goals for the Your Choice program. Traditionally as fitness qualified professionals we are taught to set goals such as losing weight over a given timeframe, for example you may say to a client that we will aim to lose 5 kilograms in the next month. With the Your Choice program we establish behavioural goals such as to walk 40 minutes in 10 minute segments over a 2 day period, or limiting soft drink consumption to 10 % of previous consumption. By setting behavioural goals that we can modify and adapt to lifestyle we may expect incidental physical changes. By setting behavioural goals the participant is in control of reaching that goal whereas if the goal was weight loss the outcome is less predictable. Goals are required to be reviewed every week and altered as required.

Self-monitoring

You will see that in worksheet 1.4 we have set a target for the week and listed columns allocated to other choices the participant made that week. These choices will give the opportunity to fine tune goals for upcoming weeks. These worksheets are important feedback tools for our future goal setting. Example worksheet 1.4 will act as an

example whereas worksheet 1.4 will be completed by participants with your guidance. All target behaviours should be simple, realistic and achievable.

For the first self-monitoring target sheet ask the adolescent-

- What healthy foods they are already eating, and can they increase that?
- What type of activity they are already doing, and can they increase that?
- Ask them generally if they having been occasional type foods and can we decrease this?
- Ask them generally about ;
    - Orange juice consumption
    - If they have breakfast
    - Soft drink consumption

Work through each column of the worksheet and explain what is required to fill these in columns. You will start off very light for targets but add to these targets as time goes on.

Contracting

The YOUR CHOICE lifestyle program requires participants to complete a contract of commitment to the program, their partner and yourself (Worksheet 1.5). Contracting is a step taken to further reinforce the need to change and make aware what behaviours are necessary to make these changes. Having participants write down their behavior change targets formalises the agreement and may help them in reaching that behavior goal.

Session 1 Resources	
Worksheet 1.0	Your Choice Manual\Session 1\1.0 Healthy Checklist.doc
Worksheet 1.1	Your Choice Manual\Session 1\1.1 Unhealthy Checklist .doc
Worksheet 1.2	Your Choice Manual\Session 1\Worksheets 1.2.doc
Example Worksheet 1.2	Your Choice Manual\Session 1\Worksheet Example 1.2.doc
Worksheet 1.3	Your Choice Manual\Session 1\Worksheet 1.3.doc
Example Worksheet 1.3	Your Choice Manual\Session 1\Example Worksheet 1.3.doc
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Example Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 Example.doc
Worksheet 1.5	Your Choice Manual\Session 1\Worksheet 1.5 Contract Plan.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc

Worksheet 1.0

Please tick the boxes you think are related to living a healthy lifestyle

√

1) Builds a stronger heart ☐
2) Improves your bone strength ☐
3) Strengthens your muscles ☐
4) Boosts your energy levels ☐
5) Improves your flexibility ☐
6) Improves your concentration ☐
7) Builds your confidence ☐
8) Helps you to have a good night sleep ☐
9) Increases social interaction with friends ☐
10) Improves your weight management ☐
11) Helps you with stress ☐
12) Improves your coordination ☐
13) Improves the way you feel about yourself ☐
14) Improves your balance ☐
15) Strengthens your immune system ☐
16) Helps you live longer ☐
17) Improves your overall health ☐
18) Helps you develop new skills ☐
19) Improves your leadership skills ☐
20) Improves your memory ☐

Worksheet 1.1

If I live an unhealthy lifestyle I may develop these conditions (please tick

√

21) Heart problems _____☐

22) Type 2 diabetes_____☐

23) High blood pressure _____☐

24) High amount of fats in the body _____☐

25) Arthritis (pain in the joints)_____☐

26) Certain types of cancer _____☐

27) Being out of breath_____☐

28) Unable to get a good nights sleep_____☐

29) Low back pain _____☐

30) Premature death _____☐

31) Feeling sad (depressed)_____☐

32) Low confidence _____☐

Worksheet 1.2

Reasons for changing	Reasons for not changing

What will happen if I don't change

Tip: It may a good idea for the adolescent to keep the list of reasons why they want to change to a healthy lifestyle in their desk draw or on their computer screen saver.

Example worksheet 1.2

Reasons for changing	Reasons for not changing
• Have more fun with friends • Buy a new summer wardrobe • Become better at my sport • May meet more people • Better for my health • Make the school team • I'll be a good role model for my friends • I'll be proud of myself	• Not enough time • Costs too much • Can't get to gym • Easier to stay the same

What will happen if I don't change
• Won't be happy • Feel sad • Hard to be successful at sport • Won't have as much fun • May get sick

Tip: It may a good idea for the adolescent to keep the list of reasons why they want to change to a healthy lifestyle in their desk draw or on their computer screen saver.

HOW IMPORTANT IS IT FOR YOU?

(Circle the appropriate number)

Worksheet 1.3

How *important* is it for you to_____?

0 1 2 3 4 5 6 7 8 9 10

Not at all Important ***Extremely Important***

How *important* is it for you to _____?

0 1 2 3 4 5 6 7 8 9 10

Not at all Important ***Extremely Important***

How *important* is it for you to _____?

0 1 2 3 4 5 6 7 8 9 10

Not at all Important ***Extremely Important***

How *important* is it for you to _____?

0 1 2 3 4 5 6 7 8 9 10

Not at all Important ***Extremely Important***

How *important* is it for you to _____?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

HOW IMPORTANT IS IT FOR YOU?

(Circle the appropriate number)

Work sheet 1.3 (Example)

How *important* is it for you to lose weight ?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

Important ***Important***

How *important* is it for you to become a little fitter?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

Important ***Important***

How *important* is it for you to keep up with my friends?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

Important ***Important***

How *important* is it for you to have less trips to the doctor?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

Important ***Important***

How *important* is it for you to fit into your summer clothes?

0 1 2 3 4 5 6 7 8 9 10

Not at all ***Extremely***

Important ***Important***

Worksheet 1.4 What I chose to do; Week - 1

Worksheet 1.4 What I chose to do; Week - 6

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

What I chose to do (Example Only)

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
To have 1 piece of fruit	√	√		√				√
To walk to school	√	√	√	√	√	√		
To shoot 40 netball goals at lunchtime	√		√	√	√	√		
Help mum hang out washing	√	√					√	
Drink 4 glasses of water	√	√	√	√		√	√	√
Total		4	3	4	2	3	2	2

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in Community			Netball at School				
Activity at Home	Helped with washing					Mowed lawn for Dad	
Serves of fruit today	1	1	3		2		
Serves of vegetables today	2		1	1		1	
Occasional foods eaten today	Chocolate brownie, Breakfast bar					Bacon McMuffin	Sweets at party,
When & Where eaten	Friends place					Way home from netball	At party
Time on Internet (mins)	35	40	60	20	20	120	80
Time Watching TV (mins)	2 hrs	2hrs	3hrs	2hrs	80	2hr 20 mins	4 hrs
What did I enjoy the most that week ?	Really liked shooting goals						
What did I find hardest that week ?	I hate the taste of fruit,						

My **YOUR CHOICE** Healthy Habits contract

Worksheet 1.5

I want to improve my health & fitness to:	**My choices to make these improvements happen are:**
1.	1.
2.	2.
3.	3.
4.	4.

I _____will try my best with my parent & Health Coach to learn some new healthy habits.

Your signature: _____Date: _____

Signature of parent: _____ Date: _____

Signature of supporting Health Coach:_____ Date: _____

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Checklist for Session 1	√	√
Meet and greet		
Review physical assessment results		
Ask permission		
Worksheets 1.0 & 1.1		
Worksheet 1.2		
Worksheet 1.3		
Worksheet 1.4		
Worksheet 1.5		
Understand client using open questions & reflection		
Reinforce importance		
Thanks for contribution		
Schedule next week session time		

Note; If there is a question that you are asked during a session, that you don't know how to answer, please advise the adolescent and parent that you will consider the question over the week and provide feedback in the next session. This will give you time to think about or source an appropriate answer.

What I chose to do; Week - 2

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Session 2: Eating cues / Stimulus control

Stimulus control involves the modification or elimination of cues that may lead to inappropriate eating. It is widely accepted that the control of food cues may help eating patterns that lead to overeating. During this session participants are required to indicate the stimuli associated with their eating patterns and investigate possibilities to nullify these cues. Worksheet 2.0 illustrates a breakdown of how situations may lead to non hungry eating. Being able to recognize these situations may be pivotal in strategy development to alter these behaviors.

Worksheet 2.1 lists examples where participants are likely to participate in non hungry eating and lists various strategies to assist your client in problem solving.

Homework for the week sedentary behavior worksheet; Work sheet 3.0

Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Worksheet 2.0	Your Choice Manual\Session 2\Worksheet 2.0 -EatingCues.doc
Worksheet 2.1	Your Choice Manual\Session 2\Worksheet 2.1.doc
Work sheet 3.0	Your Choice Manual\Session 3\Session 3 Sedentary Questionnaire.doc

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

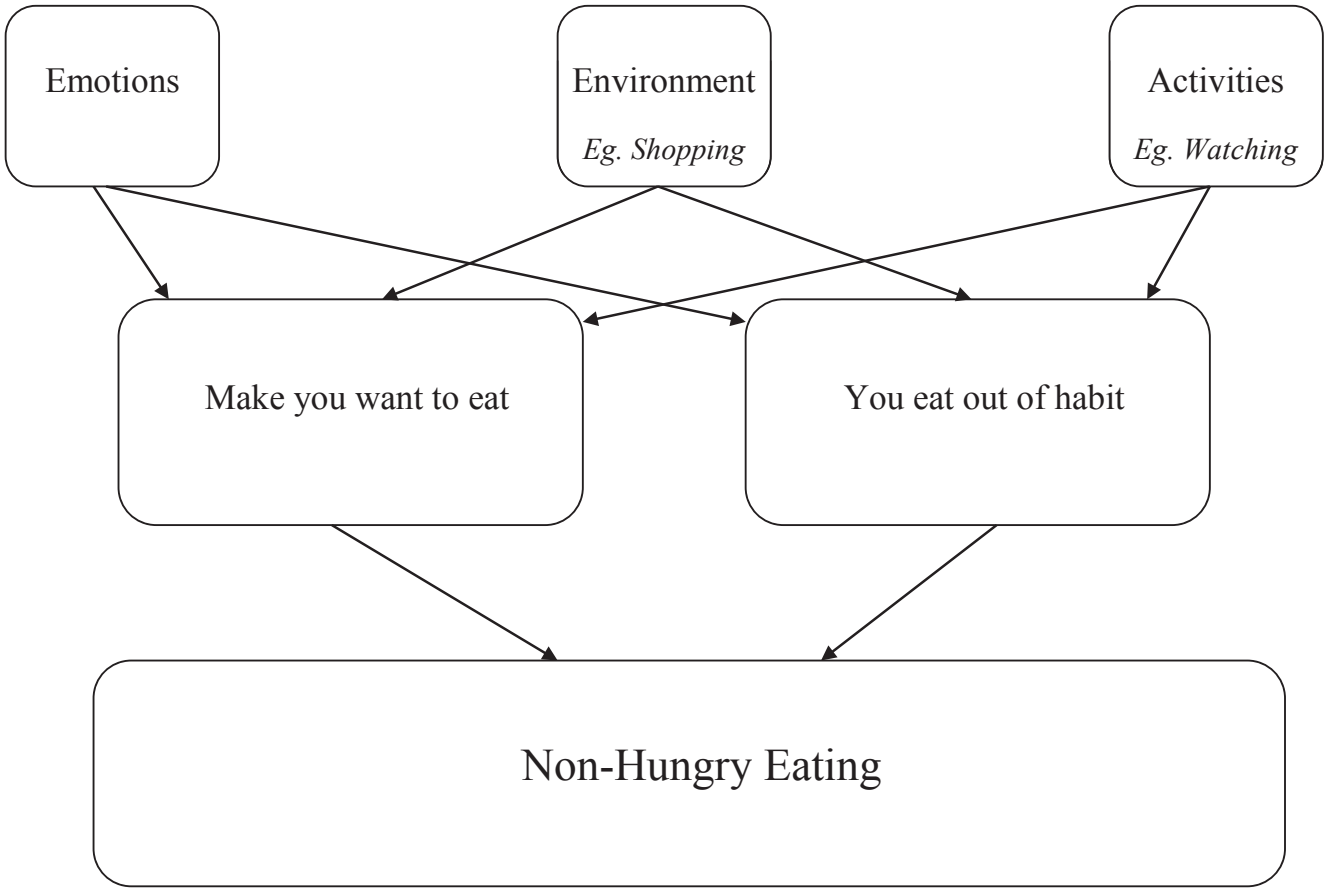
Keep for integration into worksheet 8.0

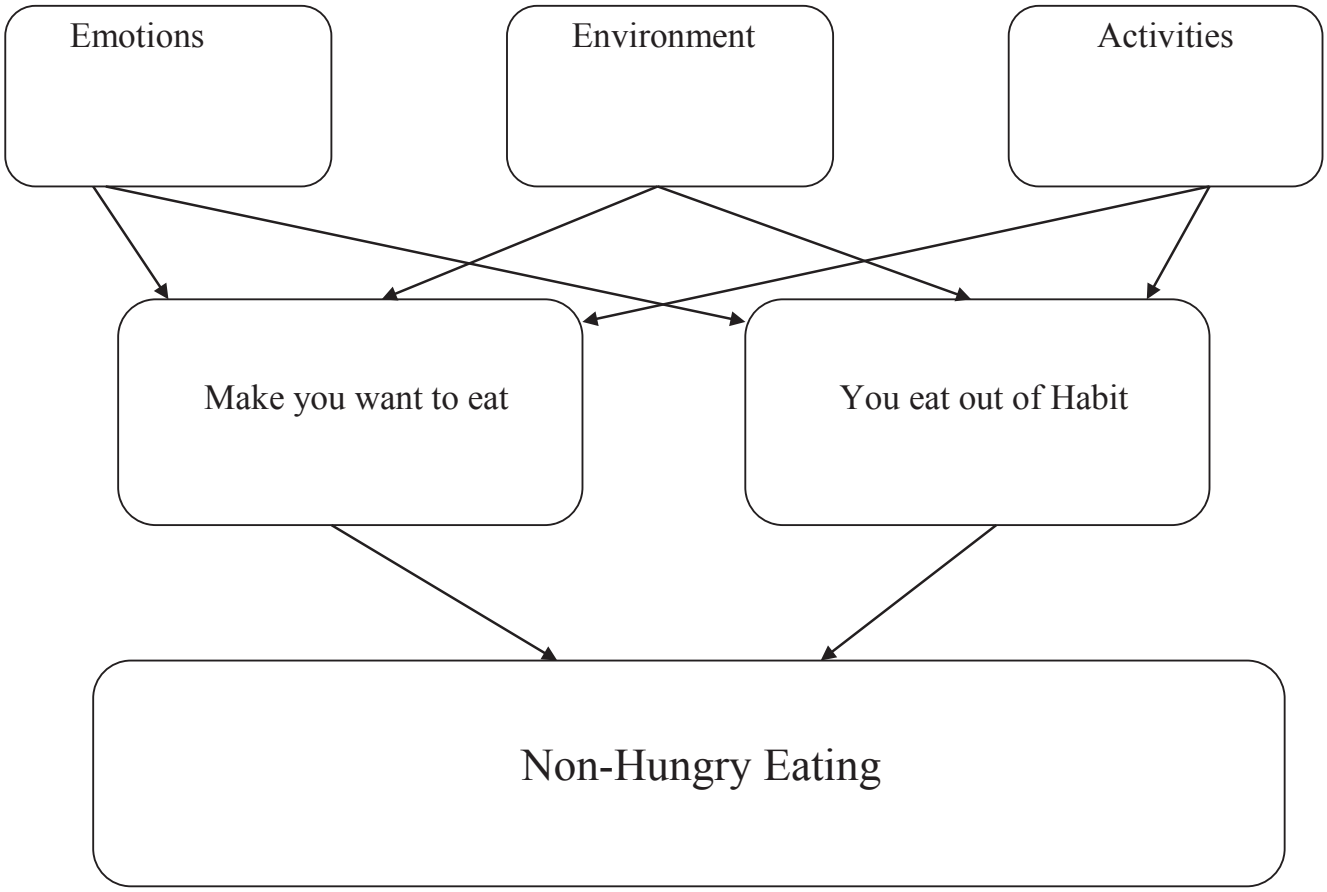
Worksheet 2.0 : Eating Habits

Eating Cues and Strategies

We all eat because we are hungry. Sometimes however we can eat for other reasons. They could be emotional, situational, or activity related cues that make us want to eat, or that we have become conditioned to eating in.

If you are able to identify the emotions, situation or activities which encourage you to partake in non-hungry eating behaviours this is the first step to changing bad eating habits. This allows you to recognise when you are non-hungry eating, and in time develop strategies that can help you to avoid these behaviours. Becoming aware of these behaviours is the first step. Using the below model as an example, fill in your own chart to identify an emotion, environment or activity with which you usually associate eating, and whether this makes you want to eat, or causes you to eat out of habit. Also try to identify at least one other factor that usually comes along with this.




Emotions
Environment
Activities
Make you want to eat
You eat out of Habit
Non-Hungry Eating

Worksheet 2.1

Below are some situations other adolescents have identified as cues for non-hungry eating, along with some strategies they have found useful. If any of these situations relate to you, mark them with a √. Include the cues you identified in Worksheet 2.0 in the My Ideas section. See if you can identify one or two strategies that may help you avoid non-hungry eating in the future, once you are aware of the situations in which you do it.

Cues	√	**Strategies**	√
Eg. Watching TV makes me want to snack	*I do this*	*Have a glass of water instead of eating*	*I can do this*
Boredom		Distract myself from eating	
Finishing a meal even if full		Prevent picking during meal preparation	
Having unhealthy food in the house		Plan ahead for social situations	
Meal preparation		Don't purchase problem foods	
Seeing unhealthy food		Clear the table immediately	
Feeling sad		Do not take second helpings	
Feelin angry		Remove uneaten food immediately	
Feeling lonely		No chips in the house	
Feeling bad about myself		Cut fruit and veges daily	
Have had a fight with friends		Hide bad food	
Have had a fight with parents/siblings		Serve on smaller plate	
When I get home from school		Eat meals at the kitchen table	
When I am watching TV		Taking small mouthfuls	

When I have friends over		New recipes (variety of foods)	
When I go to friends houses		Stop eating when full	
If I have had a long day		Eat slowly	
If I have finished my housework		Don't eat to avoid doing other things	
When I am tired		Avoid distractions while eating	
When I have achieved something good (as reward)		Practice leaving food on plate	
When I have finished doing something I find unpleasant (eg homework)		Leave serving dishes in the kitchen	
After playing sport		Don't eat dessert	
When I am on the computer		Stay away from food at parties	
Being in the Supermarket		Avoid long periods without food	
Being around shops (near cafes etc)		Planning healthy breakfast and lunch on weekends	
Seeing food commercials on TV		Healthy snacks	
My idea		Eat breakfast	
My Idea		Eat before going out	
My Idea			
My Idea			

Think about a normal school week, and write down how long you spend doing the following activities before and after school each day, Worksheet 3.0 Adapted from Hardy, Booth, Okey et al (2007)

Activity	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
TIME	Hours Minutes	Hours Minutes	Hours Minutes	Hours Minutes	Hours Minutes
Watching TV?					
Watching DVDs?					
Activity		**Saturday**		**Sunday**	
TIME		Hours	tes	Hours	utes
Watching TV?					
Watching DVDs?					
Using the computer for fun?					
Using the computer for homework?					
Doing homework not on the computer?					
Reading for fun?					
Being tutored?					

Travel (car, bus train)?																											
Doing crafts of hobbies?																											
Sitting around relaxing talking with																											
Playing practicing a musical instru																											
Using the computer for fun?																											
Using the computer for homework?																											
Doing homework not on the computer?																											
Reading for fun?																											
Being tutored?																											
Travel (car, bus, train)?																											
Doing crafts of hobbies?																											
Sitting around relaxing, talking with friends or on phone?																											
Playing a musical instrument?																											

Think about a normal weekend, and write down how long you spend doing the following activities on the weekend

Checklist for Session 2	√	√
Meet and greet		
Ask permission		
Worksheets 2.0,2.1		
Understand client using open questions & reflection		
Set / readjust goals using worksheet 1.4		
Reinforce importance		
Ask parent to support child		
Thanks for contribution		
Evaluate / set next week target goals; worksheet 1.4		
Homework for next weeks session; Work sheet 3.0		
Schedule next week session time		

Session 3: Addressing sedentary behaviours

Sedentary behaviours, watching the television, DVDs, electronic game usage and using the internet can contribute to overweight and obesity. This session involves the adolescent and parent completing a sedentary time questionnaire (Worksheet 3.0). The completion of this worksheet will allow for a better understanding of the participants current activity habits and what goals can be set for the reduction of sedentary time. For example, if a participant is spending 8 hours a week on the internet, a 60 minute reduction over a week may be a reasonable starting point. The knowledge acquired from the sedentary time questionnaire worksheet can be integrated into worksheet 3.1 time management timetable. This will form a framework for future activity habits and opportunity for activity.

The following can be reinforced to the participants:

- The reduction of sedentary time may be beneficial in increasing their physical activity time, thus increasing positive health outcomes.
- It is also important to get up and walk around during longer periods of sitting around, this also increases activity levels.

Reducing sedentary behaviours represents an important weight management strategy for your clients. Extra time being sedentary has been associated with extra food consumption at home (i.e. sedentary time is a stimulus for food consumption) what you have learnt from the participant during this exercise can be set as target behaviors for future weeks.

Issue worksheets 3.2 Diet log book and the example to the adolescent, this will be followed up next week and will act as a food intake reference for next weeks session. Worksheet 4.1 will also be completed as homework. The adolescent will need to be briefly explained the energy balance equation and the guess how far they would need to walk to burn off the particular food highlighted.

Session 3 Resources	
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Work sheet 3.0	Your Choice Manual\Session 3\Session 3 Sedentary Questionnaire.doc
Worksheet 3.1	Your Choice Manual\Session 3\Session 3 Time Management Client.doc
Worksheet 3.2	Your Choice Manual\Session 3\Worksheet 3.2 Diet Logbook.doc
Example Worksheet 3.2	Your Choice Manual\Session 3\Worksheet 3.2 example.doc
Worksheet 4.1	Your Choice Manual\Session 4\Worksheet 4.1Energy burn Homework.doc

Worksheet 1.4 What I chose to do; Week - 3

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Time Management Timetable

Worksheet 3.1

DAY	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*	*Sunday*
Before School							
During School							
After School							
Evening							

Diet Log 3.1

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast			
During Morning			
Lunch			
During Afternoon			

Evening			
During Evening/ Night			
Activity for the day			

3.2 Example Diet Log

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Meal/ Snack	Quantity Eaten	Details of Food or drink & method of cooking	Notes
Breakfast	• Bowl of cereal, low fat milk	• Healthy Cereal (Nutri-Grain)	
During Morning	• 2 Dims Sims • Bottle of OJ	• Dim Sims were steamed and eaten with soy sauce • OJ 250ml. Low sugar	
Lunch	• Salad sandwhich • Chocolate bar • Glass of water	• Sandwhich made with White bread • Salami in sandwhich • Fun-size chocolate bar	
During Afternoon			
	• Meat pie	• Meat pie was home made • Veges were both steamed and	• Dinner

Evening	• Veges • 2 glasses of Coke	roasted in Olive oil • Served with Gravy	
During Evening/ Night	• Packet of chips • Small block of chocolate • Bottle of soft drink	• Chips were baked and salted • Caramel filled chocolate	• Stayed at a friend's house for a sleep-over
Activity for the day	• Played basketball at lunch • Walked the dog after school for 30 mins • Walked 10 mins to friends house		

Worksheet 4.1

When we eat an occasional food too often, it can lead to a gain in weight. For homework this week you are required to guess how far you need to walk to burn off the energy in these foods that we eat.

Food	I eat this sometimes;√	Walking distance to burn this off; in (kms)
Mars Bar		
Aero		
Cadbury's Wholenut		
Cadbury's Whirls		
Crunchie		
Kit Kat		
Maltesers		
Milky Way		
Snickers		
Turkish Delight		
Twix		
Cheese Burger		
Double Cheese Burger		
The Big Mac		
Chicken Nuggets (1)		
Quarter Pound + Cheese		
Large Fries		
Milkshake		
Can of cola		
Potato Chips		
Dim Sim (steamed)		
Dim Sim Fried		
Pizza per 100gms		
Subway 6 inch sub		
Subway wrap		

Meat pie		
Donut		
Another snack food I have		
Another snack food I have		

How far do I walk?

To school	
In a day	
To a friends place	
Other	

Checklist for Session 3	√	√
Meet and greet		
Ask permission		
Review each day of previous target worksheet		
Define what is sedentary time and its importance in its reduction for health		
Worksheet 3.0		
Understand client using open questions & reflection		
Set / evaluate next week goals incorporating knowledge of sedentary time		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Week 4 Homework energy to burn task		
Evaluate / set next week target goals; worksheet 1.4		
Homework for the week worksheet Nutritional Diary; worksheet 3.2		
Ask parent for support		
Thanks for contribution		
Schedule next week session time		

Session 4: Healthy Eating Habits

An active lifestyle combined with a balanced food intake is important in maintaining change for your clients. Worksheet (4.0) helps participants recognize the importance of a balanced diet, highlighting recommendations from the Australian Guide to Healthy Eating. A hard copy of this manual is supplied for participants. The YOUR CHOICE program doesn't prescribe a diet as such but an emphasis on healthy choice alternatives such as an increase in fruit and vegetable intake and the advantages of low fat alternatives.

Generally through the program we encourage the following;

- Decrease in energy dense foods (occasional foods)
- Increase in fruit and vegetable consumption
- Decrease in salty food consumption
- Decrease in saturated fat foods

It is important that participants recognize the energy intake/ expenditure equation. This is highlighted on page 6 of the Food for Health National Health & Medical Research Council (NHMRC); pg 6, document using a balance scale approach. It is through the teaching the energy balance equation that the adolescent and parent becomes familiar with the mechanism of weight gain.

When over viewing the energy intake / expenditure equation it is important to overview the following points

- To have a stable weight, your energy intake (what you eat as food and drink) must be equal the energy you burn up (through normal daily living and physical activity).
- Weight problems develop when your energy intake (calories) exceeds the energy you are burning up through being active.
- A sustained reduction in energy intake (in food and drink) is needed to produce effective weight management.

Homework from week 3 assigned to the adolescent will further reinforce the energy balance equation. It is particularly important to highlight the amount of activity needed to burn off the high calorie foods in the equation. For example, it will take approximately 1.6 km of walking to burn off 100 calories. It is also necessary to highlight the low nutrient value of these products as apposed to healthier alternatives. The content from worksheet 4.2 is to be aligned with worksheet 4.1 (previous weeks homework) whilst over viewing the two worksheets highlight some alternatives the young person may eat. Also highlight that these foods are nutritionally poor options.

Worksheet 4.3 helps the adolescent categorise foods as either green amber or red. This system has been widely used in some countries and is an emerging form of food classification. Once the adolescent has been introduced to the concept, they are required to take it home and write in the green red and yellow foods they have at home. They are required to sticker those foods indicated.

Resources for session 4	
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Worksheet (4.0)	Your Choice Manual\Session 4\Worksheet 4.0-dietaryrecommendations.doc
Worksheet 4.2	Your Choice Manual\Session 4\Worksheet 4.2 Calorie to energy expenditure.doc
Worksheet 4.3	Your Choice Manual\Session 4\Worksheet 4.3.doc
Australian Guide to Healthy Eating	Your Choice Manual\Your Choice Resources\AGHE Healthy Eating Recomendations.pdf
Food for Health NHMRC	Your Choice Manual\Your Choice Resources\NHMRC DIET Consumers Recomendations.pdf

Checklist for Session 4	√	√
Meet and greet		
Ask permission		
Review each day of previous target worksheet		
Describe the purpose of the session		
Worksheet 4.0 and discuss recommendation		
Highlight important sections of AGHE handbook		
Discuss energy balance equation		
Worksheets 4.2 & 4.3		
Understand client using open questions & reflection		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Set / evaluate next week goals incorporating knowledge of nutritional status		
Ask parent for support		
Thanks for contribution		
Schedule next week session time		

Worksheet 1.4 What I chose to do; Week - 4

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Worksheet 4.0 Healthy Food Choices

Dietary choices are a key aspect of an adolescent's health and physical development. During adolescence individuals experience their greatest need for adequate nutrient intake, meaning that in order to achieve healthy development and growth; you need to have the correct intake of nutrients and energy.

Having a high intake of fats and carbohydrates (including sugars), as well as your eating patterns have a great impact on development. Below are recommendations to the amount of fat and carbohydrates that should be consumed, as well as the influence of eating patterns, to general health and weight management.

Dietary Intake		
Fat	Dietary Carbohydrates	Eating Patterns
The evidence that dietary fat intake is a significant risk for obesity in children and adolescents is minimal.	There is minimal evidence that carbohydrate intake influences body weight in children and adolescents.	Parents influence food choices and other eating behaviours in their children. Disordered eating in a parent may be associated with excess body weight in the child.

To ensure that you are eating a healthy and balanced diet, compare your diet on weekdays and weekends, to the recommendation of the AGHE (Australian Guide to Healthy eating).

Use you Australian Guide to Healthy Eating handbook to determine what is considered a standard serving for each of the food groups. How do your servings of each of the food groups compare to the recommendations for your age? How could you improve your dietary choices to ensure you are getting the nutrients you need, and the right servings of each of the different food groups?

Complete the following table to complete this comparison.

Healthy Food Choices - AGHE Recommendations							
	Number of Servings						
	Bread, Cereals, Rice, Pasta Noodles	Vegetables, Beans	Fruit	Milk, Yogurt, Cheese	Meat, Fish, Poultry, Eggs, Nuts, Legumes	Water	Extra Foods
Recommendations 12-18 y/o							
High fibre	5 - 11	4	3	3	1	8 glasses	1 - 3
Balanced	4 - 7	5 - 9	3 - 4	3 - 5	1 - 2	8 glasses	1 - 3
My Diet: Mon - Thurs							
My Diet: Friday							
My Diet: Saturday							
My Diet: Sunday							
How I should change my diet?	Have More ◯	Have More ◯	Have More ◯	Have More ◯	Have More ◯	Have More ◯	Have More ◯
	Have Less ◯	Have Less ◯	Have Less ◯	Have Less ◯	Have Less ◯	Have Less ◯	Have Less ◯
	No Change ◯	No Change ◯	No Change ◯	No Change ◯	No Change ◯	No Change ◯	No Change ◯

Jillian K. Croll, M.S., R.D., M.P.H., Division of Epidemiology, School of Public Health, University of Minnesota,

Your Choice

Worksheet 4.2; Red Foods

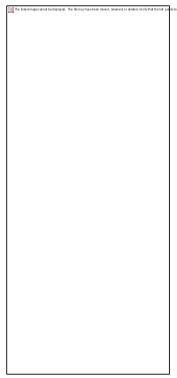
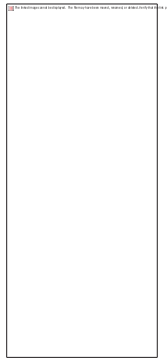
Food	Calories	Walking distance
Mars Bar	275	4.4
Aero	200	3.2
Cadbury's Wholenut	300	4.8
Cadbury's Whirls	128	2.04
Crunchie	186	2.97
Kit Kat	110 (2 bars)	1.76
Maltesers	180 (small bag)	2.88
Milky Way	130	2.08
Snickers	149	2.34
Turkish Delight	180	2.88
Twix	270 (2 bars)	4.34

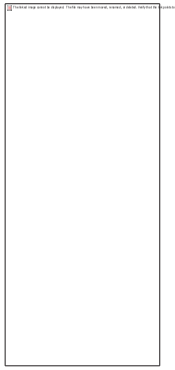
Take Away Food

Food	Calories	Walking distance
Cheese Burger	295	4.72
Double Cheese Burger	421	6.73
The Big Mac	485	7.76
Chicken Nuggets (1)	40	.64
Quarter Pound + Cheese	500	8
Large Fries	400	6.4
Milkshake	380	6.08
Can of cola	170	2.72
Potato Chips	500	8
Dim Sim (steamed)	205	3.28
Dim Sim Fried	253	4.04
Pizza per 100gms	270	4.32
Subway 6 inch sub	304	4.8
Subway wrap	353	5.64
Meat pie	474	7.58
Donut	220	3.52

1 Calorie=4.184 kilojoules

Work sheet 4.3 Traffic light foods

Green Foods 	Green foods are the healthiest choices. They are excellent sources of important nutrients needed for health and wellbeing, and low in saturated fat, added sugar and salt, and are lower in energy density.	**Can be eaten every day or at every meal.** • Plain or whole grain breads • Cereals • Vegetables • Fruit • Salads • Low fat milks and dairy products • Lean meats • fish and poultry • nuts	**Label green foods you have at home**
Yellow Foods 	Foods and drinks classified as Amber are mainly processed foods. They have some nutritional value but contain moderate levels of saturated fat, added sugar and/or salt and can, in large serve sizes, contribute to excess energy intake.	**Should be carefully selected and eaten in moderation.** • Full fat milk & dairy products • Sweetened cereals • Muesli bars • Cereal bars • Muffins • Processed meats (e.g. ham, pastrami), poly- or monounsaturated spreads	**Label amber foods you have at home**

Red Foods 	Foods and drinks classified as Red are energy dense and nutrient poor foods and drinks that are high in saturated fat, sugar and/or salt. They can contribute to excess energy intake if consumed in large amounts or on a frequent basis.	**Should only be eaten occasionally.** • Chocolate • crisps, • corn chips and similar salty snacks • sugar sweetened • soft drinks, • energy and sports drinks • Fried foods • pies and • sausage rolls, • snack bars, • sweet biscuits, • cakes and sweet pastries, • small size confectionary and packets of crisps, some sweetened drinks and • processed meats such as salamis. • The content of worksheet 4.2	**Label Red foods you have at home**

Session 5: Physical Activity

This session highlights the importance of incorporating physical activity into the participant's lifestyle. As we know, increasing physical activity is a key concept to weight loss and weight regain. During this session we educate the participants on its importance and look at ways to can increase its prevalence. Worksheet 5.0 is an overview on the importance of activity highlighting the physical and psychological importance of its inclusion into everyday life. The sheet also provides an input – output diagram in relation to normal healthy function, it is important that we reinforce this equation.

Worksheet 5.2 asks participants to list all the negatives and positives of physical activity. Included is an example worksheet that will help with the process. Worksheet 5.1 is an example that may help with the completion of worksheet 5.2. Work with the participants on this, using your reflective listening and open questioning techniques to further support and reaffirm its importance. Included is an example page to assist in its facilitation. Worksheet 5.1 provides examples of physical activity that the participants may be able to complete as part of their lifestyle. This may also highlight activities that the participants have done in the past or want to try in the future. Remember that the activity that the persons are going to adhere to is activity that people enjoy or have been successful in. Worksheet 5.3 suggests example activities for the participants; they are also required to list their ideas and what support they need. Preceding this exercise is a timetable that these planned activities can be placed into. Also integrate extra activities into targets for the week.

Resources for session 5	
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Worksheet 5.0	Your Choice Manual\Session 5\Worksheet 5.0 - Physical Activity.doc
Worksheet 5.1	Your Choice Manual\Session 5\Worksheet 5.1 example only.doc
Worksheet 5.2	Your Choice Manual\Session 5\Worksheet 5.2 - Physical Activity WS1.doc
Worksheet 5.3	Your Choice Manual\Session 5\Worksheet 5.3.doc
Resource 5.0	Your Choice Manual\Session 5\Resource 5, Barriers to Physical Activity.doc

Worksheet 1.4 What I chose to do; Week - 5

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Worksheet 5.0 : Physical Activity

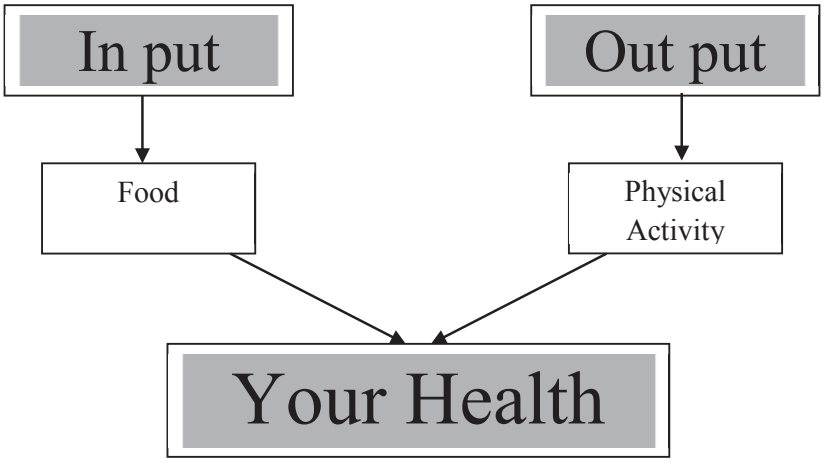
Are you active?

It is very important to ensure that you maintain a healthy level of Physical Activity every day. It is recommended that 12 – 18 year olds participate in a minimum of 1 hour of moderate or vigorous activity, every day. This means you need to spend at least 1 hour engaging in activities such as walking, bicycling, skating, dancing (moderate activity), or football, soccer running or swimming (vigorous) each day.

As well as remaining active, it is a good idea to try and limit you sedentary time to a maximum of 2 hours each day. This includes activities such as:

- surfing the net
- watching TV
- playing computer games kilojoules
- Playing Play Station / X-box games

It is important to remember that one factor that influences our ability to maintain a healthy weight is our levels of physical activity.



Aside from using energy and aiding weight loss, there are other good things about being active. These include:

- Increasing your rate your body burns energy
- Builds strong and healthy muscle tissue
- Helps to build strong bones
- Improves your health and fitness

- Boosts your self esteem
- Improves your mood
- Maintains weight loss
- It is a social activity (you can do it with friends, and make new ones)
- It is fun
- It presents a challenge and is competitive

Bearing these things in mind, use Worksheet 5.1 to make a list of Pro's and Con's relating to changing your current activity levels.

Then go on to complete you weekly activity planner to assess what Physical activity you are currently doing, and where you could do more.

To assist with ideas for new ways to be active, complete Worksheet 5.4 by identifying activities you could or would like to do, and those you may wish to try, as well as deciding if you will nee help from someone (eg. Parent) to do these activities.

Session 5: Physical Activity Worksheet 5.1 Example– Pro's and Con's

If I get active (Good Things)	If I don't get active (Bad Things)
• Build strong bones & muscles • Stay healthy • Play better with friends • Sleep better • Better at school sport • Maintain healthy weight	• May tend to keep doing boring things • May effect my future health • May feel unhappy

Session 5: Physical Activity Worksheet 5.2– Pro's and Con's

If I get active (Good Things)	If I don't get active (Bad Things)

Worksheet 5.3

My Activity Choices

Activity	I could try this	Before School	After School	Saturday	Sunday	Local sporting clubs I could join?	Who can help me with this?
Bicycling							
Swimming Laps							
Gymnastics: Trampoline							
Trying out some Gym equipment							
Exercise: Star Jumps, push-up's, sit-ups etc							
Basketball							
Baseball/Softball							
Football							
Soccer							
Volleyball							
Racquet Sports							
Ball Games: Down-ball, kickball, dodgeball							
Games: Chasey, Hopscotch							
Outdoor Activities							
Water Play							
Jump Rope/Skipping							
Dance/Movement to music							
Outdoor Chores							

Indoor Chores							
Walking							
Running							
Mixed Walking/Running							
Playing a musical Instrument							
Cricket							
Karate							
Rowing							
Table Tennis							
Javelin							
Hockey							
Netball							
Bowling							
Playing with a Pet							
Walk the Dog							
Stake boarding / Rollerblading							
Horse Riding							
My Idea:							
My Idea:							
My Idea:							
My Idea:							

Time Management, activities I could try

DAY	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*	*Sunday*
Before School							
During School							
After School							
Evening							

Resource 5.0 Barriers to Physical Activity

Barrier to activity described by the patient	Possible counselling responses
Lack of time	Even short bouts of activity (10 minutes) can be beneficial Add physical activity to your daily routine, such as going for a walk at lunch time or exercising while you watch TV
Not motivated	Link up with a friend – you will help each other There are many moderate intensity activities that are fun (eg. dancing, playing with the children)
Usually too tired	Try being active at times when you are most likely to have the energy Being active can increase your energy levels
Not the sporty type	You do not have to play sport to be active; walking and other moderate intensity activities are also beneficial for your health Make every day activities such as traveling to work or doing the housework a way to be active
Physical limitations	Moderate intensity activities such as walking are very beneficial Water based activity puts less strain on bones and joints
Lack of support	Explain your interest in activity to family and friends and ask them to join in or provide support in other ways Find out about local groups and clubs, which might help you to meet others with an interest in physical activity
Cost	There are many free activities, especially walking, that are an excellent way to get activity. Contact your local council to find out about low cost facilities and programs in your area
Feel unsafe in local environment	Link up with a friend for physical activity Find out about local groups and clubs Try to find locations and times for outdoor activity when other people are around
Family obligations	Recognise that taking time for physical activity is essential for your health and will help you to fulfill your roles better Talk to your partner, family or friends about taking care of the children while you have a break to be active Try doing active things when looking after the children

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Checklist for Session 5	√	√
Meet and greet		
Ask permission		
Review each day of previous target worksheet		
Review homework worksheet 4.3		
Describe the purpose of the session		
Review previous homework; worksheet 4.3		
Worksheet 5.0 and discuss physical activity importance		
Worksheet 5.1		
Worksheet 5.2		
Worksheet 5.3		
Worksheet 5.4		
Understand client using open questions & reflection		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Set / evaluate next week goals incorporating knowledge of activity status		
Ask parent for support		
Thanks for contribution		
Schedule next week session time		

Note: Ask adolescent at the end of this session if they would like their parents present at the next sessions. Sessions 6-7 & 9 are optional sessions for the parent.

Session 6: Thoughts & Behaviors

Thoughts can alter the way we carry out behaviours, they can be used to influence our actions by altering our confidence or perceived success. In this session participants learn to cope with their thoughts and how to alter unhelpful thoughts that may be affecting their current behaviours. Worksheets 6.0 provide a mechanism to understand unhelpful thoughts and what skills can be applied to resist the impact of these thoughts on reaching their goals.

Assertiveness Training

During times of change there is likely to be persons that are less helpful than others in what they say to the adolescent. These negative influences on the adolescent can restrict or stop the change the participant so wants to achieve. Examples may include the person being singled out because of their weight status or how their abilities or actions are different to others. Having the wrong words said to you alters your thoughts and that then alters your behaviors. Being assertive can counteract these thoughts, thus increasing the confidence and positive behavior of the participant. Assertiveness is the ability to honestly express your opinions, feelings, attitudes, and rights, without undue anxiety, in a way that doesn't infringe on the rights of others. It is also an opportunity for one to stand up for them self and it gives the person a final say on where they stand. In this situation assertiveness also promotes honesty and open communication from others eg, between adolescent and parent. Worksheet 6.1 is an example of what are likely comments and corresponding assertiveness. These strategies will be applied in a role play scenario, during the session. Worksheet 6.2 requires the adolescent to highlight times when they have heard unhelpful comments and how to be assertive in communicating their feelings toward these comments

Rational Thinking

Step through the different unhelpful thought examples in worksheet 6.3. It is very important to challenge the thinking behind these thoughts by looking at the thought rationally. We must challenge these thoughts by processes of rationale thinking and asking the following questions

- What evidence is there to support this thought?
- What evidence is there to question this thought?
- What would my best friend / parent say if they new that I was thinking this way?
- What would you say to your best friend if he or she was thinking this way?

Worksheet 6.4 is homework for session 7 & 9, this allows the adolescent several weeks to think about and deal with situations that may occur in bringing the person into relapse.

Session 6 Resources	
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Worksheets 6.0	Your Choice Manual\Session 6\Session 6.0 - Coping Strategies.doc
Worksheets 6.1	Your Choice Manual\Session 6\Worksheet 6.1.doc
Worksheet 6.2	Your Choice Manual\Session 6\Worksheet 6.2.doc
Worksheet 6.3	Your Choice Manual\Session 6\Worksheet 6.3 Rationale thoughts.doc
Worksheet 6.4	Your Choice Manual\Session 6\Worksheet 6.4.doc

Worksheet 1.4 What I chose to do; Week - 6

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Worksheet 6.0 Coping Strategies – Recent Negative Thoughts: Adolescent

It is important to understand what challenges we will face when aiming to achieve a healthy lifestyle. Quite often we can be challenged by negative thoughts that make it hard for us to achieve our goals and stick to our plans. Understanding when or why we have these thoughts can help us to overcome them.

In the following worksheet, identify a recent negative thought, it may be the last time you felt bad about yourself or your situation, and follow the questions to identify when and why this may have occurred.

From here, using the examples provided, identify what actions or activities you may have been able to use in this situation which may have helped.

Finally, use the prompts to identify alternative thoughts which may be more helpful the next time you feel this way.

Unhelpful Thoughts	**Helpful Thoughts**	**I like this thought √**
People will laugh at me if I exercise	It doesn't matter what strangers think and I will feel better about myself after I exercise	
I cant be bothered anymore	I am finding it hard today, I will take it one step at a time	
I have too many commitments	What can I give up (eg 30mins of TV) so I can make time for myself	
I don't have enough time to exercise	I have a busy day so I will need to organise my time well	
I made a bad food choice	A little bit is better than a lot, I will eat healthy choices for the rest of the day	
Tight clothes don't fit me, they look bad on me	I look good in looser fitting clothes, I feel more confident	

I am unattractive	I am working hard to feel better about my appearance	
This is too hard	This is tough but I'll give it my best shot	
I feel bad about myself	I am having a bad day, I will do some exercise and eat healthy food so I can achieve my goals and feel good about myself	
The following to be completed at Home ↓		
People won't want to exercise with me	I may have to convince my friends to come along	
I will always be made fun of	It's not personal, they will get bored with it and leave me alone soon enough	
This is hopeless	This is hard, but I will keep trying	
I will be a failure if I don't succeed at this	I am allowed to make mistakes	
Everyone is always hassling me	People are trying to look out for me	
No one understands	I could try explaining how I feel to people to make them understand better	
It's not fair	Everyone struggles from time to time, I am doing my best	
I can't exercise in public until I have lost weight	I might be embarrassed to begin with but it will be worth it in the long run	
I ate something I shouldn't have, I might as well give up right now	I made a mistake, but it's not going to stop me from getting back on target	
What if I get hungry	It's good to be hungry, I know my body is working well	
Its rude to turn down food	It's important to stick to my healthy habits	
I'm stressed or anxious I need to eat	I can deal with stressful situations without turning to food. I may become more stressed if I don't stick to my healthy habits	

Dieting is so hard	I know I can keep this up	
I wish I didn't have to exercise	I feel good when I exercise, it will be the best time of my day	
Its unfair that I cant eat like everyone else	This is how I will be successful in becoming healthy	
I could have eaten more	I'm so glad I stuck to my plan, I am heading for better health	
Sticking to my healthy habits is tough	I will keep going, I want to be a role model for my friends, I will be an inspiration	
Other:_____	Other:_____	
Other:_____	Other:_____	
Other:_____	Other:_____	

Incorporate these preferred good thoughts into worksheet 8.0

Worksheet 6.1 Assertiveness Expression

Typical comment	Assertive feedback	I could think this√
You are not losing enough weight	Every week I am making progress, I am happy with how I am going	
Keep up you are dropping off behind	I am being productive at this pace, there is no need to be quick all the time	
You should being doing more exercise	I feel that I am doing enough; I am learning how to do things differently all the time.	
Stop lounging around and watching TV, you should be doing something	I have managed my time so I can do extra activity this afternoon, I am in control	
You should not be eating that	I know that if I plan my meals well and exercise, I will achieve my goals. I want you to let me worry about my diet	
To be completed at by adolescent as homework ↓		
Why cant you be as good as your sibling when it comes to your discipline	I am doing my best, things are hard but I am improving my diet and activity levels. It really hurts my feelings when you compare me to my sibling.	
You shouldn't go out with your friends; you won't be able to stick to your diet.	I am allowed to see my friends. I have planned for this situation so I won't be tempted to eat bad food when I am out. I feel upset when you don't trust me.	
Go on, have a coke, it's not like it's making any difference anyway!	I don't want a coke that is why I asked for water. I feel good about my diet and I don't appreciate you trying to undermine my efforts. Please stop.	
Can you do better than that	This is a challenging for me, I should be given credit for my efforts	
Go on have some cake, it a special occasion!	Thank you for the offer, but I am going to stick to my healthy eating plan today. It would be great if you could support me in doing that.	

Apply helpful assertive comments into worksheet 8.0

Role play cards; Session 6

1.You are not losing enough weight	1. Every week I am making progress, I am happy with how I am going
2. Keep up you are dropping off behind	2. I am being productive at this pace, there is no need to be quick all the time
3. You should being doing more exercise	3. I feel that I am doing enough; I am learning how to do things differently all the time.
4. Stop lounging around and watching TV, you should be doing something	5. I have managed my time so I can do extra activity this afternoon, I am in control
	6. I know that if I plan my meals well and exercise, I will achieve my goals. I want you to let me worry

6. You should not be eating that	about my diet

Worksheet 6.2

Think of a time when something was said to you which was upsetting or unhelpful to you. Think about what you said back to them and how you would react in the future.

Comments you didn't like	What you said back	What you may say in the future

Worksheet 6.3

Consider that your friend Sam was trying live a healthy lifestyle and had the following thoughts. Work through the problems and see if you think if there is a real problem or not?

Thought	What evidence is there to support this thought?	What would you say to Sam who is thinking this way was thinking this way	Problem Yes or No?
I cant walk into the pool everyone will laugh at me	Has everyone laughed at you before? Absolutely everyone? How many people?	Everyone at the pool is too worried about themselves having fun. You have nothing to worry, hop in the water and have a good time	
I'm so hungry, I'm going to die	Have you been hungry before? Did you survive? Has anyone died of hunger in Melbourne lately?	Nobody has died by being a little hungry, surely you can hang off until dinner time	
Everybody at school thinks I am hopeless at sport,	What people have said this? Is that everyone? What do your teachers think? Have you asked them?	I think that your fine at sport, and the more practice you get the better you will be Everybody needs to play sport because it builds strong muscles and healthy bones	
If I exercise, it will kill me	Who has died from playing sport before? How many people have died at your	The more exercise you do the longer you will live Exercise prevents people from dying	

	school from exercise?		
If I eat a piece of fruit, I will throw up everywhere	Have you thrown up before with fruit? How many times? Who else do you know that this happens to?	Eating things like fruit will prevent me from getting sick from some diseases You can try different types of fruit, some will taste better than others	

Session 6 – Problem Solving / Session 9 – Relapse Prevention; Worksheet 6.4

It is normal to experience difficulties when trying to change your behaviours. These difficulties might make it hard for you to maintain the changes you have been working on. Difficulties could be related to certain situations, thoughts or feelings, that you experience which then have an effect on your behaviour.

For example, you find it hard to maintain you healthy eating when you are out with friends who don't care about what they eat, and often choose junk food.

If you slip up and go back to your old ways and eat junk food with them, this is called a relapse, and it can happen at any stage of your lifestyle changing process. It is a good idea to be aware of the thoughts, feelings and situations which may cause relapse for you, and have some coping strategies in place for the next time they happen.

Common reasons why we relapse:

- Stress
- Having negative/unhelpful thoughts
- Feeling bad about yourself
- Feeling overwhelmed
- Trouble at home / school / work
- Reactions of others

In the right hand column below list some reasons you feel you may relapse. They could be related to feelings, thoughts or situations you regularly find yourself in. In the left hand column, list some helpful ways of managing the situation so you can avoid relapse.

Situations	**Solutions**
eg. You are out with friends who don't care about what they eat, and often choose junk food	You eat with them, but order a healthy option from the same shop or nearby café.

Keeping track of our feelings

We need to be aware of certain feelings we have when confronted with situations that may make us relapse. Typical feelings that we may have in this situation may lead to a behaviour that is not helpful to our lifestyle.

Some feelings and behaviours related to relapse are listed below;

Feeling	**Unhealthy behaviour**	**What you could think instead**
Sad	Eating a packet of chips	I will feel better if I play around in the backyard, exercise will always do that!
Anxious	Not following your plan and having take away food	Having take away food will only make me more anxious as it doesn't help the way my body works
Angry	Going to your bedroom and not practicing your goal shooting	I have done so great with my healthy habits so far, I'm not going to let being angry miss my weekly targets

These are a list of feelings that you may feel from time to time.

Sad	Angry	Stressed
Happy	Frightened	Cross
Confused	Boredom	

Over the next 3 weeks list the any of these feelings and how you behaved in an unhealthy way, when you had these feelings. This will be talked about in session 9 with your Health Coach, you can both put forward solutions to this feeling.

Feelings	Solutions
eg. You have gotten a bad grade on your maths test. You feel very **sad** and can't help thinking you're a no-hoper. You want to watch a movie and eat chocolate instead of going for your afternoon walk to make yourself feel better.	You acknowledge the bad grade and understand that although you may be disappointed, you can improve on this next time, but that not meeting you food and exercise goals will only make you feel worse.
Put your own feelings in here ↓	Think about solutions or discuss with Health Coach here ↓

You cannot always avoid slips and relapses. However there is no need to be especially hard on yourself if you do have a slip or relapse. It is important to remember that no one can make such a difficult lifestyle change perfectly. If you have a bad day, you should forgive yourself, put it behind you, and continue to move forward in your changes. If you do experience a slip or relapse, it can be helpful to try and figure out why it happened.

Below is a list of things that you can do if you experience a slip or relapse:

- Try to remember how you were feeling before the slip/relapses occurred.
- Make a note of how you felt before, during and after the relapse happened.
- Make a plan of a healthier way you will handle the situation, feelings, emotions, etc. if you encounter it again.
- Talk to someone about what happened and how you feel (i.e. friend, family member, etc.), possibly someone off your support list.
- Remind yourself that just because you had a slip/relapse, does not mean that you have failed.
- Remember that there is no shame in having a hard day, there is no shame in having a slip or relapse and it is okay to reach out and talk about it.

The following is something you may want to consider in the future. This is something that you can try with a supportive person to help you with your healthy habits. You can talk more about this with you Health Coach in the next few months.

Below make a list of things that you can do to help yourself get past the feelings you may experience after having a slip or relapse:

Keep a copy of this list of ideas somewhere handy so that if you do relapse and need a way to manage any negative thoughts of feelings you're having because of it, you can refer back to this list of ideas. The pink worksheet 8.0 will be good for ideas in the future.

It is also important to know that you have people who are willing to support you if you are struggling to stick to your goals. Make a list below of people you think would be willing to support you, such as family, friends, teachers, or your GP, in situations where you are at risk of relapsing. Identify who could be most helpful in which situations.

eg. Your Mum, ph: 0400 111 222, can help me if I am feeling bad when I am at home.

1. _____

2. _____

3. _____

4. _____

5. _____

Now contact each of these people and ask them if they would be willing to support you, and how they could best do this.

eg. Your best friend will order healthy food with you when you are out with friends.

Keep a copy of this list in you diary or wallet so you always have it with you should you need it.

Checklist for Session 6	√	√
Meet and greet		
Ask permission		
Review each day of previous target worksheet		
Describe the purpose of the session		
Worksheet 6.0		
Worksheet 6.1		
Worksheet 6.2		
Worksheet 6.3		
Worksheet 6.4		
Adolescent to take home w/sheet and list helpful thoughts		
Adolescent to take home w/sheet and list helpful assertiveness expression		
Understand client using open questions & reflection		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Evaluate / set next week target goals; worksheet 1.4		
Ask parent for support if in attendance		
Thanks for contribution		
Schedule next week session time		

Session 7: High risk situations / problem solving

Your participants will encounter many challenges whilst undergoing lifestyle change to improve their diet and activity habits. During this session you are required to identify the problems faced and allow for appropriate problem solving skills to be developed. Problem solving involves helping the participant identify and modify the barriers contributing to diet and physical activity lapses.

When dealing with problems consider the following process;

- Identify the problem
- Consider as many solutions as possible
- Think through each solution, is it a realistic solution?
- Choose the best solution
- Act on the solution and review

Worksheet 7.0; Overviews barriers and high risk situations, these are broken down into four categories; Thoughts, Environment, Behaviours, and Networks. Each of these indicates a different aspect of living in which these barriers or HRS could occur.

Side 2 of this worksheet provides an activity where the participants are presented with barriers they have faced in the past and strategies that may be helpful during these times. Participants are required to circle the barriers that apply to them and identify an appropriate strategy.

Homework for the upcoming phone call session is the inclusion of worksheet 8.0 which is an overview of all sessions thus far, what has worked what hasn't, what strategies have been learnt and what assertive and positive thought skills have been trialed. In filling in the columns of this worksheet the client can gain information from all previous target worksheets. These worksheets will develop good conversation between the participant and yourself, and will give opportunity to think through problems and suggest solutions to living healthily. Overview this worksheet and assist if required to complete, they may want to choose to do this themselves during the week. This worksheet forms the basis of all phone call sessions and what they have learnt from the overall program.

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Resources for session 7	
Worksheet 1.4	Your Choice Manual\Session 1\Worksheet 1.4 targets.doc
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc
Worksheet 7.0	Your Choice Manual\Session 7\Woksheet 7.0 - Barriers & HRS instructions.doc
Worksheet 8.0	Your Choice Manual\Session 8\Worksheet 8.0 Phone call sessions.doc

Worksheet 1.4 What I chose to do; Week - 7

Target		*Mon*	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
	√							
	√							
	√							
	√							
	√							
Total								

Other Choices I Made

	Mon	*Tues*	*Wed*	*Thurs*	*Fri*	*Sat*	*Sun*
Activity in community							
Activity at home							
Serves of fruit today							
Serves of vegetables today							
Occasional foods eaten today							
When & Where Eaten							
Time on Internet (mins)							
Time Watching TV (mins)							
What did I enjoy the most that week ?							
What did I find hardest that week ?							

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

Keep for integration into worksheet 8.0

Worksheet 7.0 – Barriers and HRS

You now have many of the key tools you will need for choosing a healthy lifestyle, however you will face challenges. One of the hardest aspects of lifestyle interventions is maintaining the changes you have made. You may find that there are particular barriers you will face, or certain situations in which you will feel at increased risk of relapsing into your old habits.

Have a read of WS 8.1. This activity provides you with examples of Barriers or HRS that other adolescents have indicated occur regularly. There is also a description of strategies that adolescents found helpful when faced with these situations.

You will these barriers and HRS are broken down into four categories; Thoughts, Environment, Behaviours, and Networks. Each of these indicates a different aspect of your life in which these barriers or HRS could occur.

My Thoughts: This relates to Barriers or HRS that may be caused by negative thoughts or feeling you could experience.

My Behaviours: This relates to Barriers or HRS that may be caused by decisions or choices you make that result in a behavioural outcome, such as food choices or over-eating, or choosing not to exercise.

My Environment: This relates to Barriers or HRS that may be caused by negative influences in your immediate environment, for example Home, School or local community.

My Networks: This relates to Barriers or HRS that may be caused by your social interactions and peer groups, like parties or social events, and peer pressure.

In each section, circle any of the Barriers or HRS nominated by other teens that you think may be applicable to you. Then, look at the examples of strategies they found helpful in overcoming them. Could any of these ideas work for you? Circle those that you think might be helpful for you, or come up with some of your own.

My behaviour

- Overeating and no exercise
- Choice of what to eat
- Not being organised
- Eating on the run (junk food)
- Laying back down on the couch with a blanket
- Not getting up on time
- Tired
- Bad food choices
- Too tired to go out and exercise after an exhausting day

Strategies

- Get a good night sleep
- Making sure to get up on time
- Make time for exercise regularly, even if only for a short period
- Find something else to do
- Go for walks

Your Barriers

My Environment

- High fat food
- Good (tasting) food
- Having food around when there is nothing to do
- Bad weather
- Boring/difficult homework
- Lots of food in the house
- Not having healthy food available
- Unhealthy options

- Most shops sell junk food not healthy food

Strategies

- Plan what food to eat
- Hide bad foods
- Have a healthy snack ready when getting home from school
- Keep unhealthy foods out of sight
- Plan meals
- Take a packed lunch

My Thoughts

- Boredom

Strategies

- Plan what food to eat
- Reminders of goals
- Remembering healthy eating strategies
- Remind myself that to exercise is to do something for me
- Boredom

My Networks

- Others wanting fast food
- Other wanting drive-thru food
- Social events
- Being offered unhealthy food

Strategies

- Eat healthy meal beforehand
- Get healthy take-away food
- Making sure to make a healthy choice
- Go with friends/family to the gym

Insert appropriate strategy into worksheet 8.0

Worksheet 8.0. : Phone call sessions

Weeks, Target sheets	Difficulties	Why is it so hard for you to change, (Barrier)	Solution 1	Solution 2	Times when you find it hard to do healthy things

Weeks, Target sheets	Successes	Why did you think it was important to change	What made you successful	Strategies you may use to help maintaining success

Assertive strategies you have tried (From session 6)	What is your favourite new eating strategy or food (can be non-hungry eating strategy 2.1)	What is your favourite new method of physical activity (learnt from session 5)	What is your favourite thought when trying to deal with a problem (From session 6)	Is there something new that you want to try in the future: What support do you need to do this?

Checklist for Session 7	√	√
Meet and greet		
Ask permission		
Review each day of previous target worksheet		
Review thoughts & assertiveness worksheets		
Describe the purpose of the session		
Worksheet 7.1		
Worksheet 8.0 Homework		
Understand client using open questions & reflection		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Evaluate / set next week target goals ; worksheet 1.4		
Ask parent for support if in attendance		
Thanks for contribution		
Agree on a suitable phone call time for you and the adolescent		

Session 8: Phone call session: Difficulties, Maintaining change & Relapse prevention

During the phone call session you will review the difficulties and successes of the program, what worked what didn't and how we can prevent relapse and maintain change. We are particularly interested in the major difficulties encountered and success achieved. Work through the various columns on worksheet 8.0, establishing conversation relevant to long term success.

The format of worksheet 8.0 will be used also for both upcoming phone call sessions in April to June period 2010. We encourage the young person to add to the content of this worksheet or start another over this time. The major point being that the adolescent understands what has worked what hasn't, to problem solve, think rationally, and apply assertive communication and thinking skills in order to maintain their healthy habits.

Checklist for Session 8	√	√
Meet and greet		
Ask permission		
Describe the purpose of the session		
Review worksheet 8.0		
Understand client using open questions & reflection		
Reinforce importance		
Allow time for difficulties experienced or questions they may have		
Thanks for contribution		
Schedule next weeks physical results overview		

	Health Coach Phone call worksheet
Worksheet 8.1	Your Choice Manual\Session 8\Phone call sessions Worksheet 8.1.doc

Phone call sessions Worksheet 8.1

√	Questions	Notes
☐	Welcome Adolescent	
☐	Discuss previous targets	
☐	Introduce session, Discuss importance	
☐	What are the main Difficulties you have found when trying to lead a healthy lifestyle	
☐	Why is it so hard for you to change, (Barrier)	
☐	Solutions you can try	
☐	What are the main times you find it hard to do more healthy things	
☐	What have the main successes of the program so far	
☐	Why did you think it was important to change Your Choice	

☐	What made you successful	
☐	Strategies you may use to help maintaining success	
☐	Assertive strategies you have tried (From session 6)	
☐	What is your favourite new eating strategy or food (can be non hungry eating strategy 2.1) or favourite new food	
☐	What is your favourite new method of physical activity (learnt from session 5)	
☐	What is your favourite thought when trying to deal with a problem (From session 6)	

☐	Is there something new that you want to try in the future: What support do you need to do this?	
☐	Anything else that I can do for you, concerns	
☐	Thanks for contribution	

Session 9: Physical assessment results and Maintaining change

The session will include the physical assessment information from the September pre assessment to the March - April post assessments. From the assessments you are required to discuss the following areas.

- Changes in total fat composition
- Changes in total muscle mass
- Discuss why no change is also important (if this occurs)
- Highlight that they will have free fitness facility access for a further 4 months, so they can further enhance or maintain their situation

During this session we will overview the worksheet from session 6 (Worksheet 6.4) as regards to problem solving and maintaining changes. The adolescent is required to list times when it was hard to stick to their healthy habits plan; therefore, we may be able to bring forward solutions they can use in the future. What is leant from this session can then be applied in the two upcoming phone call sessions.

Relapse:

Earlier in session 6 the adolescent was asked to think about and give examples of problem solving and relapse prevention. During this session it is important that we highlight relapses are a normal part of behaviour change. Persons are being asked to change long standing attitudes to their old behaviour and it is unrealistic that change can be made without relapse. The session is designed to help prevent future relapses. It aims to better equip the young person with the skills they need to face future problems on their own or with supports the support of their parent. Unfortunately when persons do relapse they tend to think that they have failed and may contemplate giving up all together. It is our task to reassure the participants that these indiscretions are normal and they have not ruined what they have already achieved. Furthermore its is important that we identify when and where the relapse took place, that way they may be able to avoid or plan ahead from that stimulus in the future.

Checklist for Session 9	√	√
Meet and greet		
Ask permission		
Worksheets 6.4		
Review physical assessment results		
Set targets using worksheet 1.4		
Understand client using open questions & reflection		
Re submit worksheet 8.0 if required for phone call sessions		
Reinforce importance		
Thanks for contribution		
Schedule next session times (phonecalls) for Jan & Feb 2010		

	Health Coach worksheet
Worksheet 1.6	Your Choice Manual\Session 1\Worksheet 1.6Targets Coach.doc

Weekly Targets and Revised Goals Health Coach Week;

Worksheet 1.6

Previous Targets:,		Revised Goals
Activity in Community ☐		Strategies for difficulties
Activity at Home ☐		
Healthy foods ☐		
Occasional Foods ☐		
Sedentary time ☐		
Enjoyable tasks ☐		
Easy Challenges ☐		
Hard Challenges ☐		

NOTES:

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Appendix 4: Counselling Skills

Counselling Skills

Name_____

Interviewer_____

Counselling Skills and Techniques	Check off √	
Establishes Therapeutic Relationship and Supportive Environment	Yes	No
Creates comfortable environment		
Uses appropriate greeting gestures		
Offers seat		
Uses appropriate body language and tone of voice		
Provides comfortable, trusting atmosphere for adolescent and parent		
Active Listening		
Looks at adolescent when speaking; maintains eye contact- averts eyes occasionally		
Sits facing toward the adolescent		
Has attentive body language and facial expressions		
Leans a little forward to adolescent, (or mirror)		
Uses occasional nonverbal gestures, such as nods or smiles		
Limit verbal cues such as “yes” or “OK”		
Uses Effective Questioning		
Uses open-ended questions to elicit information; how, what & why		
Asks relevant questions		
Waits for answers rather than speaking immediately		
Reflects statements back to adolescent for confirmation		

Questions for Role Play

1. Why did you want a job in the fitness industry?

2. How long have you been at your current job?

3. What type of training did you receive?

4. What are the best aspects of your current role?

5. Where do you hope to go from here?

Appendix 5: Health Coach Satisfaction Measures

Your Choice

Your Choice Evaluations of individual sessions

Background Information	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Basic Counseling skills	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 1; Goal setting & self monitoring	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 2; Eating cues / Stimulus control	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 3; Addressing sedentary behaviors	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 4; Healthy Eating Habits	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 5; Physical Activity	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 6; Thoughts & Behaviors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 7; High risk situations / problem solving	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 8; Phone call sessions	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Session 9; Review results of physical assessment / Maintaining Change	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I understood the content in this session	1	2	3	4	5
I can see how this material was relevant to treating obesity in adolescents.	1	2	3	4	5
This information was new to me.	1	2	3	4	5
This information will be helpful in preparing me for the coaching of adolescents .	1	2	3	4	5

Your Choice
Health Coach Satisfaction Survey

Please circle the appropriate response

I feel as though I was well trained to deliver the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I enjoyed delivering the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I had enough time each week to prepare for delivering the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
Facilities at my work place allowed me to deliver the Your Choice program to the best of my ability	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt comfortable supporting an ***adolescent*** during the delivery of the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt comfortable supporting the ***parent*** of an adolescent during the delivery of the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program had an appropriate number of sessions	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program covered appropriate topics	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I feel that the Your Choice program can play a role in supporting adolescents to develop a healthy lifestyle	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The experience of delivering the Your Choice program will help me when I work with ***adolescents*** in the future	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The experience of delivering the Your Choice program will help me when I work with ***adults*** in the future	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I would recommend the Your Choice program to adolescents and their families who are seeking support to develop a healthy lifestyle	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I would recommend Belgravia Leisure include the Your Choice program as a service for adolescents and their families who are seeking support to develop a healthy lifestyle	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I would recommend other exercise leaders undertake the training to become a Your Choice Health Coach	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

On a scale of 1(low) to 10 (high), place a mark on the line to rate how well you think each of the Your Choice program sessions was received by the adolescent.

Session 1: Goal setting & self monitoring
(Low).....
.....
..... (High)
1_____10

Session 2: Eating cues / Stimulus control
1_____10

Session 3: Addressing sedentary behaviours
1_____10

Session 4: Healthy Eating Habits
1_____10

Session 5: Physical Activity
1_____10

Session 6: Thoughts & Behaviors
1_____10

Session 7: High risk situations / problem solving
1_____10

Session 8: Phone call session
1_____10

Session 9: Review results of physical assessment / Maintaining Change .....
1_____10

What parts of the Your Choice program would you change?

_____
_____
_____
_____

What major things have you learnt from your experience of delivering the Your Choice program_____
_____
_____

Thank you for completing this survey; this will assist in improving the quality of the program

Appendix 6: Health Coach Supplementary Materials

(Health Coach Background; Post Training Questionnaire; Evaluation of Individual Sessions; Satisfaction Survey)

Your Choice: A Healthy Lifestyle Program for Adolescents
Health Coach Questionnaire (Pre-Training)

Name: _____

_____

Belgravia Facility:_____

Position: _____

_____

Are you currently employed; Please circle

1. Full-time	2. Part-time	3. Casual/contracted

Please describe your particular client group.

_____

_____

What level of education have you obtained?

1. Less than year 10	2. Year 10/11	3. Year 12	4. Tafe/College certificate	5. Undergraduate University degree	6. Postgraduate University degree

Please specify title or degree or certificate:

_____

What level of exercise Fitness qualification have you achieved?

1. Certificate 3	2. Certificate 4	3. TAFE Diploma	4. Human Movement or equivalent

Please specify title or degree or certificate:

_____

The questions in this section ask about food, physical activity, and being overweight. Please circle the letter that corresponds with your answer. If you do not know the answer, please circle the letter d, which means "don't know," instead of guessing. Please give an answer to every question.

Questions 1 to 5 are about the fat and calories in foods and beverages (please circle).

1. Which beverage contains the greatest amount of fat?

1. One cup of whole milk	2. One cup of skim milk	3. One cup of orange juice	4. Don't know

2. Which food contains the least amount of sugar?

1. One cup of vanilla pudding	2. One cup of chocolate ice cream	3. One cup of fresh pineapple	4. Don't know

3. Which type of food contains the greatest amount of fat?

1. Fruits	2. Cheese	3. Vegetables	4. Don't know

4. Which meal contains the least amount of calories?

1. Hamburger with bread & fried potatoes	2. Ham and Cheese pizza	3. Pasta with tomato sauce	4. Don't know

5. Which food contains the greatest amount of fibre?

1. Carrots	2. Eggs	3. Beef	4. Don't know

Questions 6 to 10 are about ways to lose weight (please circle).

6. What is the best thing a person can do to lose weight effectively?

1. Reduce the amount of foods eaten	2. Reduce the amount of foods eaten and do more exercise	3. Do more exercise	4. Don't know

7. How many meals should a person eat in a day to lose weight in a healthy way?

1. One	2. Two	3. Three	4. Don't know

8. How many kilograms should a person lose in a week to lose weight in a healthy way?

1. ½ to 1	2. 5½ to 7½	3. 2½ to 5	4. Don't know

9. Which substance should be eaten in smaller amounts by a person who wishes to lose weight?

1. Sugar	2. Fat	3. Sugar and Fat	4. Don't know

10. Which type of food should be eaten more frequently by a person who wishes to lose weight?

1. Vegetables	2. Shellfish	3. Meats	4. Don't know

Questions 11 to 15 are about physical activity

11. Which activity uses the least amount of energy?

1. Walking at a normal rate on a flat surface	2. Running	3. Watching television	4. Don't know

12. Which is one of the health benefits of doing frequent exercise?

1. It helps keep the heart healthy	2. It helps us lose weight in a specific part of the body such as the hips or waist	3. It converts body fat into muscle	4. Don't know

13. How often should we do exercise to remain in good health?

1. Once a month	2. Once a week	3. At least three times per week	4. Don't know

14. Where does the energy come from that is needed to carry out physical activities?

1. From the rest we get when we sleep	2. From the foods we eat	3. From the water we drink	4. Don't know

15. Which is one of the factors that determine how much energy the body uses during physical activity?

1. The type of physical activity that is done	2. The intensity of the pain the person feels during the activity	3. How tired the person feels after carrying out the activity	4. Don't know

Questions 16 to 20 are about food preparation methods.

16. Which method of cooking chicken is the least fattening?

1. Baking it with its skin	2. Grilling it with its skin	3. Baking it without skin	4. Don't know

17. Which method of cooking potatoes is the most fattening?

1. Grilling them	2. Frying them	3. Boiling them	4. Don't know

18. Which method of preparing a salad would add the least number of calories?

1. Combining two lettuce leaves and a sliced tomato with one tablespoon of vinegar	2. Combining two lettuce leaves and a sliced tomato with one tablespoon of oil	3. Combining two lettuce leaves and a sliced tomato with one tablespoon of mayonnaise	4. Don't know

19. Which method of cooking fish is the least fattening?

1. Grilling it with lemon juice	2. Frying it in butter	3. Frying it in oil	4. Don't know

20. In a cake recipe, which ingredient contributes the greatest amount of calories?

1. One cup of butter	2. One cup of water	3. One cup of sugar	4. Don't know

Questions 21 to 25 are about the relationship between excess body fat and health

21. Which health problem occurs more frequently among overweight people than among people of normal weight?

1. Fevers	2. Intestinal infections	3. Heart disease	4. Don't know

22. Where on the body is it most dangerous to health to have excess of fat?

1. The abdomen ("The Stomach")	2. The legs	3. The hips	4. Don't know

23. Which health problem could improve when an overweight person loses weight?

1. Iron deficiency	2. Diabetes (high blood sugar)	3. Cancer	4. Don't know

24. Which is one of the health benefits when an overweight person loses weight?

1. The blood sugar increases	2. The heart works more efficiently	3. The blood pressure increases	4. Don't know

25. Which health problem is associated with an excess of body fat?

1. High blood pressure	2. Iron deficiency	3. Intestinal infections	4. Don't know

The following questions 26-30 refer to the Cognitive behaviour therapy; (CBT) (Health Coaching Model) please circle

26. Cognitive restructuring involves one to do which of the following?

1. Modifying unhelpful thoughts	2. Change memory	3. Addressing social relationships	4. listening to others speak

27. Self monitoring refers to:

1. Recording and observing parts of your behaviour	2. Removing Tim tams from the house	3. Thinking rationally about situations	4. Assessing what type of physical activity is best for you

28. Stimulus control refers to:

1. The increase of incidental activity	2. The removal of cues that lead to overeating	3. The utilisation of a food diary	4. The removal of unhappy feelings

29. Which of the following are examples of feelings?

1. Eating a box of cookies	2. Sadness	3. Going on a run	4. Thinking you are not good enough

30. Relapse prevention strategies aim to:

1. Increase sedentary behaviour	2. Increase RED food consumption	3. Prevent weight regain	4. Maintain overeating

Your Choice: A Healthy Lifestyle Program for Adolescents
Health Coach Post Training Questionnaire

The questions in this section ask about food, physical activity, and being overweight. Please circle the letter that corresponds with your answer. If you do not know the answer, please circle the letter d, which means "don't know," instead of guessing. Please give an answer to every question.

Questions 1 to 5 are about the fat and calories in foods and beverages (please circle).

1. Which beverage contains the greatest amount of fat?

1. One cup of whole milk	2. One cup of skim milk	3. One cup of orange juice	4. Don't know

2. Which food contains the least amount of sugar?

1. One cup of vanilla pudding	2. One cup of chocolate ice cream	3. One cup of fresh pineapple	4. Don't know

3. Which type of food contains the greatest amount of fat?

1. Fruits	2. Cheese	3. Vegetables	4. Don't know

4. Which meal contains the least amount of calories?

1. Hamburger with bread & fried potatoes	2. Ham and Cheese pizza	3. Pasta with tomato sauce	4. Don't know

5. Which food contains the greatest amount of fibre?

1. Carrots	2. Eggs	3. Beef	4. Don't know

Questions 6 to 10 are about ways to lose weight (please circle).

6. What is the best thing a person can do to lose weight effectively?

1. Reduce the amount of foods eaten	2. Reduce the amount of foods eaten and do more exercise	3. Do more exercise	4. Don't know

7. How many meals should a person eat in a day to lose weight in a healthy way?

1. One	2. Two	3. Three	4. Don't know

8. How many kilograms should a person lose in a week to lose weight in a healthy way?

1. ½ to 1	2. 5½ to 7½	3. 2½ to 5	4. Don't know

9. Which substance should be eaten in smaller amounts by a person who wishes to lose weight?

1. Sugar	2. Fat	3. Sugar and Fat	4. Don't know

10. Which type of food should be eaten more frequently by a person who wishes to lose weight?

1. Vegetables	2. Shellfish	3. Meats	4. Don't know

Questions 11 to 15 are about physical activity

11. Which activity uses the least amount of energy?

1. Walking at a normal rate on a flat surface	2. Running	3. Watching television	4. Don't know

12. Which is one of the health benefits of doing frequent exercise?

1. It helps keep the heart healthy	2. It helps us lose weight in a specific part of the body such as the hips or waist	3. It converts body fat into muscle	4. Don't know

13. How often should we do exercise to remain in good health?

1. Once a month	2. Once a week	3. At least three times per week	4. Don't know

14. Where does the energy come from that is needed to carry out physical activities?

1. From the rest we get when we sleep	2. From the foods we eat	3. From the water we drink	4. Don't know

15. Which is one of the factors that determine how much energy the body uses during physical activity?

1. The type of physical activity that is done	2. The intensity of the pain the person feels during the activity	3. How tired the person feels after carrying out the activity	4. Don't know

Questions 16 to 20 are about food preparation methods.

16. Which method of cooking chicken is the least fattening?

1. Baking it with its skin	2. Grilling it with its skin	3. Baking it without skin	4. Don't know

17. Which method of cooking potatoes is the most fattening?

1. Grilling them	2. Frying them	3. Boiling them	4. Don't know

18. Which method of preparing a salad would add the least number of calories?

1. Combining two lettuce leaves and a sliced tomato with one tablespoon of vinegar	2. Combining two lettuce leaves and a sliced tomato with one tablespoon of oil	3. Combining two lettuce leaves and a sliced tomato with one tablespoon of mayonnaise	4. Don't know

19. Which method of cooking fish is the least fattening?

1. Grilling it with lemon juice	2. Frying it in butter	3. Frying it in oil	4. Don't know

20. In a cake recipe, which ingredient contributes the greatest amount of calories?

1. One cup of butter 2. One cup of water 3. One cup of sugar 4. Don't know

Questions 21 to 25 are about the relationship between excess body fat and health

21. Which health problem occurs more frequently among overweight people than among people of normal weight?

1. Fevers 2. Intestinal infections 3. Heart disease 4. Don't know

22. Where on the body is it most dangerous to health to have excess of fat?

1. The abdomen ("The Stomach") 2. The legs 3. The hips 4. Don't know

23. Which health problem could improve when an overweight person loses weight?

1. Iron deficiency 2. Diabetes (high blood sugar) 3. Cancer 4. Don't know

24. Which is one of the health benefits when an overweight person loses weight?

1. The blood sugar increases 2. The heart works more efficiently 3. The blood pressure increases 4. Don't know

25. Which health problem is associated with an excess of body fat?

1. High blood pressure 2. Iron deficiency 3. Intestinal infections 4. Don't know

The following questions 26-30 refer to the Cognitive behaviour therapy; (CBT)

(Health Coaching Model) please circle

26. Cognitive restructuring involves one to do which of the following?

1. Modifying unhelpful thoughts 2. Change memory 3. Addressing social relationships 4. listening to others speak

27. Self monitoring refers to:

1. Recording and observing parts of your behaviour 2. Removing Tim tams from the house 3. Thinking rationally about situations 4. Assessing what type of physical activity is best for you

28. Stimulus control refers to:

1. The increase of incidental activity 2. The removal of cues that lead to overeating 3. The utilisation of a food diary 4. The removal of unhappy feelings

29. Which of the following are examples of feelings?

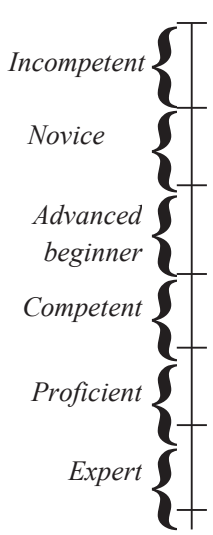
1. Eating a box of cookies 2. Sadness 3. Going on a run 4. Thinking you are not good enough

30. Relapse prevention strategies aim to:

1. Increase sedentary behaviour 2. Increase RED food consumption 3. Prevent weight regain 4. Maintain overeating

Appendix 7: Revised Cognitive Therapy Scale

The present seven point scale (i.e. a 0-6 Likert scale) extends from (0) where the therapist did not adhere to that aspect of therapy (non-adherence) to (6) where there is adherence and very high skill.



0 absence of feature, or highly inappropriate performance

1 Inappropriate performance, with major problems evident

2 evidence of competence, but numerous problems and lack of consistency

3 competent, but some problems and/or inconsistencies

4 good features, but minor problems and/or inconsistencies

5 very good features, minimal problems and/or inconsistencies

6 excellent performance, or very good even in the face of patient difficulties

Appendix 8: Human Research Ethics Approval

RMIT University

Research and Innovation

Bundoora campus west
Building 215, Level 4
Plenty Road
Bundoora VIC 3083
Australia

PO Box 71
Bundoora VIC 3083
Australia

Tel. +61 3 9925 7781
Fax +61 3 9466 9980

City campus
Building 3, Level A, Room 7
124 La Trobe Street
Melbourne VIC 3000
Australia

GPO Box 2476V
Melbourne VIC 3001
Australia

• www.rmit.edu.au

Phone: 9925 2251
Fax: 9925 2387
peter.burke@rmit.edu.au

3 July 2007

Dr Jeff Walkley
School of Medical Sciences,
RMIT University
PO Box 71
Bundoora VIC 3083

Dear Dr Walkley

Project No 10/07 Walkley – The treatment of overweight adolescents using CBT delivered by exercise leaders

Thank you for making the amendments sought by the RMIT Human Research Ethics Committee to the above project. Your project is now approved.

This project is approved from the date of this letter until **30 June 2010**. This approval is conditional on the submission of annual reports. A final report should be provided at the conclusion of the project. If your work is completed within twelve months a final report, only, is required. Report forms are available from the Human Research Ethics Committee web site (http://www.rmit.edu.au/rd/hrec_apply).

If, as you proceed with your investigation you find reason to amend your research method, you should advise the RMIT Human Research Ethics Committee and seek approval for the proposed changes. If you decide to discontinue your research before its planned completion you must also advise the Committee of this and of the circumstances.

You should notify the Committee immediately of any serious or unexpected adverse effects on subjects, or unforeseen events, which may affect the ethical acceptability of your project.

All data should *normally* be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving, data transport where necessary and some works in progress. The

Appendix 9: Your Choice Recruitment Flyers


Your Choice
FREE
HEALTH PROGRAM
FOR ADOLESCENTS
Does your 12 – 16 year old child have difficulty in maintaining a healthy weight and wants to do something about it?
You may be interested in joining a research project that provides a free healthy-lifestyle program or gym-based fitness program designed to assist you and your child to better health outcomes.
This is an opportunity for parents and adolescents to participate in a program designed to achieve better health. The program will run in selected leisure centres in Melbourne.
If you and your child are interested, please call Lara Taylor on 03 9925 6572, or email yourchoice@rmit.edu.au and ask about the 'Your Choice' study.
www.rmit.edu.au/medicalsciences
RMIT UNIVERSITY

CALL FOR VOLUNTEERS

Your Choice

Does your 12 – 16 year old child have difficulty in maintaining a healthy weight and wants to do something about it?

You may be interested in joining a research project that provides a free healthy-lifestyle program or gym-based fitness program designed to assist you and your child to better health outcomes.

This is an opportunity for parents and adolescents to participate in a program designed to achieve better health. The program will run in selected leisure centres in Melbourne.

If you and your child are interested, please call Lara Taylor on 03 9925 6572, or email yourchoice@rmit.edu.au and ask about the 'Your Choice' study.

www.rmit.edu.au/medical-sciences

RMIT UNIVERSITY

Appendix 10: Participant Recruitment Forms

(Plain Language Statement; Self-Administered Questionnaire; and Consent Form)

INVITATION TO PARTICIPATE IN A RESEARCH PROJECT EXAMINING THE TREATMENT OF OVERWEIGHT IN ADOLESCENTS

PROJECT INFORMATION STATEMENT

Project: Adolescent weight management in community leisure settings.

Investigators: A/Prof Jeff Walkley, Richard Mallows.

Dear Adolescent and Parent,

Thank you for your interest in the research project '*Adolescent weight management in community leisure settings*'. As a follow-up to our phone call I am writing to invite you to participate in this project being conducted by RMIT University with the support of Belgravia Leisure. This information sheet describes the project in straightforward language, or 'plain English'. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

Who is involved in this research project?
The study is being undertaken by Associate Professor Jeff Walkley (Exercise Scientist), Professor Neil Mann (Nutritionist), Richard Mallows (Exercise Scientist) from RMIT University. This study is partly funded by the Sheppard Foundation. The project has been approved by the RMIT Human Research Human Research Ethics Committee.

Why is it being conducted?
The prevalence of overweight and obesity problems has increased dramatically in recent years. Many Australian adolescents are experiencing problems in maintaining a healthy weight. Unfortunately these overweight children and adolescents are at risk of becoming overweight adults. Overweight individuals have an increased risk of cardiovascular problems, a higher incidence of diabetes, high blood pressure and other medical problems. In addition to these health problems, overweight individuals commonly experience social stigma and negative psychological consequences. There has been very little research looking at the best way to help adolescents lose weight and keep it off.

Why are you receiving this information?
You have received this information letter following your enquiry about the project. Overweight adolescents experiencing difficulties maintaining a healthy body weight, without a medical condition or disability impacting on weight, and with a parent who is willing to participate, are eligible to participate. We are aiming to offer the program to 80 adolescents and their families.

What is the project about? What are the questions being addressed?
The current project will extend the findings of the original YOUR CHOICE project and make the program more widely available to overweight adolescents and their families. The ultimate aim of this project is to determine the best way to assist adolescents to make healthy eating and exercise choices so they can lose weight and keep it off.

If I agree to participate, what will I be required to do?
If you and one of your parents decide to participate in this program there are a number of steps involved:

1. Assessment

All adolescents and parents participating in the program are required to complete the assessment process. These assessments will be completed prior to commencing the program, immediately after completing treatment, following the maintenance phase, and at 6 month and 1 year follow up. There are a number of reasons for this. Firstly, it allows us to see if the program is appropriate for you; it helps us determine how best to meet your needs, and finally it provides details about your present health and behaviour so we can see if the program helps you.

(a) Parent and adolescent questionnaires: Parents and adolescents will be also asked to complete a questionnaire booklet which will take approximately 1½ hours to complete. These comprehensive questionnaires packages are necessary to measure factors implicated in obesity and thought to be important for weight loss and to assess treatment outcomes. The adolescent questionnaire asks a range of questions regarding family background, health, and personal and family weight history, family problem solving and communication, and healthy beliefs and behaviours. There are also measures of dieting behaviour, self-esteem, depression, anxiety and stress, and perceived social support from family and friends. You will also be asked to record your eating and physical activity for one week. In addition, you will be asked to rate your level of pubic hair and genital development from a range of drawings. The parent questionnaire includes questions about adolescents, parent and family health and weight history, family Influence on eating and exercise behaviour and habits, and parent exercise and weight loss behaviours. Factors related to parent well-being including self-esteem, depression, anxiety and stress, and family problem solving and communication will also be measured. You will receive feedback about the results of these assessments during treatment.

(b) Physical Assessment: Adolescents will undergo a range of physical assessments. These assessments will take approximately 1 hour to complete. Body composition and growth will be measured using dual energy x-ray absorptiometry (DEXA)*, bio-impedance measures, body circumferences, and height and weight measurements. DEXA* provides a fast and precise measurement of tissue composition. Participants will lay for approximately 15 to 20-minutes on a bench in comfortable clothing in the Bone Densitometry Laboratory (Bld 213, Bundoora West Campus) while body composition is measured using an X-ray based technique. The X-ray dose is minimal and well within National Health & Medical Research Council limits. This test of body composition is entirely non-invasive and the participant will not feel any sensation. Physical activity will be measured via an accelerometer, a small, lightweight, self-contained monitor strapped around the waist. These are small and do not interfere with ongoing activity. You will receive feedback about the results of these assessments during treatment. The investigator is trained and experienced in conducting these physical assessments and they will do all that they can to ensure that you feel comfortable while completing the assessments. Parents will also be asked to complete body composition and blood pressure measures.

(c) Optional Bloods Test Assessment: All adolescent participants will be given the option of undergoing a blood test before, immediately after, and 6 months after the program. Blood samples will be collected by Dorevitch Pathology Center, and can be paid for by the Your Choice Program if needed. The amount of blood will not pose any risk to the individual. Overnight fasting (only able to drink water) will be required. This assessment will provide important

information about cardiovascular disease and diabetes risk factors. If you would like to participate in this optional assessment please sign and return the additional consent form enclosed. Your decision to undergo blood tests or not will have no impact on your participation in the rest of the research. If the result of these tests indicates to us the possibility of a health concern, we will inform you and advise you to visit your Doctor.

2. Group Allocation

After you have been assessed as suitable for the project, and once you and a parent agree to participate, you will be randomly allocated to one of two groups. One group will receive the treatment as normal intervention, the other will participate in the support intervention outlined below. Before, during and after the treatment phase, we will contact you via phone, e-mail and post to organise appointment times and to advise you of arrangements regarding this project.

a) Treatment as Normal: Adolescents allocated to the treatment as normal group will receive an exercise plan aimed at healthy weight management, prescribed by a professional qualified in fitness instruction. This program will run within the school term.
   I. Results Summary: Participants will receive a summary of key height, weight, body composition and fitness results.
   II. Participants will receive an orientation of fitness equipment that includes its safe and effective use.
   III. Participants will receive ongoing support from the Fitness Professional during the program if required.

b) Support Intervention: Families allocated to the Treatment Intervention will be offered a treatment program, followed by a maintenance program and an enhanced program if required.
   - Treatment Program: The treatment program will consist of eight, 1 hour sessions conducted weekly throughout the school term. The treatment will provide information about the causes and consequences of weight problems, strategies for changing eating behaviour, improving diet increasing daily activity, and maintaining changes. Adolescents will be asked to monitor their eating and exercise behaviour throughout the program. The nutrition and exercise components of the program are designed to reduce the likelihood that you will find improving your diet and increasing your daily activity stressful or unpleasant. Treatment sessions may be videotaped, only the research team will have access to these tapes.

What are the risks or disadvantages associated with participation?

This study has been designed to minimise any risks or disadvantages associated with participation. The intervention strategies used are aimed at improving adolescent health and wellbeing. The psychotherapeutic intervention strategies used in this study have been repeatedly used and shown to be effective with adolescents. Thus the inclusion of a psychological component in an overweight and obesity treatment program is likely to reduce the risks associated with overweight and obesity treatment. The dietary recommendations used in the program will be based on scientifically supported dietary interventions. The program does not require participants to restrict their food intake, instead participants are asked to select healthier foods rather than energy dense foods with low nutritional value. This procedure prevents participants from feeling hungry and avoids the risk of dieting and disordered eating as a result of hunger or feelings of deprivation. All physical activity promoted throughout the program conforms with the current physical activity guidelines. The gradual introduction of the type of physical activity promoted in this program is unlikely to cause physical,

psychological or social risks. If you elect to participate in more strenuous activity we will recommend that you undergo a medical assessment prior to participation.

The data collected throughout this research project is the minimum amount of data that should be collected in order to thoroughly evaluate any weight loss program. Although all physical assessments* are non-invasive you may be initially uncomfortable or anxious about these assessments. If you choose to have the blood tests they will be performed by a certified phlebotomist. The amount of blood will not pose any risk and the method will be identical to that used in medical tests in pathology clinics. All procedures are commonly used with adolescents and we will be available to answer any questions you may have and to familiarise you with all equipment to help you feel as comfortable as possible. While unlikely, the completion of some questionnaires and intervention tasks may cause minimal concern to adolescents and their parents.

If you are unduly concerned about your responses to any of the questionnaire items or if you find participation in the project distressing, you should contact Jeff Walkley, Neil Mann or Richard Mallows as soon as convenient. They will discuss your concerns with you confidentially and suggest appropriate follow-up if necessary. If the assessment or intervention reveals any serious risk you will be contacted and referred to someone who can be of assistance

What are the benefits associated with participation?
There are a number of ways in which you will benefit from the participating in this project:

- You will receive a thorough assessment and feedback on your height, weight, body circumferences, body composition (percent body fat).
- If you participate in the blood tests you will also receive information about cardiovascular disease and diabetes risk factors.
- You will be provided with detailed, up to date information about the causes and potential long-term consequences of being overweight.
- You will receive empirically based information and strategies to assist you to improve your health and fitness by making long term lifestyle changes aimed at improving dietary quality and increasing daily activity levels.
- The research literature lists reduced health risks, improved mood, more positive social relations, and increased educational and occupational opportunities as some of the many benefits of improving health and fitness and reducing weight.
- Studies have shown that providing adolescents with information and strategies about safe ways to lose weight can reduce their use of unhealthy attempts at weight loss such as crash dieting and excessively restricted calorie intake.

The results of the proposed research project will also allow for improvements to be made to future weight loss programs. Given the finding that overweight adolescents typically become overweight adults, and that this is associated with considerable medical and psychological problems, there is a need to develop programs that maximise the long-term maintenance of weight loss. The results of this will allow for the development of training packages and interventions programs for health professionals to improve the weight and wellbeing of overweight adolescents.

What will happen to the information I provide?
All information collected throughout this study will be kept in a locked filing cabinet accessible only to the researchers. The names of people participating in the study will not be associated with either answers to questionnaires or information gathered throughout the intervention. The data must be kept securely at RMIT for a period of 5 years before being destroyed. Any information that you provide can be disclosed only

if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission. The final report and any subsequent publications or presentations will not include any identifying information. Generally only group results will be reported, if individual data is reported personal information will be changed to protect your anonymity.

What are my rights as a participant?
Your participation in this program is completely voluntary and there is no obligation for you to take part. Please note that you can withdraw from the project at any time. If you do choose to withdraw, all unprocessed information already obtained from you will not be used. You can also expect any questions you have about the study to be answered at any time throughout the study.

Whom should I contact if I have any questions?
If you have any questions or you would like more information please call or email Jeff Walkley (9925 7359; jeff.walkley@rmit.edu.au), or Richard Mallows (9925 7670; richard.mallows@rmit.edu.au).

Looking forward to your participation,

A/Prof Jeff Walkley
Principal Investigator

Richard Mallows
PhD Candidate

Recruitment Questionnaire – self-administered version

Child name:	DOB:

Age:	Gender:

Parent name:

Contact Phone (H):	(W):	Mobile:

Email:	Fax

Address:	Postcode

What is your child's current height (preferably without shoes on)	cm
What is your child's current weight (preferably first thing in the morning with minimal clothing)	Kg
Has your child had any exposure to radiation in the last 12 months? Yes / No (i.e xrays, CT scan, radiotherapy etc.)	
If yes, please give details of what they had and the date Date	

Has your child been receiving treatment for their weight in the last 3 months? Yes / No		
If yes, please give details & dates Yes / No Details:		

Does your child have any of the following conditions?

Y or N?

Endocrine disorders		Hypothalamic damage		Cancer	
Cerebral palsy		Muscular dystrophy		Autism	
Asthma		Diabetes		Low tone	
Dyslexia		Dyspraxia		Learning difficulties	
DCD		ADHD		Spina Bifida	
Retts		Arthritis		Intellectual disability	
Gene disorders		Mental Illness			

Other condition (please specify):
Is your child on any medications or supplements?
If yes, what are these for?
How did you hear about the study?

Will you be able to participate in the following?	Yes or No?
Able to be present & provide support to your child through either program and at physical assessments	
Able to attend RMIT University Bundoora West Campus, for physical assessments January , April, and June 2010 & and January 2011	
Able to attend nominated Leisure centre once a week for up to 1 hour (Health coaching group) or (Fitness program group) for approximately 10 weeks, starting February 2010	

If eligible for the program, Please indicate what leisure centre you could attend

Yes / No

Wyndham Leisure 80 Derrimut Road, HOPPERS CROSSING VIC 3029	
Windy Hill Fitness centre 74-84 Napier St Essendon VIC 3040	
Melton Waves 206 Coburns Road Melton 3337	
Bundoora Netball and Sports Centre McKimmies Rd, RMIT University, 3083	
Diamond Valley Sports and. Fitness Complex, Civic Drive, Greensborough 3088	
Yarra Recreation Centre, Warburton Hwy Yarra Junction	

Thank you for completing this questionnaire
Please return to:

Lara Taylor

c/o RMIT University

PO Box 71,

Bundoora, Vic, 3083

If you have any questions, please contact

Lara Taylor, ph. 9925 6572

Consent Form

RMIT HUMAN RESEARCH ETHICS COMMITTEE

SCHOOL OF: **Medical Sciences, Health Sciences, and Applied Sciences**

Project Title: The Treatment of Overweight Adolescents Using CBT Delivered by Exercise Leaders.

Name(s) of investigators:
(1) Assoc Prof Jeff Walkley Phone: 9925 7359
(2) Assoc Prof Neil Mann Phone: 9925-7722
(3) Richard Mallows Phone: 9925 7670

Name of adolescent participant: _____

Name of parent or guardian participant: _____

Address: _____

Phone Number _____

1. I have received a statement explaining the procedures and interview/questionnaires involved in this project.
2. I consent to participate in the above project, the particulars of which - including details of the procedures, interviews and questionnaires - have been explained to me.
3. I authorise the investigator or his or her assistant to use the procedures, interview me and administer questionnaires referred to in 1 above.
4. I acknowledge that:
   (a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
   (b) The possible effects of the tests or procedures have been explained to me to my satisfaction.
   (c) I understand that assessment interviews and treatment sessions will be videotaped for research, training and supervision purposed.
   (d) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).
   (e) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
   (f) The confidentiality of the information I provide will be safeguarded. However should information of a confidential nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
   (g) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to participating schools and interested organisations. Any information which will identify me will not be used.

Adolescent Consent

Signature: _____ **Date:** _____
(Participant)

Signature: _____ **Date:** _____
(Witness to signature)

Parent of Guardian Consent:

I consent to the participation of _____ in the above project.

Signature: (1) (2) **Date:** _____
(Signatures of parents or guardians)

Signature: _____ **Date:** _____
(Witness to signature)

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001.
Details of the complaints procedure are available at: http://www.rmit.edu.au/rd/hrec_complaints

Appendix 11: Ineligible Participant Recommendations

Dear Parent and Adolescent,

Please find attached a copy of the Australian Guide to Healthy Eating. This booklet includes information about each of the food groups, suggested serving sizes, recommendations regarding the number of servings to consume from each food group, and some ideas to help you achieve these recommendations.

You can use the information provided in the Australian Guide to Healthy Eating to inform your decisions regarding eating habits and food choices.

You may like to use the information and resources suggested on Information Sheet 1: Healthy Weight and Adolescents, and listed again below, to find out more about making healthy food choices.

Australian Government Department of Health and Ageing:
http://www.health.gov.au/internet/wcms/publishing.nsf/content/health-pubhlth-strateg-hlthwt-obesity.htm

Healthy Active Australia
http://www.healthyactive.gov.au

Victorian Government Health Information
http://www.health.vic.gov.au/nutrition/obesity/index.htm

Go-For-Your-Life Teenagers
http://www.goforyourlife.vic.gov.au/hav/articles.nsf/webl1/teenagers?open
Info Line 1300 73 98 99

Better Health Channel (Quality Assured by the Victorian Government)
http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Obesity_in_children?open

VicHealth
http://www.vichealth.vic.gov.au/assets/contentFiles/Obesity_Fact_Sheet.pdf

Australian Institute of Health and Welfare
http://www.aihw.gov.au/riskfactors/overweight.cfm

Kind Regards,

The YOUR CHOICE Team
Discipline of Exercise Sciences
RMIT University

Appendix 12: Questionnaires

(Parent Questionnaire; Male Adolescent Questionnaire; Female Adolescent)

Your Choice: A healthy-lifestyle program for Adolescents

PARENTS QUESTIONNAIRE

This questionnaire collects information about you and your family, your eating and activity habits, and your general wellbeing.
Please read every question carefully and answer as honestly as you can. Some of these questions may seem a bit personal, but this information will help us learn more about adolescent health. Your personal information will be kept in the strictest of confidences.

1. **Name:**_____ **Date:**_____

Your Adolescent

2. **Participating Adolescent:**_____

3. **Date of Birth:**_____

4. **Age:** _____ years _____ months

   Sex: 1. M 2. F

The next two questions are very important. If you are not sure about your adolescent's height and weight, please measure/weigh them.

5. **Height:** _____ cm

   Weight: _____ kg

6. **Your Adolescent's School Year:** *(please circle)*
   1. Year 6 2. Year 7 3. Year 8 4. Year 9 5. Year 10 6. Year 11

7. **Your relationship with this adolescent?** *(please circle)*
   1. Mother
   2. Father
   3. Step Mother
   4. Step Father
   5. Foster Mother
   6. Foster Father
   7. Other: _____

8. **How would you describe your adolescent's present weight?** *(please circle)*
   1. Underweight **2.** Normal Weight **3.** Overweight **4.** Obese

9. **Would you like your adolescent to weigh something different to their present weight?**
   1. No *(go to question 11)* 2.Yes

10. **a) If yes, how much does your adolescent's weight concern you?** *(please circle)*
    1. A lot. It is a major problem 2. Some. It is a small Problem. 3. None. It is not a problem.

    b) How much would you like your adolescent to weigh? _____kg

11. **What would their DOCTOR say is their ideal body weight?** _____ kg

12. What would YOU say is their ideal body weight? _____ kg

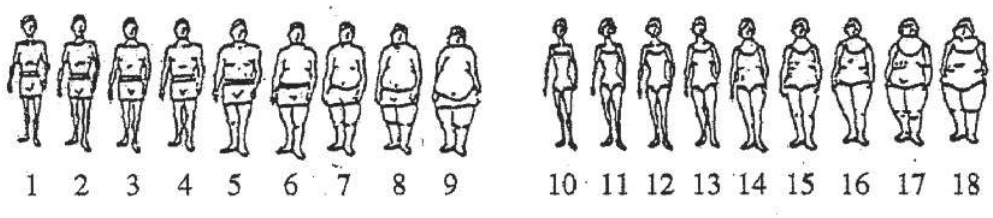
13. What would THEY say is their ideal body weight? _____ kg

14. What do they usually weigh? _____ Kg

15. Use the silhouettes below to answer the following questions about your adolescent.

a) Which figure is closest to their PRESENT size? _____

b) Which figure is closest to the size YOU would like them to be? _____



c) Which figure is closest to the size THEY would like to be? _____

d) Which figure is closest to the size their DOCTOR think they should be? _____

16. In an average week or month, does THEIR weight usually fluctuate (go up or down)? *(please circle)*

1. No *(go to question 17)* 2. Yes

a. How much does their weight fluctuate? _____ Kg per month or week

b. What do you think causes their weight to fluctuate? *(please circle all that apply)*

1. Changes in activity patterns ☐
2. Changes in weather ☐
3. Stress ☐
4. Special events (Holidays, parties, vacations etc.) ☐
5. Changes associated with the menstrual cycle ☐
6. Binge eating ☐
7. Irregular eating habits ☐
8. Changes in metabolism ☐
9. Changes in water retention ☐
10. Other: *(please describe)*

_____

_____

17. In your opinion, has your adolescent been overweight in other periods in their life?

1. No *(go to question 19)* 2. Yes

18. If yes, when were they overweight? *(circle all that apply)*

a) Infant (up to 1 year)

b) Young child (1 – 5 years)

c) Older child (5 – 11 years)

d) Early adolescence (11 – 15 years)

e) Late adolescence (15 – 18 years)

19. Do any of your adolescent's relatives have a similar body shape to theirs? *(circle all that apply)*

1. Mother
2. Father
3. Step Mother
4. Step Father
5. Grandmother on mother's side
6. Grandfather on mother's side
7. Grandmother on father's side
8. Grandfather on father's side

9. Older brother
10. Younger brother
11. Older sister
12. Younger sister

20. How do you explain the fact that your adolescent's and this person / these people have similar body shapes?

1. Biology / Genetics 2. Social Influence 3. Similar lifestyle 4. Other *(please specify)* _____

21. Has your adolescent ever tried to lose weight?

1. No *(please go to question 22)* 2. Yes

a. About how many times has your adolescent tried to lose weight? _____

b. What is the most weight they have ever lost in one time? _____ kg

22. How often is your adolescent preoccupied with losing weight? *(please circle)*

1. Never 2. Sometimes 3. Often 4. Always

23. How important is weight to your adolescent's self concept? *(please circle)*

1. Not important 2. Somewhat important 3. Very important 4. Extremely important

24. Do you think of your adolescent as having a weight problem? *(please circle)*

1. No *(go to question 25)* 2. Yes *(please circle the following questions)*

a) How do you generally deal with your adolescent's weight problem?

1. Very Accepting 2. Accepting 3. Neutral 4. Critical 5. Very Critical

b) Do you try to give your adolescent advice regarding their weight problems?

1. No 2. Yes

25. Do you feel that your adolescent has been discriminated against because of their weight? *(please circle)*

1. No 2. Yes

26. Do you feel that their opportunities in life have been limited because of their weight? *(please circle)*

1. No 2. Yes

Your Family Background

27. Your country of birth:

1. Australia ☐
2. Somalia ☐
3. Turkey ☐
4. Macedonia ☐
5. Italy ☐
6. Yugoslavia ☐
7. Greece ☐
8. China ☐
9. Vietnam ☐
10. Other: _____

28. Are you of Aboriginal or Torres Straight Islander origin? 1. No 2. Yes

29. What ethnic group do you identify with?

Australian ☐ Macedonian ☐ Vietnamese ☐
Turkish ☐ Greek ☐ Chinese ☐
Italian ☐ Yugoslav ☐ Somalian ☐

2. Other: _____

30. What is the main language spoken at home? _____

31. Your highest level of education? *(please circle)*

1. Less than Year 10
2. Year 10/11
3. Year 12
4. Trade/Apprentice
5. Tafe/College Certificate
6. University Degree

32. Are you currently in paid employment? *(please circle)* 1. No 2. Yes

a. If yes, how many hours per week? _____hrs

Please write your job title and a brief description of what you do in your paid employment: _____

_____

_____

_____

33. Your partner's country of birth:

1. Australia ☐
2. Somalia ☐
3. Turkey ☐
4. Macedonia ☐
5. Italy ☐
6. Yugoslavia ☐
7. Greece ☐
8. China ☐
9. Vietnam ☐
10. Other: _____

34. Is your partner of Aboriginal or Torres Straight Islander origin? 1. No 2. Yes

35. What ethnic group does your partner identify with?

1. Australian ☐
2. Turkish ☐
3. Italian ☐
4. Macedonian ☐
5. Greek ☐
6. Yugoslav ☐
7. Vietnamese ☐
8. Chinese ☐
9. Somalian ☐
10. Other: _____

36. Your partner's highest level of education? *(please circle)*

1. Less than Year 10
2. Year 10/11
3. Year 12
4. Trade/Apprentice
5. Tafe/College Certificate
6. University Degree

37. Is your partner currently in paid employment? *(please circle)* 1. No 2. Yes

a. If yes, how many hours per week? _____hrs

Please write your partner's job title and a brief description of what they do in their paid employment: _____

_____

_____

_____

38. Which of the following income bands best describes the TOTAL INCOME for your family (gross – before tax)? *(please circle)*

1. Less than $58 per week (less than $3001 per year)
2. $59 - $96 per week ($3001 - $5000 per year)
3. $97 - $154 per week ($5001 - $8000 per year)
4. $155 - $230 per week ($8001 - $12,000 per year)
5. $231 - $308 per week ($12,001 - $16,000 per year)
6. $309 - $385 per week ($16,001 - $20,000 per year)
7. $386 - $481 per week ($20,001 - $25,000 per year)
8. $482 - $577 per week ($25,001 - $30,000 per year)
9. $578 - $673 per week ($30,001 - $35,000 per year)
10. $674 - $796 per week ($35,001 - $40,000 per year)

11. $770 - $961 per week ($40,001 - $50,000 per year)
12. $962 - $1154 per week ($50,001 - $60,000 per year)
$1,155 - $1,346 per week ($60,001 - $70,000 per year)
More than $1,346 per week (more than $70,000 per year)

Your Family

39. Your current marital status: *(please circle)*

1. Married
2. Defacto
3. Divorced
4. Seperated
5. Never married/defacto
6. Widower

40. At present, who lives at home with your adolescent? *(include parents, siblings, grandparents extended family and non family members)*

	Age (yrs)	Sex	Relationship to Adolescent	Height (cm)	Weight (kg)
eg.	*15*	*M*	*Brother*	*170*	*68*
1					
2					
3					
4					
5					
6					
7					
8					

41. Which best describes the household in which your adolescent is presently living? *(please circle)*

1. Original family (both biological parents)
2. Step family (two parents, one a step parent)
3. Sole parent family
4. Other: _____

Your Health

42. Do you have any health problems? 1. No 2. Yes *(please describe)* _____

_____

_____

_____

43. Are you taking any medication? 1. No 2. Yes *(please describe)* _____

_____

_____

_____

44. Compared to other people your age, how would you rate you physical health at the present? *(please circle one)*

1. Poor 2. Fair 3. Good 4. Excellent 5. Don't know

45. Compared to other people your age, how would you rate you mental health at the present? (please circle one)

1. Poor 2. Fair 3. Good 4. Excellent 5. Don't know

46. Height _____ cm

47. Weight: _____ kg

48. How would you describe your current weight?

1. Very Underweight **2.** Underweight **3.** Normal **4.** Overweight **5.** Very Overweight

49. Would you like to weigh something different to your present weight?

1. No *(go to question 50)* 2.Yes

a) If yes, how much does your weight bother you? *(please circle)*

1. A lot. It is a major problem 2. Some. It is a small problem. 3. None. It is not a problem.

b) How much would you like to weigh? _____ kg

50. What would your DOCTOR say is your IDEAL body weight?

51. In your opinion, have you been overweight in other periods in your life? 1. No 2. Yes

If yes, when were you overweight? *(circle all that apply)*

1. Infant (up to 1 year)

2. Young child (1 – 5 years)

3. Older child (5 – 11 years)

4. Early adolescence (11 – 15 years)

5. Late adolescence (15 – 18 years)

6. Early Adulthood (18 – 40 years)

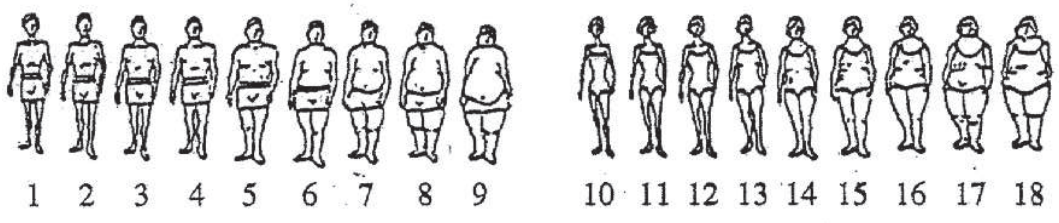
7. Middle Adulthood (40 – 60years)

8. Late Adulthood (60+ years)

52. Use the silhouettes below to answer the following questions about yourself.

a. Which figure is closest to your PRESENT size? _____

b. Which figure is closest to the size YOU DESIRE? _____



c. Which figure is closest to the size your DOCTOR would RECOMMEND that you be? ___

d. Which figure best represents you as a child? _____

e. Which figure best represents you before puberty? _____

f. Which figure best represents you after puberty? _____

g. Which figure best represents you during your 20's? _____

h. Which figure best represents you during your 30's? _____

i. Which figure best represents you during your 40's? _____

The questions in this section ask about food, physical activity, and being overweight. Please circle the letter that corresponds with your answer. If you do not know the answer, please circle the letter **d**, which means "don't know" instead of guessing. Please give an answer to every question.

Question 1-5 are about the fat and calories in foods and beverages (please circle).

1. Which beverage contains the greatest amount of fat?

One cup of whole milk	One cup of skim milk	One cup of Orange Juice	Don't know

2. Which food contains the least amount of sugar?

One cup of Vanilla pudding	One cup of chocolate ice cream	One cup of fresh pineapple	Don't know

3. Which type of food contains the greatest amount of fat?

Fruits	Cheese	**a.** Vegetables	Don't know

4. Which meal contains the least amount of calories?

Hamburger with bread & fried potatoes	Ham and Cheese pizza	Pasta with tomato sauce	Don't know

5. Which food contains the most amount of fibre?

Carrots	**a.** Eggs	Beef	Don't know

Questions 6 to 10 are about ways to lose weight (please circle).

6. What is the best thing a person can do to lose weight effectively?

Reduce the amount of foods eaten	Reduce the amount of foods eaten and do more exercise	Do more exercise	Don't know

7. How many meals should one person eat in a day to lose weight in a healthy way?

a.	One	**b.**	Two	**c.**	Three	Don't know

8. How many kilograms should a person lose in a week to lose weight in a healthy way?

a.	½ to 1	**b.**	5 ½ to 7 ½	**c.**	2 ½ to 5	Don't know

9. Which substance should be eaten in smaller amount by a person who wishes to lose weight?

a.	Sugar	**b.**	Fat	Sugar and Fat	Don't know

10. Which type of food should be eaten more frequently by a person who wishes to lose weight?

a.	Vegetables	**b.**	Shellfish	**c.**	Meats	Don't know

The next five questions are about physical activity.

11. Which activity uses the least amount of energy?

Walking at a normal rate on a flat surface	Running	Watching television	Don't know

12. Which is one of the health benefits of doing frequent exercise?

It helps keep the heart healthy	It helps us lose weight in a specific part of our body such as the hips or waist	**a.** It converts body fat to muscle	Don't know

13. How often should we do exercise to remain in good health?

Once a month	Once a week	At least three times a week	Don't know

14. Where does the energy come from that is needed to carry out physical activities?

From the rest we get when we sleep	From the foods we eat	From the water we drink	Don't know

15. Which is one of the factors that determine how much energy the body uses during physical activity?

The type of physical activity that is done	The intensity of the pain the person feels during the activity	How tired the person feels after carrying out the activity	Don't know

The next five questions are about food preparation methods

16. Which method of cooking chicken is the least fattening?

Baking it with its skin	Grilling it with its skin	Baking it without its skin	Don't know

17. Which method of cooking potatoes is the most fattening?

Grilling them	Frying them	Boiling them	Don't know

18. Which method of preparing a salad would add the least number of calories?

Combining two lettuce leaves and a sliced tomato with	one tablespoon of vinegar Combining two lettuce leaves and a	sliced tomato with one tablespoon of oil Combining two lettuce leaves and a sliced	tomato with one tablespoon of mayonnaise Don't know

19. Which method of cooking fish is the least fattening?

Grilling it with lemon juice	Frying it in butter Frying it in oil	Don't know

20. In a cake recipe, which ingredient contributes the greatest amount of calories?

One cup of butter	One cup of water	One cup of sugar	Don't know

The last five questions are about the relationship between excess body fat and health.

21. Which health problem occurs more frequently in overweight people than among people of normal weight?

Fevers	Intestinal infectionsHeart disease	Don't know

22. Where on the body is it most dangerous to have excess fat?

The abdomen ("The Stomach")	**a.**	The legs	The hips
			Don't know

23. Which health problem could improve when an overweight person loses weight?

Iron deficiency	Diabetes (high blood sugar)	Cancer Don't know

24. Which is one of the health benefits when an overweight person loses weight?

The blood sugar increases	The heart works more efficiently	The blood pressure increases	Don't know

25. Which health problem is associated with an excess of body fat?

High blood pressure
Iron deficiency
Intestinal infections
Don't know

Physical Discomfort	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
1. Because of my weight I avoid using stairs whenever possible.	**1**	**2**	**3**	**4**	**5**
2. Because of my weight it is difficult for me to bend over to tie my shoes or to pick something up off the floor.	**1**	**2**	**3**	**4**	**5**
3. Because of my weight it is hard for me to fit into seats in public places (eg. Movie theatres, desks at school, booths in restaurants).	**1**	**2**	**3**	**4**	**5**
4. Because of my weight it is hard for me to move around.					
5. Because of my weight my knees or ankles hurt.	**1**	**2**	**3**	**4**	**5**
6. Because of my weight it is hard for me to cross my legs.	**1**	**2**	**3**	**4**	**5**

Body Esteem	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
7. Because of my weight I am ashamed of my body.	**1**	**2**	**3**	**4**	**5**
8. Because of my weight I don't like myself very much.	**1**	**2**	**3**	**4**	**5**
9. Because of my weight I try not to look at myself in mirrors or photographs.	**1**	**2**	**3**	**4**	**5**
10. Because of my weight I have a hard time believing compliments that I receive from others.	**1**	**2**	**3**	**4**	**5**
11. Because of my weight I am lacking in self confidence.	**1**	**2**	**3**	**4**	**5**
12. Because of my weight I avoid activities that involve wearing shorts or a bathing suit.	**1**	**2**	**3**	**4**	**5**
13. Because of my weight it is very difficult for me to buy clothing.	**1**	**2**	**3**	**4**	**5**
14. Because of my weight I don't like to change my clothes or undress in front of others.	**1**	**2**	**3**	**4**	**5**
15. Because of my weight I am embarrassed to try out for activities at work.	**1**	**2**	**3**	**4**	**5**

Social Life	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
16. Because of my weight people tease me or make fun of me.	**1**	**2**	**3**	**4**	**5**
17. Because of my weight people talk about me behind my back.	**1**	**2**	**3**	**4**	**5**
18. Because of my weight people avoid spending time with me.	**1**	**2**	**3**	**4**	**5**
19. Because of my weight people stare at me.	**1**	**2**	**3**	**4**	**5**
20. Because of my weight I have trouble making or keeping friends.	**1**	**2**	**3**	**4**	**5**

21. Because of my weight people don't think I'm very smart.	1	2	3	4	5

Family Relations	Always True	Usually True	Sometimes True	Rarely True	Never True
22. Because of my weight family members treat me differently from the way they treat other people.	1	2	3	4	5
23. Because of my weight family members talk about me behind my back.	1	2	3	4	5
24. Because of my weight one or more people in my family reject me.	1	2	3	4	5
25. Because of my weight my family members aren't proud of me.	1	2	3	4	5
26. Because of my weight family members make fun of me.	1	2	3	4	5
27. Because of my weight family members don't want to be seen with me.	1	2	3	4	5

Please complete these questions about your relationship with your Adolescent. Indicate whether you agree or disagree with the following statements about your relationship with your adolescent using the following

Strongly Disagree (**SD**); Disagree (**D**); Neither Agree nor Disagree (**N**); Agree (**A**); Strongly Agree (**SA**)

	SD	D	N	A	SA
1. I can discuss my beliefs with my adolescent without feeling restrained or embarrassed	1	2	3	4	5
2. Sometimes I have trouble believing everything my adolescent tells me	1	2	3	4	5
3. My adolescent is always a good listener	1	2	3	4	5
4. I am sometimes afraid to ask my adolescent for what I want	1	2	3	4	5
5. My adolescent has a tendency to say things to me which would be better left unsaid	1	2	3	4	5
6. My adolescent can tell how I'm feeling without asking	1	2	3	4	5
7. I am very satisfied with how my adolescent and I talk together	1	2	3	4	5
8. If I were in trouble I could tell my adolescent	1	2	3	4	5
9. I openly show affection to my adolescent	1	2	3	4	5
10. When we are having a problem, I often give my adolescent the silent treatment	1	2	3	4	5
11. I am careful about what I say to my adolescent	1	2	3	4	5
12. When talking to my adolescent, I have a tendency to say things that would be better left unsaid	1	2	3	4	5
13. When I ask questions, I get honest answers from my adolescent	1	2	3	4	5
14. My adolescent tries to understand my point of view	1	2	3	4	5
15. There are topics I avoid discussing with my adolescent	1	2	3	4	5
16. I find it easy to discuss problems with my adolescent	1	2	3	4	5

17. It is very easy for me to express all my true feeling to my adolescent	1	2	3	4	5
18. My adolescent nags/bothers me	1	2	3	4	5
19. My adolescent insults me when they are angry with me	1	2	3	4	5
20. I don't think I can tell my adolescent how I really feel about some things	1	2	3	4	5

Please answer the following statements by circling the number that best applies to you in the **PAST SEVEN DAYS**. Be as open as possible. There are no right or wrong answers.

Physical Discomfort	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
28. Because of my weight I avoid using stairs whenever possible.	1	2	3	4	5
29. Because of my weight it is difficult for me to bend over to tie my shoes or to pick something up off the floor.	1	2	3	4	5
30. Because of my weight it is hard for me to fit into seats in public places (eg. Movie theatres, desks at school, booths in restaurants).	1	2	3	4	5
31. Because of my weight it is hard for me to move around.	1	2	3	4	5
32. Because of my weight my knees or ankles hurt.	1	2	3	4	5
33. Because of my weight it is hard for me to cross my legs.	1	2	3	4	5

Body Esteem	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
34. Because of my weight I am ashamed of my body.	1	2	3	4	5
35. Because of my weight I don't like myself very much.	1	2	3	4	5
36. Because of my weight I try not to look at myself in mirrors or photographs.	1	2	3	4	5
37. Because of my weight I have a hard time believing compliments that I receive from others.	1	2	3	4	5
38. Because of my weight I am lacking in self confidence.	1	2	3	4	5
39. Because of my weight I avoid activities that involve wearing shorts or a bathing suit.	1	2	3	4	5
40. Because of my weight it is very difficult for me to buy clothing.	1	2	3	4	5
41. Because of my weight I don't like to change my clothes or undress in front of others.	1	2	3	4	5
42. Because of my weight I am embarrassed to try out for activities at school.	1	2	3	4	5

Social Life	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
43. Because of my weight people tease me or make fun of me.	**1**	**2**	**3**	**4**	**5**
44. Because of my weight people talk about me behind my back.	**1**	**2**	**3**	**4**	**5**
45. Because of my weight people avoid spending time with me.	**1**	**2**	**3**	**4**	**5**
46. Because of my weight people stare at me.	**1**	**2**	**3**	**4**	**5**
47. Because of my weight I have trouble making or keeping friends.	**1**	**2**	**3**	**4**	**5**
48. Because of my weight people don't think I'm very smart.	**1**	**2**	**3**	**4**	**5**

Family Relations	**Always True**	**Usually True**	**Sometimes True**	**Rarely True**	**Never True**
49. Because of my weight family members treat me differently from the way they treat other people.	**1**	**2**	**3**	**4**	**5**
50. Because of my weight family members talk about me behind my back.	**1**	**2**	**3**	**4**	**5**
51. Because of my weight one or more people in my family reject me.	**1**	**2**	**3**	**4**	**5**
52. Because of my weight my parents aren't proud of me.	**1**	**2**	**3**	**4**	**5**
53. Because of my weight family members make fun of me.	**1**	**2**	**3**	**4**	**5**
54. Because of my weight family members don't want to be seen with me.	**1**	**2**	**3**	**4**	**5**

Please complete these questions about your relationship with your parents. Indicate whether you agree or disagree with the following statements about your relationship with your parents using the following

Strongly Disagree (**SD**); Disagree (**D**); Neither Agree nor Disagree (**N**); Agree (**A**); Strongly Agree (**SA**)

	SD	**D**	**N**	**A**	**SA**
21. I can discuss my beliefs with my parents without feeling restrained or embarrassed	**1**	**2**	**3**	**4**	**5**
22. Sometimes I have trouble believing everything my parent tells me	**1**	**2**	**3**	**4**	**5**
23. My parent is always a good listener	**1**	**2**	**3**	**4**	**5**
24. I am sometimes afraid to ask my parent for what I want	**1**	**2**	**3**	**4**	**5**
25. My parent has a tendency to say things to me which would be better left unsaid	**1**	**2**	**3**	**4**	**5**
26. My parent can tell how I'm feeling without asking	**1**	**2**	**3**	**4**	**5**
27. I am very satisfied with how my parent and I talk together	**1**	**2**	**3**	**4**	**5**
28. If I were in trouble I could tell my parent	**1**	**2**	**3**	**4**	**5**
29. I openly show affection to my parent	**1**	**2**	**3**	**4**	**5**
30. When we are having a problem, I often give my parent the silent treatment	**1**	**2**	**3**	**4**	**5**
31. I am careful about what I say to my parent	**1**	**2**	**3**	**4**	**5**

32. When talking to my parent, I have a tendency to say things that would be better left unsaid	**1**	**2**	**3**	**4**	**5**
33. When I ask questions, I get honest answers from my parent	**1**	**2**	**3**	**4**	**5**
34. My parent tries to understand my point of view	**1**	**2**	**3**	**4**	**5**
35. There are topics I avoid discussing with my parent	**1**	**2**	**3**	**4**	**5**
36. I find it easy to discuss problems with my parent	**1**	**2**	**3**	**4**	**5**
37. It is very easy for me to express all my true feeling to my parent	**1**	**2**	**3**	**4**	**5**
38. My parent nags/bothers me	**1**	**2**	**3**	**4**	**5**
39. My parent insults me when they are angry with me	**1**	**2**	**3**	**4**	**5**
40. I don't think I can tell my parent how I really feel about some things	**1**	**2**	**3**	**4**	**5**

Appendix 13: Result Summaries

Results

	Pre Results	Post Results	Follow Up 1 Results	Follow Up 2 Results
Anthropometric				
Height (cm)				
Weight (kg)				
BMI (Based on Height & Weight)				
Waist (cm)				
Hip (cm)				
Body Composition (DXA)				
Fat Mass (kg)				
Lean Mass (kg)				
% Body Fat				

Results

	Pre Results	Post Results	Follow Up 1 Results	Follow Up 2 Results
Height (cm)				
Weight (kg)				
BMI				
Waist (cm)				
Hip (cm)				
% Body Fat				

Please note: The scales used for the measurement of body fat for parents do not provide as reliable an indication of body fat and change as the DEXA scan. These percentages may vary based on time of day, weather, food consumed, etc.

Appendix 14 Tanner Scales

Tanner Scales - Male

Assessment of Sexual Maturity

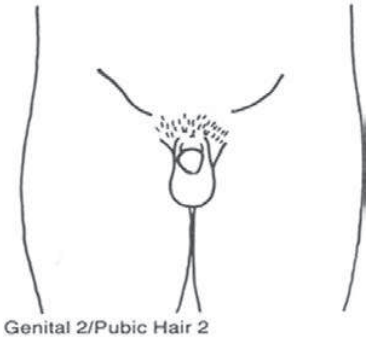
How far you are along in puberty can make a big difference to the way your body works. For example, your body fat, muscles, height and weight can all be affected by puberty. Because of this, we ask that you carefully fill in this questionnaire.

Your answers will be kept strictly private and your name will not be on this questionnaire.

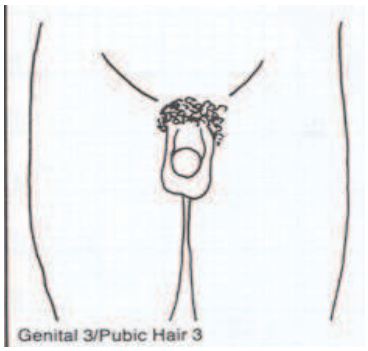
INSTRUCTIONS:

1. Please pick the drawing that looks like you do now.
2. In a place that you feel comfortable (you may want to ask your parent to help you with this), compare your level of sexual maturity with the **ILLUSTRATIONS** and **DESCRIPTIONS** for both breast and pubic hair development. Please look at each of the drawings carefully and read the sentence next to the drawing.
3. Check that the drawing you have chosen is **CLOSEST** to your stage of pubic hair or breast shape and size at this time.
4. At the bottom of each page (pubic hair and genital/penis), place a **CIRCLE** around the drawing that is closest to your stage of development, then put these sheets in the **ENVELOPE** so that your answer will be kept private.

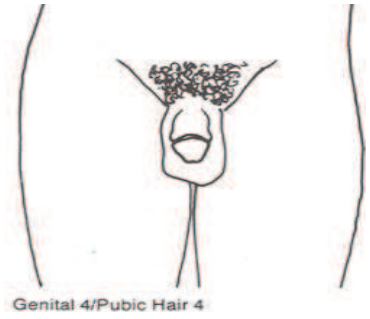
Genital (penis) Development


Genital 2/Pubic Hair 2

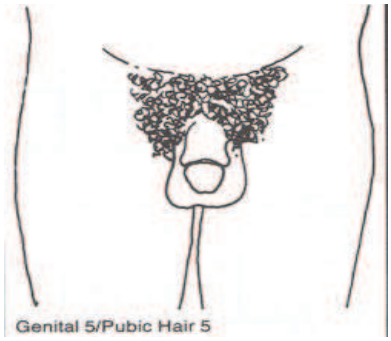
Stage 1: Testes, scrotum and penis are of about the same size and proportion as in early childhood.


Genital 3/Pubic Hair 3

Stage 2: The scrotum and testes are both larger than in Stage 1. The skin of the scrotum reddens and changes texture. There is little or no enlargement of penis at this stage.


Genital 4/Pubic Hair 4

Stage 3: Enlargement of the penis which occurs first mainly in length. Further growth of the testes and scrotum.


Genital 5/Pubic Hair 5

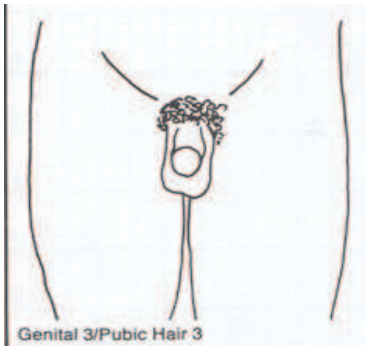
Stage 4: There is an increase in the size of the penis with growth in breadth and development of glans. The testes and scrotum are larger and the scrotal skin has darkened.

Stage 5: Genitalia adult in size and shape.

Pubic Hair


Genital 2/Pubic Hair 2

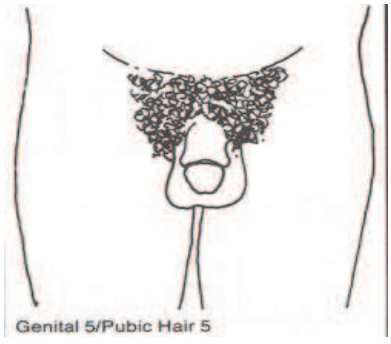
Stage 1: No pubic hair at all.


Genital 3/Pubic Hair 3

Stage 2: There is a small amount of lightly coloured hair. The hair is sparse and slightly pigmented downy hair, straight or slightly curled at the base of the penis.


Genital 4/Pubic Hair 4

Stage 3: The hair is now darker, courser and more curled. The hair spreads sparsely over a wider area than in Stage 2.


Genital 5/Pubic Hair 5

Stage 4: The hair is now thicker and more spread out covering a larger area than in stage 3. but the area covered is still considerably smaller that in the adult. There is no spread to the thighs.

Stage 5: The hair is now adult in quantity and type with distribution in an inverse triangle. The hair has spread to the thighs.

Tanner Scales – Girls

Assessment of Sexual Maturity

How far you are along in puberty can make a big difference to the way your body works. For example, your body fat, muscles, height and weight can all be affected by puberty. Because of this, we ask that you carefully fill in this questionnaire.

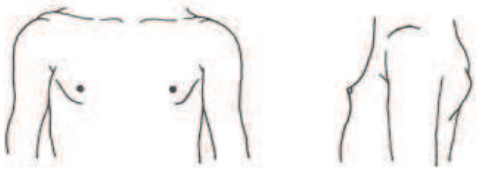
Your answers will be kept strictly private and your name will not be on this questionnaire.

INSTRUCTIONS:

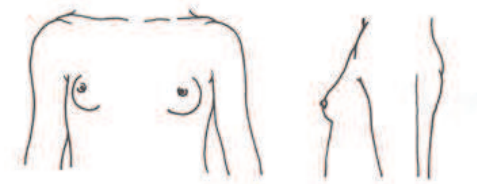
5. Please pick the drawing that looks like you do now.
6. In a place that you feel comfortable (you may want to ask your parent to help you with this), compare your level of sexual maturity with the **ILLUSTRATIONS** and **DESCRIPTIONS** for both breast and pubic hair development. Please look at each of the drawings carefully and read the sentence next to the drawing.
7. Check that the drawing you have chosen is **CLOSEST** to your stage of pubic hair or breast shape and size at this time.
8. At the bottom of each page (pubic hair and breast shape and size), place a **CIRCLE** around the drawing that is closest to your stage of development, then put these sheets in the **ENVELOPE** so that your answer will be kept private.

Breast Shape and Size

Stage 1: The nipple is raised a little at this stage, The rest of the breast is flat.



Stage 2: This is the breast bud stage, the nipple is raised as a small mound, and the diameter (size) of the areola is increased.



Stage 3 – further elevation and areola but no separation of contours

Stage 3: The breast and areola are both larger than in stage 2. The areola does not stick out away from the breast.

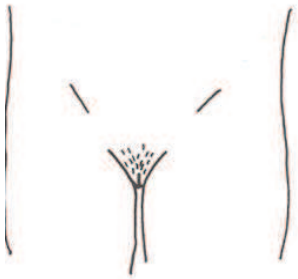
Stage 4 – areola and papilla form a secondary mound above level of the breast

Stage 4: The areola and the nipple make up a mound that sticks up above the shape of the breast.

Stage 5 – areola recesses to the general contour of the breast

Stage 5: This is the mature adult stage. The breasts are fully grown. Only the nipple sticks out in this stage. The areola has moved back to the general shape of the breast.

Pubic Hair



ubic Hair Stage 2

Pubic Hair Stage 3

Pubic Hair Stage 4

Pubic Hair Stage 5

Stage 1: No pubic hair at all.

Stage 2: There is a small amount of lightly coloured hair. Hair may be straight or a little curly.

Stage 3: There is hair that is darker, curlier and thinly spread out to cover a somewhat wider area than in stage 2.

Stage 4: The hair is now thicker and more spread out, covering a larger area that in stage 3. There is no spread to the thighs.

Stage 5: The hair is adult in quantity and type, distributed in an inverse triangle and has spread to the inner surface of the thigh.

Appendix 15: Monitoring Record

Wearing the motion sensor (Actigraph)

VOLUNTEER INFORMATION SHEET

What is a motion sensor?

A motion sensor measures your movement. It is a really expensive piece of equipment so it is important you take good care of it and keep it dry!

Motion sensors are NOT waterproof

Your motion sensor will be threaded onto a piece of elastic

How to wear the motion sensor

Secure the elastic firmly around your hips (under your clothes is ok).

- The motion sensor can be then be taken on and off by stepping into or out of the elastic belt.
- The elastic must NOT sag (diagram 2 shows sagging elastic) and must be **firm** (as in diagrams 1 and 2)
- The motion sensor must be positioned on your **right hip**, in line with your armpit (see diagrams 1 and 2)

✓ Correct

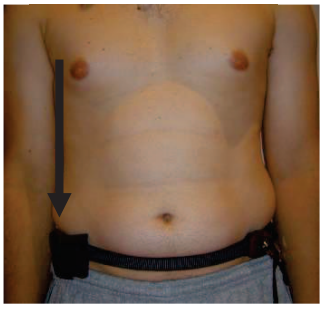


Diagram 1

Worn ***correctly*** with firm belt, on right hip

✓ Correct

Diagram 2

Worn ***correctly*** with firm belt, on right hip

- Make sure the motion sensor is in an **upright position and is not tilted**
- Please **DO NOT** wear the motion sensor in an incorrect place or position. Motion sensors worn incorrectly in diagrams 3 or 4 will **NOT** work properly

✗ Incorrect

Diagram 3

Worn ***incorrectly*** with loose belt

✗ Incorrect

Diagram 4

Worn ***incorrectly*** in centre of

When do I wear the motion sensor?

You will need to wear your motion sensor for **8 days** ……..

Starting from waking on

Finishing when you go to sleep on the evening of

- Please wear the motion sensor **ALL THE TIME**, including to bed (except for water based activities)
- Reposition the motion sensor correctly when you wake first thing in the morning
- **ONLY** take the motion sensor off when doing **water based activities** where it would get wet (i.e. swimming, or showering). **Remember** to put it back on as soon as you have finished.
- Be sure to record in your activity booklet if you remove the motion sensor AT ANY TIME (see further on)
- If possible, wear the motion sensor under clothing during sporting activities.

What information do I need to record?

- We need to know when the actigraph was worn and not worn during each day (e.g. taken of for a shower)
- ***If the motion sensor is taken off:*** please make a note of the length of time it was off for and what activity you were doing at the time. There is space to write this in your activity booklet.

IF YOU HAVE ANY QUERIES, QUESTIONS OR CONCERNS PLEASE CONTACT:

Jeff Walkley 9925 7359 or 0407 345 525 (project coordinator)

(OR Lara Taylor 9925 6572)

Movement Sensor Volunteer Recording Sheet

ID:
NAME:

	DAY (Mon-Sun)	**DATE**	**Time movement sensor removed**	**Time movement sensor replaced**	**Activities done whilst monitor was off**	**Did you wear the movement sensor to bed?** **If NO,** please indicate the **time** you put the sensor **ON** first thing in the morning, and the **time** you **REMOVED** it last thing at night
example	*Mon*	*11/2/08*	*7am* *12pm*	*7:35am* *1pm*	*Shower* *swimming*	*Wore sensor to bed*
DAY 1						
DAY 2						
DAY 3						
DAY 4						
DAY 5						
DAY 6						
DAY 7						
DAY 8						

Comments:

Please return this sheet with your movement sensor when complete

Appendix 16: Consumer Satisfaction Surveys

(Health Coach Parent Survey (Post); Health Coach Adolescent Survey (Post); Health Coach Parent Survey (Follow Up One and Two); Health Coach Adolescent Survey (Follow Up One and Two); Gym Group Parent Survey; and Gym Group Adolescent Survey)

Note; for clarity to the consumer, the Standard Treatment group was known as the Gym group for project evaluation.

Your Choice Parent Satisfaction Survey

Please circle the appropriate response

The Health Coach was supportive of my child's lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Health Coach was friendly toward my child and I	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Health Coach was easy to talk to	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Health Coach was well organised	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Health Coach was knowledgeable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The program was convenient and easy to attend	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
As a parent, I was able to be supportive of my child's lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The healthy eating ideas and support were helpful to you and your child	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The getting active ideas and support were helpful to you and your child	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The sessions provided useful and practical healthy lifestyle ideas that you could be done at home	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Sessions content

Comments

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I would recommend the Your Choice program to others?	Yes	No

Thankyou for completing this survey, this will assist in improving the quality of the program.

Your Choice Adolescent Satisfaction Survey
Please circle the appropriate response

My Health Coach was supportive of my lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach was friendly toward me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach was easy to talk to	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach was well organised	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach was knowledgeable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The program was convenient for me to attend	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My parent was supportive of my lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Program gave me some good ideas that I could use at home	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Sessions content

I was able to complete my weekly targets (green sheets)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The healthy eating teachings were helpful to me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The getting active education sessions were helpful to me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The healthy thoughts session was helpful to me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The phone call session was helpful to me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Comments

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I would recommend the Your Choice program to others?	Yes	No

Thankyou for completing this survey, this will assist in improving the quality of the program.

Your Choice Parent Satisfaction Survey

Please circle the appropriate response

The Your Choice program has helped my adolescent reach their lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program has helped with the way my adolescent has chosen to eat	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program has helped with the way my adolescent child has chosen to be active	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I as a parent, have learnt and implemented healthy eating habits from the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I as a parent, I have learnt and implemented healthy activity habits from the Your Choice program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My facility provided appropriate and adequate services to suit my adolescent's needs	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent utilised their gym membership	Never 1	Once 2	Monthly 3	Weekly 4	> Once a week 5

Comments

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I would recommend the Your Choice program to others?	Yes	No

Thankyou for completing this survey, this will assist in improving the quality of the program.

Your Choice Adolescent Satisfaction Survey
Please circle the appropriate response

The Your Choice program has helped me reach my lifestyle goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program has helped with the way I choose to eat	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program has helped with the way I choose to be active	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice program has helped me become a positive thinker	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach has made been in contact at least twice since the sessions were completed, (either by phone or in the gym)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My facility provided appropriate and adequate services to suit my needs	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I utilised my gym membership	Never 1	Once 2	Monthly 3	Weekly 4	> Once a week 5

Comments

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I would recommend the Your Choice program to others?	Yes	No

Thankyou for completing this survey, this will assist in improving the quality of the program.

Your Choice Parent Satisfaction Survey

Please circle the appropriate response

The fitness centre staff were friendly and approachable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre was convenient and easy for my child to attend	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre was welcoming to my child	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt comfortable with my child using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My child felt comfortable using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt my child would be safe while using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre was well organised	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My child received appropriate support from the fitness centre staff	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My child received appropriate advice from the fitness centre staff	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I found it easy to support my child to use the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre provided an appropriate opportunity for my child to achieve their goals	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I would recommend the fitness centre to other parents who have a child like mine	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Comments

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Thankyou for completing this survey, this will assist in improving the quality of the program.

Your Choice Adolescent Satisfaction Survey

Please circle the appropriate response

The fitness centre staff were friendly and approachable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre was convenient and easy to attend	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt welcome at the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt comfortable using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt safe while using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre was well organised	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I received appropriate support from the fitness centre staff	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I received appropriate advice from the fitness centre staff	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My parent supported me to use the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My fitness program was changed when required	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I intend to use the fitness centre again in the future	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I would recommend the fitness centre to my friends	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Comments

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Thankyou for completing this survey, this will assist in improving the quality of the program.

Appendix 17 :Food Frequency Questionnaire

Dietary Questionnaire

QUESTIONS ABOUT WHAT YOU USUALLY EAT AND DRINK

Please fill in the date you completed this questionnaire:

DAY		MTH	YEAR
		○ JAN	○ 2004
		○ FEB	○ 2005
0	0	○ MAR	○ 2006
1	1	○ APR	○ 2007
2	2	○ MAY	○ 2008
3	3	○ JUN	○ 2009
	4	○ JUL	○ 2010
	5	○ AUG	○ 2011
	6	○ SEP	○ 2012
	7	○ OCT	○ 2013
	8	○ NOV	○ 2014
	9	○ DEC	○ 2015

INSTRUCTIONS:

This questionnaire is about your **usual** eating habits **over the past 12 months**. Where possible give only **one answer per question** for the type of food you eat **most often.**
(If you can't decide which type you have most often, answer for the types you usually eat.)

- Use a soft pencil only, preferably 2B.
- Do not use **any** biro or felt tip pen.
- Erase mistakes fully.
- Make no stray marks.

Please MARK LIKE THIS: ○■○○

1. How many pieces of fresh fruit do you usually eat per day? *(Count 1/2 cup of diced fruit, berries or grapes as one piece.)*

- ○ I didn't eat fruit
- ○ less than 1 piece of fruit per day
- ○ 1 piece of fruit per day
- ○ 2 pieces of fruit per day
- ○ 3 pieces of fruit per day
- ○ 4 or more pieces of fruit per day

2. How many different vegetables do you usually eat per day? *(Count all types, fresh, frozen or tinned.)*

- ○ less than 1 vegetable per day
- ○ 1 vegetable per day
- ○ 2 vegetables per day
- ○ 3 vegetables per day
- ○ 4 vegetables per day
- ○ 5 vegetables per day
- ○ 6 or more vegetables per day

3. What type of milk do you usually use?

- ○ none
- ○ full cream milk
- ○ reduced fat milk
- ○ skim milk
- ○ soya milk

4. How much milk do you usually use per day? *(Include flavoured milk and milk added to tea, coffee, cereal, etc.)*

- ○ none
- ○ less than 250 ml *(1 large cup or mug)*
- ○ between 250 and 500 ml *(1-2 cups)*
- ○ between 500 and 750 ml *(2-3 cups)*
- ○ 750 ml *(3 cups)* or more

5. What type of bread do you usually eat?

- ○ I don't eat bread
- ○ high fibre white bread
- ○ white bread
- ○ wholemeal bread
- ○ rye bread
- ○ multi-grain bread

6. How many slices of bread do you usually eat per day? *(Include all types, fresh or toasted and count one bread roll as 2 slices.)*

- ○ less than 1 slice per day
- ○ 1 slice per day
- ○ 2 slices per day
- ○ 3 slices per day
- ○ 4 slices per day
- ○ 5-7 slices per day
- ○ 8 or more slices per day

7. Which spread do you usually put on bread?

- ○ I don't usually use any fat spread
- ○ margarine of any kind
- ○ polyunsaturated margarine
- ○ monounsaturated margarine
- ○ butter and margarine blends
- ○ butter

8. On average, how many teaspoons of sugar do you usually use per day? *(Include sugar taken with tea and coffee and on breakfast cereal, etc.)*

- ○ none
- ○ 1 to 4 teaspoons per day
- ○ 5 to 8 teaspoons per day
- ○ 9 to 12 teaspoons per day
- ○ more than 12 teaspoons per day

9. On average, how many eggs do you usually eat per week?

- ○ I don't eat eggs
- ○ less than 1 egg per week
- ○ 1 to 2 eggs per week
- ○ 3 to 5 eggs per week
- ○ 6 or more eggs per week

10. What types of cheese do you usually eat?

- ○ I don't eat cheese
- ○ hard cheeses, e.g. parmesan, romano
- ○ firm cheeses, e.g. cheddar, edam
- ○ soft cheeses, e.g. camembert, brie
- ○ ricotta or cottage cheese
- ○ cream cheese
- ○ low fat cheese

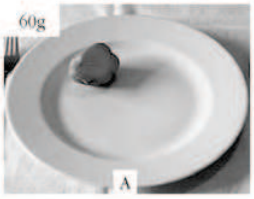
DO NOT WRITE IN THIS AREA.

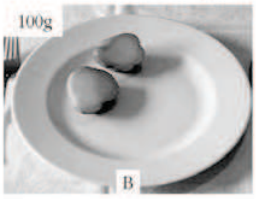
□□□□□□□□□□□□□□□□□□□□□□□□□□□□

■ ■

For each food shown on this page, indicate ***how much on average you would usually have eaten at main meals during the past 12 months.*** *When answering each question, think of the* ***amount*** *of that food you usually ate, even though you may rarely have eaten the food on its own.*
If you usually ate more than one helping, fill in the oval for the serving size closest to the ***total amount*** *you ate.*

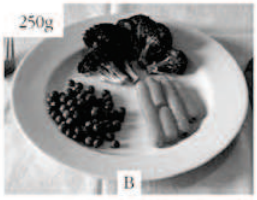
11. When you ate potato, did you usually eat: ○ I never ate potato





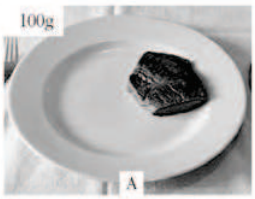
○ Less than A ○ A ○ Between A & B ○ B ○ Between B & C ○ C ○ More than C

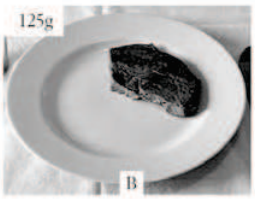
12. When you ate vegetables, did you usually eat: ○ I never ate vegetables

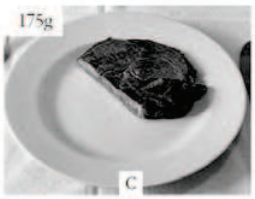


○ Less than A ○ A ○ Between A & B ○ B ○ Between B & C ○ C ○ More than C

13. When you ate steak, did you usually eat: ○ I never ate steak







○ Less than A ○ A ○ Between A & B ○ B ○ Between B & C ○ C ○ More than C

14. When you ate meat *or* vegetable casserole, did you usually eat: ○ I never ate casserole

○ Less than A ○ A ○ Between A & B ○ B ○ Between B & C ○ C ○ More than C

15. Over the last 12 months, on average, *how often* did you eat the following foods? *Please completely fill one oval in every line.* Please MARK LIKE THIS: ● NOT LIKE THIS: ✓ ✗ —

Times You Have Eaten		NEVER	less than once per month	1 to 3 times per month	1 time per week	2 times per week	3 to 4 times per week	5 to 6 times per week	1 time per day	2 times per day	3 or more times per day
CEREAL FOODS, SWEETS & SNACKS											
All Bran™	A1	○	○	○	○	○	○	○	○	○	○
Sultana Bran™, FibrePlus™, Branflakes™	A2	○	○	○	○	○	○	○	○	○	○
Weet Bix™, Vita Brits™, Weeties™	A3	○	○	○	○	○	○	○	○	○	○
Cornflakes, Nutrigrain™, Special K™	A4	○	○	○	○	○	○	○	○	○	○
Porridge	A5	○	○	○	○	○	○	○	○	○	○
Muesli	A6	○	○	○	○	○	○	○	○	○	○
Rice	A7	○	○	○	○	○	○	○	○	○	○
Pasta or noodles (include lasagne)	A8	○	○	○	○	○	○	○	○	○	○
Crackers, crispbreads, dry biscuits	A9	○	○	○	○	○	○	○	○	○	○
Sweet biscuits	A10	○	○	○	○	○	○	○	○	○	○
Cakes, sweet pies, tarts and other sweet pastries	A11	○	○	○	○	○	○	○	○	○	○
Meat pies, pasties, quiche and other savoury pastries	A12	○	○	○	○	○	○	○	○	○	○
Pizza	A13	○	○	○	○	○	○	○	○	○	○
Hamburger with a bun	A14	○	○	○	○	○	○	○	○	○	○
Chocolate	A15	○	○	○	○	○	○	○	○	○	○
Flavoured milk drink (cocoa, Milo™, etc.)	A16	○	○	○	○	○	○	○	○	○	○
Nuts	A17	○	○	○	○	○	○	○	○	○	○
Peanut butter or peanut paste	A18	○	○	○	○	○	○	○	○	○	○
Corn chips, potato crisps, Twisties™, etc.	A19	○	○	○	○	○	○	○	○	○	○
Jam, marmalade, honey or syrups	A20	○	○	○	○	○	○	○	○	○	○
Vegemite™, Marmite™ or Promite™	A21	○	○	○	○	○	○	○	○	○	○
DAIRY PRODUCTS, MEAT & FISH											
Cheese	B1	○	○	○	○	○	○	○	○	○	○
Ice-cream	B2	○	○	○	○	○	○	○	○	○	○
Yoghurt	B3	○	○	○	○	○	○	○	○	○	○
Beef	B4	○	○	○	○	○	○	○	○	○	○
Veal	B5	○	○	○	○	○	○	○	○	○	○
Chicken	B6	○	○	○	○	○	○	○	○	○	○
Lamb	B7	○	○	○	○	○	○	○	○	○	○
Pork	B8	○	○	○	○	○	○	○	○	○	○
Bacon	B9	○	○	○	○	○	○	○	○	○	○
Ham	B10	○	○	○	○	○	○	○	○	○	○
Corned beef, luncheon meats or salami	B11	○	○	○	○	○	○	○	○	○	○
Sausages or frankfurters	B12	○	○	○	○	○	○	○	○	○	○
Fish, steamed, grilled or baked	B13	○	○	○	○	○	○	○	○	○	○
Fish, fried (include take-away)	B14	○	○	○	○	○	○	○	○	○	○
Fish, tinned (salmon, tuna, sardines, etc.)	B15	○	○	○	○	○	○	○	○	○	○
FRUIT											
Tinned or frozen fruit (any kind)	C1	○	○	○	○	○	○	○	○	○	○
Fruit juice	C2	○	○	○	○	○	○	○	○	○	○
Oranges or other citrus fruit	C3	○	○	○	○	○	○	○	○	○	○
Apples	C4	○	○	○	○	○	○	○	○	○	○
Pears	C5	○	○	○	○	○	○	○	○	○	○
Bananas	C6	○	○	○	○	○	○	○	○	○	○
Watermelon, rockmelon (cantaloupe), honeydew, etc.	C7	○	○	○	○	○	○	○	○	○	○
Pineapple	C8	○	○	○	○	○	○	○	○	○	○
Strawberries	C9	○	○	○	○	○	○	○	○	○	○
Apricots	C10	○	○	○	○	○	○	○	○	○	○
Peaches or nectarines	C11	○	○	○	○	○	○	○	○	○	○
Mango or paw paw	C12	○	○	○	○	○	○	○	○	○	○
Avocado	C13	○	○	○	○	○	○	○	○	○	○

Times You Have Eaten CONTINUED

		NEVER	less than once per month	1 to 3 times per month	1 time per week	2 times per week	3 to 4 times per week	5 to 6 times per week	1 time per day	2 times per day	3 or more times per day
VEGETABLES (INCLUDING FRESH, FROZEN AND TINNED)											
Potatoes, roasted or fried (include hot chips)	D1	○	○	○	○	○	○	○	○	○	○
Potatoes cooked without fat	D2	○	○	○	○	○	○	○	○	○	○
Tomato sauce, tomato paste or dried tomatoes	D3	○	○	○	○	○	○	○	○	○	○
Fresh or tinned tomatoes	D4	○	○	○	○	○	○	○	○	○	○
Peppers (capsicum)	D5	○	○	○	○	○	○	○	○	○	○
Lettuce, endive, or other salad greens	D6	○	○	○	○	○	○	○	○	○	○
Cucumber	D7	○	○	○	○	○	○	○	○	○	○
Celery	D8	○	○	○	○	○	○	○	○	○	○
Beetroot	D9	○	○	○	○	○	○	○	○	○	○
Carrots	D10	○	○	○	○	○	○	○	○	○	○
Cabbage or Brussels sprouts	D11	○	○	○	○	○	○	○	○	○	○
Cauliflower	D12	○	○	○	○	○	○	○	○	○	○
Broccoli	D13	○	○	○	○	○	○	○	○	○	○
Silverbeet or spinach	D14	○	○	○	○	○	○	○	○	○	○
Peas	D15	○	○	○	○	○	○	○	○	○	○
Green beans	D16	○	○	○	○	○	○	○	○	○	○
Bean sprouts or alfalfa sprouts	D17	○	○	○	○	○	○	○	○	○	○
Baked beans	D18	○	○	○	○	○	○	○	○	○	○
Soy beans, soy bean curd or tofu	D19	○	○	○	○	○	○	○	○	○	○
Other beans (include chick peas, lentils, etc.)	D20	○	○	○	○	○	○	○	○	○	○
Pumpkin	D21	○	○	○	○	○	○	○	○	○	○
Onion or leeks	D22	○	○	○	○	○	○	○	○	○	○
Garlic (not garlic tablets)	D23	○	○	○	○	○	○	○	○	○	○
Mushrooms	D24	○	○	○	○	○	○	○	○	○	○
Zucchini	D25	○	○	○	○	○	○	○	○	○	○

16. Over the last 12 months, how often did you drink beer, wine and/or spirits?

Times That You Drank

		NEVER	less than once a month	1-3 days per month	1 day per week	2 days per week	3 days per week	4 days per week	5 days per week	6 days per week	every day
Beer (low alcohol)	1	○	○	○	○	○	○	○	○	○	○
Beer (full strength)	2	○	○	○	○	○	○	○	○	○	○
Red wine	3	○	○	○	○	○	○	○	○	○	○
White wine (include sparkling wines)	4	○	○	○	○	○	○	○	○	○	○
Fortified wines, port, sherry, etc.	5	○	○	○	○	○	○	○	○	○	○
Spirits, liqueurs, etc.	6	○	○	○	○	○	○	○	○	○	○

When answering the next two questions, please convert the amounts you drank into glasses using the examples given below. For spirits, liqueurs, and mixed drinks containing spirits, please count each nip (30 ml) as one glass.

1 can or stubby of beer = 2 glasses
1 large bottle beer (750 ml) = 4 glasses
1 bottle wine (750 ml) = 6 glasses
1 bottle of port or sherry (750 ml) = 12 glasses

17. Over the last 12 months, on days when you were drinking, how many glasses of beer, wine and/or spirits altogether did you *usually* drink?

TOTAL NUMBER OF GLASSES PER DAY	1	2	3	4	5	6	7	8	9	10 or more
	○	○	○	○	○	○	○	○	○	○

18. Over the last 12 months, what was the *maximum* number of glasses of beer, wine and/or spirits that you drank in 24 hours?

MAXIMUM NUMBER OF GLASSES PER 24 HOURS	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19 or more
	○	○	○	○	○	○	○	○	○	○

Thank You for completing this questionnaire

DO NOT WRITE IN THIS AREA.

□□□□□□□□□□□□□□□□□□□□□□□□□□

*NAME*_____

When answering the next questions, please convert the amounts you drank into glasses using the examples given below.

1 can of soft drink = 2 glasses
1 small bottle (750 ml) = 4 glasses
1 medium bottle (1.25L) = 7 glasses
1 Large bottle (2L) = 11 glasses

Over the last 12 months, what was the *maximum* number of glasses of soft drink that you drank in 24 hours? Please circle

None	1 - 2	3-4	5-6	7-8	9-10	11-12	13-14	15- 16	17-18	19 or more

Appendix 18: Drop Out Surveys

(Adolescent Health Coach; Parent Health Coach; Adolescent Gym; and Parent Gym)

Note, for clarity to the consumer, the Standard Treatment group was known as the Gym group for project evaluation.

Your Choice **Adolescent** Withdrawal Survey

Please circle the appropriate response

The Assessments

I did not like completing the questionnaires	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like wearing the actigraph	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like completing the physical assessments	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Program

I was not pleased with my group allocation (Health Coaching Group)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not feel the program was working for me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I found the sessions boring	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I found the weekly targets too hard to achieve	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The duration of the program was too long (10 weeks)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The session content was difficult to understand	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My Health Coach was not supportive	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
It was too hard to practice the healthy lifestyle strategies at home	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The location the program was offered was not convenient or easy to attend (fitness centre)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The times of day the session were available was not convenient	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Personal Barriers

I did not think my weight or health was a problem	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My parent did not want to make an effort to participate in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My peers were not supportive of me participating in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

I did not want to participate in the first place – I enrolled to please someone else	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I had too many other commitments (eg. school)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My health made it difficult to participate	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Staff

I found the Your Choice staff unhelpful	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice staff did not try to understand my concerns/difficulties	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Other Comments

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Thank you for your time

Your Choice **Parent** Withdrawal Survey

Please circle the appropriate response

Your Choice

The Assessments

I did not like completing the questionnaires	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent did not like wearing the actigraph	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like completing the physical assessments	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Program

I was not pleased with my adolescent's group allocation (Health Coaching Group)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I not not feel the program was working for my adolescent	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent found the sessions boring	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent found the weekly targets too hard to achieve	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The duration of the program was too long (10 weeks)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The session content was difficult to understand	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Health Coach was not supportive	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
It was too hard to implement the healthy lifestyle strategies at home	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The location the program was offered was not convenient or easy to attend (fitness centre)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The times of day the session were available was not convenient	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Personal Barriers

I did not think my adolescent's weight or health was a problem	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent did not want to make an effort to participate in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not want to participate in the first place – I enrolled my adolescent to please someone else	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

I had too many other commitments (eg. work, family)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My health made it difficult to participate	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Staff

I found the Your Choice staff unhelpful	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice staff did not try to understand my concerns/difficulties	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Other Comments

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Thank you for your time

Your Choice **Adolescent** Withdrawal Survey

Please circle the appropriate response

The Assessments

I did not like completing the questionnaires	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like wearing the actigraph	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like completing the physical assessments	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Program

I was not pleased with my group allocation (Fitness Group)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not feel the program was working for me	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt uncomfortable using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The location the program was offered was not convenient or easy to attend (fitness centre)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The times of day my adolescent was allowed to attend the fitness centre was not convenient	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre staff were not friendly and approachable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Personal Barriers

I did not think my weight or health was a problem	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My parent did not want to make an effort to participate in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My peers were not supportive of me participating in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not want to participate in the first place – I enrolled to please someone else	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I had too many other commitments (eg. school)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My health made it difficult to participate	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Staff

I found the Your Choice staff <u>unhelpful</u>	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The Your Choice staff did <u>not</u> try to understand my concerns/difficulties	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Other Comments

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Thank you for your time

Your Choice **Parent** Withdrawal Survey

Please circle the appropriate response

The Assessments

I did not like completing the questionnaires	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent did not like wearing the actigraph	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not like completing the physical assessments	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Program

I was not pleased with my adolescent's group allocation (Fitness Group)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not feel the program was working for my adolescent	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I felt uncomfortable with my adolescent using the fitness centre	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The location the program was offered was not convenient or easy to attend (fitness centre)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The times of day my adolescent was allowed to attend the fitness centre was not convenient	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
The fitness centre staff were not friendly or approachable	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Personal Barriers

I did not think my adolescent's weight or health was a problem	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My adolescent did not want to make an effort to participate in the program	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I did not want to participate in the first place – I enrolled my adolescent to please someone else	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I had too many other commitments (eg. work, family)	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
My health made it difficult to participate	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Staff

I found the Your Choice staff unhelpful	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

The Your Choice staff did <u>not</u> try to understand my concerns/difficulties	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

Other Comments

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Thank you for your time

Appendix 19: Complete Analysis Output

Total Body Fat Mass: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.006	.066	131.198	.924	-.123	.136
		6-Months	-.087	.067	131.255	.196	-.219	.045
		12-Months	-.193	.065	131.209	.003	-.321	-.065
	8-Weeks	Pre	-.006	.066	131.198	.924	-.136	.123
		6-Months	-.093	.068	131.082	.173	-.227	.041
		12-Months	-.199	.066	131.018	.003	-.329	-.069
	6-Months	Pre	.087	.067	131.255	.196	-.045	.219
		8-Weeks	.093	.068	131.082	.173	-.041	.227
		12-Months	-.106	.066	130.950	.112	-.237	.025
	12-Months	Pre	.193	.065	131.209	.003	.065	.321
		8-Weeks	.199	.066	131.018	.003	.069	.329
		6-Months	.106	.066	130.950	.112	-.025	.237
Health Coach	Pre	8-Weeks	.051	.063	131.044	.421	-.074	.175
		6-Months	.031	.059	130.916	.600	-.085	.147
		12-Months	-.088	.059	130.916	.136	-.204	.028
	8-Weeks	Pre	-.051	.063	131.044	.421	-.175	.074
		6-Months	-.020	.062	131.013	.749	-.143	.103
		12-Months	-.139	.062	131.013	.027	-.261	-.016
	6-Months	Pre	-.031	.059	130.916	.600	-.147	.085
		8-Weeks	.020	.062	131.013	.749	-.103	.143
		12-Months	-.119	.058	130.894	.042	-.233	-.004
	12-Months	Pre	.088	.059	130.916	.136	-.028	.204
		8-Weeks	.139	.062	131.013	.027	.016	.261
		6-Months	.119	.058	130.894	.042	.004	.233

Significant at $p < .05$

Lean Mass: Adolescent

Group	*(I) Assessment*	*(J) Assessment*	*Mean Difference (I-J)*	*Std. Error*	*df*	*Sig.*	*95% Confidence Interval for Difference Lower Bound*	*Upper Bound*
Standard Treatment	Pre	8-Weeks	-.112	.080	131.386	.164	-.271	.047
		6-Months	-.184	.082	131.482	.027	-.345	-.022
		12-Months	-.381	.079	131.404	.000	-.538	-.224
	8-Weeks	Pre	.112	.080	131.386	.164	-.047	.271
		6-Months	-.071	.083	131.201	.393	-.236	.093
		12-Months	-.269	.081	131.092	.001	-.428	-.109
	6-Months	Pre	.184	.082	131.482	.027	.022	.345
		8-Weeks	.071	.083	131.201	.393	-.093	.236
		12-Months	-.197	.081	130.978	.016	-.358	-.037
	12-Months	Pre	.381	.079	131.404	.000	.224	.538
		8-Weeks	.269	.081	131.092	.001	.109	.428
		6-Months	.197	.081	130.978	.016	.037	.358
Health Coach	Pre	8-Weeks	-.078	.077	131.137	.315	-.230	.075
		6-Months	-.227	.072	130.920	.002	-.369	-.085
		12-Months	-.392	.072	130.920	.000	-.534	-.250
	8-Weeks	Pre	.078	.077	131.137	.315	-.075	.230
		6-Months	-.150	.076	131.084	.051	-.300	.001
		12-Months	-.314	.076	131.084	.000	-.465	-.164
	6-Months	Pre	.227	.072	130.920	.002	.085	.369
		8-Weeks	.150	.076	131.084	.051	-.001	.300
		12-Months	-.165	.071	130.881	.021	-.305	-.025
	12-Months	Pre	.392	.072	130.920	.000	.250	.534
		8-Weeks	.314	.076	131.084	.000	.164	.465
		6-Months	.165	.071	130.881	.021	.025	.305

Significant at $p < .05$

Total Body Percent Fat: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.122	.092	131.698	.191	-.061	.304
		6-Months	.097	.094	131.823	.305	-.089	.283
		12-Months	.110	.091	131.720	.229	-.070	.290
	8-Weeks	Pre	-.122	.092	131.698	.191	-.304	.061
		6-Months	-.025	.096	131.470	.798	-.214	.165
		12-Months	-.011	.093	131.329	.903	-.195	.172
	6-Months	Pre	-.097	.094	131.823	.305	-.283	.089
		8-Weeks	.025	.096	131.470	.798	-.165	.214
		12-Months	.013	.093	131.182	.888	-.171	.198
	12-Months	Pre	-.110	.091	131.720	.229	-.290	.070
		8-Weeks	.011	.093	131.329	.903	-.172	.195
		6-Months	-.013	.093	131.182	.888	-.198	.171
Health Coach	Pre	8-Weeks	.128	.089	131.389	.152	-.048	.303
		6-Months	.205	.083	131.107	.014	.042	.369
		12-Months	.200	.083	131.107	.017	.036	.363
	8-Weeks	Pre	-.128	.089	131.389	.152	-.303	.048
		6-Months	.078	.088	131.320	.377	-.096	.251
		12-Months	.072	.088	131.320	.411	-.101	.245
	6-Months	Pre	-.205	.083	131.107	.014	-.369	-.042
		8-Weeks	-.078	.088	131.320	.377	-.251	.096
		12-Months	-.005	.082	131.057	.947	-.167	.156
	12-Months	Pre	-.200	.083	131.107	.017	-.363	-.036
		8-Weeks	-.072	.088	131.320	.411	-.245	.101
		6-Months	.005	.082	131.057	.947	-.156	.167

Significant at $p < .05$

Trunk Fat Mass: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.012	.054	145.202	.828	-.095	.118
		6-Months	-.071	.056	145.242	.203	-.181	.039
		12-Months	-.162	.053	145.164	.002	-.266	-.059
	8-Weeks	Pre	-.012	.054	145.202	.828	-.118	.095
		6-Months	-.083	.056	145.100	.144	-.194	.029
		12-Months	-.174	.053	144.996	.001	-.279	-.069
	6-Months	Pre	.071	.056	145.242	.203	-.039	.181
		8-Weeks	.083	.056	145.100	.144	-.029	.194
		12-Months	-.092	.055	145.043	.097	-.200	.017
	12-Months	Pre	.162	.053	145.164	.002	.059	.266
		8-Weeks	.174	.053	144.996	.001	.069	.279
		6-Months	.092	.055	145.043	.097	-.017	.200
Health Coach	Pre	8-Weeks	.019	.056	145.121	.739	-.092	.129
		6-Months	.018	.052	144.994	.725	-.085	.122
		12-Months	-.075	.052	144.994	.155	-.178	.029
	8-Weeks	Pre	-.019	.056	145.121	.739	-.129	.092
		6-Months	.000	.055	145.063	.997	-.108	.108
		12-Months	-.093	.055	145.063	.089	-.201	.014
	6-Months	Pre	-.018	.052	144.994	.725	-.122	.085
		8-Weeks	.000	.055	145.063	.997	-.108	.108
		12-Months	-.093	.051	144.951	.070	-.194	.008
	12-Months	Pre	.075	.052	144.994	.155	-.029	.178
		8-Weeks	.093	.055	145.063	.089	-.014	.201
		6-Months	.093	.051	144.951	.070	-.008	.194

Significant at $p < .05$

Trunk Lean Mass: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-.101	.075	145.506	.180	-.249	.047
		6-Months	-.068	.077	145.595	.383	-.220	.085
		12-Months	-.311	.073	145.423	.000	-.455	-.166
	8-Weeks	Pre	.101	.075	145.506	.180	-.047	.249
		6-Months	.034	.078	145.308	.669	-.121	.188
		12-Months	-.210	.074	145.083	.005	-.356	-.063
	6-Months	Pre	.068	.077	145.595	.383	-.085	.220
		8-Weeks	-.034	.078	145.308	.669	-.188	.121
		12-Months	-.243	.076	145.184	.002	-.394	-.093
	12-Months	Pre	.311	.073	145.423	.000	.166	.455
		8-Weeks	.210	.074	145.083	.005	.063	.356
		6-Months	.243	.076	145.184	.002	.093	.394
Health Coach	Pre	8-Weeks	-.036	.078	145.353	.641	-.190	.117
		6-Months	-.173	.073	145.079	.018	-.317	-.030
		12-Months	-.266	.073	145.079	.000	-.409	-.122
	8-Weeks	Pre	.036	.078	145.353	.641	-.117	.190
		6-Months	-.137	.076	145.227	.073	-.287	.013
		12-Months	-.229	.076	145.227	.003	-.379	-.079
	6-Months	Pre	.173	.073	145.079	.018	.030	.317
		8-Weeks	.137	.076	145.227	.073	-.013	.287
		12-Months	-.093	.071	144.987	.194	-.233	.048
	12-Months	Pre	.266	.073	145.079	.000	.122	.409
		8-Weeks	.229	.076	145.227	.003	.079	.379
		6-Months	.093	.071	144.987	.194	-.048	.233

Significant at $p < .05$

Trunk Percent Fat: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.136	.105	145.903	.196	-.071	.344
		6-Months	.083	.108	146.074	.445	-.131	.296
		12-Months	.069	.102	145.744	.503	-.134	.271
	8-Weeks	Pre	-.136	.105	145.903	.196	-.344	.071
		6-Months	-.054	.110	145.587	.625	-.270	.163
		12-Months	-.068	.104	145.165	.516	-.273	.138
	6-Months	Pre	-.083	.108	146.074	.445	-.296	.131
		8-Weeks	.054	.110	145.587	.625	-.163	.270
		12-Months	-.014	.107	145.356	.896	-.225	.197
	12-Months	Pre	-.069	.102	145.744	.503	-.271	.134
		8-Weeks	.068	.104	145.165	.516	-.138	.273
		6-Months	.014	.107	145.356	.896	-.197	.225
Health Coach	Pre	8-Weeks	.099	.109	145.671	.362	-.116	.315
		6-Months	.215	.102	145.159	.036	.014	.416
		12-Months	.269	.102	145.159	.009	.068	.471
	8-Weeks	Pre	-.099	.109	145.671	.362	-.315	.116
		6-Months	.116	.106	145.435	.278	-.094	.326
		12-Months	.170	.106	145.435	.112	-.040	.380
	6-Months	Pre	-.215	.102	145.159	.036	-.416	-.014
		8-Weeks	-.116	.106	145.435	.278	-.326	.094
		12-Months	.054	.099	144.986	.586	-.142	.251
	12-Months	Pre	-.269	.102	145.159	.009	-.471	-.068
		8-Weeks	-.170	.106	145.435	.112	-.380	.040
		6-Months	-.054	.099	144.986	.586	-.251	.142

Significant at $p < .05$

Bone Mass: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-.073	.090	131.819	.416	-.251	.104
		6-Months	-.205	.091	131.944	.026	-.386	-.025
		12-Months	-.495	.088	131.841	.000	-.670	-.320
	8-Weeks	Pre	.073	.090	131.819	.416	-.104	.251
		6-Months	-.132	.093	131.592	.157	-.316	.052
		12-Months	-.421	.090	131.452	.000	-.599	-.243
	6-Months	Pre	.205	.091	131.944	.026	.025	.386
		8-Weeks	.132	.093	131.592	.157	-.052	.316
		12-Months	-.289	.091	131.306	.002	-.469	-.110
	12-Months	Pre	.495	.088	131.841	.000	.320	.670
		8-Weeks	.421	.090	131.452	.000	.243	.599
		6-Months	.289	.091	131.306	.002	.110	.469
Health Coach	Pre	8-Weeks	.011	.086	131.511	.899	-.159	.181
		6-Months	-.078	.080	131.231	.335	-.236	.081
		12-Months	-.371	.080	131.231	.000	-.530	-.213
	8-Weeks	Pre	-.011	.086	131.511	.899	-.181	.159
		6-Months	-.089	.085	131.442	.299	-.257	.079
		12-Months	-.382	.085	131.442	.000	-.550	-.214
	6-Months	Pre	.078	.080	131.231	.335	-.081	.236
		8-Weeks	.089	.085	131.442	.299	-.079	.257
		12-Months	-.294	.079	131.181	.000	-.450	-.137
	12-Months	Pre	.371	.080	131.231	.000	.213	.530
		8-Weeks	.382	.085	131.442	.000	.214	.550
		6-Months	.294	.079	131.181	.000	.137	.450

Significant at $p < .05$

BMI-Z Scores: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.016	.026	140.385	.538	-.036	.068
		6-Months	.034	.027	140.414	.204	-.019	.086
		12-Months	.015	.025	140.332	.553	-.035	.065
	8-Weeks	Pre	-.016	.026	140.385	.538	-.068	.036
		6-Months	.018	.027	140.210	.512	-.036	.071
		12-Months	-.001	.026	140.099	.969	-.052	.050
	6-Months	Pre	-.034	.027	140.414	.204	-.086	.019
		8-Weeks	-.018	.027	140.210	.512	-.071	.036
		12-Months	-.019	.026	140.132	.476	-.070	.033
	12-Months	Pre	-.015	.025	140.332	.553	-.065	.035
		8-Weeks	.001	.026	140.099	.969	-.050	.052
		6-Months	.019	.026	140.132	.476	-.033	.070
Health Coach	Pre	8-Weeks	.038	.026	140.258	.145	-.013	.089
		6-Months	.051	.024	140.093	.039	.003	.099
		12-Months	.053	.024	140.093	.031	.005	.101
	8-Weeks	Pre	-.038	.026	140.258	.145	-.089	.013
		6-Months	.012	.025	140.182	.623	-.038	.063
		12-Months	.015	.025	140.182	.555	-.035	.065
	6-Months	Pre	-.051	.024	140.093	.039	-.099	-.003
		8-Weeks	-.012	.025	140.182	.623	-.063	.038
		12-Months	.003	.024	140.037	.916	-.044	.049
	12-Months	Pre	-.053	.024	140.093	.031	-.101	-.005
		8-Weeks	-.015	.025	140.182	.555	-.065	.035
		6-Months	-.003	.024	140.037	.916	-.049	.044

Significant at $p < .05$

Light Week Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	208.853	137.655	80.530	.133	-65.062	482.767
		6-Months	253.650	133.787	79.193	.062	-12.636	519.936
		12-Months	347.111	128.074	79.171	.008	92.193	602.028
	8-Weeks	Pre	-208.853	137.655	80.530	.133	-482.767	65.062
		6-Months	44.798	108.248	76.492	.680	-170.774	260.369
		12-Months	138.258	101.046	76.197	.175	-62.984	339.500
	6-Months	Pre	-253.650	133.787	79.193	.062	-519.936	12.636
		8-Weeks	-44.798	108.248	76.492	.680	-260.369	170.774
		12-Months	93.460	97.936	75.692	.343	-101.608	288.529
	12-Months	Pre	-347.111	128.074	79.171	.008	-602.028	-92.193
		8-Weeks	-138.258	101.046	76.197	.175	-339.500	62.984
		6-Months	-93.460	97.936	75.692	.343	-288.529	101.608
Health Coach	Pre	8-Weeks	65.344	91.444	76.705	.477	-116.755	247.443
		6-Months	25.422	79.214	75.634	.749	-132.358	183.202
		12-Months	116.697	75.052	75.135	.124	-32.810	266.205
	8-Weeks	Pre	-65.344	91.444	76.705	.477	-247.443	116.755
		6-Months	-39.922	91.403	74.508	.664	-222.025	142.182
		12-Months	51.354	89.726	76.307	.569	-127.339	230.047
	6-Months	Pre	-25.422	79.214	75.634	.749	-183.202	132.358
		8-Weeks	39.922	91.403	74.508	.664	-142.182	222.025
		12-Months	91.275	76.878	74.505	.239	-61.891	244.441
	12-Months	Pre	-116.697	75.052	75.135	.124	-266.205	32.810
		8-Weeks	-51.354	89.726	76.307	.569	-230.047	127.339
		6-Months	-91.275	76.878	74.505	.239	-244.441	61.891

Significant at $p < .05$

Moderate Week Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference	
							Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-31.427	29.022	79.590	.282	-89.188	26.334
		6-Months	-42.853	28.128	79.221	.132	-98.837	13.131
		12-Months	-46.517	26.930	79.264	.088	-100.116	7.083
	8-Weeks	Pre	31.427	29.022	79.590	.282	-26.334	89.188
		6-Months	-11.426	22.630	78.496	.615	-56.474	33.622
		12-Months	-15.090	21.118	78.515	.477	-57.129	26.949
	6-Months	Pre	42.853	28.128	79.221	.132	-13.131	98.837
		8-Weeks	11.426	22.630	78.496	.615	-33.622	56.474
		12-Months	-3.664	20.447	78.383	.858	-44.367	37.039
	12-Months	Pre	46.517	26.930	79.264	.088	-7.083	100.116
		8-Weeks	15.090	21.118	78.515	.477	-26.949	57.129
		6-Months	3.664	20.447	78.383	.858	-37.039	44.367
Health Coach	Pre	8-Weeks	-21.302	19.124	78.548	.269	-59.372	16.767
		6-Months	-25.393	16.535	78.360	.129	-58.310	7.524
		12-Months	-23.535	15.656	78.345	.137	-54.702	7.633
	8-Weeks	Pre	21.302	19.124	78.548	.269	-16.767	59.372
		6-Months	-4.090	19.018	77.823	.830	-41.954	33.773
		12-Months	-2.232	18.748	78.413	.906	-39.553	35.088
	6-Months	Pre	25.393	16.535	78.360	.129	-7.524	58.310
		8-Weeks	4.090	19.018	77.823	.830	-33.773	41.954
		12-Months	1.858	16.006	77.995	.908	-30.007	33.723
	12-Months	Pre	23.535	15.656	78.345	.137	-7.633	54.702
		8-Weeks	2.232	18.748	78.413	.906	-35.088	39.553
		6-Months	-1.858	16.006	77.995	.908	-33.723	30.007

Significant at $p < .05$

Vigorous Week Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	2.095	5.174	77.888	.687	-8.206	12.395
		6-Months	-5.178	5.037	75.846	.307	-15.209	4.854
		12-Months	-2.467	4.822	75.747	.610	-12.071	7.137
	8-Weeks	Pre	-2.095	5.174	77.888	.687	-12.395	8.206
		6-Months	-7.273	4.089	71.676	.080	-15.424	.879
		12-Months	-4.562	3.818	71.066	.236	-12.175	3.052
	6-Months	Pre	5.178	5.037	75.846	.307	-4.854	15.209
		8-Weeks	7.273	4.089	71.676	.080	-.879	15.424
		12-Months	2.711	3.703	70.292	.467	-4.674	10.096
	12-Months	Pre	2.467	4.822	75.747	.610	-7.137	12.071
		8-Weeks	4.562	3.818	71.066	.236	-3.052	12.175
		6-Months	-2.711	3.703	70.292	.467	-10.096	4.674
Health Coach	Pre	8-Weeks	-2.858	3.453	72.120	.411	-9.741	4.025
		6-Months	-9.571	2.995	70.223	.002	-15.545	-3.598
		12-Months	-2.571	2.840	69.271	.368	-8.236	3.094
	8-Weeks	Pre	2.858	3.453	72.120	.411	-4.025	9.741
		6-Months	-6.714	3.460	69.072	.056	-13.617	.190
		12-Months	.287	3.390	71.571	.933	-6.471	7.045
	6-Months	Pre	9.571	2.995	70.223	.002	3.598	15.545
		8-Weeks	6.714	3.460	69.072	.056	-.190	13.617
		12-Months	7.000	2.911	68.657	.019	1.193	12.808
	12-Months	Pre	2.571	2.840	69.271	.368	-3.094	8.236
		8-Weeks	-.287	3.390	71.571	.933	-7.045	6.471
		6-Months	-7.000	2.911	68.657	.019	-12.808	-1.193

Significant at $p < .05$

Light Weekday Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	91.412	103.316	82.137	.379	-114.112	296.937
		6-Months	168.245	100.463	80.649	.098	-31.659	368.149
		12-Months	239.595	96.175	80.606	.015	48.223	430.967
	8-Weeks	Pre	-91.412	103.316	82.137	.379	-296.937	114.112
		6-Months	76.833	81.369	77.621	.348	-85.172	238.838
		12-Months	148.183	75.964	77.248	.055	-3.073	299.439
	6-Months	Pre	-168.245	100.463	80.649	.098	-368.149	31.659
		8-Weeks	-76.833	81.369	77.621	.348	-238.838	85.172
		12-Months	71.350	73.640	76.680	.336	-75.296	217.996
	12-Months	Pre	-239.595	96.175	80.606	.015	-430.967	-48.223
		8-Weeks	-148.183	75.964	77.248	.055	-299.439	3.073
		6-Months	-71.350	73.640	76.680	.336	-217.996	75.296
Health Coach	Pre	8-Weeks	8.199	68.731	77.883	.905	-128.638	145.036
		6-Months	-51.240	59.564	76.620	.392	-169.857	67.376
		12-Months	43.725	56.446	76.007	.441	-68.698	156.147
	8-Weeks	Pre	-8.199	68.731	77.883	.905	-145.036	128.638
		6-Months	-59.439	68.758	75.492	.390	-196.397	77.518
		12-Months	35.526	67.450	77.451	.600	-98.772	169.824
	6-Months	Pre	51.240	59.564	76.620	.392	-67.376	169.857
		8-Weeks	59.439	68.758	75.492	.390	-77.518	196.397
		12-Months	94.965	57.833	75.388	.105	-20.234	210.164
	12-Months	Pre	-43.725	56.446	76.007	.441	-156.147	68.698
		8-Weeks	-35.526	67.450	77.451	.600	-169.824	98.772
		6-Months	-94.965	57.833	75.388	.105	-210.164	20.234

Significant at $p < .05$

Moderate Weekday Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	15.000	28.702	81.712	.603	-42.101	72.101
		6-Months	-10.250	27.843	81.053	.714	-65.649	45.149
		12-Months	-27.892	26.655	81.092	.298	-80.927	25.143
	8-Weeks	Pre	-15.000	28.702	81.712	.603	-72.101	42.101
		6-Months	-25.250	22.443	79.746	.264	-69.915	19.416
		12-Months	-42.892	20.944	79.706	.044	-84.574	-1.210
	6-Months	Pre	10.250	27.843	81.053	.714	-45.149	65.649
		8-Weeks	25.250	22.443	79.746	.264	-19.416	69.915
		12-Months	-17.642	20.285	79.464	.387	-58.015	22.730
	12-Months	Pre	27.892	26.655	81.092	.298	-25.143	80.927
		8-Weeks	42.892	20.944	79.706	.044	1.210	84.574
		6-Months	17.642	20.285	79.464	.387	-22.730	58.015
Health Coach	Pre	8-Weeks	-13.187	18.964	79.833	.489	-50.928	24.555
		6-Months	-15.448	16.406	79.427	.349	-48.100	17.203
		12-Months	-12.435	15.535	79.308	.426	-43.356	18.485
	8-Weeks	Pre	13.187	18.964	79.833	.489	-24.555	50.928
		6-Months	-2.262	18.893	78.618	.905	-39.870	35.346
		12-Months	.751	18.597	79.610	.968	-36.260	37.763
	6-Months	Pre	15.448	16.406	79.427	.349	-17.203	48.100
		8-Weeks	2.262	18.893	78.618	.905	-35.346	39.870
		12-Months	3.013	15.895	78.810	.850	-28.626	34.652
	12-Months	Pre	12.435	15.535	79.308	.426	-18.485	43.356
		8-Weeks	-.751	18.597	79.610	.968	-37.763	36.260
		6-Months	-3.013	15.895	78.810	.850	-34.652	28.626

Significant at $p < .05$

Vigorous Weekend Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	1.814	4.188	88.324	.666	-6.507	10.135
		6-Months	-4.211	4.082	86.167	.305	-12.325	3.902
		12-Months	-2.341	3.908	86.039	.551	-10.109	5.428
	8-Weeks	Pre	-1.814	4.188	88.324	.666	-10.135	6.507
		6-Months	-6.025	3.322	81.586	.073	-12.635	.584
		12-Months	-4.155	3.104	80.823	.184	-10.331	2.021
	6-Months	Pre	4.211	4.082	86.167	.305	-3.902	12.325
		8-Weeks	6.025	3.322	81.586	.073	-.584	12.635
		12-Months	1.871	3.012	79.956	.536	-4.123	7.864
	12-Months	Pre	2.341	3.908	86.039	.551	-5.428	10.109
		8-Weeks	4.155	3.104	80.823	.184	-2.021	10.331
		6-Months	-1.871	3.012	79.956	.536	-7.864	4.123
Health Coach	Pre	8-Weeks	-2.431	2.805	82.211	.389	-8.011	3.148
		6-Months	-8.110	2.436	79.892	.001	-12.958	-3.262
		12-Months	-2.883	2.311	78.716	.216	-7.484	1.718
	8-Weeks	Pre	2.431	2.805	82.211	.389	-3.148	8.011
		6-Months	-5.679	2.816	79.016	.047	-11.284	-.073
		12-Months	-.452	2.754	81.644	.870	-5.931	5.028
	6-Months	Pre	8.110	2.436	79.892	.001	3.262	12.958
		8-Weeks	5.679	2.816	79.016	.047	.073	11.284
		12-Months	5.227	2.370	78.238	.030	.509	9.945
	12-Months	Pre	2.883	2.311	78.716	.216	-1.718	7.484
		8-Weeks	.452	2.754	81.644	.870	-5.028	5.931
		6-Months	-5.227	2.370	78.238	.030	-9.945	-.509

Significant at $p < .05$

Light Weekend Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	127.414	73.954	88.463	.088	-19.543	274.371
		6-Months	97.268	72.081	86.320	.181	-46.017	240.553
		12-Months	116.537	69.012	86.193	.095	-20.649	253.723
	8-Weeks	Pre	-127.414	73.954	88.463	.088	-274.371	19.543
		6-Months	-30.146	58.669	81.768	.609	-146.862	86.570
		12-Months	-10.877	54.812	81.011	.843	-119.936	98.182
	6-Months	Pre	-97.268	72.081	86.320	.181	-240.553	46.017
		8-Weeks	30.146	58.669	81.768	.609	-86.570	146.862
		12-Months	19.269	53.186	80.150	.718	-86.570	125.109
	12-Months	Pre	-116.537	69.012	86.193	.095	-253.723	20.649
		8-Weeks	10.877	54.812	81.011	.843	-98.182	119.936
		6-Months	-19.269	53.186	80.150	.718	-125.109	86.570
Health Coach	Pre	8-Weeks	43.157	49.530	82.388	.386	-55.367	141.682
		6-Months	71.725	43.023	80.085	.099	-13.891	157.342
		12-Months	77.074	40.818	78.918	.063	-4.175	158.322
	8-Weeks	Pre	-43.157	49.530	82.388	.386	-141.682	55.367
		6-Months	28.568	49.733	79.209	.567	-70.418	127.554
		12-Months	33.916	48.639	81.824	.488	-62.845	130.678
	6-Months	Pre	-71.725	43.023	80.085	.099	-157.342	13.891
		8-Weeks	-28.568	49.733	79.209	.567	-127.554	70.418
		12-Months	5.348	41.853	78.439	.899	-77.966	88.663
	12-Months	Pre	-77.074	40.818	78.918	.063	-158.322	4.175
		8-Weeks	-33.916	48.639	81.824	.488	-130.678	62.845
		6-Months	-5.348	41.853	78.439	.899	-88.663	77.966

Significant at $p < .05$

Moderate Weekend Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-43.586	11.977	79.387	.000	-67.424	-19.749
		6-Months	-29.735	11.610	78.960	.012	-52.843	-6.626
		12-Months	-16.105	11.115	79.005	.151	-38.229	6.019
	8-Weeks	Pre	43.586	11.977	79.387	.000	19.749	67.424
		6-Months	13.851	9.344	78.120	.142	-4.750	32.453
		12-Months	27.481	8.719	78.133	.002	10.122	44.840
	6-Months	Pre	29.735	11.610	78.960	.012	6.626	52.843
		8-Weeks	-13.851	9.344	78.120	.142	-32.453	4.750
		12-Months	13.630	8.443	77.979	.110	-3.178	30.438
	12-Months	Pre	16.105	11.115	79.005	.151	-6.019	38.229
		8-Weeks	-27.481	8.719	78.133	.002	-44.840	-10.122
		6-Months	-13.630	8.443	77.979	.110	-30.438	3.178
Health Coach	Pre	8-Weeks	-6.770	7.896	78.179	.394	-22.490	8.949
		6-Months	-9.771	6.828	77.953	.156	-23.364	3.822
		12-Months	-10.951	6.465	77.923	.094	-23.821	1.920
	8-Weeks	Pre	6.770	7.896	78.179	.394	-8.949	22.490
		6-Months	-3.000	7.855	77.351	.704	-18.640	12.640
		12-Months	-4.180	7.741	78.025	.591	-19.591	11.231
	6-Months	Pre	9.771	6.828	77.953	.156	-3.822	23.364
		8-Weeks	3.000	7.855	77.351	.704	-12.640	18.640
		12-Months	-1.180	6.610	77.535	.859	-14.341	11.981
	12-Months	Pre	10.951	6.465	77.923	.094	-1.920	23.821
		8-Weeks	4.180	7.741	78.025	.591	-11.231	19.591
		6-Months	1.180	6.610	77.535	.859	-11.981	14.341

Significant at $p < .05$

Vigorous Weekend Physical Activity: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.304	2.346	66.184	.897	-4.379	4.988
		6-Months	-.885	2.276	65.280	.699	-5.430	3.661
		12-Months	-.122	2.179	65.317	.956	-4.474	4.230
	8-Weeks	Pre	-.304	2.346	66.184	.897	-4.988	4.379
		6-Months	-1.189	1.836	63.504	.520	-4.858	2.480
		12-Months	-.426	1.714	63.418	.804	-3.850	2.997
	6-Months	Pre	.885	2.276	65.280	.699	-3.661	5.430
		8-Weeks	1.189	1.836	63.504	.520	-2.480	4.858
		12-Months	.763	1.660	63.092	.647	-2.554	4.079
	12-Months	Pre	.122	2.179	65.317	.956	-4.230	4.474
		8-Weeks	.426	1.714	63.418	.804	-2.997	3.850
		6-Months	-.763	1.660	63.092	.647	-4.079	2.554
Health Coach	Pre	8-Weeks	-.932	1.551	63.621	.550	-4.031	2.168
		6-Months	-2.013	1.342	63.045	.139	-4.696	.670
		12-Months	-.347	1.271	62.848	.786	-2.888	2.193
	8-Weeks	Pre	.932	1.551	63.621	.550	-2.168	4.031
		6-Months	-1.081	1.547	62.035	.487	-4.173	2.010
		12-Months	.584	1.522	63.328	.702	-2.456	3.625
	6-Months	Pre	2.013	1.342	63.045	.139	-.670	4.696
		8-Weeks	1.081	1.547	62.035	.487	-2.010	4.173
		12-Months	1.666	1.301	62.238	.205	-.935	4.266
	12-Months	Pre	.347	1.271	62.848	.786	-2.193	2.888
		8-Weeks	-.584	1.522	63.328	.702	-3.625	2.456
		6-Months	-1.666	1.301	62.238	.205	-4.266	.935

Significant at $p < .05$

Total Energy Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	1121.493	562.874	127.270	.048	7.689	2235.297
		6-Months	1007.117	566.718	126.874	.078	-114.326	2128.561
		12-Months	834.267	551.989	127.790	.133	-257.955	1926.489
	8-Weeks	Pre	-1121.493	562.874	127.270	.048	-2235.297	-7.689
		6-Months	-114.376	548.123	126.373	.835	-1199.064	970.313
		12-Months	-287.226	533.678	127.461	.591	-1343.242	768.790
	6-Months	Pre	-1007.117	566.718	126.874	.078	-2128.561	114.326
		8-Weeks	114.376	548.123	126.373	.835	-970.313	1199.064
		12-Months	-172.850	543.183	127.795	.751	-1247.647	901.946
	12-Months	Pre	-834.267	551.989	127.790	.133	-1926.489	257.955
		8-Weeks	287.226	533.678	127.461	.591	-768.790	1343.242
		6-Months	172.850	543.183	127.795	.751	-901.946	1247.647
Health Coach	Pre	8-Weeks	974.450	517.566	126.878	.062	-49.729	1998.630
		6-Months	553.211	503.380	126.482	.274	-442.927	1549.349
		12-Months	-96.387	496.994	126.296	.847	-1079.902	887.128
	8-Weeks	Pre	-974.450	517.566	126.878	.062	-1998.630	49.729
		6-Months	-421.239	510.635	126.669	.411	-1431.720	589.241
		12-Months	-1070.837	504.170	126.471	.036	-2068.540	-73.135
	6-Months	Pre	-553.211	503.380	126.482	.274	-1549.349	442.927
		8-Weeks	421.239	510.635	126.669	.411	-589.241	1431.720
		12-Months	-649.598	490.300	126.126	.188	-1619.877	320.681
	12-Months	Pre	96.387	496.994	126.296	.847	-887.128	1079.902
		8-Weeks	1070.837	504.170	126.471	.036	73.135	2068.540
		6-Months	649.598	490.300	126.126	.188	-320.681	1619.877

Significant at $p < .05$

Saturated Fat Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	4.812	2.876	127.567	.097	-.879	10.502
		6-Months	5.319	2.896	127.132	.069	-.410	11.049
		12-Months	4.702	2.820	128.112	.098	-.877	10.281
	8-Weeks	Pre	-4.812	2.876	127.567	.097	-10.502	.879
		6-Months	.508	2.801	126.575	.856	-5.035	6.050
		12-Months	-.110	2.726	127.741	.968	-5.504	5.285
	6-Months	Pre	-5.319	2.896	127.132	.069	-11.049	.410
		8-Weeks	-.508	2.801	126.575	.856	-6.050	5.035
		12-Months	-.617	2.775	128.111	.824	-6.108	4.873
	12-Months	Pre	-4.702	2.820	128.112	.098	-10.281	.877
		8-Weeks	.110	2.726	127.741	.968	-5.285	5.504
		6-Months	.617	2.775	128.111	.824	-4.873	6.108
Health Coach	Pre	8-Weeks	6.371	2.644	127.142	.017	1.138	11.603
		6-Months	3.760	2.572	126.701	.146	-1.330	8.850
		12-Months	1.979	2.540	126.495	.437	-3.047	7.005
	8-Weeks	Pre	-6.371	2.644	127.142	.017	-11.603	-1.138
		6-Months	-2.610	2.609	126.910	.319	-7.773	2.553
		12-Months	-4.392	2.576	126.689	.091	-9.490	.706
	6-Months	Pre	-3.760	2.572	126.701	.146	-8.850	1.330
		8-Weeks	2.610	2.609	126.910	.319	-2.553	7.773
		12-Months	-1.781	2.506	126.306	.478	-6.739	3.177
	12-Months	Pre	-1.979	2.540	126.495	.437	-7.005	3.047
		8-Weeks	4.392	2.576	126.689	.091	-.706	9.490
		6-Months	1.781	2.506	126.306	.478	-3.177	6.739

Significant at $p < .05$

Calcium Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	58.658	68.480	127.993	.393	-76.841	194.156
		6-Months	42.172	68.973	127.438	.542	-94.309	178.652
		12-Months	89.675	67.125	128.584	.184	-43.138	222.488
	8-Weeks	Pre	-58.658	68.480	127.993	.393	-194.156	76.841
		6-Months	-16.486	66.743	126.709	.805	-148.561	115.588
		12-Months	31.018	64.920	128.080	.634	-97.436	159.472
	6-Months	Pre	-42.172	68.973	127.438	.542	-178.652	94.309
		8-Weeks	16.486	66.743	126.709	.805	-115.588	148.561
		12-Months	47.504	66.055	128.562	.473	-83.191	178.199
	12-Months	Pre	-89.675	67.125	128.584	.184	-222.488	43.138
		8-Weeks	-31.018	64.920	128.080	.634	-159.472	97.436
		6-Months	-47.504	66.055	128.562	.473	-178.199	83.191
Health Coach	Pre	8-Weeks	67.979	62.990	127.476	.283	-56.663	192.620
		6-Months	83.571	61.287	126.895	.175	-37.706	204.849
		12-Months	15.150	60.521	126.623	.803	-104.613	134.913
	8-Weeks	Pre	-67.979	62.990	127.476	.283	-192.620	56.663
		6-Months	15.593	62.159	127.171	.802	-107.408	138.593
		12-Months	-52.828	61.384	126.880	.391	-174.298	68.641
	6-Months	Pre	-83.571	61.287	126.895	.175	-204.849	37.706
		8-Weeks	-15.593	62.159	127.171	.802	-138.593	107.408
		12-Months	-68.421	59.715	126.372	.254	-186.593	49.751
	12-Months	Pre	-15.150	60.521	126.623	.803	-134.913	104.613
		8-Weeks	52.828	61.384	126.880	.391	-68.641	174.298
		6-Months	68.421	59.715	126.372	.254	-49.751	186.593

Significant at $p < .05$

Magnesium Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	43.614	17.851	127.841	.016	8.293	78.935
		6-Months	36.165	17.975	127.391	.046	.597	71.734
		12-Months	33.352	17.503	128.392	.059	-1.279	67.983
	8-Weeks	Pre	-43.614	17.851	127.841	.016	-78.935	-8.293
		6-Months	-7.449	17.388	126.813	.669	-41.857	26.960
		12-Months	-10.262	16.924	128.005	.545	-43.749	23.225
	6-Months	Pre	-36.165	17.975	127.391	.046	-71.734	-.597
		8-Weeks	7.449	17.388	126.813	.669	-26.960	41.857
		12-Months	-2.813	17.223	128.390	.871	-36.892	31.265
	12-Months	Pre	-33.352	17.503	128.392	.059	-67.983	1.279
		8-Weeks	10.262	16.924	128.005	.545	-23.225	43.749
		6-Months	2.813	17.223	128.390	.871	-31.265	36.892
Health Coach	Pre	8-Weeks	25.556	16.416	127.404	.122	-6.927	58.039
		6-Months	22.729	15.968	126.946	.157	-8.870	54.327
		12-Months	4.651	15.767	126.731	.768	-26.549	35.851
	8-Weeks	Pre	-25.556	16.416	127.404	.122	-58.039	6.927
		6-Months	-2.827	16.197	127.163	.862	-34.879	29.224
		12-Months	-20.905	15.993	126.934	.194	-52.553	10.743
	6-Months	Pre	-22.729	15.968	126.946	.157	-54.327	8.870
		8-Weeks	2.827	16.197	127.163	.862	-29.224	34.879
		12-Months	-18.078	15.555	126.534	.247	-48.859	12.704
	12-Months	Pre	-4.651	15.767	126.731	.768	-35.851	26.549
		8-Weeks	20.905	15.993	126.934	.194	-10.743	52.553
		6-Months	18.078	15.555	126.534	.247	-12.704	48.859

Significant at $p < .05$

Potassium Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	295.495	168.304	127.699	.082	-37.530	628.520
		6-Months	211.521	169.466	127.272	.214	-123.815	546.857
		12-Months	161.955	165.033	128.238	.328	-164.585	488.496
	8-Weeks	Pre	-295.495	168.304	127.699	.082	-628.520	37.530
		6-Months	-83.974	163.921	126.728	.609	-408.351	240.403
		12-Months	-133.540	159.569	127.876	.404	-449.276	182.197
	6-Months	Pre	-211.521	169.466	127.272	.214	-546.857	123.815
		8-Weeks	83.974	163.921	126.728	.609	-240.403	408.351
		12-Months	-49.566	162.400	128.238	.761	-370.896	271.765
	12-Months	Pre	-161.955	165.033	128.238	.328	-488.496	164.585
		8-Weeks	133.540	159.569	127.876	.404	-182.197	449.276
		6-Months	49.566	162.400	128.238	.761	-271.765	370.896
Health Coach	Pre	8-Weeks	267.579	154.768	127.281	.086	-38.672	573.831
		6-Months	193.241	150.537	126.850	.202	-104.648	491.131
		12-Months	20.907	148.633	126.648	.888	-273.218	315.033
	8-Weeks	Pre	-267.579	154.768	127.281	.086	-573.831	38.672
		6-Months	-74.338	152.701	127.054	.627	-376.505	227.829
		12-Months	-246.672	150.774	126.838	.104	-545.030	51.686
	6-Months	Pre	-193.241	150.537	126.850	.202	-491.131	104.648
		8-Weeks	74.338	152.701	127.054	.627	-227.829	376.505
		12-Months	-172.334	146.635	126.463	.242	-462.511	117.843
	12-Months	Pre	-20.907	148.633	126.648	.888	-315.033	273.218
		8-Weeks	246.672	150.774	126.838	.104	-51.686	545.030
		6-Months	172.334	146.635	126.463	.242	-117.843	462.511

Significant at $p < .05$

Sodium Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	361.460	216.158	127.310	.097	-66.268	789.188
		6-Months	315.282	217.664	126.855	.150	-115.439	746.004
		12-Months	216.080	211.942	127.866	.310	-203.288	635.449
	8-Weeks	Pre	-361.460	216.158	127.310	.097	-789.188	66.268
		6-Months	-46.178	210.558	126.271	.827	-462.856	370.501
		12-Months	-145.380	204.935	127.475	.479	-550.894	260.135
	6-Months	Pre	-315.282	217.664	126.855	.150	-746.004	115.439
		8-Weeks	46.178	210.558	126.271	.827	-370.501	462.856
		12-Months	-99.202	208.561	127.863	.635	-511.879	313.476
	12-Months	Pre	-216.080	211.942	127.866	.310	-635.449	203.288
		8-Weeks	145.380	204.935	127.475	.479	-260.135	550.894
		6-Months	99.202	208.561	127.863	.635	-313.476	511.879
Health Coach	Pre	8-Weeks	306.962	198.785	126.868	.125	-86.402	700.325
		6-Months	161.479	193.362	126.406	.405	-221.168	544.126
		12-Months	-42.961	190.922	126.189	.822	-420.783	334.862
	8-Weeks	Pre	-306.962	198.785	126.868	.125	-700.325	86.402
		6-Months	-145.483	196.137	126.625	.460	-533.613	242.648
		12-Months	-349.922	193.667	126.393	.073	-733.172	33.327
	6-Months	Pre	-161.479	193.362	126.406	.405	-544.126	221.168
		8-Weeks	145.483	196.137	126.625	.460	-242.648	533.613
		12-Months	-204.440	188.361	125.990	.280	-577.200	168.321
	12-Months	Pre	42.961	190.922	126.189	.822	-334.862	420.783
		8-Weeks	349.922	193.667	126.393	.073	-33.327	733.172
		6-Months	204.440	188.361	125.990	.280	-168.321	577.200

Significant at $p < .05$

Vitamin C Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.061	10.294	127.929	.995	-20.309	20.430
		6-Months	-3.919	10.365	127.520	.706	-24.429	16.591
		12-Months	-7.392	10.095	128.455	.465	-27.366	12.581
	8-Weeks	Pre	-.061	10.294	127.929	.995	-20.430	20.309
		6-Months	-3.980	10.025	127.000	.692	-23.818	15.859
		12-Months	-7.453	9.760	128.112	.446	-26.765	11.859
	6-Months	Pre	3.919	10.365	127.520	.706	-16.591	24.429
		8-Weeks	3.980	10.025	127.000	.692	-15.859	23.818
		12-Months	-3.474	9.934	128.458	.727	-23.129	16.181
	12-Months	Pre	7.392	10.095	128.455	.465	-12.581	27.366
		8-Weeks	7.453	9.760	128.112	.446	-11.859	26.765
		6-Months	3.474	9.934	128.458	.727	-16.181	23.129
Health Coach	Pre	8-Weeks	15.143	9.466	127.526	.112	-3.588	33.874
		6-Months	4.523	9.207	127.115	.624	-13.696	22.741
		12-Months	-.855	9.090	126.923	.925	-18.844	17.133
	8-Weeks	Pre	-15.143	9.466	127.526	.112	-33.874	3.588
		6-Months	-10.621	9.340	127.310	.258	-29.101	7.860
		12-Months	-15.998	9.221	127.104	.085	-34.246	2.249
	6-Months	Pre	-4.523	9.207	127.115	.624	-22.741	13.696
		8-Weeks	10.621	9.340	127.310	.258	-7.860	29.101
		12-Months	-5.378	8.968	126.746	.550	-23.124	12.369
	12-Months	Pre	.855	9.090	126.923	.925	-17.133	18.844
		8-Weeks	15.998	9.221	127.104	.085	-2.249	34.246
		6-Months	5.378	8.968	126.746	.550	-12.369	23.124

Significant at $p < .05$

Glycaemic Load: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	20.706	7.241	125.694	.005	6.375	35.037
		6-Months	16.498	7.294	125.277	.025	2.063	30.933
		12-Months	12.198	7.094	126.288	.088	-1.839	26.236
	8-Weeks	Pre	-20.706	7.241	125.694	.005	-35.037	-6.375
		6-Months	-4.208	7.063	123.532	.552	-18.188	9.771
		12-Months	-8.508	6.870	124.532	.218	-22.104	5.088
	6-Months	Pre	-16.498	7.294	125.277	.025	-30.933	-2.063
		8-Weeks	4.208	7.063	123.532	.552	-9.771	18.188
		12-Months	-4.300	6.999	124.826	.540	-18.152	9.552
	12-Months	Pre	-12.198	7.094	126.288	.088	-26.236	1.839
		8-Weeks	8.508	6.870	124.532	.218	-5.088	22.104
		6-Months	4.300	6.999	124.826	.540	-9.552	18.152
Health Coach	Pre	8-Weeks	5.830	6.503	123.934	.372	-7.042	18.702
		6-Months	1.353	6.324	123.601	.831	-11.164	13.871
		12-Months	-5.513	6.244	123.445	.379	-17.871	6.846
	8-Weeks	Pre	-5.830	6.503	123.934	.372	-18.702	7.042
		6-Months	-4.477	6.416	123.759	.487	-17.175	8.222
		12-Months	-11.342	6.334	123.592	.076	-23.880	1.195
	6-Months	Pre	-1.353	6.324	123.601	.831	-13.871	11.164
		8-Weeks	4.477	6.416	123.759	.487	-8.222	17.175
		12-Months	-6.866	6.159	123.303	.267	-19.058	5.326
	12-Months	Pre	5.513	6.244	123.445	.379	-6.846	17.871
		8-Weeks	11.342	6.334	123.592	.076	-1.195	23.880
		6-Months	6.866	6.159	123.303	.267	-5.326	19.058

Significant at $p < .05$

Soft Drink Intake: Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.187	.306	148.877	.542	-.417	.791
		6-Months	.444	.302	148.618	.143	-.152	1.040
		12-Months	.127	.296	148.501	.670	-.459	.712
	8-Weeks	Pre	-.187	.306	148.877	.542	-.791	.417
		6-Months	.257	.302	148.618	.396	-.339	.853
		12-Months	-.060	.296	148.501	.839	-.646	.525
	6-Months	Pre	-.444	.302	148.618	.143	-1.040	.152
		8-Weeks	-.257	.302	148.618	.396	-.853	.339
		12-Months	-.317	.292	148.297	.280	-.895	.260
	12-Months	Pre	-.127	.296	148.501	.670	-.712	.459
		8-Weeks	.060	.296	148.501	.839	-.525	.646
		6-Months	.317	.292	148.297	.280	-.260	.895
Health Coach	Pre	8-Weeks	-.146	.306	148.371	.634	-.750	.458
		6-Months	-.593	.290	147.508	.043	-1.166	-.020
		12-Months	-.841	.289	148.686	.004	-1.413	-.270
	8-Weeks	Pre	.146	.306	148.371	.634	-.458	.750
		6-Months	-.447	.306	148.371	.146	-1.051	.158
		12-Months	-.696	.305	149.433	.024	-1.298	-.093
	6-Months	Pre	.593	.290	147.508	.043	.020	1.166
		8-Weeks	.447	.306	148.371	.146	-.158	1.051
		12-Months	-.249	.289	148.686	.391	-.820	.323
	12-Months	Pre	.841	.289	148.686	.004	.270	1.413
		8-Weeks	.696	.305	149.433	.024	.093	1.298
		6-Months	.249	.289	148.686	.391	-.323	.820

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL):Physical Comfort Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-2.966	2.433	148.971	.225	-7.774	1.841
		6-Months	-2.467	2.401	148.735	.306	-7.212	2.278
		12-Months	-2.809	2.357	148.627	.235	-7.466	1.849
	8-Weeks	Pre	2.966	2.433	148.971	.225	-1.841	7.774
		6-Months	.499	2.401	148.735	.836	-4.246	5.245
		12-Months	.158	2.357	148.627	.947	-4.500	4.815
	6-Months	Pre	2.467	2.401	148.735	.306	-2.278	7.212
		8-Weeks	-.499	2.401	148.735	.836	-5.245	4.246
		12-Months	-.342	2.326	148.441	.883	-4.939	4.255
	12-Months	Pre	2.809	2.357	148.627	.235	-1.849	7.466
		8-Weeks	-.158	2.357	148.627	.947	-4.815	4.500
		6-Months	.342	2.326	148.441	.883	-4.255	4.939
Health Coach	Pre	8-Weeks	-1.710	2.434	148.502	.483	-6.519	3.099
		6-Months	-2.778	2.307	147.717	.230	-7.337	1.781
		12-Months	-.391	2.302	148.825	.865	-4.939	4.157
	8-Weeks	Pre	1.710	2.434	148.502	.483	-3.099	6.519
		6-Months	-1.068	2.434	148.502	.661	-5.877	3.741
		12-Months	1.319	2.429	149.501	.588	-3.480	6.118
	6-Months	Pre	2.778	2.307	147.717	.230	-1.781	7.337
		8-Weeks	1.068	2.434	148.502	.661	-3.741	5.877
		12-Months	2.387	2.302	148.825	.301	-2.161	6.935
	12-Months	Pre	.391	2.302	148.825	.865	-4.157	4.939
		8-Weeks	-1.319	2.429	149.501	.588	-6.118	3.480
		6-Months	-2.387	2.302	148.825	.301	-6.935	2.161

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL): Body Esteem Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-6.207	3.373	148.434	.068	-12.873	.458
		6-Months	-3.191	3.329	148.223	.339	-9.770	3.388
		12-Months	-6.843	3.268	148.123	.038	-13.301	-.386
	8-Weeks	Pre	6.207	3.373	148.434	.068	-.458	12.873
		6-Months	3.016	3.329	148.223	.366	-3.563	9.595
		12-Months	-.636	3.268	148.123	.846	-7.094	5.821
	6-Months	Pre	3.191	3.329	148.223	.339	-3.388	9.770
		8-Weeks	-3.016	3.329	148.223	.366	-9.595	3.563
		12-Months	-3.652	3.225	147.957	.259	-10.025	2.721
	12-Months	Pre	6.843	3.268	148.123	.038	.386	13.301
		8-Weeks	.636	3.268	148.123	.846	-5.821	7.094
		6-Months	3.652	3.225	147.957	.259	-2.721	10.025
Health Coach	Pre	8-Weeks	-7.506	3.374	148.004	.028	-14.174	-.839
		6-Months	-6.305	3.198	147.302	.051	-12.624	.014
		12-Months	-7.195	3.191	148.333	.026	-13.501	-.890
	8-Weeks	Pre	7.506	3.374	148.004	.028	.839	14.174
		6-Months	1.201	3.374	148.004	.722	-5.466	7.868
		12-Months	.311	3.367	148.933	.927	-6.343	6.965
	6-Months	Pre	6.305	3.198	147.302	.051	-.014	12.624
		8-Weeks	-1.201	3.374	148.004	.722	-7.868	5.466
		12-Months	-.890	3.191	148.333	.781	-7.196	5.415
	12-Months	Pre	7.195	3.191	148.333	.026	.890	13.501
		8-Weeks	-.311	3.367	148.933	.927	-6.965	6.343
		6-Months	.890	3.191	148.333	.781	-5.415	7.196

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL): Social Life Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-1.762	2.661	148.369	.509	-7.021	3.497
		6-Months	-3.647	2.627	148.205	.167	-8.837	1.544
		12-Months	-2.953	2.578	148.125	.254	-8.047	2.141
	8-Weeks	Pre	1.762	2.661	148.369	.509	-3.497	7.021
		6-Months	-1.884	2.627	148.205	.474	-7.075	3.306
		12-Months	-1.191	2.578	148.125	.645	-6.285	3.903
	6-Months	Pre	3.647	2.627	148.205	.167	-1.544	8.837
		8-Weeks	1.884	2.627	148.205	.474	-3.306	7.075
		12-Months	.694	2.544	147.998	.786	-4.334	5.721
	12-Months	Pre	2.953	2.578	148.125	.254	-2.141	8.047
		8-Weeks	1.191	2.578	148.125	.645	-3.903	6.285
		6-Months	-.694	2.544	147.998	.786	-5.721	4.334
Health Coach	Pre	8-Weeks	-5.424	2.661	148.024	.043	-10.684	-.165
		6-Months	-8.025	2.522	147.482	.002	-13.008	-3.041
		12-Months	-6.083	2.518	148.337	.017	-11.058	-1.108
	8-Weeks	Pre	5.424	2.661	148.024	.043	.165	10.684
		6-Months	-2.600	2.661	148.024	.330	-7.860	2.659
		12-Months	-.659	2.657	148.793	.805	-5.910	4.592
	6-Months	Pre	8.025	2.522	147.482	.002	3.041	13.008
		8-Weeks	2.600	2.661	148.024	.330	-2.659	7.860
		12-Months	1.942	2.518	148.337	.442	-3.033	6.916
	12-Months	Pre	6.083	2.518	148.337	.017	1.108	11.058
		8-Weeks	.659	2.657	148.793	.805	-4.592	5.910
		6-Months	-1.942	2.518	148.337	.442	-6.916	3.033

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL): Family Relations Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-1.936	2.792	152.072	.489	-7.452	3.581
		6-Months	-3.073	2.792	152.072	.273	-8.589	2.443
		12-Months	-3.355	2.741	151.887	.223	-8.770	2.060
	8-Weeks	Pre	1.936	2.792	152.072	.489	-3.581	7.452
		6-Months	-1.137	2.757	151.632	.681	-6.584	4.310
		12-Months	-1.419	2.706	151.510	.601	-6.766	3.927
	6-Months	Pre	3.073	2.792	152.072	.273	-2.443	8.589
		8-Weeks	1.137	2.757	151.632	.681	-4.310	6.584
		12-Months	-.282	2.706	151.510	.917	-5.629	5.064
	12-Months	Pre	3.355	2.741	151.887	.223	-2.060	8.770
		8-Weeks	1.419	2.706	151.510	.601	-3.927	6.766
		6-Months	.282	2.706	151.510	.917	-5.064	5.629
Health Coach	Pre	8-Weeks	1.819	2.791	151.356	.516	-3.695	7.333
		6-Months	-.833	2.687	150.177	.757	-6.142	4.476
		12-Months	3.101	2.676	151.787	.248	-2.186	8.389
	8-Weeks	Pre	-1.819	2.791	151.356	.516	-7.333	3.695
		6-Months	-2.652	2.791	151.356	.343	-8.166	2.862
		12-Months	1.282	2.780	152.856	.645	-4.211	6.775
	6-Months	Pre	.833	2.687	150.177	.757	-4.476	6.142
		8-Weeks	2.652	2.791	151.356	.343	-2.862	8.166
		12-Months	3.935	2.676	151.787	.144	-1.353	9.222
	12-Months	Pre	-3.101	2.676	151.787	.248	-8.389	2.186
		8-Weeks	-1.282	2.780	152.856	.645	-6.775	4.211
		6-Months	-3.935	2.676	151.787	.144	-9.222	1.353

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL): Total Adolescent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-3.918	2.160	150.402	.072	-8.186	.351
		6-Months	-3.074	2.160	150.402	.157	-7.342	1.195
		12-Months	-4.274	2.120	150.291	.046	-8.463	-.084
	8-Weeks	Pre	3.918	2.160	150.402	.072	-.351	8.186
		6-Months	.844	2.132	150.179	.693	-3.369	5.057
		12-Months	-.356	2.093	150.105	.865	-4.491	3.779
	6-Months	Pre	3.074	2.160	150.402	.157	-1.195	7.342
		8-Weeks	-.844	2.132	150.179	.693	-5.057	3.369
		12-Months	-1.200	2.093	150.105	.567	-5.335	2.935
	12-Months	Pre	4.274	2.120	150.291	.046	.084	8.463
		8-Weeks	.356	2.093	150.105	.865	-3.779	4.491
		6-Months	1.200	2.093	150.105	.567	-2.935	5.335
Health Coach	Pre	8-Weeks	-4.601	2.158	149.960	.035	-8.865	-.337
		6-Months	-4.709	2.075	149.374	.025	-8.810	-.608
		12-Months	-3.171	2.071	150.495	.128	-7.262	.920
	8-Weeks	Pre	4.601	2.158	149.960	.035	.337	8.865
		6-Months	-.108	2.158	149.960	.960	-4.371	4.156
		12-Months	1.430	2.153	150.999	.508	-2.824	5.685
	6-Months	Pre	4.709	2.075	149.374	.025	.608	8.810
		8-Weeks	.108	2.158	149.960	.960	-4.156	4.371
		12-Months	1.538	2.071	150.495	.459	-2.553	5.629
	12-Months	Pre	3.171	2.071	150.495	.128	-.920	7.262
		8-Weeks	-1.430	2.153	150.999	.508	-5.685	2.824
		6-Months	-1.538	2.071	150.495	.459	-5.629	2.553

Significant at $p < .05$

Bioimpedance Hand Held: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-.526	.425	150.874	.218	-1.365	.314
		6-Months	.521	.419	150.839	.216	-.308	1.349
		12-Months	.028	.413	151.079	.945	-.788	.845
	8-Weeks	Pre	.526	.425	150.874	.218	-.314	1.365
		6-Months	1.046	.431	150.914	.016	.196	1.897
		12-Months	.554	.425	151.134	.194	-.285	1.394
	6-Months	Pre	-.521	.419	150.839	.216	-1.349	.308
		8-Weeks	-1.046	.431	150.914	.016	-1.897	-.196
		12-Months	-.492	.419	151.106	.242	-1.320	.336
	12-Months	Pre	-.028	.413	151.079	.945	-.845	.788
		8-Weeks	-.554	.425	151.134	.194	-1.394	.285
		6-Months	.492	.419	151.106	.242	-.336	1.320
Health Coach	Pre	8-Weeks	.435	.409	150.869	.289	-.372	1.242
		6-Months	.298	.399	150.804	.456	-.489	1.086
		12-Months	.332	.399	150.804	.406	-.455	1.120
	8-Weeks	Pre	-.435	.409	150.869	.289	-1.242	.372
		6-Months	-.137	.409	150.869	.738	-.944	.671
		12-Months	-.103	.409	150.869	.802	-.910	.705
	6-Months	Pre	-.298	.399	150.804	.456	-1.086	.489
		8-Weeks	.137	.409	150.869	.738	-.671	.944
		12-Months	.034	.399	150.804	.932	-.754	.821
	12-Months	Pre	-.332	.399	150.804	.406	-1.120	.455
		8-Weeks	.103	.409	150.869	.802	-.705	.910
		6-Months	-.034	.399	150.804	.932	-.821	.754

Significant at $p < .05$

Total Mass: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.387	.472	156.996	.414	-.546	1.320
		6-Months	.671	.478	157.000	.163	-.274	1.616
		12-Months	.023	.467	156.993	.961	-.899	.944
	8-Weeks	Pre	-.387	.472	156.996	.414	-1.320	.546
		6-Months	.284	.484	157.003	.558	-.673	1.241
		12-Months	-.364	.472	156.996	.442	-1.297	.569
	6-Months	Pre	-.671	.478	157.000	.163	-1.616	.274
		8-Weeks	-.284	.484	157.003	.558	-1.241	.673
		12-Months	-.648	.478	157.000	.177	-1.593	.297
	12-Months	Pre	-.023	.467	156.993	.961	-.944	.899
		8-Weeks	.364	.472	156.996	.442	-.569	1.297
		6-Months	.648	.478	157.000	.177	-.297	1.593
Health Coach	Pre	8-Weeks	1.298	.478	157.000	.007	.353	2.243
		6-Months	.806	.467	156.993	.086	-.115	1.728
		12-Months	-.234	.467	156.993	.616	-1.156	.687
	8-Weeks	Pre	-1.298	.478	157.000	.007	-2.243	-.353
		6-Months	-.491	.478	157.000	.306	-1.436	.454
		12-Months	-1.532	.478	157.000	.002	-2.477	-.587
	6-Months	Pre	-.806	.467	156.993	.086	-1.728	.115
		8-Weeks	.491	.478	157.000	.306	-.454	1.436
		12-Months	-1.041	.467	156.993	.027	-1.962	-.119
	12-Months	Pre	.234	.467	156.993	.616	-.687	1.156
		8-Weeks	1.532	.478	157.000	.002	.587	2.477
		6-Months	1.041	.467	156.993	.027	.119	1.962

Significant at $p < .05$

Bioimpedance, Foot Scale: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.952	.864	149.239	.272	-.755	2.659
		6-Months	-.444	.852	149.153	.603	-2.127	1.240
		12-Months	-.919	.841	149.069	.276	-2.581	.743
	8-Weeks	Pre	-.952	.864	149.239	.272	-2.659	.755
		6-Months	-1.395	.875	149.335	.113	-3.125	.334
		12-Months	-1.871	.864	149.239	.032	-3.578	-.164
	6-Months	Pre	.444	.852	149.153	.603	-1.240	2.127
		8-Weeks	1.395	.875	149.335	.113	-.334	3.125
		12-Months	-.476	.852	149.153	.578	-2.159	1.208
	12-Months	Pre	.919	.841	149.069	.276	-.743	2.581
		8-Weeks	1.871	.864	149.239	.032	.164	3.578
		6-Months	.476	.852	149.153	.578	-1.208	2.159
Health Coach	Pre	8-Weeks	-.247	.831	149.227	.767	-1.888	1.395
		6-Months	.305	.821	149.236	.711	-1.319	1.928
		12-Months	-.810	.821	149.236	.326	-2.433	.813
	8-Weeks	Pre	.247	.831	149.227	.767	-1.395	1.888
		6-Months	.551	.842	149.419	.514	-1.113	2.215
		12-Months	-.563	.842	149.419	.505	-2.227	1.101
	6-Months	Pre	-.305	.821	149.236	.711	-1.928	1.319
		8-Weeks	-.551	.842	149.419	.514	-2.215	1.113
		12-Months	-1.115	.825	149.069	.179	-2.746	.516
	12-Months	Pre	.810	.821	149.236	.326	-.813	2.433
		8-Weeks	.563	.842	149.419	.505	-1.101	2.227
		6-Months	1.115	.825	149.069	.179	-.516	2.746

Significant at $p < .05$

Body Mass Index: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.114	.177	156.995	.520	-.235	.463
		6-Months	.196	.179	156.999	.276	-.158	.549
		12-Months	-.068	.175	156.991	.698	-.413	.277
	8-Weeks	Pre	-.114	.177	156.995	.520	-.463	.235
		6-Months	.082	.181	157.004	.652	-.276	.440
		12-Months	-.182	.177	156.995	.305	-.531	.167
	6-Months	Pre	-.196	.179	156.999	.276	-.549	.158
		8-Weeks	-.082	.181	157.004	.652	-.440	.276
		12-Months	-.264	.179	156.999	.143	-.617	.090
	12-Months	Pre	.068	.175	156.991	.698	-.277	.413
		8-Weeks	.182	.177	156.995	.305	-.167	.531
		6-Months	.264	.179	156.999	.143	-.090	.617
Health Coach	Pre	8-Weeks	.431	.179	156.999	.017	.077	.784
		6-Months	.287	.175	156.991	.102	-.058	.632
		12-Months	-.111	.175	156.991	.526	-.456	.234
	8-Weeks	Pre	-.431	.179	156.999	.017	-.784	-.077
		6-Months	-.144	.179	156.999	.424	-.497	.210
		12-Months	-.542	.179	156.999	.003	-.895	-.188
	6-Months	Pre	-.287	.175	156.991	.102	-.632	.058
		8-Weeks	.144	.179	156.999	.424	-.210	.497
		12-Months	-.398	.175	156.991	.024	-.743	-.053
	12-Months	Pre	.111	.175	156.991	.526	-.234	.456
		8-Weeks	.542	.179	156.999	.003	.188	.895
		6-Months	.398	.175	156.991	.024	.053	.743

Significant at $p < .05$

Waist Circumference: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.513	.543	156.989	.347	-.561	1.586
		6-Months	.884	.550	157.000	.110	-.203	1.972
		12-Months	.195	.537	156.978	.717	-.866	1.255
	8-Weeks	Pre	-.513	.543	156.989	.347	-1.586	.561
		6-Months	.372	.557	157.012	.505	-.729	1.472
		12-Months	-.318	.543	156.989	.559	-1.391	.756
	6-Months	Pre	-.884	.550	157.000	.110	-1.972	.203
		8-Weeks	-.372	.557	157.012	.505	-1.472	.729
		12-Months	-.690	.550	157.000	.212	-1.777	.398
	12-Months	Pre	-.195	.537	156.978	.717	-1.255	.866
		8-Weeks	.318	.543	156.989	.559	-.756	1.391
		6-Months	.690	.550	157.000	.212	-.398	1.777
Health Coach	Pre	8-Weeks	1.189	.550	157.000	.032	.101	2.276
		6-Months	1.412	.537	156.978	.009	.352	2.473
		12-Months	.612	.537	156.978	.256	-.448	1.673
	8-Weeks	Pre	-1.189	.550	157.000	.032	-2.276	-.101
		6-Months	.224	.550	157.000	.685	-.863	1.311
		12-Months	-.576	.550	157.000	.297	-1.663	.511
	6-Months	Pre	-1.412	.537	156.978	.009	-2.473	-.352
		8-Weeks	-.224	.550	157.000	.685	-1.311	.863
		12-Months	-.800	.537	156.978	.138	-1.860	.260
	12-Months	Pre	-.612	.537	156.978	.256	-1.673	.448
		8-Weeks	.576	.550	157.000	.297	-.511	1.663
		6-Months	.800	.537	156.978	.138	-.260	1.860

Significant at $p < .05$

Hip Circumference: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	.346	.395	156.993	.382	-.435	1.127
		6-Months	.522	.401	156.998	.194	-.269	1.313
		12-Months	-.075	.391	156.988	.848	-.847	.697
	8-Weeks	Pre	-.346	.395	156.993	.382	-1.127	.435
		6-Months	.176	.405	157.003	.666	-.625	.976
		12-Months	-.421	.395	156.993	.288	-1.202	.360
	6-Months	Pre	-.522	.401	156.998	.194	-1.313	.269
		8-Weeks	-.176	.405	157.003	.666	-.976	.625
		12-Months	-.597	.401	156.998	.138	-1.388	.194
	12-Months	Pre	.075	.391	156.988	.848	-.697	.847
		8-Weeks	.421	.395	156.993	.288	-.360	1.202
		6-Months	.597	.401	156.998	.138	-.194	1.388
Health Coach	Pre	8-Weeks	.996	.401	156.998	.014	.205	1.787
		6-Months	.796	.391	156.988	.043	.025	1.568
		12-Months	-.179	.391	156.988	.648	-.950	.593
	8-Weeks	Pre	-.996	.401	156.998	.014	-1.787	-.205
		6-Months	-.200	.401	156.998	.618	-.991	.591
		12-Months	-1.175	.401	156.998	.004	-1.966	-.384
	6-Months	Pre	-.796	.391	156.988	.043	-1.568	-.025
		8-Weeks	.200	.401	156.998	.618	-.591	.991
		12-Months	-.975	.391	156.988	.014	-1.747	-.203
	12-Months	Pre	.179	.391	156.988	.648	-.593	.950
		8-Weeks	1.175	.401	156.998	.004	.384	1.966
		6-Months	.975	.391	156.988	.014	.203	1.747

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL),Physical Comfort: Parent

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-.302	1.456	146.211	.836	-3.179	2.574
		6-Months	-3.044	1.448	146.298	.037	-5.905	-.182
		12-Months	-.707	1.407	146.092	.616	-3.488	2.075
	8-Weeks	Pre	.302	1.456	146.211	.836	-2.574	3.179
		6-Months	-2.741	1.424	146.020	.056	-5.556	.074
		12-Months	-.404	1.411	146.171	.775	-3.193	2.385
	6-Months	Pre	3.044	1.448	146.298	.037	.182	5.905
		8-Weeks	2.741	1.424	146.020	.056	-.074	5.556
		12-Months	2.337	1.391	146.099	.095	-.412	5.085
	12-Months	Pre	.707	1.407	146.092	.616	-2.075	3.488
		8-Weeks	.404	1.411	146.171	.775	-2.385	3.193
		6-Months	-2.337	1.391	146.099	.095	-5.085	.412
Health Coach	Pre	8-Weeks	1.354	1.467	146.311	.357	-1.545	4.254
		6-Months	1.186	1.404	145.932	.400	-1.588	3.960
		12-Months	.792	1.391	146.100	.570	-1.957	3.541
	8-Weeks	Pre	-1.354	1.467	146.311	.357	-4.254	1.545
		6-Months	-.168	1.467	146.311	.909	-3.068	2.731
		12-Months	-.562	1.426	146.093	.694	-3.380	2.255
	6-Months	Pre	-1.186	1.404	145.932	.400	-3.960	1.588
		8-Weeks	.168	1.467	146.311	.909	-2.731	3.068
		12-Months	-.394	1.391	146.100	.777	-3.143	2.355
	12-Months	Pre	-.792	1.391	146.100	.570	-3.541	1.957
		8-Weeks	.562	1.426	146.093	.694	-2.255	3.380
		6-Months	.394	1.391	146.100	.777	-2.355	3.143

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL)Parent: Body Esteem

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-2.724	2.940	145.149	.356	-8.535	3.087
		6-Months	-1.867	2.884	145.241	.518	-7.568	3.834
		12-Months	-2.785	2.805	144.782	.322	-8.329	2.758
	8-Weeks	Pre	2.724	2.940	145.149	.356	-3.087	8.535
		6-Months	.857	2.878	144.708	.766	-4.831	6.546
		12-Months	-.061	2.851	145.041	.983	-5.697	5.574
	6-Months	Pre	1.867	2.884	145.241	.518	-3.834	7.568
		8-Weeks	-.857	2.878	144.708	.766	-6.546	4.831
		12-Months	-.918	2.772	144.793	.741	-6.396	4.560
	12-Months	Pre	2.785	2.805	144.782	.322	-2.758	8.329
		8-Weeks	.061	2.851	145.041	.983	-5.574	5.697
		6-Months	.918	2.772	144.793	.741	-4.560	6.396
Health Coach	Pre	8-Weeks	.119	2.922	145.275	.968	-5.657	5.895
		6-Months	1.996	2.798	144.422	.477	-3.535	7.526
		12-Months	.504	2.772	144.794	.856	-4.974	5.982
	8-Weeks	Pre	-.119	2.922	145.275	.968	-5.895	5.657
		6-Months	1.877	2.922	145.275	.522	-3.899	7.652
		12-Months	.385	2.841	144.789	.892	-5.230	6.001
	6-Months	Pre	-1.996	2.798	144.422	.477	-7.526	3.535
		8-Weeks	-1.877	2.922	145.275	.522	-7.652	3.899
		12-Months	-1.491	2.772	144.794	.591	-6.969	3.987
	12-Months	Pre	-.504	2.772	144.794	.856	-5.982	4.974
		8-Weeks	-.385	2.841	144.789	.892	-6.001	5.230
		6-Months	1.491	2.772	144.794	.591	-3.987	6.969

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL)Parent: Social Life

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-2.190	1.125	141.496	.054	-4.414	.034
		6-Months	-2.841	1.105	141.532	.011	-5.025	-.657
		12-Months	-2.360	1.103	142.188	.034	-4.541	-.179
	8-Weeks	Pre	2.190	1.125	141.496	.054	-.034	4.414
		6-Months	-.652	1.072	141.429	.544	-2.771	1.468
		12-Months	-.171	1.071	142.126	.874	-2.287	1.946
	6-Months	Pre	2.841	1.105	141.532	.011	.657	5.025
		8-Weeks	.652	1.072	141.429	.544	-1.468	2.771
		12-Months	.481	1.041	142.009	.645	-1.576	2.538
	12-Months	Pre	2.360	1.103	142.188	.034	.179	4.541
		8-Weeks	.171	1.071	142.126	.874	-1.946	2.287
		6-Months	-.481	1.041	142.009	.645	-2.538	1.576
Health Coach	Pre	8-Weeks	-1.217	1.089	141.739	.266	-3.369	.936
		6-Months	-.769	1.042	141.272	.462	-2.829	1.291
		12-Months	-1.107	1.032	141.478	.285	-3.148	.934
	8-Weeks	Pre	1.217	1.089	141.739	.266	-.936	3.369
		6-Months	.447	1.089	141.739	.682	-1.706	2.600
		12-Months	.109	1.058	141.471	.918	-1.983	2.202
	6-Months	Pre	.769	1.042	141.272	.462	-1.291	2.829
		8-Weeks	-.447	1.089	141.739	.682	-2.600	1.706
		12-Months	-.338	1.032	141.478	.744	-2.379	1.703
	12-Months	Pre	1.107	1.032	141.478	.285	-.934	3.148
		8-Weeks	-.109	1.058	141.471	.918	-2.202	1.983
		6-Months	.338	1.032	141.478	.744	-1.703	2.379

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL) Parent: Social life

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-.928	1.084	142.305	.393	-3.069	1.214
		6-Months	-2.385	1.064	142.345	.027	-4.488	-.281
		12-Months	-1.567	1.063	143.067	.143	-3.667	.534
	8-Weeks	Pre	.928	1.084	142.305	.393	-1.214	3.069
		6-Months	-1.457	1.033	142.230	.160	-3.499	.584
		12-Months	-.639	1.031	142.997	.536	-2.678	1.399
	6-Months	Pre	2.385	1.064	142.345	.027	.281	4.488
		8-Weeks	1.457	1.033	142.230	.160	-.584	3.499
		12-Months	.818	1.002	142.866	.416	-1.164	2.799
	12-Months	Pre	1.567	1.063	143.067	.143	-.534	3.667
		8-Weeks	.639	1.031	142.997	.536	-1.399	2.678
		6-Months	-.818	1.002	142.866	.416	-2.799	1.164
Health Coach	Pre	8-Weeks	.909	1.049	142.575	.387	-1.164	2.983
		6-Months	.481	1.004	142.056	.633	-1.504	2.465
		12-Months	1.403	.995	142.284	.160	-.563	3.369
	8-Weeks	Pre	-.909	1.049	142.575	.387	-2.983	1.164
		6-Months	-.429	1.049	142.575	.683	-2.502	1.645
		12-Months	.494	1.019	142.277	.629	-1.521	2.509
	6-Months	Pre	-.481	1.004	142.056	.633	-2.465	1.504
		8-Weeks	.429	1.049	142.575	.683	-1.645	2.502
		12-Months	.923	.995	142.284	.355	-1.043	2.889
	12-Months	Pre	-1.403	.995	142.284	.160	-3.369	.563
		8-Weeks	-.494	1.019	142.277	.629	-2.509	1.521
		6-Months	-.923	.995	142.284	.355	-2.889	1.043

Significant at $p < .05$

Impact of Weight on Quality of Life (IWQOL) Parent: Total

Group	(I) Assessment	(J) Assessment	Mean Difference (I-J)	Std. Error	df	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
Standard Treatment	Pre	8-Weeks	-1.077	1.434	145.970	.454	-3.911	1.758
		6-Months	-3.167	1.427	146.078	.028	-5.986	-.347
		12-Months	-3.321	1.387	145.821	.018	-6.062	-.581
	8-Weeks	Pre	1.077	1.434	145.970	.454	-1.758	3.911
		6-Months	-2.090	1.403	145.731	.139	-4.864	.684
		12-Months	-2.245	1.390	145.920	.109	-4.993	.503
	6-Months	Pre	3.167	1.427	146.078	.028	.347	5.986
		8-Weeks	2.090	1.403	145.731	.139	-.684	4.864
		12-Months	-.155	1.370	145.830	.910	-2.863	2.553
	12-Months	Pre	3.321	1.387	145.821	.018	.581	6.062
		8-Weeks	2.245	1.390	145.920	.109	-.503	4.993
		6-Months	.155	1.370	145.830	.910	-2.553	2.863
Health Coach	Pre	8-Weeks	.452	1.445	146.096	.755	-2.404	3.309
		6-Months	1.051	1.383	145.622	.449	-1.683	3.784
		12-Months	.606	1.370	145.831	.659	-2.102	3.314
	8-Weeks	Pre	-.452	1.445	146.096	.755	-3.309	2.404
		6-Months	.598	1.445	146.096	.680	-2.258	3.455
		12-Months	.154	1.405	145.824	.913	-2.622	2.930
	6-Months	Pre	-1.051	1.383	145.622	.449	-3.784	1.683
		8-Weeks	-.598	1.445	146.096	.680	-3.455	2.258
		12-Months	-.444	1.370	145.831	.746	-3.153	2.264
	12-Months	Pre	-.606	1.370	145.831	.659	-3.314	2.102
		8-Weeks	-.154	1.405	145.824	.913	-2.930	2.622
		6-Months	.444	1.370	145.831	.746	-2.264	3.153

Significant at $p < .05$

Appendix 20: Demographics Table

Demographics Table

Age (Years)	14.15	
Groups (Sex)	Male	Female
Standard Treatment (*n* / %)	16 (57%)	12 (43%)
Health Coach (*n* / %)	7 (25 %)	21 (75 %)
	Standard Treatment	Health Coach
Total Percent body fat (M/SD)	45.61 (5.33)	44.57 (6.94)
Total Fat (Kg) (M/SD)	34.75 (9.40)	32.77 (9.44)
BMI, mean (M/SD)	30.88 (2.19)	29.132(2.22)
Participants (Facility)	Standard Treatment	Health Coach
Bundoora	4	5
Diamond Valley	4	6
Essendon	6	6
Hoppers Crossing	6	5
Melton	4	3
Monbulk	2	2
Yarra Junction	2	1