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**Childhood Obesity Prevention: A Parent Administered
Behavioural Intervention to Increase Child Physical
Activity**

A thesis
submitted in partial fulfilment
of the requirements for the degree of
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ABSTRACT

Obesity is a complex and increasingly prevalent health disorder that is associated with a wide range of medical, social, and psychological difficulties. People are more likely to be obese if they consume an energy dense diet but do not engage in physical activity. Research has indicated that interventions, when implemented during childhood, have long-term outcomes that are superior to interventions implemented in adulthood. This research piloted a behaviourally based intervention programme, with parents as the agents of change, to promote a lifestyle change for inactive children. The programme focussed on increasing physical play (lifestyle activity) and on decreasing sedentary behaviour (an obesity promoting behaviour) during children's after school leisure time. The intervention was investigated using three case studies. Although no conclusive evidence was gained regarding the effectiveness of the pilot programme there was some evidence that children participating reduced their amount of sedentary behaviour and increased the amount of time they spent in physical play. There was also evidence that parents were able to administer the programme and that they found it useful. The results from the present study suggest that the development and application of parent administered behavioural programmes, in the form of packaged interventions to prevent child obesity, warrant further investigation both in terms of the benefits and cost-effectiveness it could offer parents and practitioners alike.

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CHAPTER ONE

A Review of the Literature

1.1 *Introduction*

In this review of the literature I will briefly outline why childhood obesity and overweight is a public health concern and why intervention and prevention should be directed at childhood. Furthermore, I will examine the relationship between sedentary behaviour and the increasing prevalence of child obesity and how reducing sedentary behaviour and increasing physical activity, focussing on lifestyle activity, may be a suitable and achievable protective strategy against childhood and/or adult obesity.

It is important to note that because there is still only a small body of New Zealand literature on this topic the majority of the material referred to in this review has come from the United States of America and other countries in which this topic is a prevalent health concern.

1.2 *Child obesity is a growing concern*

Obesity is a complex and increasingly prevalent health disorder that is associated with a wide range of medical, social, and psychological difficulties. Eissa and Gunner (2004) define the standard medical assessment of child obesity as being a Body Mass Index (BMI) greater than, or equal to, the “95th percentile for age and gender. Children with a BMI between the 85th to 95th percentile for age and gender are defined as being at risk of obesity “(p.35). A BMI is calculated by weight in kilograms divided by height in meters squared (kg/m^2); once a BMI has been calculated for an individual it is interpreted using gender specific percentile charts (Eissa & Gunner, 2004).

People are more likely to be obese if they consume an energy dense diet but do not engage in physical activity (Ministry of Health, 2001b). Obesity is recognised as a major risk factor for cardiovascular disease, type 2 diabetes, high cholesterol, and sleep problems (Jerum & Melnyk, 2001; Peregrin, 2001; Skybo & Ryan-Wenger, 2002). Individuals who are obese are two to three times more likely to develop coronary heart disease than those who are not obese (Ministry of Health, 2001b).

When obesity is present during childhood it is more likely to persist through adolescence and into adulthood (Baranowski et al., 2000; Jerum & Melnyk, 2001). Obesity in adulthood with the associated health complications can be fatal. Although the complications in childhood obesity are not usually as severe as those associated with adult obesity, childhood obesity is now becoming increasingly associated with serious health complications such as type 2 diabetes, hypertension, orthopaedic disorders, and sleep disorders (Baranowski et al., 2000; Barlow & Dietz, 1998; Wadden, Brownell & Foster, 2002).

In the New Zealand Health Strategy obesity reduction has been targeted as one of thirteen priority population health areas to be addressed specifically by District Health Boards (DHB) (Ministry of Health 2001a). The New Zealand Obesity Toolkit acknowledges the importance of increasing levels of physical activity as part of the treatment and prevention of obesity (Ministry of Health 2001a).

1.2.1 *Prevalence*

Obesity is becoming increasingly prevalent in the western world; it is to the point where many are describing this phenomenon as an epidemic (Ebbeling, Pawlak & Ludwig, 2002; Elrick, Samaras & Demas 2002; Wadden et al., 2002). In the United States of America (USA), estimates of adult overweight and obesity are approximately 50 to 60 percent of the population (Elrick et al., 2002; United States Department of Health and Human Services 2001; Wadden et al., 2002). In the last ten years it has also been estimated that European countries have seen a 10 to 40 percent increase in obesity prevalence (Elrick et al., 2002).

In 2003 21 percent of New Zealand adults (aged 15 years and older) and 10 percent of New Zealand children, aged from 5 to 14 years old, were classified as obese (Ministry of Social Development 2006). It was also found that obesity is the most prevalent in Pacific populations with 48 percent of adult females and 38 percent of adult males in this population being obese. In Māori populations 28 percent of adult females and 29 percent of adult males were found to be obese, while 20 percent of females from European/Other populations and 18 percent of males from European/Other populations were obese.

Child obesity and overweight is also increasing at an alarming rate. Estimates of overweight and obesity in youth (aged two to twenty years) in the USA have been reported as being over twenty percent of the population and it is evident that this figure is rising (Campbell, Waters, O'Meara & Summerbell, 2001). Similarly, it is estimated that approximately 25 percent of Australian children are either overweight or obese (Bongiorno, 2002). The New Zealand National Children's Nutrition Survey (2003) revealed, using international cut-offs, that 21.3 percent of New Zealand children aged five to fourteen years are overweight and that 9.8 percent are obese. Among New Zealand children aged 5 to 14 years in 2002, in Pacific populations 31 percent of females and 26 percent of males were obese, in Māori populations 17 percent of females and 16 percent of males were obese, and in European/Other populations 6 percent of females and 5 percent of males were obese (Ministry of Social Development 2006).

1.2.2 *Issues related to childhood obesity*

As with adults, obesity can negatively impact on both a child's physical and psychological well being (Ebbeling et al., 2002; Vander Wal & Thelen, 2000). Obesity, and the health issues that are associated with it, is conservatively thought to cost public health services in developed countries between two to seven percent of their total health care costs (New Zealand Health Strategy 2001). In the New Zealand Ministry of Health Obesity Toolkit (2001a) it is estimated that obesity cost New Zealand \$135 million in 1996 and it is noted that this is a conservative estimate that did not include costs incurred from chronic disease that are due to obesity. The Toolkit also states that more than one thousand New Zealanders die a year from obesity related complications (Ministry of Health 2001a).

Ebbeling et al. (2002) grouped potential childhood obesity related health problems in several categories including neurological, cardiovascular, endocrine, musculoskeletal, renal, gastrointestinal, pulmonary, and psychosocial. One of the most serious medical consequences of child and adolescent obesity is the development of type 2 diabetes. The incidence of Type 2 diabetes or non-insulin-dependent diabetes mellitus (NIDDM), previously known as adult onset diabetes, is on the increase in adolescent

and child populations (U.S. Department of Health and Human Services 1996). Although individuals may have a genetic propensity (U.S. Department of Health and Human Services 1996), increasing their risk of Type 2 diabetes, the development of this disorder in children is “almost entirely attributable to the paediatric obesity epidemic” (Ebbeling, et al., p.473). Further explanation and discussion concerning these medical conditions is beyond the scope of this review.

The psychosocial consequences of overweight and obesity in childhood can be just as crippling as the physical complications. These consequences can include negative self image and low self efficacy (Ebbeling et al, 2002; French, Story & Perry 1995; Maffei 1999; Vander Wal & Thelen 2000). Obese and overweight children often experience social discrimination such as teasing and peer rejection, which serves to reinforce negative self appraisal. Ebbeling, et al., (2002) also note that previous research has found that “obese children are stereotyped as unhealthy, academically unsuccessful, socially inept, unhygienic, and lazy” (p. 747). Such experiences can increase the risk of developing more serious mental health difficulties such as depression, anxiety and high risk or suicidal behaviour (Ebbeling et al., 2002).

1.2.3 Causes and contributors to childhood obesity

It is largely agreed by experts in the field that no one factor is responsible for the rising epidemic of childhood obesity and obesity, in general. However researchers and health experts alike hypothesise that several factors are likely to interact and contribute to the development of obesity. These factors are often said to include genetics, physiology, poor diet, inactivity, and familial and general lifestyle factors (Arluk, Branch, Swain & Dowling 2003; Baranowski et al., 2000; Ebbeling et al., 2002; Gable & Lutz 2000; Maffei 1999, U.S. Department of Health and Human Services 1996, Wadden et al., 2002; Wake, Hesketh & Waters 2003).

Specific obesity genes have yet to be identified; however, researchers believe that some people may have a genetic predisposition to developing obesity in given conditions such as in the case of excess energy intake and the lack of energy expenditure (Baranowski et al., 2000, Wadden et al., 2002).

As part of an Australian study, parents' perceptions of the barriers to a healthy diet and physical activity for their children were examined (Hesketh, Waters, Green, Salmon, & Williams, 2005). Parents' responses included environmental barriers such as unsafe roads, pollution, neighbours complaining about noisy children, increasing distances between home and school, and a lack of playground equipment. Other themes in parental responses were reported as including a lack of money, distractions in the home such as televisions and computers, decreased physical activity time at school, peer pressure and a lack of parental time. Parents were also reported to be concerned with the contradiction between knowing what a healthy lifestyle includes and the messages received from advertising and media encouraging unhealthy alternatives (Hesketh et al., 2005).

This influx of contradictory messages regarding food consumption and the ever increasing portion size, coupled with the 'time and energy saving' technology designed to promote limited human effort, has been referred to as the 'toxic environment' (Baranowski et al., 2000; Wadden et al., 2002). Referring specifically to the food component, Wadden et al. (2002) note that the western world is increasingly experiencing "unprecedented exposure to energy-dense, heavily advertised, inexpensive and highly accessible foods" (p. 513). They also explain that phenomenon has been compounded even further for children in the USA with a continual de-emphasis of physical activity such as the decline in physical education in schools.

Although the literature notes a lack of scientific evidence surrounding the exact relationship, many experts in the field postulate that high levels of sedentary behaviour coupled with low levels of physical activity, are highly related to the western world's obesity epidemic (Arluk et al., 2003; Ebbeling et al., 2002; Epstein, Paluch, Gordy & Dorn, 2000; Faith et al., 2001; Robinson, 1999). Moreover, a decline in physical activity and increase in sedentary behaviour is a phenomenon that is highly correlated with many other serious health concerns such as coronary heart disease, and high blood pressure (Brunton et al., 2003; Epstein et al., 2000; Robinson, 1999; Secretary of Health and Human Services & Secretary of Education, 2000). Therefore, children who engage in high levels of sedentary behaviour and low levels

of physical activity may be at greater risk of developing obesity and other related health concerns (Arluk et al., 2003; Ebbeling et al., 2002).

1.2.4 *The necessity and advantages of early intervention*

The literature suggests that obesity, in the absence of a medical origin, is considered a preventable disorder. The literature also highlights many sound arguments as to why obesity treatment and prevention should be targeted in childhood.

Children who are obese or overweight are at greater risk of being obese adults (Baranowski et al., 2000). Furthermore, it has been found that children who become more overweight as they get older increase their risk of becoming morbidly obese adults (Maffeis 1999; Steinbeck, 2001). As well as the physical morbidity that develops as a result of obesity, childhood onset also increases the risk of more severe psychosocial dysfunction (Steinbeck, 2001).

An advantage of targeting obesity in children is that they have height and growth potential (Barlow & Dietz, 2002; Steinbeck, 2001). This potential creates opportunity to target weight maintenance as opposed to weight loss. If an overweight or obese child is able to maintain their weight (to a certain point) while growing taller, their BMI will consequently decrease (Barlow & Dietz 2002; Barlow, Trowbridge, Klish & Dietz, 2002).

In addition to growth, children have a greater potential to learn new patterns of behaviour than adults and perhaps even adolescents (Steinbeck 2001). Behavioural programmes have been more successful for children than for adolescents and this may be the result of children having less established obesity promoting habits (Wadden et al., 2002). It is also likely that these results are partly due to the influence that parents have over their children's behaviour. It is also thought that healthy habits established in childhood increase the likelihood of healthy outcomes in adulthood (Baranowski et al., 2000). Baranowski et al. also note that child nutrition and physical activity interventions to reduce and prevent obesity also provide children with many other health and developmental benefits.

1.3 *The role of physical activity and sedentary behaviour in childhood obesity treatment and prevention*

Regular physical activity is an important aspect of a child's physical and mental health and well-being (Baranowski et al., 2000; Brunton et al., 2003; Diloranzo, Stucky-Ropp, Vander Wal & Gotham 1998; Sallis et al., 1999). Moreover, decreasing sedentary behaviour and increasing physical activity are important parts of the equation when considering methods to prevent and treat childhood obesity (Baranowski et al., 2000; Brunton et al., 2003; Steinbeck 2001; U.S. Department of Health and Human Services, 1996). Some authors suggest that a vicious cycle exists; when a child is overweight or obese, they become less active, leading to even less energy expenditure, further compounding their weight issues (McWhorter, Wallman & Alpert, 2003). Unfortunately, today's lifestyle involves a reduction in general lifestyle activity (decreasing energy expenditure) and larger portions of high energy foods (increasing energy intake) (Ebbeling, et al., 2002).

1.3.1 *Physical activity*

The benefits of regularly participating in physical activity, for both adults and children, are numerous. Physical activity is believed to benefit many areas of human functioning and development including physical, cognitive, emotional and psychological health/performance (Baranowski et al., 2000; U.S. Department of Health and Human Services, 1996). When children and adolescents participate regularly in physical activity this has been found to contribute to the development of healthy bones, joints and to building lean muscle (Secretary of Health and Human Services & Secretary of Education, 2000).

Furthermore, being physically active has been shown to reduce the risk of mortality from serious diseases and health disorders such as coronary heart disease, cardiovascular disease and colon cancer in adulthood (U.S. Department of Health and Human Services, 1996). Regular physical activity has also been found to reduce the risk of developing Type 2 diabetes (non-insulin-dependent diabetes mellitus) and obesity (U.S. Department of Health and Human Services).

The amount of physical activity that an individual engages in affects the energy intake and expenditure equation. If a person consumes more energy than they use, the result will be a positive energy balance (Ebbeling, et al., 2002; Epstein et al., 2002).

Bodyweight is regulated by numerous physiological mechanisms that maintain balance between energy intake and energy expenditure. These regulatory systems are extraordinarily precise under normal conditions—e.g., a positive energy balance of only 500 kJ (120 kcal) per day (about one serving of sugar-sweetened soft drink) would produce a 50-kg increase in body mass over 10 years (Ebbeling, et al., 2002, p. 474).

For adults, increased physical activity has been found to be the best predictor of weight loss maintenance (Wadden et al., 2002).

In the report to the President of the United States from the Secretary of Health and Human Services and the Secretary of Education (2000), it is recommended that the least amount of physical activity primary-school aged children should accumulate, from a variety of activities, most days of the week, should be at least 30 to 60 minutes. But it is recommended that children accumulate more than one hour, even up to several hours, of physical activity per day.

Enjoyment is thought to be the major component for children choosing to be physically active and positive social influences such as peers and parents/caregivers can greatly influence this perceived level of enjoyment (McWhorter et al., 2003). Associated with enjoyment is the child's ability to complete the activity; children are more likely to participate if they believe the desired outcome is attainable (Anderssen & Wold 1992; McWhorter et al., 2003). Therefore, making physical activity a positive and fun experience for children is necessary to gain participation, particularly if the child habitually avoids activity.

1.3.2 *Sedentary behaviour and obesity*

In the report to the President from the Secretary of Health and Human Services and the Secretary of Education (2000) it is stated that “children should not have extended periods of inactivity” (p.9). However, research shows children and adults alike are spending an ever increasing amount of time in inactive or sedentary pursuits.

The American Academy of Pediatrics has recommended limitation of television to 1 or 2 hours per day. Such limitation of television, video games, and computer games will compel children to choose other pastimes, most of which will generate more physical activity and may lead to improved weight (Barlow & Dietz 1998, p.37).

A 1999 American survey found that young people aged from two to eighteen years spent an average amount of four hours per day engaged in sedentary recreation (Secretary of Health and Human Services & Secretary of Education 2000). In an Australian study involving 2849 participants, it was found, using parents’ reports, that 41 percent of children spent 11 to 20 hours per week watching television and/or video gaming; 28 percent spent 21 to 30 hours; and 17 percent spent 30 hours or more in these pursuits per week (Wake et al., 2003).

The New Zealand 2002 National Children’s Nutrition Survey found that 33 percent of children aged 5 to 14 years watched 4 to 8 hours of television on the weekend and 22 percent watched 10 to 20 hours during the week (Ministry of Health 2003). The survey results also showed that only 39 percent of children aged 5 to 14 years were found to be very active for at least four days after school (before the evening meal) each week, and that 20 percent reported no activity (Ministry of Health 2003). It was also found that only 52 percent of children were very active on at least four occasions on the weekends, while 12.5 percent reported no activity (Ministry of Health 2003). A Christchurch longitudinal study found that overweight and obesity were increasing in children aged 10 to 14 years, and that fitness levels were declining (Dawson, Hamlin & Ross, 2001).

In their study involving 101 children aged nine to twelve from American Naval families, Arluk et al., (2003) reported a strong positive correlation between the

obesity status of the child's mother and the amount of hours that the child spent in sedentary pursuits. Similar results were observed in an Australian study; however, the proportion of variance in children's Body Mass Indexes accounted for by having an overweight or obese parent was much greater than the variance accounted for by hours spent watching television (Wake et al., 2003). Wake et al. (2003) discussed the relationship between adult BMI and television habits and mentioned that children who watched numerous hours of television were likely to have come from environments where the adults also watched numerous hours of television.

In a longitudinal birth cohort study Hancox, Milne & Poulton (2004) assessed approximately 1000 children born in Dunedin, New Zealand, between 1972 and 1973 at regular intervals, until 2003. During this study participants were assessed at ages five, seven, nine, eleven, thirteen and fifteen years, for the amount time they spent watching television. They found that on average 61 percent of the children sampled spent more than two hours watching television per week day.

The assessment was carried out using parental reports for ages five to eleven and self report was used for ages thirteen and fifteen (the authors note that they had no way of assessing the accuracy of these reports) (Hancox et al., 2004). It was reported that their results showed "that television viewing during childhood and adolescence is associated with overweight, poor cardiorespiratory fitness, raised serum cholesterol, and cigarette smoking in early adulthood" (p.260). Their findings also suggested that television viewing habits established in childhood are likely continue into early adulthood.

Another disadvantage of leading a sedentary lifestyle is that many of these pursuits, particularly television watching, promote energy consumption and often the foods eaten during sedentary pursuits are energy dense and are of lower nutritional value (Epstein et al., 2002; Gable & Lutz, 2000; Steinbeck, 2001). Epstein et al. (2002) concluded that normal weight children are at greater risk of developing obesity if they increase sedentary pursuits such as television watching. Their study, involving thirteen eight to twelve year olds, demonstrated that when targeted sedentary behaviours (such as television viewing) were increased, more energy dense food was

consumed and that this was coupled with less energy expenditure. It was reported that the statistically significant increase in energy balance (a positive energy balance of 350 calories per day) observed in this study could cause children to increase their body weight by 0.32 kilograms per week (Epstein et al., 2002).

Various environmental, technological and social changes have been labelled as responsible for our populations becoming less active (Ebbeling et al., 2002). Parents are now more concerned for their children's safety outside in their neighbourhood (Hesketh et al., 2005). Historically, children may have been encouraged to walk or cycle around their neighbourhood with their friends or to school; however, today, there are many urban areas where parents feel that it is unsafe for their children to be without adult supervision. Parents' concerns include 'stranger danger' and busy dangerous roads. As this concern for child safety has risen, television has also come to replace outdoor activities and busy parents find television an effective babysitter (Steinbeck, 2001). Furthermore, the technological age has given rise to socialising without physically being with friends or leaving home; children can now socialise and play with their friends using the internet and text messaging.

1.3.3 *Lifestyle activity*

Life style physical activity (sometimes termed incidental activity)

... has been defined as the daily accumulation of at least 30 minutes of self-selected activities, which includes all leisure, occupational, or household activities that are at least moderate to vigorous in their intensity and could be planned or unplanned activities that are part of everyday life (Dunn, Andersen & Jakicic 1998, p. 399).

Lifestyle strategies have been found to effectively increase and maintain physical activity levels for previously sedentary adults and children (Dunn et al., 1998).

In their review of lifestyle interventions, Dunn et al., (1998) explained that such interventions focus on increasing moderate amounts and intensities of physical activity within the individual's environment and that these activities are selected by the individual, rather than prescribed. Advantages of a lifestyle intervention include that the actual approach is customised to the individual's lifestyle, activities can be

both planned or unplanned, and that short periods of activity can be accumulated as opposed to completing a prescribed continuous exercise period (Dunn et al., 1998; Wadden et al., 2002).

Further benefits of a life style approach to increasing physical activity are that it may seem more achievable than strict exercise routines to those who currently live sedentary lives; the individual is given the opportunity to determine the activity they will engage in; people do not have to change their lives dramatically to increase their lifestyle activity; lifestyle activity may be more easily maintained than planned exercise routines; and the life style approach has been successfully adapted for various populations including children (Dunn et al., 1998; Wadden et al., 2002).

1.4 Interventions

Various modes of treatment and preventative interventions for child obesity have been developed and tested. These have included medical interventions; school based educational and behavioural interventions; individual and group educational and behavioural interventions; parent-administered educational and behavioural interventions; and multidisciplinary approaches. Wing (2003) argues that family based behavioural interventions targeting overweight children and school based behavioural programmes aimed at decreasing television watching seem to be the most successful at preventing adult obesity (Wing 2003). Overall, however, there is still a real need for further research to produce more conclusive evidence regarding what are the most effective, cost and time efficient strategies to treat and prevent childhood and adult obesity (Ebbeling et al., 2002; Reilly, Wilson, Summerbell & Wilson 2002).

In their systematic review of randomised and non-randomised controlled studies of childhood obesity treatments (seven studies met their inclusion criteria), Campbell et al., (2001) found that none of the studies targeted individuals. Six of the seven studies were school or kindergarten based and the seventh was a community based and culturally relevant intervention. Most of the studies focussed on dietary education and increase in physical activity and three included a focus on reducing sedentary behaviours. Four of the studies found a reduction in the prevalence of obesity in the

intervention groups compared to the control groups, while three found no significant difference.

Reilly et al. (2002) used an ‘evidence appraisal’ methodology to identify evidence based answers to a series of questions relating to the prevention and treatment of childhood obesity. Sixteen studies were identified specifically relating to their question ‘is childhood obesity treatable?’ and only three met their inclusion criteria (and “did not have major methodological flaws” (p. 394)). It was reported that the three studies included were complex interventions that focussed on long-term behavioural change. All three studies reportedly involved the family and focussed on diet combined with increasing physical activity levels via lifestyle activity interventions and/or a focus on reduction in sedentary behaviour. It was also reported that all three studies showed significant reduction in overweight and obesity. From the studies reviewed the authors concluded that treatments that reduce sedentary behaviour are particularly promising and require further research. They also recommend that treatment efforts should involve the family and aim to create behaviour change such as improving diet, increasing physical activity (at least 30 minutes of moderate activity on most days) and decreasing sedentary pursuits (less than 2 hours of television watching or computer gaming per day), rather than focusing solely on weight-loss, (Reilly et al., 2002).

1.4.1 *Behavioural change theory and childhood obesity*

Behavioural interventions have been developed to target individuals, families and groups and all are designed with the basic premise of reducing obesity promoting behaviour and increasing healthier alternatives.

Behaviour change theory focuses on the contingencies that shape how we react to the world around us and how altering these contingencies can serve to alter behaviour. Consequences, as reactions to behaviours, can be either rewards or punishments. By definition, a reward, or reinforcement, means it will serve to increase, strengthen or maintain the behaviour it has followed. Conversely, a punishment will weaken the behaviour it has followed. Clinical evidence suggests that reinforcing desirable

alternative behaviours can be more successful and produce longer lasting results than punishing undesirable behaviours (Flick, 1988; Martin & Pear, 2003).

The behavioural model of obesity assumes that an individual has dysfunctional eating and activity patterns which lead to a positive energy balance (i.e. more energy than required) and that the surplus energy leads to the accumulation of excess weight over time (Handen, 1995). From a behavioural perspective, it may be assumed that behaviours which promote positive energy balance, such as sedentary pursuits and consuming energy dense food, are reinforcing for the individual. Therefore, when applying behavioural change theory and considering clinical research it might be supposed that reinforcing alternative behaviours that do not promote obesity (e.g. physical activity as opposed to sedentary pursuits) may be an effective measure to decrease obesity related behaviours and serve to reduce the accumulation of excess weight. Of course, the strength of the reinforcement will need to be considered. Many behavioural treatments or prevention efforts target those behaviours that are thought to cause positive energy balance.

In their chapter on childhood obesity, Foreyt and Goodrick (1995) state that behavioural interventions have been found to be more effective in treating child obesity than educational interventions. They also note that certain components that make behavioural treatments for child obesity successful. These components included: parental involvement; lifestyle exercise; enjoyable rather than punitive approaches; monitoring; charting progress; and they also recommended a multidisciplinary approach (Foreyt & Goodrick, 1995).

In a single case study Jason and Brackshaw (1999) made television viewing contingent on cycling on a stationary bicycle for an obese 11 year old who was reported by her parents to watch 6 to 10 hours of television per day. The experiment successfully reduced the number of hours spent watching television and child was also reported to have lost weight. The changes were maintained at follow up and it was thought that the weight loss and continued reduction in television viewing was subsequent to the child choosing alternative activities including physical activities (like sports and playing with friends) and that these activities were self-reinforcing

(or intrinsically reinforcing) for the child and were therefore maintained (Jason & Brackshaw, 1999).

Similarly, in their study, Faith, Fontaine, Cheskin, and Allison (2001) made television-viewing contingent on pedalling a stationary bicycle for six obese children (in the experimental group) aged from eight to twelve years old. The results from this study demonstrated that television-viewing contingent on cycling can significantly decrease hours spent watching television and increase minutes spent cycling for obese children. It was also found that the experimental group had significantly greater reductions in body fat than the control group (consisting of four obese children). The authors do, however, caution that they did not measure changes in other behaviours and variables such as eating and calorific intake, which may have resulted from increased time cycling and therefore contributed to the reductions found in body fat (Faith et al., 2001).

Token economies and points systems have regularly been found to be an effective tool to create behaviour change in children of various ages (Flick, 1988; Martin & Pear, 2003). These programmes rely on the child earning points or tokens, for particular behaviours, that can later be exchanged for ‘back-up’ reinforcers (a pre-determined reward). The tokens or points earned are, in effect, conditioned reinforcers as they have reinforcing power because they are paired with a back-up reinforcer; by themselves, a point or token is unlikely to have a great deal of reinforcing power. The advantage of conditioned reinforcers such as tokens or points is that they can usually be delivered more immediately in the presence of the desired behaviour and serve to bridge the gap between the desired behaviour and the delayed or back-up reinforcer (Martin & Pear, 2003).

Wolf, Mendes and Facto (1984) found their parent-administered behavioural intervention, using a token system, to be successful in reducing time spent watching television for five children aged between eight and twelve years old. It was reported that time spent watching television was reduced to less than half the baseline levels and that reductions were maintained one year after the intervention was terminated.

1.4.2 *Parents as agents of change*

Although obesity is deemed a societal epidemic, change needs to take place at the individual or familial level as well as at a society level. In the case of childhood obesity it makes sense that parents (or primary caregivers) are the agents of behaviour change in the home setting. However, several factors may impact on how successful parents will be as agents of change in the face of overweight and obesity. Firstly, if parents do not perceive childhood overweight and obesity as a health risk it is unlikely they will be motivated to change. Secondly, if parents do not perceive their child to have a weight problem (when they do) they are unlikely to instigate change and, thirdly, if parents do not have any strategies to target the problem they will be unlikely to make change.

In a recent American study, 151 parents, of children (aged 2 to 12 years) who had been identified as having a BMI greater than, or equal to, the 85th percentile for their age and gender, were assessed, using a Likert scale, for their perceptions about weight and their readiness to make lifestyle changes to improve their child's weight (Rhee, De Lago, Arscott-Mills, Mehta, & Davis, 2005). The study was based on Prochaska and DiClemente's theoretical model of the five stages of behaviour change, which have been shown to be applicable to adult weight control behaviours (Rhee et al., 2005). These stages include: the pre-contemplation stage, when the individual is not aware that there is a problem and/or has not shown interest in making changes in the near future; the contemplation stage, when the individual has recognised there is a problem and shown some interest in changing but has not committed to change; the preparation stage, when the individual is preparing to make changes in the near future (i.e. in the next month); the action stage, is when the individual is currently making changes to resolve their problems; and the maintenance stage, is when the individual is maintaining changes (i.e. over six months) (Prochaska & DiClemente 1992; Rhee et al., 2005).

Rhee et al. (2003) reported that 62 percent of the children in their sample had a BMI equal to or greater than the 95th percentile and would therefore reach the criteria of being obese; the remainder would be categorised as at risk of being obese (BMI of 85 to 95). Only 38 percent of parents were in the preparation or action stages (the

remainder were below). Furthermore, the research findings suggested that parents were more likely to be in the preparation or action stage if they perceived their child's weight to be a health risk and if their child was older (i.e. 8 to 12 years). Conversely, if parents perceived themselves as overweight they were less likely to be in the preparation or action stage and more likely to be at pre-contemplation or the contemplation stage. Although not a statistically significant factor in this study, Rhee et al. (2003) also reported that many parents who perceived their child's weight to be a health concern had also had a healthcare provider express concern for the child's weight.

In another study Etelson, Brand, Patrick, and Shirali (2003) anonymously surveyed 83 parents about their perceptions regarding obesity and their child's health. Seventy-eight percent of parents indicated that they would be "quite" or "extremely" concerned if their child was overweight and 67 percent indicated that they would be "quite" or "extremely" concerned if their child watched too much television. Of the parents surveyed, those with overweight children had the least accurate perceptions of their child's weight and tended to underestimate their child's weight and only 10.5 percent of these parents perceived their child's weight accurately. However, most parents, regardless of their child's weight status, recognised the health risks of obesity and had some understanding of healthy eating habits (Etelson, et al., 2003).

Myers and Vargas (2000) surveyed 200 parents of obese preschool children; 95 percent of parents in the sample were Hispanic. The results indicated that 7 percent of parents thought their child was mildly overweight and a further 47 percent of parents perceived their child to be overweight. However, just over 35 percent of parents did not think that their obese child was overweight at all (Myers & Vargas, 2000). This could be an indication that, while obesity is becoming more prevalent it is also becoming more socially acceptable, at least in particular populations.

Golan, Weizman, Apter, and Fainaru (1998) compared two childhood obesity interventions. A 'conventional' approach, where the children were the agents of change (control group), was compared with an intervention where the parents were the exclusive agents of change (experimental group) (Golan et al., 1998). They

reported that the results for the control group were similar to other studies that focussed on children as the agents of change; however, they reported that the weight loss results were superior and the dropout rate was lower for the experimental group, compared to the control group. The experimental group lost a greater percentage of weight and had better maintenance of weight lost than the control group. It was also reported that obese parents in the experimental group also lost weight because they actively participated in the intervention.

In a later paper, Golan and Crow (2004b) tracked the long-term results for the study described above. Fifty out of the sixty original participants were located and follow up data was collected seven years after the intervention termination. Overall, the experimental group was reported to have superior weight loss at each of the one, two and seven year follow-up points (Golan & Crow 2004b).

Golan and Crow (2004) argue that “effective interventions for prevention and treatment of weight-related problems should be approached from a health-centered perspective, with the parents as central agents of change” (p.39). They also stated that when children are their own change agents they are more likely to resist and rebel against the change demands placed on them. Ultimately they considered using parents as change agents as advantageous because parents serve as “both as a source of authority and as a role model for their children” (p.45). Previous research shows that parents play an important role in how active their children are. Parents who model active lifestyles and encourage activity are more likely to have active children (Golan & Crow 2004a; McWhorter et al., 2003; U.S. Department of Health and Human Services, 1996). However it has been found that obesity runs in families (Birch & Fisher, 1998) which may provide further evidence child obesity management needs to be focussed at familial level.

1.4.3 *Lifestyle change*

Much of the preventative health literature suggests lifestyle changes are the fundamental components in preventing ill health (Brunton et al., 2003; Faith et al., 2000). In particular, participating in regular physical activity and reducing sedentary recreation as a part of daily life is considered particularly beneficial to good health and the prevention of overweight and obesity (Barlow et al., 2002; Brunton et al., 2003, Epstein et al.; 2000; Robinson 1999). Lifestyle changes that promote an increase in physical activity are thought to help improve many aspects of health as well as prevent, or even reduce, increases in overweight (Epstein et al., 2002; Faith et al., 2000).

It is important to note that adopting regular physical activity does not need to be in the form of organised sport or structured exercise. It can simply be lifestyle physical activity (as described above), or physical recreation, which involves activity achieved in daily living and leisure time activity (Dunn et al., 1998; U.S. Department of Health and Human Services 1996). Any increase in physical activity may be thought of as beneficial (Faith et al., 2000; U.S. Department of Health and Human Services 1996) and therefore could serve as a protective factor against the development of sedentary related health problems such as obesity.

Furthermore, research has provided evidence that lifestyle interventions that target an increase in physical activity and/or a reduction in sedentary behaviour, have produced positive short-term and long-term results (Dunn et al., 1998). Decreasing sedentary recreation and replacing it with physical activity will also help to improve positive energy balances which arise when energy intake is higher than energy expenditure (Epstein et al., 2002). Additional benefits of replacing sedentary behaviour with physical activity may also include a reduction in caloric intake, as sedentary activities such as television watching have been found to increase eating behaviours as well as the intake of energy dense foods (Ebbeling et al., 2002; Epstein, Paluch, Consalvi, Riordan, & Scholl, 2002; Epstein et al., 2000; Steinbeck 2001).

1.5 *Rationale and goals of this research*

Previous studies involving obese children have indicated that interventions, when implemented during childhood, have long-term outcomes that are superior to interventions implemented in adulthood (Barlow et al., 2002). Furthermore, preventing obesity in childhood is thought to be a more manageable task than overcoming it (Campbell et al., 2001; New Zealand Health Strategy 2001, U.S. Department of Health and Human Services 1996). Therefore, effective interventions that target inactivity and weight problems in childhood are likely to be effective in preventing adult obesity, controlling additional weight gain, and reducing already present excess weight (Barlow et al., 2002; Faith et al., 2000).

As a public health concern, targeting schools to prevent child obesity has been a common and regularly researched approach (Campbell et al., 2001; U.S. Department of Health and Human Services, 1996). However not all individual children will benefit from such a large scale group intervention and schools are too often the only agent made responsible for social change initiatives. It is equally important that such initiatives are generalised to the home as parents and caregivers play a crucial role in a child's lifestyle development (Golan & Crow, 2004b). Encouraging children to participate regularly in physical recreation and activity and reducing their sedentary activity, as part of their daily living, will help prevent the development of obesity (Brunton et al., 2003; Robinson 1999). Furthermore, research has provided evidence that behaviourally based interventions for changing lifestyle patterns, such as those relevant to treating and preventing child obesity, are particularly efficacious (Faith et al., 2001; Faith et al., 2000).

Being physically active is an important health advantage for both children and adults. However, there is little New Zealand research that has specifically investigated interventions to increase child activity levels and reduce sedentary behaviours and even less research that has focussed on parent administered interventions. This research will focus on both the reduction of target sedentary behaviour and the increase of physical activity during children's after school leisure time. The programme essentially encourages a lifestyle change and focuses on lifestyle activity rather than prescribed exercise. Focusing on reducing sedentary recreation and

increasing physical play means that children will be encouraged to substitute target sedentary behaviour with more physical pursuits.

The general aim of this pilot research is, firstly, to investigate whether parent administered behavioural strategies to increase child activity during leisure time, as a packaged intervention, are found to be helpful and achievable by parents and caregivers. The second aim is to assist the future development of a parent administered behavioural resource package to increase child physical activity levels and reduce sedentary behaviours as part of the prevention and management of child obesity (and other health risks related to inactivity). It is envisaged that such a package would then be made available to agencies (such as schools, general practitioners, or community services) to give to parents and caregivers when there is concern about a child's habitual inactivity.

The specific objective of this pilot research is to develop and test a pilot parent administered behavioural strategy package to increase child physical activity levels and reduce target sedentary behaviours during leisure time and to:

1. cause a reduction of sedentary behaviour during leisure time
2. cause an increase of physical activity during leisure time
3. establish whether these goals are achievable using such a package
4. establish whether parents and caregivers consider such a package to be helpful
5. gain feedback from parents and caregivers about the intervention package and how it might be improved or refined
6. use the research findings to suggest how a resource package may be further developed

The intentions of the researcher were to investigate the applicability of a parent administered intervention targeting activity levels as a possible contributing intervention/prevention strategy to address childhood obesity rather than specifically addressing weight reduction. Therefore, it is important to note that, for the purposes of this research, the participants' weight and body composition and energy intake and expenditure were not addressed or measured.

CHAPTER TWO

Research Design and Methodology

2.1 *Introduction*

In this section I will explain both the intervention design and the intended research methodology as well as the outcome methodology.

2.2 *The intervention programme*

The intervention programme was designed as a parent administered behavioural intervention that aimed to reduce time spent in sedentary behaviours, such as television watching and computer gaming, and increase participation in physical play in a child's after school leisure time.

2.2.1 *Target, non-target and physical activity defined*

For the purposes of this intervention programme target activities were defined as sedentary activities that parents, guided by the research goals, perceived as activities that their child could reduce their time in. Parents were advised that such activities might include television watching, sitting listening to music and any kind of computer/video gaming.

Non-target activities included sedentary behaviour that parents did not want their child to reduce their involvement in. Parents were advised that non target activities should include homework and may include other activities such as reading or educational computer gaming depending on their preferences.

For the purposes of this study the definition of physical activity was kept very broad and included any physical play activity where the child was moving most of their body, whether it be at a slow or fast rate (for example when dancing or climbing a tree), or when the child was moving one part of their body fairly vigorously (for example their legs when riding a push bike). The activity did not necessarily require the child's heart rate to increase or for them to 'puff'.

2.2.2 *Intervention design*

The intervention was behaviourally based, using a points system, whereby the child earned points for their participation in agreed (with parents/caregivers) activities. Desirable behaviour was to be reinforced; however, no punishment was to be implemented for non-compliance. At the end of each week children were to receive rewards according to the number of points they had earned during that week. The literature shows that these kinds of interventions for six to twelve year old children can be very successful (Flick 1988; Wolf et al., 1984).

It was intended that parents and caregivers would be completely responsible for the administration of this intervention, including: data collection, deciding on target behaviours, deciding on rewards and the delivery of rewards. Although ideas and suggestions were provided, the rewards, along with target behaviours, were determined individually by each family, and were therefore controlled by the individual family's resources and preferences. The reasons for this approach were twofold. The first intention was to ensure that parents retain their power to determine their own outcomes rather than using a completely prescribed approach that could possibly undermine their position as an expert of their family and their resources. This approach is in accordance with the value of 'active participation' (Principle two) in the code of ethics for psychologists working in New Zealand, which recognises "that clients should actively participate in decisions that affect their welfare"(Code of Ethics Review Group, 2002, p.10). The second reason for such an approach was to provide a family based intervention that was largely independent of outside professional guidance. This could help to minimise cost both for the client and the practitioner involved.

Parents were asked to assess the child's preferences and perceived value of the suggested rewards by using a 'Reinforcement Menu'. Following this, each family was asked to establish a 'rewards list' with each reward item receiving an appropriate points value according to the perceived cost and value to both parent and child (Flick, 1988). However, due to the aims and concerns influencing this study, parents/caregivers were advised to avoid food and sedentary type reinforcers. The following were provided as examples of activity based rewards for points earned:

- A family trip to the beach- 50 points or more
- Having a friend over to play-40 points or more
- A family trip to the park- 30 points
- A family game of spot-light- 25 points
- A family parent/child bike ride in the country- 20 points
- A family game of cricket on the lawn- 15 points

Points were earned on the basis of time spent in either target sedentary activity or physical activity. One point was earned for every half hour that was not spent in the target sedentary behaviours; a second point was earned if the alternative activity the child is engaged in met the criteria for physical activity as operationally defined earlier.

The parent was asked to use momentary time sampling (Martin & Pear, 2003), reviewing the child's activity every 15 minutes, to establish rates of participation in activities. The child was also given the opportunity to keep a record of their daily after-school activity in a diary and, as an additional measure of activity, the child was asked to wear a pedometer from which a daily total was to be recorded. At the end of each day the parent and child were to discuss the child's activity for the afternoon and allocate the points accordingly. To encourage the child to participate in data collection the child was to receive an extra point for every day that they accurately recorded their activity. Parents were also permitted to administer 'bonus points' at their discretion for honesty and effort (relating to this intervention).

Example Points calculations (without bonus points)

- A three hour period/ 0.5hr = 6 possible points for not being involved in target sedentary behaviour.
- +
- A three hour period/ 0.5hr = 6 possible points for being involved in a physical activity.
- +
- For every day that the child accurately records their activity they will receive an extra point
- =
- A maximum of 13 points can be earned each day
- =
- Giving a weekly maximum of (13 points* 5 days) 65 point that can be earned (an additional 5 points could be earned from bonus points)

2.2.3 Resources and materials

To carry out the intervention the parents and caregivers were provided with a resource box. This box contained an ‘instruction and recording booklet’ (see appendix I), a ‘child activity diary’ (see appendix K), a wall chart (see appendix J), a pedometer, a set of SPARC ‘push play’ activity cards’, a tennis ball, a bouncy ball, some giant chalk (for drawing hop-scotch etc.), some balloons, a skipping rope and a copy of an activity and information poster for parents.

Parents were also offered the opportunity to borrow other physical play equipment from the researcher. This equipment included a child’s bowls set, a game of ‘twister’, a scooter, a volleyball set and a child’s tee-ball set.

2.2.4 Measures

As outlined in the intervention design, two components of the child's activities during leisure time were to be measured to determine the effectiveness of the intervention programme. First, a measure of the child's physical activity was to be recorded and, second, a measure of the child's sedentary behaviour during the same time period was also to be recorded in the 'instruction and recording booklet' provided.

A pre-intervention or baseline phase was used to collect a measure of each child's activity and sedentary behaviour prior to the beginning of the intervention, and a follow-up phase was also included to measure activity post-intervention.

Momentary time sampling (Martin & Pear, 2003) was used by parents and caregivers to record the child's participation in sedentary behaviour and physical activity during the baseline, intervention, and post-intervention phases. It was anticipated that baseline recording would take place over three to ten school days and intervention was to be carried out over four weeks, while follow-up was to be an additional week following the withdrawal of the intervention. The parent was asked to observe the child every 15 minutes over a three hour period during their after school leisure time (Monday through to Friday). They were asked to record what the child was doing and then indicate, by ticking the appropriate box, whether the activity was a 'target' sedentary activity, a 'non-target' sedentary activity or a 'physical' activity (see appendix I). A pedometer was also provided to be used to count the child's steps and movement as an additional measure of the child's level of activity. The child was also asked to keep a daily activity diary focussing on the duration of their activities.

2.3 Programme procedure

The 'Instructions and Recording Booklet' (see appendix I) outlined the procedure from baseline through to follow-up and the researcher went through this information with parents/caregivers prior to the research commencement to confirm understanding and to answer any questions. Parents were required to determine which activities they would label 'target' sedentary behaviour and 'non-target' sedentary behaviour. Parents were also asked to identify both inside and outside physical play activities that they would be happy to encourage.

2.3.1 *Baseline*

It was explained in the ‘instruction and recording booklet’ that parents/caregivers were required to collect baseline data before they began the intervention phase and that this would take approximately three to ten days and that the researcher would inform them when they needed to change phases. It was also explained what baseline meant and why it was required.

The instructions regarding data recording outlined that in the recording sheet parents/caregivers would need to note the time they started recording in the first interval box. Parents/caregivers were then instructed to note down the times that they would be sampling their child’s activities over the afternoon. It was also explained that the ‘sampling times’ would need to be in 15 minute blocks.

At each interval parents were required to label the activity the child was involved in, and then tick the appropriate box detailing whether the activity was a ‘target sedentary activity’, a ‘non-target sedentary activity’, or ‘a physical activity’ (see appendix I for example of recording sheet).

Parents were also advised that their child would need to wear a pedometer at the start of the three-hour recording period. At the end of each recording period parents were required to record the number on the pedometer in the space provided at the bottom of the recording sheet.

2.3.2 *Reinforcement Menu and Rewards List*

In preparation for the intervention, parents were required to develop their own reinforcement menu and rewards list. Parents were to determine the ‘rewards list’ to suit their needs and preferences and those of their child and family. To create the rewards list, parents/caregivers were advised to compile a reinforcement menu to determine the rewards to suit their needs and preferences and those of their child. Parents were instructed to begin with a list of things that they would be happy to do or to give to their child as rewards. At the same time, they were instructed to think about the value or cost (time, effort, money etc.) that these rewards would have for

them. Parents were asked to rate their perceived ‘cost’ from 1 to 10 with 10 being the most cost and 1 being no cost in the table provided. Parents were then instructed to give their child a list of the rewards and ask them to rate the rewards from their most preferred (or favourite) to their least preferred. This was intended to give parents an estimate of the child’s perceived value of the reward. It was also suggested to parents that they ask their child if they had any other ideas for rewards (that are not food or sedentary type rewards). To develop the final ‘rewards list’ parents were asked to assign points to the rewards from their own ratings of cost, together with their child’s perceived value of the reward. (see appendix I)

2.3.3 *Intervention*

Parents were advised to begin the intervention phase by explaining to their child the reasons that they think physical activity is important. It was acknowledged that reasons these can be many and varied according to individual perspectives, values and life experiences. Parents were instructed to explain to their child that they were going to implement a ‘reward system’ for four weeks where the child could earn points and gain rewards for choosing to do less sedentary activity and choosing to do more physical play. Parents were advised that they should provide their child examples of the activities they were referring to and to also give them examples from the ‘inside’ and ‘outside play’ activity lists.

Parents were to explain to their child that points would be earned on the basis of time spent in either target sedentary activity, non-target sedentary activity or physical activity. One point would be earned for every half hour that is not spent in the target sedentary activities; a second point would be earned if the alternative activity the child engaged in met the criteria for physical activity. Parents were also required to tell their child that they would be monitoring and writing down what they did during the afternoon; however, they were advised to avoid explaining in too much detail how momentary time sampling works.

Parents were also required to introduce their child to the daily after-school activity diary and encourage the child to record their own afternoon activities. For every day

that the child accurately recorded their own activity, they were to receive an extra point.

At the end of each day, parents were required to discuss with their child the results for the afternoon, allocate the points accordingly and record them on the ‘points/wall chart’ provided (see appendix J). Parents were also permitted to award ‘bonus points’ at their discretion for honesty and effort (only relating to this intervention) or if their child chose a non-target activity but for some reason was not able to do a physical activity instead (such as in the case of a big homework project or sickness).

2.3.4 *Follow-up*

To provide post-intervention data, parents were also asked to collect follow up data. This phase was to proceed the same way as baseline with the parent/caregiver recording the child’s activity without points or rewards. This phase was to last one week at the withdrawal of the intervention.

2.3.5 *Parent/caregiver interview*

Following the intervention, each parent was to participate in a brief half hour semi structured interview (see appendix H) to collect qualitative information about the intervention package and to discover how useful they found it and to gather any suggestions that they had for improvement.

2.4 *The research procedure*

Consultation with Sport Waikato helped guide the proposed research procedure. However, difficulty gaining participants meant that the outcome/actual research procedure deviated from the original proposal. Further ethical consultation occurred and ethical approval was granted to seek participants using additional procedures. Both the proposed research procedure and the actual research procedure are described below. Commentary regarding these procedural outcomes can found in the discussion section.

2.4.1 *The proposed research procedure*

It was intended that a multiple-baseline, across subjects design would be used to conduct this research (Martin & Pear, 2003). According to a multiple baseline procedure, once baseline behaviour is stable (that is clear pattern can be seen in the child's physical and sedentary recreation) the intervention will be administered to the first subject, and their behaviour recorded, while the other subjects continue to be monitored (data recorded) under baseline conditions. When the behaviour of the first subject becomes stable in the presence of the intervention, then intervention will begin for the second subject and continue for the first subject and so on. Parent and child groups (subjects) will be randomly assigned their order of intervention. A multiple-baseline procedure has been shown to reduce threats to internal validity such as maturation and timing of training (Martin & Pear 2003). It was thought that such a procedure would help to control for the effects of weather and other environmental influences on child activity levels.

It was intended that all participants would consist of parents and caregivers of children, aged 8 to 10 years of age, from a local primary school who agreed to be part of the research.

Sport Waikato agreed to support this research and was interested in the outcomes as an intervention such as this could complement the school and community based initiatives that Sport Waikato implement. However Sport Waikato asked that the research be conducted in a school that they saw as suitable because they were conducting a large scale research project and they preferred that this research took place in one of their control schools rather than in one of their intervention schools. I accepted advice and a representative from Sport Waikato directed this research to a control school that they saw as suitable (For details about the Sport Waikato research project see Project Energize www.projectenergize.org.nz/).

The primary school was contacted via a letter to the principal and board of trustees, explaining the research and asking for permission to conduct the research within their school population. The researcher was then invited to meet with the principal and the research and method was discussed further.

Permission was granted by the school principal to seek participants from the parent/caregiver population of children aged 8 to 10 years of age. After consultation with the principal it was decided that contact with parents regarding this research would take place in two steps. First, a letter that briefly explained the project and its goals (see appendix A), was sent home with all children aged 8 to 10 to their parents, and it invited those interested in gaining more information to send a return slip back to their school. Second, those who sent back their return slip were sent home an information pack with their child. The information package (see appendix B) explained the research further and outlined the time commitment involved, participants' responsibilities, and the researcher's responsibilities.

2.4.2 *The screening procedure*

Parents and caregivers, interested in participating, were required to fill in a modified parent version of the Physical Activity Questionnaire (see appendix F) from the NZ Food, NZ Children, National Children's Nutrition Survey (Ministry of Health, 2003), to gain a measure of their child's current level of activity; the Child Behaviour Check List (CBCL) (see appendix M) (Achenbach & Edelbrock, 1983), to screen for any major behaviour or psychological difficulties; and a brief health screen (a Modified version of the Physical Activity Readiness – Questionnaire (PAR-Q) (see appendix G) used in the Summer Camps at Carleton University was used) to check that the child had no existing health problems that may be negatively impacted by increasing physical activity. Once they had been found to have been suitable, and parents had agreed to participate, they were also required to fill out a consent form (see appendix L) explaining that they have agreed to participate in the research.

The child's current level of sedentary versus physical activity during their leisure time was assessed on a case by case basis using the information gathered from the Physical Activity Questionnaire (mentioned above) and qualitative information gained in preliminary discussions with the parents regarding their reasons for wanting to participate. Children who were determined to be already at least moderately physically active during their leisure time were to be excluded, as were those with major behavioural difficulties and those with health problems that would be

negatively impacted by an increase physical activity. The willing participants (see chapter three) who meet the research suitability criteria were asked to fill out a consent form that indicated they have read and understand the nature, goals and commitments of the research and that they are willing to participate.

2.4.3 *The actual procedure*

Twelve parents responded to the initial letter and requested the information pack. However, only one parent indicated that they wanted to be considered for the research. The researcher met with the interested parent and administered the screening procedure which determined the child's suitability for this research. The researcher also explained the programme, the parent and the researcher's responsibilities within the programme in more detail and answered the parent's questions. The screening information was taken away to be scored.

The screening information found the child to be a suitable candidate for the purposes of this research. The parent was then informed and another meeting was scheduled and the parent was given the choice to consent to participate in the research. It was also explained to the parent that if they decided at any point during the research that they wanted to discontinue, that they could do so without prejudice. The parent consented to participate in the research and data collection began, despite having only one participant at this point.

A reminder letter was later sent out to the other eleven parents who indicated their interest to encourage their response if they were interested in participating. Following the reminder letter, a second parent responded and indicated that wanted to be considered for participation. However, the screening results found the second child was unsuitable for the purposes of the current research. It was found that the child was already active in their leisure time and discussion with the parent revealed that the child would regularly choose physical play over sedentary activities. For these reasons, it was explained to the parent that this child was unsuitable as a candidate because their physical activity appeared to already be at the level that the intervention programme intended to produce.

Unfortunately a lack of interested participants meant that alternative methods of attracting participants had to be sought. A request to the Psychology Research Committee was made to recruit psychology student parents, and to use ‘snowballing’ and word of mouth procedures to attract additional candidates. Ethical consent was given to use these techniques.

A lack of simultaneous participants also meant a case study approach was adopted in place of the intended multiple-baseline across subjects approach.

2.5 *Data analysis*

To analyse the quantitative data frequencies were collected and descriptive results were displayed graphically for analysis. Qualitative information was gathered from the post intervention interviews and assessed for common themes.

CHAPTER THREE

Results

3.1 *Introduction*

This section will report the results of this research. To begin, I will briefly outline who the participants were and how they were recruited. I will then report the results of each case study including their suitability, the programme results and the parent interview results.

3.1.1 *Participants*

Out of four interested parties, three children were deemed suitable for the purposes of this research. As explained previously in the method section, only one suitable participant was found using the original proposed method of participant recruitment at a local primary school (see sections 2.4.1. and 2.4.3).

As a result of that lack of interest it was decided that I would attempt to attract more participants by advertising for student parents from the psychology department and to use other snowballing techniques such as word of mouth. Once ethical approval was granted I placed several notices in the psychology department (see appendix D) briefly explaining the research and indicating that more information (see appendix E) could be retrieved from the psychology office. Several people picked up additional information packs; however, only one student came forward wanting to be considered for participation. The screening procedure was applied and this child was found to be suitable.

A third participant was found from the community through word of mouth. This person approached the researcher to find out more about the research and decided one of her children might be suitable and that she was willing to participate. The screening procedure was again applied and the child candidate was found to be suitable.

For the purpose of confidentiality and to protect anonymity, pseudonyms have been given to all participants for the purposes of this report

3.2 Case Study One

The participants for the first case study consisted of a mother and her son, who turned 8 years old during the course of the programme. Mrs Andrews was a working mother of two and Tom had one slightly older sibling living at home with him. Mrs Andrews did not indicate Tom's ethnic group or race on the CBCL form (Child Behaviour Check List).

3.2.1 Suitability

During initial discussions with Mrs Andrews it was discovered that Tom preferred sedentary activities such as television watching and computer gaming to physical activity and that he could be involved in these sedentary pursuits for several hours in succession, both on weekends and after school. Mrs Andrews filled out a modified parent version of the Physical Activity Questionnaire (see appendix F) from the NZ Food, NZ Children, National Children's Nutrition Survey (Ministry of Health, 2003). This was used to provide additional information about Tom's current level of activity.

The following results from the Physical Activity Questionnaire (covering the past seven days), along with information gathered in initial discussions, were considered indicators of habitual inactivity and suitability for the current programme. Tom reportedly watched 4 or more hours of television on the most recent Saturday, and played computer or video games for 2 to 4 hours. On the most recent Sunday, he watched 2 to 4 hours of television and played 2 to 4 hours of computer or video games. He reportedly watched television for 2 to 4 hours every day after school (over the past seven days before filling out this form) and, in addition, he was reported to have played computer or video games on 4 days after school for 1 to 2 hours. It was reported that Tom participated in five physical activities 1 to 2 times during the last seven days; these activities included soccer, trampoline or gymnastics, active games, cycling, climbing or tramping. It was also reported that Tom walked to or from school 3 to 4 times in the last seven days. In the space provided Mrs Andrews reported that her responses represented a moderately typical week for Tom, except

that she more often [than indicated] finds it “easier” and “safer” to drop Tom off and pick him up from school, due to her work commitments.

Mrs Andrews filled out the parent form for the CBCL for ages 6-18 years (see appendix M). The results from this screening tool indicated that Tom did not have any serious behavioural or psychological difficulties that would be likely to be negatively impacted by participating in this programme.

Mrs Andrews filled out the PAR-Q (modified for the purposes of this research) (see appendix G) which indicated that Tom had no existing health problems that may have been negatively impacted by increasing his levels of physical activity.

3.2.2 Programme results

In the ‘instructions and recording booklet’ Mrs Andrews recorded the target sedentary behaviours that she wanted Tom to reduce as [playing on the] ‘computer’, ‘playstation’ and [watching] ‘television’. The non-target sedentary behaviours that were listed included [doing] ‘homework’ and ‘reading’. Table 1 shows the rewards list and corresponding points that were decided for Tom during the intervention phase of the programme. For example, Tom was required to earn 40 points in order to gain the reward of going for a swim.

Table 1. Showing the rewards list and corresponding points for Tom.

<i>Rewards list</i>	<i>Points</i>
Play with a friend	20
Bike ride at school	30
Swimming	40
[go to] Lollipops (an indoor activity park for children)	50
Movies	60
Having a friend over to stay	70

In total, data was collected for thirty-three days, eight days at baseline, and twenty days at intervention and five days at follow-up. Baseline data was collected over two working weeks for Tom. However, this only equated to 8 days out of a possible 10 as the Monday of the second week was a public holiday, and it had been agreed between the researcher and the parent that data collection would be on school days only. The final day of baseline was not recorded due to unforeseen circumstances.

Over the 8 days of baseline, Tom participated in a daily mean of 7.38 15 minute intervals of target sedentary behaviour, 2.13 15 minute intervals of non-target sedentary behaviour and 2.5 15 minute intervals of physical activity over a 180 minute period after school. During the 20 days of the intervention phase, Tom participated in a daily mean of 4 15 minute intervals of target sedentary behaviour, 2.7 15 minute intervals of non-target sedentary behaviour and 5.3 15 minute intervals of physical activity over a 180 minute period after school. Finally, during the follow-up phase Tom participated in a daily mean of 4.2 15 minute intervals of target sedentary behaviour, 1.8 15 minute intervals of non-target sedentary behaviour and 6 15 minute intervals of physical activity over a 180 minute period after school.

Figure 1 shows the distribution of the twelve 15 minute intervals spent in each activity category over the 33 days in each phase. As shown in Figure 1, Tom spent at least six of the twelve 15 minute intervals in target sedentary behaviour every day during baseline and, on one occasion, he spent ten 15 minute intervals in target sedentary behaviour. Tom spent between one and three 15 minute intervals in non-target sedentary behaviour throughout baseline and spent between zero and five 15 minute intervals in physical activity during baseline.

During the intervention phase Figure 1 shows that Tom usually spent between two and six of the twelve 15 minute intervals in target sedentary behaviour. The only exceptions were days sixteen and seventeen when he spent zero and nine 15 minute intervals in target sedentary behaviour respectively. Tom usually spent between two and seven 15 minute intervals in non-target sedentary behaviour throughout the intervention phase. However, on day thirteen he spent ten 15 minute intervals and on days sixteen and twenty-four he spent zero 15 minute intervals in non-target

sedentary behaviour. During the intervention phase, Tom usually spent between two and nine 15 minute intervals participating in physical activity; however, on day thirteen Tom participated in no physical activity during the recording period.

During the follow-up phase Figure 1 shows that Tom spent between zero and seven of the twelve 15 minute intervals in sedentary pursuits and between zero and five 15 minute intervals in non-target sedentary pursuits. Figure 1 also shows that Tom spent between five and seven of the twelve 15 minute intervals in physical activity during the follow-up phase.

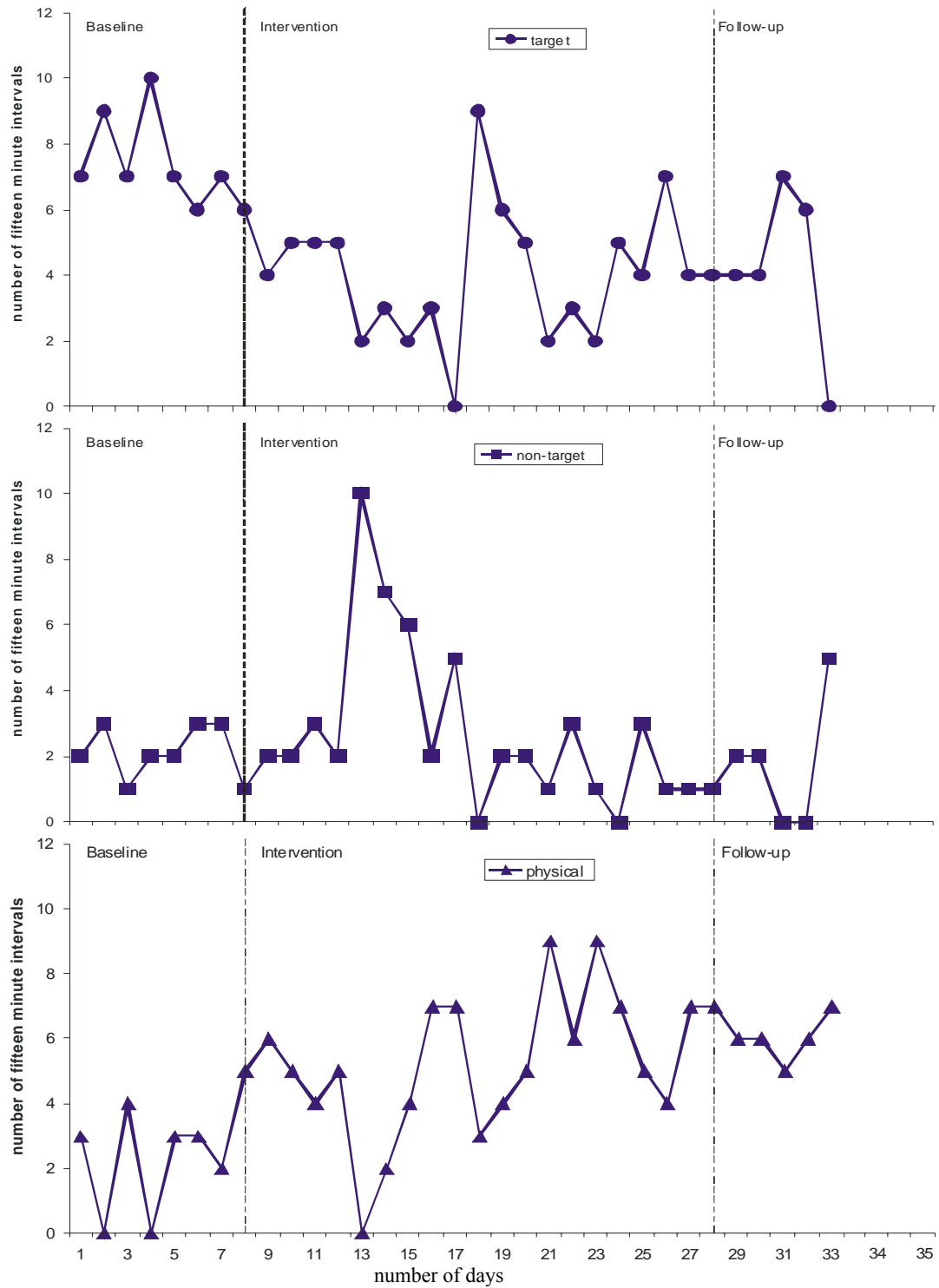


Figure 1. The number of 15 minute intervals that Tom spent in target, non-target and sedentary activities over 33 days consisting of baseline, intervention and follow-up phases.

Mrs Andrews recorded Tom's pedometer readings on most days; however she reported that she did not think they were accurate because she found that Tom had taken it off and had played with it on various occasions and that he often 'jiggles' in his seat when he plays on the computer. Mrs Andrews said on some occasions the pedometer reading was not recorded because she had confiscated it from Tom for misuse. Figure 2 shows the pedometer readings over the 33 day period.

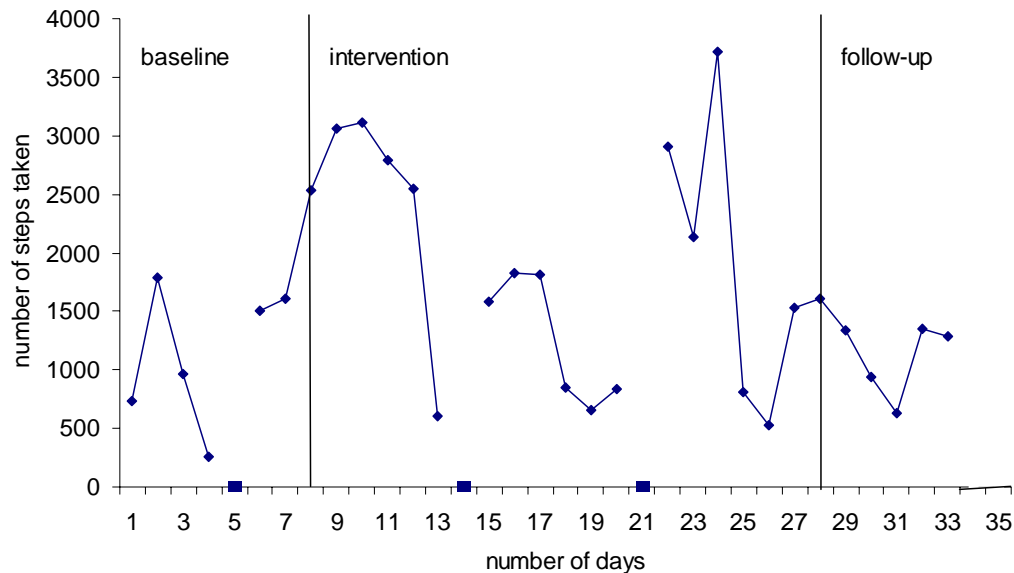


Figure 2. Number of steps taken, as measured by a pedometer, over 33 days consisting of baseline, intervention and follow-up phases. Measurements were not recorded for days 13, 14 and 21.

The distribution of Tom's activity equated to a weekly total of 15 points, with a daily average of 3 points in week one of the base line phase. In week two of baseline Tom's activity equated to a total of 13.5 points (only three days of this week were recorded) with a daily average of 4.5. In week three, the first week of the intervention phase, Tom earned a total 29.5 points for his distribution of activity with a daily average of 5.9 points. In week four, Tom earned 33 points for his distribution of activity and an additional 2 bonus points. His daily average of points was 6.6, excluding bonus points. In week five, the third week of intervention, Tom earned a weekly total of 37.5 points and he was awarded 1 bonus point. His daily average of points earned during this week was 7.5 excluding bonus points. In week six Tom

earned 33 points in total and his daily average was 6.6. Finally, during week seven, the follow-up phase when intervention was withdrawn, Tom's activity equated to 34.5 points with a daily average of 6.9 points.

During the intervention phase Mrs Andrews made use of the research sports equipment that was available. The Andrews family borrowed the tee ball set and the volleyball set.

3.2.3 *Parent Interview results*

Mrs Andrews was interviewed using the pre-prepared semi structured interview (see appendix H). Mrs Andrews said that the experience of administering the programme was "quite good". She said "I enjoyed that I actually paid a bit more attention to Tom and what he does... Its amazing how much time gets away on you while you're busy doing things... you don't realise all of a sudden they've been on the computer for an hour".

Aspects of the experience that Mrs Andrews reported as difficult included bad weather, finding non-sedentary activities and "not pushing" Tom to be physically active and letting him choose to be active during the intervention phase. She also found coding some activities as sedentary or physical difficult at times and she gave the example of Tom playing in the bath. Mrs Andrews said "if he was keeping moving I put it under physical". With respect to the definition of physical provided for the purpose of this research, Mrs Andrews said "but it gave me room to move".

Mrs Andrews said Tom was not as concerned with the rewards as he could have been; however, despite that, he seemed to be interested in earning the points. Concerning the recording sheets, Mrs Andrews said she found them "pretty good" but that sometimes she was "a little worried whether I was doing it correctly" when filling them in, because she sometimes had difficulty categorising Tom's activities. Mrs Andrews said that she was disappointed that they did not use the wall chart (she said that she did not know why she did not use it) and that she thought it would have helped if they had used it.

Mrs Andrews said that Tom did not like the child's daily activity diary and that "he does not like writing". Tom filled out two days of his daily activity diary. Mrs Andrews suggested that some children may prefer a drawing diary instead of writing. Mrs Andrews said she liked the resource box and enjoyed the 'push-play activity cards' (which she had seen before). In response to the question about the research sports equipment, Mrs Andrews said "it went off a treat" and that Tom and his sibling enjoyed having something different to play with.

Regarding any improvements to the programme, Mrs Andrews suggested that a weekly totals page for the end of each week might be helpful to gage an understanding of progress and help in assigning rewards. She also suggested that the wall chart could include the baseline and follow-up phases, rather than just the intervention phase, so that progress could be seen visually.

Mrs Andrews' over all reflections on her experience of the programme included the "realisation that playstation, computer and TV take a lot out of your child's day... and you don't even see it... it's way too easy!" Mrs Andrews said that since implementing the programme, they have had "more family time lately" and that the programme has helped the family pay more attention to the way time has been spent. She said that since the programme (post follow-up) Tom has been choosing to participate less in the target activities and that he is finding more interactive and physical activities instead, which has pleased her.

3.3 *Case study two*

The participants for the second case study consisted of a mother and her daughter who was 8 years old during the course of the programme. Mrs Jones was a student mother and Hine had no other siblings living at home with her. Mrs Jones indicated Hine's ethnic group or race on the CBCL form to be Māori.

3.3.1 *Suitability*

During initial discussions, Mrs Jones reported that Hine preferred to watch television during her after school leisure time, as opposed to physical play. Mrs Jones filled out a modified parent version of the Physical Activity Questionnaire from the NZ Food, NZ Children, National Children's Nutrition Survey (Ministry of Health 2003). This was used to provide additional information about Hine's current level of activity.

The following results from the Physical Activity Questionnaire, along with information gathered in initial discussions, were considered indicators of habitual inactivity and therefore suitability for the current programme. Hine reportedly watched 4 or more hours of television on the most recent Saturday and again on the most recent Sunday. It was reported that Hine did not play any computer or video games during the weekend. She reportedly watched television for 4 or more hours every day after school (over the past seven days before filling out this form) and was reported to have played computer or video games on 3 days after school; however, the duration was unknown. It was reported that Hine had participated in three physical activities 1 to 2 times during the last seven days; these activities included martial arts, active games, and rugby. In the space provided Mrs Jones reported that her responses represented a very typical week for Hine.

Mrs Jones filled out the parent form for the CBCL for ages 6-18. The results from this screening tool indicated that Hine did not have any serious behavioural or psychological difficulties that would be likely to be negatively impacted by participating in this programme.

Mrs Jones filled out the PAR-Q (modified for the purposes of this research) which indicated that Hine had asthma but that it was controlled by ventolin (a common asthma medication). The PAR-Q indicated no other existing health problems that may have been negatively impacted by increasing her levels of physical activity.

3.3.2 Programme results

In the ‘instructions and recording booklet’ Mrs Jones recorded the target sedentary behaviours that she wanted Hine to reduce as being [playing on the] ‘computer’ and ‘playstation’, [watching] ‘television’, ‘videos’ and ‘DVDs’ and ‘lying around doing nothing’. The non-target sedentary behaviours that were listed included ‘piano practice’, ‘reading’, ‘playing board games’, ‘playing cards’ and ‘cooking’. Table 2 shows the rewards list and corresponding points that were decided for Hine during the intervention phase of the programme. For example, Hine was required to earn 40 points in order to gain the reward of going to a friend’s or having a friend over.

Table 2. Showing the rewards list and corresponding points for Hine.

<i>Rewards list</i>	<i>Points</i>
Going swimming	50
Going to a friend’s or having a friend over	40
Tramping/ hiking	35
Trip to the park	30
Game of Hide and go seek	25
Walk the dogs	20

In total, data was collected for thirty-five days, ten days at baseline, twenty days at intervention and five days at follow-up. Baseline data was collected over two working weeks for Hine; this equated to 10 days. However, five of these days were for a reduced time period, due to other time commitments that Mrs Jones had. The durations recorded for those days were 150 minutes on ‘day 3’, 165 minutes on ‘day 4’, 165 minutes on ‘day 6’, 165 minutes on ‘day 7’ and 150 minutes on ‘day 9’.

Over the 10 days of baseline, Hine participated in a daily mean of 6.4 15 minute intervals of target sedentary behaviour, 2.9 15 minute intervals of non-target sedentary behaviour and 2 15 minute intervals of physical activity after school. During the 20 days of the intervention phase, Hine participated in a daily mean of

2.25 15 minute intervals of target sedentary behaviour, 2.65 15 minute intervals of non-target sedentary behaviour and 7.1 15 minute intervals of physical activity over a 180 minute period after school. Finally, during the follow-up phase, Hine participated in a daily mean of 1.8 15 minute intervals of target sedentary behaviour, 1.6 15 minute intervals of non-target sedentary behaviour and 8.2 15 minute intervals of physical activity over a 180 minute period after school.

Figure 3 shows the distribution of the twelve 15 minute intervals spent in each activity category over the 35 days in each phase. As shown in Figure 3, Hine spent between three and eleven 15 minute intervals in target sedentary behaviour every day during baseline. Hine spent between zero and six 15 minute intervals in non-target sedentary behaviour throughout baseline and spent between zero and six 15 minute intervals in physical activity during baseline.

During the intervention phase, Figure 3 shows that Hine usually spent between zero and four of the twelve 15 minute intervals in target sedentary behaviour. The only exception was on day 27 when she spent seven 15 minute intervals in target sedentary behaviour. Hine usually spent between zero and seven 15 minute intervals in non-target sedentary behaviour throughout the intervention phase.

During the intervention phase Hine usually spent between five and ten 15 minute intervals participating in physical activity, except on days 21 and 30, when she participated in three 15 minutes intervals of physical activity during the recording period.

During the follow-up phase Figure 3 shows that Hine spent between zero and four of the twelve 15 minute intervals in sedentary pursuits and between zero and three 15 minute intervals in non-target sedentary pursuits. Figure 3 also shows that Hine spent between seven and ten of the twelve 15 minute intervals in physical activity during the follow-up phase.

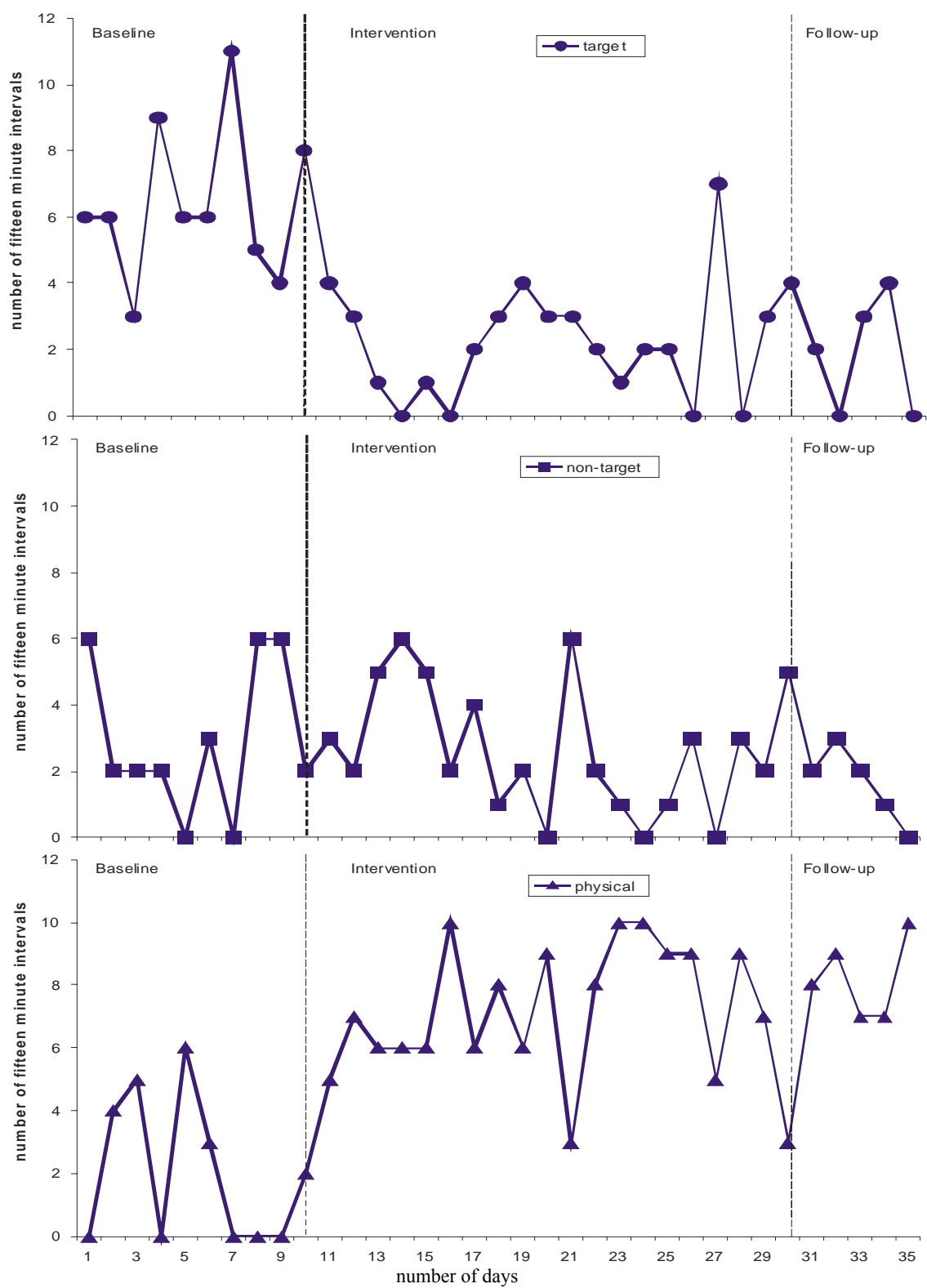


Figure 3. The number of 15 minute intervals that Hine spent in target, non-target and sedentary activities over 35 days consisting of baseline, intervention and follow-up phases.

The distribution of Hine's activity equated to a weekly total of 21 points, with a daily average of 4.2 points in week one of the base line phase. In week two of baseline Hine's activity equated to a total of 13.5 points with a daily average of 2.7 points. In week three, the first week of the intervention phase, Hine earned a total 40.5 points for her distribution of activity with a daily average of 8.1 points. She was awarded an additional 8 bonus points. In week four Hine earned 43.5 points for her distribution of activity and she was awarded an additional 4 bonus points. Hine's her daily average was 8.7 points excluding bonus points. In week five, the third week of intervention, Hine earned a weekly total of 45 points and 5 bonus points; her daily average was 9 excluding bonus points. In week six, Hine earned 39.5 points in total and was awarded 5 bonus points; her daily average was 7.9 excluding bonus points. Finally, during week seven, the follow-up phase when intervention was withdrawn, Hine's activity equated to 45 points with a daily average of 9 points.

Mrs Jones did not record any of Hine's pedometer readings and they did not borrow any sports equipment.

3.3.3 Parent Interview results

Mrs Jones participated in a brief interview. However, the pre-prepared semi-structured format was not used as the interview occurred as a result of a chance meeting and Mrs Jones explained that it would be a convenient time for her to be interviewed. Therefore, the interview was improvised.

Mrs Jones said that Hine enjoyed the programme and that she would plan her leisure time in the afternoons around earning points. For example, she would plan to watch her favourite television programmes and to be active the remainder of her time, Mrs Jones said that this "added balance" to Hine's afternoon. Mrs Jones said that Hine "invented activities" like 'hopscotch' on the carpet when it was wet outside.

Mrs Jones said that she used stickers on the wall chart rather than colouring it in. Mrs Jones reported that filling in the wall chart was "very reinforcing" for Hine and "kept her motivated" because she could see her progress. Mrs Jones also explained that she

added short-term rewards that also helped to increase Hine's physical activity time, such as going to the pools after school.

Regarding her experience as a parent administering the programme, Mrs Jones commented that it "was not a lot of work". She also said "it created opportunity for interaction' between herself and Hine and that they "planned activities together" such as "taking the dogs for a walk" or "playing at the park'. However, Mrs Jones did say she found it difficult to find non-sedentary or food rewards. She said "going to the movies" or "getting pizza" for the evening meal were no longer appropriate as rewards [in the current programme].

Another difficulty that Mrs Jones and Hine experienced was when Hine earned the opportunity to have a friend over to play and the friend did not arrive. Mrs Jones said Hine was very disappointed as she had worked hard (earned 40 points) to earn the privilege and she was "let down". Mrs Jones suggested that if rewards are contingent on "other people or the weather" that both parents and child need to have an agreed upon alternative or a postponement arrangement.

Since the programme has finished (post follow-up) Mrs Jones has found that Hine's of level activity has declined somewhat but that "overall she has kept pretty active". She says that Hine is not as active as she was during the programme but "is still more active than before the programme".

3.4 Case study three

The participants for the third case study consisted of a mother and her daughter who was 8 years old during the course of the programme. Mrs Smith was a working mother and Anna had two younger siblings living at home with her. The Smith family existed in a blended family situation and another older sibling usually stayed two to three nights per week. On several occasions during the programme Anna and one of her siblings stayed with their father. Mrs Smith indicated Anna's ethnic group or race on the CBCL form to be European.

3.4.1 *Suitability*

Mrs Smith said that Anna would always complain she was tired after school and therefore preferred sedentary activities, such as television watching, as opposed to physical activity, during her leisure time. Mrs Smith filled out a modified parent version of the Physical Activity Questionnaire from the NZ Food, NZ Children, National Children's Nutrition Survey (Ministry of Health 2003). This was used to provide additional information about Anna's current level of activity.

The following results from the Physical Activity Questionnaire, along with information gathered in initial discussions, were considered indicators of habitual inactivity during Anna's leisure time and suitability for the current programme. Anna reportedly watched 4 or more hours of television on the most recent Saturday and played computer or video games for 1 to 2 hours. On the most recent Sunday she watched 2 to 4 hours of television and played less than 1 hour of computer or video games. She reportedly watched television for 2 to 4 hours every day after school (over the past seven days before filling out the form) Anna was reported to have played computer or video games on 3 days after school for up to 1 hour. It was reported that Anna participated in five physical activities during the last seven days. These activities included active games 5 to 6 times in the last seven days, cycling 1 to 2 times, gymnastics or trampoline 3 to 4 times, skating or scooter riding 1 to 2 times, and walking for a fifteen minute period 1 to 2 times. In the space provided Mrs Smith reported that her responses represented a very typical week for Anna.

Mrs Smith filled out the parent form for the CBCL for ages 6-18. The results from this screening tool indicated that Anna did not have any serious behavioural or psychological difficulties that would be likely to be negatively impacted by participating in this programme.

Mrs Smith filled out the PAR-Q (modified for the purposes of this research) which indicated that Anna had no existing health problems that may have been negatively impacted by increasing her levels of physical activity.

3.4.2 Programme results

In the ‘instructions and recording booklet’ Mrs Smith recorded the target sedentary behaviours that she wanted Anna to reduce as being [playing on the] ‘computer games’, ‘surfing the internet’ and [watching] ‘television’. The non-target sedentary behaviours that were listed included [doing] ‘homework’ ‘educational computer programmes’, reading and ‘chores’. Table 3 shows the rewards list and corresponding points that were decided for Anna during the intervention phase of the programme. For example Anna was required to earn 40 points in order to gain the reward of having a friend over for a slumber party.

Table 3. Showing the rewards list and corresponding points for Anna.

<i>Rewards list</i>	<i>Points</i>
Buying lunch at school on a Friday	10
Family board game	20
A walk with mum	30
Having a friend over for slumber party	40
Have a family trip	50

In total, data was collected for thirty-five days, ten days at baseline, twenty days at intervention and five days at follow-up. Baseline data was collected over two working weeks for Anna, which equated to 10 days. The data provided by Mrs Smith was an approximation of Anna’s results throughout the programme as the instruction and recording booklet was misplaced at some point near the end of the programme (discussed further in Chapter four).

Over the 10 days of baseline, Anna participated in an approximate daily mean of 6.3 15 minute intervals of target sedentary behaviour, 2.8 15 minute intervals of non-target sedentary behaviour and 2.9 15 minute intervals of physical activity over a 180 minute period after school. During the 20 days of the intervention phase Anna participated in an approximate daily mean of 3.7 15 minute intervals of target sedentary behaviour, 2.6 15 minute intervals of non-target sedentary behaviour and

5.8 15 minute intervals of physical activity over a 180 minute period after school.

Finally, during the follow-up phase Anna participated in an approximate daily mean of 4 15 minute intervals of target sedentary behaviour, 4 15 minute intervals of non-target sedentary behaviour and 4 15 minute intervals of physical activity over a 180 minute period after school.

Figure 4 shows the distribution of the twelve 15 minute intervals spent in each activity category over the 35 days in each phase. As shown in Figure 4, Anna approximately spent between two and eight 15 minute intervals in target sedentary behaviour every day during baseline and she spent between two and four 15 minute intervals in non-target sedentary behaviour throughout baseline. Anna usually spent zero 15 minute intervals in physical activity during baseline except for on days one, four and ten when she was involved in approximately eight, ten and ten 15 minute intervals of physical activity respectively.

During the intervention phase, Figure 4 shows that Anna usually spent between two and five of the twelve 15 minute intervals in target sedentary behaviour. The only exception was on day 20 when she spent ten 15 minute intervals in target sedentary behaviour. Anna usually spent between zero and four 15 minute intervals in non-target sedentary behaviour throughout the intervention phase.

During the intervention phase Anna usually spent between three and ten 15 minute intervals participating in physical activity, except on day 20 when she participated in zero 15 minutes intervals of physical activity during the recording period.

During the follow-up phase Figure 4 shows that Anna spent approximately four of the twelve 15 minute intervals in sedentary pursuits, four 15 minute intervals in non-target sedentary pursuits and four of the twelve 15 minute intervals in physical activity during the follow-up phase.

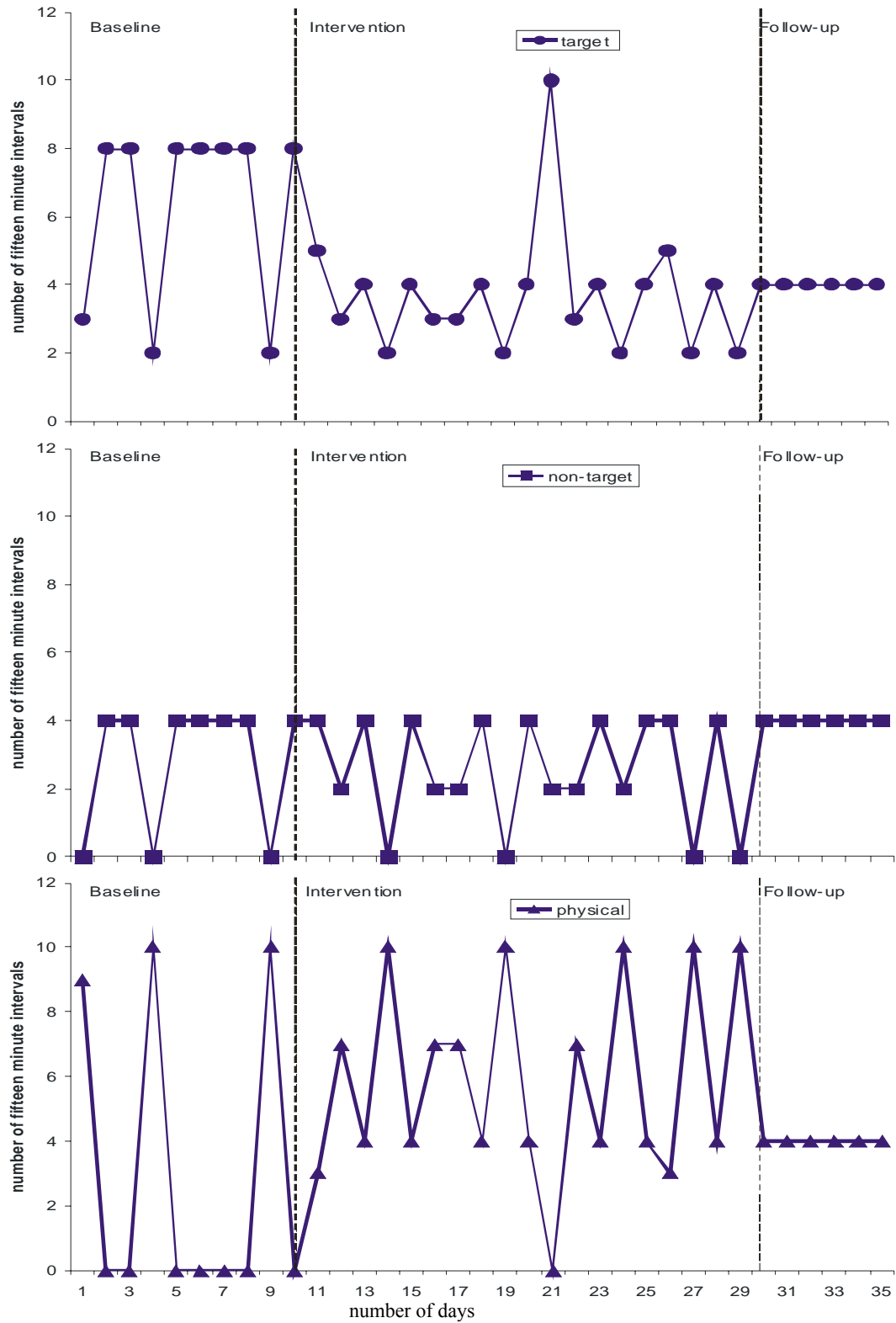


Figure 4. The number of 15 minute intervals that Anna spent in target, non-target and sedentary activities over 35 days consisting of baseline, intervention and follow-up phases.

The distribution of Anna's activity equated to a weekly total of 25 points, with a daily average of 5 points in week one of the base line phase. In week two of baseline, Anna's activity equated to a total of 18 points with a daily average of 3.6 points. In week three, the first week of the intervention phase, Anna earned a total 35 points for her distribution of activity with a daily average of 7 points. In week four, Anna earned 38 points for her distribution of activity and her daily average was 7.6 points. She was also awarded an additional 10 bonus points during that week. In week five, the third week of intervention, Anna earned a weekly total of 32 points and she was awarded an additional 8 bonus points during that week. Anna's daily average was 6.4 points excluding bonus points. In week six Anna earned 37 points in total and her daily average was 7.4 points. Finally, during week seven, the follow-up phase when intervention was withdrawn, Anna's activity equated to 30 points with a daily average of 6 points.

Mrs Smith did not record any of Anna's pedometer readings (Mrs Smith also reported that the pedometer was misplaced at the completion of the programme) and the Smith family did not borrow any sports equipment.

3.4.3 Parent Interview results

Mrs Smith was interviewed using the pre-prepared semi structured interview (see appendix H). Regarding her experience of the programme, Mrs Smith said she found it "simple but my family is complex". The most positive aspect about the programme for Mrs Smith was "encouraging my daughter to be more active... and it was just the right length to become habit". "It seemed like a long time but was just enough to get her into a routine". Mrs Smith said the most difficult aspect of the programme was "remembering to keep track" of Anna's data and progress when she was working or when Anna was away. Mrs Smith said these difficulties could have been reduced if Anna could have "taken more management of the programme", referring mostly to the data collection.

When asked about the rewards list, Mrs Smith explained that in hindsight they could have designed a better rewards list because the top reward was a family trip which required Anna to earn 50 points; however, Mrs Smith said that because of their

blended family situation there was already a family trip or activity taking place between Anna's two homes almost every weekend. Mrs Smith explained that this meant Anna "only worked towards getting a friend over" which required her to earn 40 points as opposed to the 50 point needed for the family trip. Mrs Smith also explained that "it became more of a family programme" rather than a programme solely about Anna. She also said "it was hard to come up with something just for her" referring to Anna's rewards. Mrs Smith said the rewards were helpful, "especially the slumber parties"; "even when it was raining she was outside riding her bike" to earn points. Mrs Smith did explain that she "found it hard not use them [the rewards] as weapons" to punish Anna for other unrelated behaviour. Mrs Smith explained that she awarded bonus points during the programme as well; Anna could earn 1 bonus point for morning chores and 1 bonus point for not turning the TV on in the morning before school.

Regarding the instruction and recording booklet, Mrs Smith explained that her family did not use it consistently; instead they chose to write the data on a large black board they have mounted on the wall (at their home) and transfer the data into the booklet. Mrs Smith said she found the instruction and recording booklet "useful and clear and well set out". However she did say that between the different recorders, herself, her partner, the babysitter, Anna's father and his partner, there was some confusion regarding target and non-target sedentary behaviour. The example she gave was when Anna watched music television and danced to it, this activity should have been coded as physical (given the definition in the recording booklet) but may have been coded as target in some cases because Anna was watching television. Regarding the child activity diary, Mrs Smith said that Anna did not fill it in but that she and the baby sitter used it as a notebook record of Anna's activity. Mrs Smith also said that "the wall chart didn't last long... that's what happens when you have a three year old".

Mrs Smith said that she found the resource box useful. She also said that the children had the push play cards and an activity wheel at home already so they knew how to use them. Overall, Mrs Smith said the experience "was good". She said Anna "finished about four weeks ago and she's kept it up" referring to Anna's level of physical play. Mrs Smith said that "she's a creature of habit" and that Anna is "in a

pattern now” and she explained that the pattern seen in the follow-up data is still evident since the withdrawal of the intervention. Mrs Smith said that “her [Anna’s] enjoyment of more physical stuff [activity/play] has increased” and that she expects this will continue to grow as the weather gets better. Mrs Smith also explained that Anna’s siblings helped her earn her points by being physically active with her and that Anna would encourage her siblings to play outside with her “so she could earn her points”; it “affected the whole family”.

3.5 *Summary of differences between phases across subjects*

The results for case study one, Tom Andrews, show that Tom spent, on average, 3.38 15 minute intervals less in target sedentary behaviour during the intervention phase than in the baseline phase. On average, Tom spent 0.2 15 minute intervals more in target sedentary behaviour in the follow-up phase than in the intervention phase and Tom spent 3.18 15 minute intervals less in target sedentary behaviour during the follow-up phase than in the baseline phase. Tom spent, on average, 0.57 15 minute intervals more in non-target sedentary behaviour during the intervention phase than in the baseline phase. On average, Tom spent 0.9 15 minute intervals less in non-target sedentary behaviour in the follow-up phase than in the intervention phase and Tom spent 0.33 15 minute intervals less in non-target sedentary behaviour during the follow-up phase than in the baseline phase. Tom spent, on average, 2.8 15 minute intervals more in physical activity during the intervention phase than in the baseline phase. On average, Tom spent 0.7 15 minute intervals more in physical activity in the follow-up phase than in the intervention phase and Tom spent 3.5 15 minute intervals more in physical activity during the follow-up phase than in the baseline phase.

The results for case study Two, Hine Jones, show that Hine spent on average 4.15 15 minute intervals less in target sedentary behaviour during the intervention phase than in the baseline phase. On average, Hine spent 0.45 15 minute intervals less in target sedentary behaviour in the follow-up phase than in the intervention phase and Hine spent 4.6 15 minute intervals less in target sedentary behaviour during the follow-up phase than in the baseline phase. Hine spent, on average, 0.25 15 minute intervals less in non-target sedentary behaviour during the intervention phase than in the baseline phase. On average, Hine spent 1.05 15 minute intervals less in non-target

sedentary behaviour in the follow-up phase than in the intervention phase and Hine spent 1.3 15 minute intervals less in non-target sedentary behaviour during the follow-up phase than in the baseline phase. Hine spent, on average, 5.1 15 minute intervals more in physical activity during the intervention phase than in the baseline phase. On average, Hine spent 1.1 15 minute intervals more in physical activity in the follow-up phase than in the intervention phase and Hine spent 6.2 15 minute intervals more in physical activity during the follow-up phase than in the baseline phase.

The results for case study three, Anna Smith, show that Anna spent on average 2.6 15 minute intervals less in target sedentary behaviour during the intervention phase than in the baseline phase. On average, Anna spent 0.3 15 minute intervals more in target sedentary behaviour in the follow-up phase than in the intervention phase and Anna spent 2.3 15 minute intervals less in target sedentary behaviour during the follow-up phase than in the baseline phase. Anna spent, on average, 0.2 15 minute intervals less in non-target sedentary behaviour during the intervention phase than in the baseline phase. On average, Anna spent 1.4 15 minute intervals more in non-target sedentary behaviour in the follow-up phase than in the intervention phase and Anna spent 1.2 15 minute intervals more in non-target sedentary behaviour during the follow-up phase than in the baseline phase. Anna spent, on average, 2.9 15 minute intervals more in physical activity during the intervention phase than in the baseline phase. On average, Anna spent 1.8 15 minute intervals less in physical activity in the follow-up phase than in the intervention phase and Anna spent 1.1 15 minute intervals more in physical activity during the follow-up phase than in the baseline phase.

CHAPTER FOUR

Discussion

4.1 *Introduction*

In this chapter I will discuss the research findings in relation to the original aims and objectives of this study, I will also consider the literature reviewed in chapter one. To reiterate, the objectives of this pilot research were to develop and test a parent administered behavioural strategy programme to increase child physical activity levels and reduce to target sedentary behaviours during leisure time. The specific objectives of the parent administered programme were to cause a reduction of sedentary behaviour during leisure time and to cause an increase in physical activity during leisure time. The additional aims of this research were, firstly, to investigate whether parent administered behavioural strategies to increase child activity during leisure time, as a packaged intervention, were deemed helpful and achievable by parents and caregivers. Secondly, this research aimed to gain feedback from parents and caregivers about the intervention package and how it might be improved or refined. Finally, it was envisaged that the results could assist in the future development of parent administered behavioural resource packages to increase child physical activity levels and reduce sedentary behaviours as part of the prevention and management of child obesity (and other health risks related to inactivity).

4.2 *The programme*

The primary objectives to develop and test a pilot parent-administered behavioural strategy programme to increase child physical activity levels and reduce target sedentary behaviours during leisure time were achieved to a certain degree. The intervention programme was developed based on behavioural modification theory and literature in collaboration with obesity prevention and treatment literature. The programme was tested using three case studies, although this was fewer participants than desired. Although no conclusive evidence could be gained from this research, the results from the three case studies suggest that the programme may have helped to

increase child physical activity and reduce target sedentary behaviour in their leisure time and that parents may find the intervention programme achievable and helpful.

As outlined in chapter three, all three case studies showed some change in the time that children allocated to target sedentary activities and physical activity. The parents who administered the programme appeared to be able to follow the instructions, record the data, and administer the intervention with varying degrees of accuracy and success.

A particular strength of this programme was that it measured a change in three variables: time spent in sedentary behaviour, time spent in non-target sedentary behaviour and time spent in physical activity. Although these variables were not mutually exclusive, the combination meant that changes seen in one variable did not predict which other variable would change with it. Therefore, three possible scenarios may be argued as clinically significant (the practical or applied value or importance of the effect of an intervention (Kazdin, 1999, p.332).

Firstly, a reduction in time spent in target sedentary behaviour (without an increase in physical activity) could be viewed as a clinically positive result, given that particular target activities, such as television watching, produce the occasion for other obesity promoting behaviours such as snacking (Epstein et al., 2002; Gable & Lutz 2000; Steinbeck 2001). Furthermore, there is a body of literature that promotes a reduction in both television viewing and video gaming in children for various other psychosocial, health, and developmental reasons (not discussed in this study) (e.g. Robinson; Wilde, Navracruz, Haydel, & Varady; 2001; Hancox, Milne, & Poulton, 2004; Johnson, Cohen, Kasen, First, & Brook, 2004). Secondly, an increase in physical activity (without a decrease in target sedentary behaviour) may also be regarded as a clinically positive result, in the first instance, because it promotes energy expenditure, can improve physical development and is usually incompatible with obesity promoting behaviours (Epstein et al., 2002). The final, and most desired, positive outcome would result in both a reduction in time spent in target sedentary behaviour and an increase in physical activity in order to help reduce the health risks

associated with habitual inactivity (Ebbeling et al., 2002; Epstein et al., 2002, Epstein et al., 2000; Ministry of Health 2003).

Another possible strength of this programme is that it did not focus on prescribed exercise; rather, it aimed to encourage children to be more active during play and to enjoy the activity. Barlow and Dietz (1998) explained that “most preadolescent children find periods of defined exercise (aerobics classes or videos, stationary bicycles or treadmills) boring or punitive. Children who are active as part of their daily routine are more likely to continue the activity” (p. 37). Overall, parents indicated that their children enjoyed the programme and no parents indicated the children found it aversive.

It is important to note that any comparisons made between subjects in this study should be interpreted with caution as all children started with varying degrees of inactivity and time allocation; the relative success of the programme could have been affected by individual differences and the uncontrolled extraneous variables within each household.

4.2.1 Decreasing sedentary behaviour and increasing physical activity

The behaviours that parents listed as target sedentary behaviours were very consistent. All three parents included watching television and playing computer games and gaming consoles (if applicable) as behaviours that they wanted reduced.

As reflected in the summary of differences in section 3.5, all three cases showed some decrease in the amount of time they spent in target sedentary behaviour between the baseline phase and the intervention phase. The greatest reduction was seen for case study two, Hine Jones, with a daily mean reduction of 4.15 15 minute intervals of time spent in target sedentary behaviour during the intervention phase, compared to the baseline phase. This result equates to a reduction of just over 1 hour (1.04 hours) or one third of the recording period. Although no conclusions can be drawn regarding the statistical significance, such a result might be seen as a clinically significant reduction, given the objectives of the research.

The results from case study one, Tom Andrews, also showed a reduction in target sedentary behaviour with a daily average reduction of 3.38 15 minute intervals during the intervention phase, compared to the baseline phase. This equates to just over 50 minutes (0.85 hours) less time spent in sedentary activities. The results from case study three, Anna Smith, showed that Anna had the least reduction in the amount of time spent in target sedentary behaviour. On average, Anna spent 2.6 15 minute intervals less in target sedentary behaviour during the intervention phase than in the baseline phase. This equated to just over 30 minutes (0.54 hours) less time in sedentary activities on, average, per day.

All three children showed a very small change in the amount of time they allocated to target sedentary behaviour between the intervention phase and the follow-up phase. Both Tom and Anna showed a very small increase of (0.2 and 0.3 15 minute intervals respectively) while Hine showed an average decrease during the follow-up period (0.45 15 minute intervals) of time spent in target sedentary behaviour. These small changes did not impact on the overall result for all three children, which indicated they all spent less time in target sedentary behaviour during both the intervention phase and the follow-up phase compared to baseline (for more details see chapter three).

No obvious pattern emerged across the three case studies regarding the amount of time they spent in non-target sedentary activity (see figures 1, 2 and 3 in chapter three). Tom's time spent in non-target sedentary behaviour fluctuated between 0 and 5 15 minute intervals throughout the programme, except on three days during the intervention phase and on one day during follow-up when he participated in more than 5 15 minute intervals of non-target sedentary activity.

Hine's time spent in non-target sedentary behaviour fluctuated between 0 and 6 15 minute intervals throughout the programme and Anna's time spent in non-target sedentary behaviour fluctuated between 0 and 4 15 minute intervals throughout the programme. These results were positive because it was never intended that the programme would alter or discourage children from participating in sedentary

behaviours that parents valued, such as homework, reading or educational sedentary activities.

Also reflected in the summary of differences in section 3.5, was that all three children showed some increase in the time they spent in physical activities between the baseline and intervention phases. The greatest increase was seen in case study two. Hine Jones spent a daily mean of 5.1 15 minute intervals more in physical activity during the intervention phase than in the baseline phase. This equated to a daily mean of 76.5 minutes (1.28 hours) extra spent being physically active over the recording period.

Case studies one and three did not achieve the same level of increase. Anna Smith had a mean daily increase of 2.9 15 minute intervals (43.5 minutes or 0.73 hours) in physical activity during the intervention phase, compared to the baseline phase. Tom Andrews had a mean daily increase of 2.8 15 minute intervals (42 minutes or 0.7 hours) in physical activity during the intervention phase compared to the baseline phase. There could be numerous reasons that these two cases did not achieve the same level of increase seen case study two. One possibility could be that there was a problem with the development and the application of the reinforcements (i.e. the rewards list) in each case (discussed further in section 4.2.3).

All three children showed some change in the amount of time they allocated to physical activity between the intervention phase and the follow-up phase. On average, Hine spent 1.1 15 minute intervals more in physical activity in the follow-up phase than in the intervention phase and Tom spent 0.7 15 minute intervals more in physical activity in the follow-up phase than in the intervention phase. Anna spent 1.8 15 minute intervals less in physical activity in the follow-up phase than in the intervention phase, on average. These changes did not impact on the overall result seen for all three children, which indicated they all spent more time participating in physical activity during both the intervention phase and the follow-up phase, compared to baseline (for more details see chapter three).

These results were partially expected. It was thought that the intervention phase would show a reduction in time spent in target sedentary behaviour and an increase in physical activity. However, it was not expected that these changes would be maintained, given the short duration of the intervention, at the withdrawal of the rewards. Certainly, the follow-up phase of one school week does not provide any conclusive evidence of habituation or lasting change but it gives cause to further investigate the phenomenon, particularly as all three parents described some lasting behaviour change in their interviews which were conducted at least two weeks after the follow-up phase.

With this in mind, the reinforcement gained from physical play, itself, may need to be considered in future investigations. The children may have experienced enough intrinsic satisfaction, or reinforcement from the physical activities they were now involved in, to continue participating in these activities even after the external rewards were withdrawn. As reported in chapter one, a similar result was seen in a single case study (Jason & Brackshaw, 1999).

Other related factors may be that family routines and family participation in physical activity had changed as a subsequent result of participating in the programme. There is some evidence of this in the interviews as all three parents discussed how participating in the programme affected their own, or their family's, level of activity, as well as their monitoring of their child's time.

This is consistent with the literature reviewed in chapter one which outlines the impact that parental levels of activity has on children's levels of activity (Golan & Crow 2004; McWhorter et al., 2003; U.S. Department of Health and Human Services 1996). It is also possible that children simply just need to be reminded that there are other play activities, besides television and computer gaming, that they can enjoy in their leisure time. However, a more detailed interview that specifically addressed how the programme impacted parents' levels of physical activity, and impacted on the rest of the family, would be required to draw more conclusive explanations of this phenomenon.

4.2.2 *Parents as the programme administrators*

Before commencing the programme I had a detailed discussion and training session (with no time limits imposed) with the individual parents about the programme procedure. Together, we went through the objectives and the instructions, as well as the recording sheets, and parents were given every opportunity to ask questions and clarify any concerns that they had. By the end of their sessions all three parents said they understood what was required and that they were comfortable to begin recording.

The greatest reduction in target sedentary behaviour and the greatest increase in physical activity was seen in case study two. That parent was a psychology student who had theoretical experience in behavioural modification and was very comfortable with the programme. I assumed that the other parents did not have the same experience since they did not mention any, but I did not specifically ask whether they had had any previous experience. The superior outcome in case study two may have resulted because of the parent-administrator's clearer understanding of the theoretical basis of the programme and the procedures involved. If this was the situation, then it may also have been an indication that the other two parents needed more training to increase their understanding and to improve their administration of the programme. For example, although I thought the training session was thorough and parents said that they were comfortable, it may have been helpful to have booster session before commencing the intervention given that there was a lot of new information that parents needed to remember, particularly in the case of the two parents who had no previous experience in behavioural modification. It may also be useful to provide the instructions in an audio-video format (i.e. VCR and DVD format) so that strategies can be modelled to parents learning skills.

Furthermore, I made contact with all the parents at regular intervals throughout the programme and was available to answer questions. Both parents in case studies one and two made use of my availability when they had questions (on more than one occasion) but the third parent insisted that she had no problems or questions. It may have been that parents did not want to ask questions, or ask questions that they thought might be perceived as 'stupid'; therefore, it might have been more useful for

me to use a set of questions to sample parents' understanding of the programme procedure and to detect any problems they might have been having.

It was my intention to be available as needed to participants and to be in contact with them every week to collect data and discuss any issues. In the case of participant one, contact was made weekly and data was collected weekly. In the case of participant two, contact was made weekly and then fortnightly and the data was collected three times, first at the end of baseline, once during intervention and finally at the completion of the programme. Participant two was the psychology student who had theoretical experience in behavioural modification and preferred to work quite independently throughout the programme. Contact with participant three was made every week throughout the programme; however, no data was collected, although it was requested on a weekly basis. At the end of the programme the parent confessed that her copy of the instruction and recording booklet was misplaced between her home and Anna's father's home. The data that Mrs Smith returned (and reported in this study) was an approximation of what actually happened because the actual data was misplaced. Mrs Smith thought that her recollection of the data was "fairly accurate".

In regards to case study three, it would have been useful to have enforced the data collection on a weekly basis. Although I requested the data regularly, Mrs Smith always said that she did not have the recording book with her (as we met at her place of work). Mrs Smith was a busy working mother (as were the other two parents) and at the time I felt it was inappropriate to pursue her heavily for the data given her situation. However, in hindsight, collecting data at the regular intervals, as initially intended, would have lessened the impact of the data approximation due to the loss of the recording booklet. Enforcing data collection on a weekly basis would also encourage parents to be accountable for the programme (Detweiler & Whisman 1999; Golan & Crow 2004).

Case study three also had the most complex family situation; however, the extent of the complexity and its impact on the administration of the programme was not discovered until they had completed the programme. The Smith family context meant

that five different people were involved in recording Anna's data throughout the programme. The main disadvantage of not initially understanding the family structure was that I did not get to talk to the other people involved and did not realise that Mrs Smith was responsible for training and managing the other people involved. This meant that any misunderstandings that Mrs Smith had would have been communicated to the other people concerned. Furthermore, without contact with the other people involved, it is also unlikely that there would have been continuity in the way that the programme was administered.

At the end of the research, it became clear that the parents needed more direction with their allocation of points and with developing their rewards lists. Mrs Andrews said that Tom did not seem overly interested in obtaining the rewards. However to achieve the highest reward Tom had to earn 70 points. The allocation of 70 points to this reward was not easily obtainable; it would have required him to be physically active everyday for the entire recording period and he would have needed to earn an additional 5 bonus points in order to gain the 70 points needed. Although Mrs Smith allocated more achievable points to Anna's rewards list, there may have been problems in the order. Mrs Smith said that Anna only worked towards the second highest reward, having her friends over for a "slumber party". Furthermore, Mrs Smith had included a food reward (to buy lunch at school on a Friday worth 10 points) on her list although I had strongly advised against it. I also suspect that the parents in case study one and three did not use the reinforcement menu or involve their children in their decisions regarding the rewards list, although this was included in the instruction and recording booklet as part of the intervention procedure. They needed more training to fully understand why the rewards were important and how to develop the list effectively.

All parents reported a positive overall experience of the programme and none of them offered very much in the way of criticism. All parents reported that the instructions and procedure were clear and easy to follow. All parents said that participating in the programme had improved their own, or other family members', level of activity. This was a very positive spin-off of the programme because active families ultimately mean healthier families (reference). Two of the three parents reported some confusion

in coding some of their children's activities as target, non-target or physical. This again suggests that more parental training was needed. All three parents reported some difficulty in finding appropriate rewards that did not have a food or sedentary component. Although this aspect was a challenge for parents, I think this may emphasise how reliant we are on sedentary or food based rewards as a society (Ebbeling et al., 2002) as well as highlighting individual difficulties.

Some of the suggestions that parents made to improve the programme included having a weekly totals page provided in the recording booklet and suggestions that the wall chart should include the baseline and follow-up weeks as well as the intervention weeks. One parent also suggested that the children's recording diary could be either a written or a pictorial record of their activity. These suggestions are practical and would help parents see and keep track of their children's progress more easily.

Parents' overall lack of overt criticism may not have accurately reflected their perceptions. I was the only researcher involved and I conducted the interviews as well. It may have been that parents felt obligated to give more positive feedback, although I encouraged them to be critical, because of the work I had put into designing the programme. It may have also been that parents wanted me to regard them as good participants and therefore did not want to highlight any problems they had. Taking these possible scenarios into consideration, it may be more useful to give participants an anonymous questionnaire to fill in, rather than having a face to face interview.

4.3 The research procedure

Overall, the research procedure did not go to plan. When originally designed, it was intended that all participants would be generated from one school and that they would begin data collection simultaneously. If this had happened, a multiple baseline procedure would have been used to control for environmental variables that may impact on a child's level of activity, such as changes in the weather (Martin & Pear, 2003). It was also intended that there would be at least five participants.

Another difficulty was the lack of use of the pedometer. It was intended that pedometer recordings would provide an additional measure of child activity. Pedometers were chosen because they are a relatively inexpensive and accessible device (minimising the loss in case of damage or misplacement) to measure activity. However, the parent in case study one found it impractical and reported she found the data recorded unreliable. The other two parents chose not to use it (or perhaps forgot to use it). Future investigations may need to consider how practical and reliable pedometers are for estimating a child's level of activity. However, other methods might need to be considered to complement the parental report.

The following discussion assumes that more children (than the one included) within the original target school sample would have fit the research criteria and have benefited from the programme (e.g. the New Zealand 2002 National Children's Nutrition Survey found that approximately 20 percent of New Zealand children reported no activity during the week after school and before the evening meal (Ministry of Health 2003b)).

4.3.1 The difficulties attracting participants

Several factors may have been involved in the difficulties I had in finding willing participants. Firstly, I was relying on only one school, which had a population of approximately one hundred children in the age group of interest (children between eight and ten years old), restricting the pool of potential participants. Furthermore, the initial means of contact I had with parents was a letter that was sent home with the children. Unfortunately, the reliability of this method of contact is unknown. This letter was sent home independent of any school communication so parents would not

have been expecting it and children may have forgotten to give it to parents because it was outside their usual school correspondence routine.

The school informed me that twelve parents requested the second information pack to be sent home with their children. However, only a further two parents filled in the consent form giving the school permission to give me their contact details (for more details see section 2.4.3). Again, the information pack arriving home to parents was the responsibility of the child and subject to the same question of reliability.

Secondly, busy parents may have read the initial letter (or the information pack) and assumed that they would be too busy to participate, or that their child would not fit the research criteria. In this case it may have been useful to allow some flexibility in the recording and interventions times, for example letting parents administer the programme over three school nights as opposed to five. On the other hand some parents may not have considered the research valuable, and other parents may prefer that their children be involved in sedentary activities like television watching and computer gaming because they pose less safety risks than outdoor activities.

Thirdly because this school was not a Project Energize intervention school, the school population, including parents, may not received the same level of publicity, exposure, or emphasis, regarding the importance of physical activity. Although the child obesity epidemic receives a lot of media coverage it does not mean it reaches, or impacts on, all members, or sub-populations, of society. Furthermore, because the consequences of obesity in children are usually less immediate, or severe, than in adulthood (Wadden et al., 2002) parents may not perceive any urgency to act on their child's weight problems. Or perhaps parents simply do not perceive the link between inactivity and the risk of obesity? Other parents may think their child gets enough physical activity at school and/or they may feel it is the schools responsibility to provide opportunity for physical activity.

Another possible explanation is that parents may not want to think that their parenting is inadequate in some way, or that their child has a problem. Moreover, obesity and overweight are becoming more common and this may affect how parents perceive their child's weight, especially when parents themselves are obese (Birch & Fisher, 1998).

However it may have simply been that families were not ready to make the lifestyle changes emphasised in this study. Parents may have been at the pre-contemplation or at the contemplation stage, as opposed to the preparation or action stage of change (Prochaska & DiClemente 1992; Rhee et al., 2005) in relation to their child's inactivity. Barolw and Dietz (1998) described the characteristics of families of obese children who were not ready to change; "Families who are not ready to change may express a lack of concern about the child's obesity or believe the obesity is inevitable and cannot be changed, or are not interested in modification of activity or eating" (p.34).

4.3.2 Parents' perceptions and readiness to change

A person's perception of a problem has a huge impact on their readiness to make change in order to resolve the problem. The stages of behaviour change model considers people who do not perceive there to be a problem to be at the pre-contemplation stage and ultimately not ready to change (Prochaska & DiClemente 1992; Rhee et al., 2005). Other people may perceive a problem but not believe there is a solution, or may not be prepared to commit to a solution at the present point in time. Such perceptions would place these people in either the pre-contemplation stage, or the contemplation stage, and again conclude that they are not ready to change.

Assuming that there were more families that would have met the research criteria, their lack of interest in participating in the programme may have been an indication that they were not ready to make the lifestyle changes required by the programme. However, Barlow and Dietz (1998) report that;

The family must be ready for change. The [Expert] Committee felt that lack of readiness would probably lead to failure, which will frustrate the family and perhaps prevent future weight-control efforts. When the family believes that obesity is inevitable or resists efforts to modify activity or meals, the Committee recommended either deferral of treatment until the family is ready or referral to a therapist who can address the family's readiness (p.36).

With this in mind it may be advantageous for future research to explore how to help parents reach the preparation and actions stages of change, and therefore be ready to make change. This might involve more preparation before requesting participants and perhaps sampling parents' perceptions of the issues involved, including their perception of the interaction between activity and health. The next step may involve education around these issues to improve understanding around the risks of habitual inactivity and the benefits of a physically active lifestyle.

CHAPTER FIVE

Conclusions and Future Considerations

5.1 *Limitations of this research*

This pilot research was subject to several limitations; therefore caution should be taken when interpreting the results. Firstly, due the difficulty finding interested participants, the research was conducted with a very small sample (i.e. three case studies). Furthermore, due to the methodological demands on parents, the length of the various phases (baseline, intervention and follow-up) of the programme were deliberately shorter (seven weeks in total) than ideal with regards to generating meaningful data analysis.

Secondly there was only one data source. Unfortunately this research relied entirely on parental report; therefore there was no independent verification of the data (discussed in chapter four). The parental report was also subject to self-report biases and the administration of the programme and the data collections was subject to parents' understanding and application of the procedure.

Thirdly it is likely that not all potential participants could comply with the methodological demands of this research and this may have prevented them participating. For example the programme assumes parents can read and independently follow the programme procedure.

5.2 *Future research considerations*

The results and outcomes from this pilot study have provided evidence that both the research procedure and the intervention programme need to be enhanced in number of ways in order to produce clearer and more conclusive evidence regarding the effectiveness of the parent administered programme.

5.2.1 *Refining the programme*

One of the objectives of this pilot study was generate information to enhance the programme. The results and outcomes indicated several areas that could be improved and the following discussion outlines possible methods to achieve this.

Ultimately, the programme needs to be longer in order to gather more conclusive evidence that change can be caused by this programme. All three phases would benefit from being substantially longer, making comparisons across phases more meaningful. It would also be helpful to have larger sample and to execute the multiple baseline procedure.

The results indicated more training is necessary before the programme is commenced, particularly with parents who have not been previously been exposed to the principles of behaviour modification and contingency management. It might also be helpful to have a booster training session before the intervention phase and at that time it might also be useful to develop a set of questions to ask parents to determine their understanding of the procedures. Future research may also consider making an audio-video version of the instructions so that parents see how to implement particular strategies.

The results also indicated that more direction be given regarding the rewards lists and the associated points allocated. Parents can still retain the ownership of final decisions but there needs to be more emphasis on making the rewards reinforcing and achievable for the child so that they want to work towards them. With this in mind more emphasis needs to be placed on the development of the rewards lists and using the reinforcement menu to this.

It might be helpful, particularly for research purposes, to be more directive with parents regarding their application of the programme and record keeping. For example behavioural contracts (see Martin & Pear 2003) between the researcher, parents and children might also be helpful to ensure that parents follow procedures and to ensure that children receive the rewards they earn.

Given the diversity in family situations, it would be useful to gain more information regarding family structure and who would be involved and affected by participation in this intervention programme. Having this information before the commencement of the programme would be helpful in order for the researcher to support parents in managing potentially complex situations, rather than leaving parents to manage on their own.

Improvements could be made to the wall chart and the recording booklet. As suggested by parents, the wall chart should include baseline, intervention and follow-up the phases as a pictorial record of progress. To further assist record keeping, parents have recommended a weekly totals page as well. It is also recommended that children be given the choice to keep their daily activity diary in pictorial or written form.

5.2.2 *Refining the research procedure*

In the case of the present project it may have been better to use a Sports Waikato intervention schools because parents/children would have been exposed to the premise that increasing physical activity is beneficial to child health and development. The present research assumed participants already had some awareness or knowledge of the issues around child obesity and the risks of inactivity but that may not have been the case. Future research should assess parent perception and knowledge of the benefits of an active lifestyle and the risks of habitually sedentary lifestyles. Following such an assessment educational programmes could be provided to parents regarding these issues before recruiting participants.

Future research may consider alternative ways to have generated participants, rather than focussing on schools to access parents. For example Public Health Nurses may be able to detect children in need, and direct parents to the programme. General Health practitioners may also be to do this. Approaching Dieticians may also be advantageous and those in private settings may also have the added advantage that parents attending are already recognising that there is a problems and/or are looking for solutions (i.e. at the preparation and action stages of change).

Furthermore, to reduce the effect of biases in parental self-report additional measures of child activity should be explored. Moreover to reduce biases in parental feedback and appraisal of the programme future research may consider using an anonymous Likert Scale questionnaire with a section for parents to add additional comments.

It might be useful for future research to consider being more flexible regarding the recording the recording and intervention periods. Allowing parents, who work, or for other reasons, can not commit the programme for five school nights a week, to take part. For example some parents may be able to take part on three nights a week or on weekends instead.

5.3 Conclusion

This research piloted an intervention programme, with parents as the agents of change, using a behavioural intervention, to promote a lifestyle change for children. The programme focussed on increasing physical play (lifestyle activity) and on decreasing sedentary behaviour (an obesity promoting behaviour) during children's after school leisure time. Although no conclusions could be drawn regarding the effectiveness of the programme, because of the small sample, some useful issues were raised and promoted useful discussion regarding improvement. There was some evidence that, during the course of the programme, the children participating reduced their amount of sedentary behaviour and increased the amount of time they spent in physical play, to varying degrees. There was also evidence that parents were able to administer the programme and that they found it useful. The results from the present study suggest that the development and application of parent administered behavioural programmes, in the form of packaged interventions to prevent child obesity, warrant further investigation both in terms of the benefits and cost-effectiveness it could offer parents and practitioners alike.

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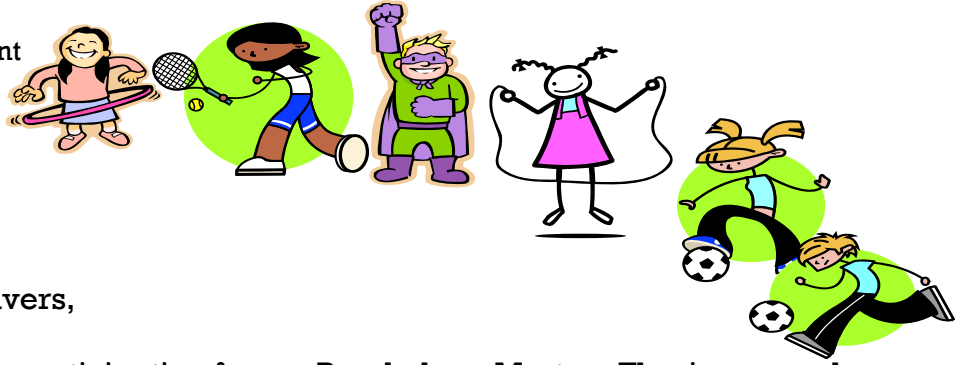
APPENDICES

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APPENDIX A

Joelene Howarth
c/o Psychology Department
University of Waikato
Private Bag 3105
Hamilton



Dear parents and caregivers,

I am writing to seek your participation for my Psychology Masters Thesis research, which is aimed at increasing children's physical play activity in their after school spare time.

Being physically active is important for good health for both children and adults. However there is not a lot of New Zealand research that has tried to find ways to increase children's activity levels and even less research has focussed on parent-based approaches.

This research will focus on both reducing children's sedentary activity, like watching TV or playing computer games, and increasing their physical activity when they have spare time at home after school. Children will be encouraged to swap watching TV and playing computer games for physical play activities where they are on their feet and moving about.

The main aim of this pilot research is to firstly investigate whether a parent-based 'behavioural programme' will be helpful for parents and caregivers. This parent-based 'behavioural programme' is aimed at families who have a child who is aged between 8 and 10 years old and who usually chooses to watch TV or play computer games during their after school spare time.

This project has been acknowledged as a very valuable endeavour by Sport Waikato's Project Energize and it has received support in the form of a Trust Waikato Student Community Grant. The results will be made available to both of these organisations and to all those who are key stakeholders in children's health. A summary of the results will also be given to all parents and caregivers who participated and a presentation will be given, to school representatives and all those who participated in the research. Ethical consent has been granted by the Human Subjects Ethics Committee of the Psychology Department at the University of Waikato.

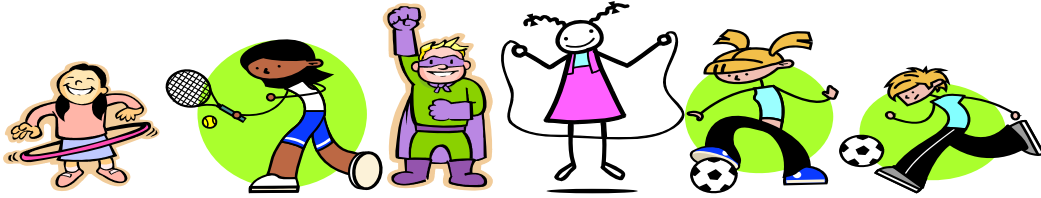
Interested in becoming involved or wanting more information?

That's easy, just fill out this slip and return it to your school by Tuesday the 10th of May and your school will send home an 'information pack' on Thursday the 12th of May.

Child's Name _____ Room Number _____

Parents/Caregivers Name _____ Phone _____

APPENDIX B





An information package




What is this research for?

The main aim of this research is to see if parents and caregivers can get their children to be more active using a 'behavioural programme'. The second aim is to see if parents think this 'behavioural programme' is helpful.

The aims of the 'behavioural programme' are to

- To get your inactive child to be more active during their spare time 
- AND
- To get your child to choose less sedentary activities like computer gaming and watching television 


Other questions to be by this research include:

- What do parents and caregivers think about the behavioural programme?
- Do parents think that it worked?
- Did any changes last?
- What do parents and caregivers think needs improving, or needs to be changed to be more effective? 

How will the research be done?

The 'behavioural programme' will use a points system and parents and caregivers will run the programme for four weeks. The programme works by giving the child a chance to earn points which can then be exchanged for rewards. They can earn points by choosing to do more of the agreed upon physical activities and less sedentary activities like computer gaming and watching television. However it is important to note that children will NOT be punished for not choosing more physical activities. At the end of each week you will count the points your child has earned and they will receive rewards according to the number of points they have earned during that week. Rewards will be decided by each individual family with the help of the researcher, and will consider your family's resources and preferences. Each family will be provided with some basic home activities ideas and equipment and some basic games and sports gear to rotate with other participants.

What is this 'behavioural programme'?

During the 'behavioural programme' your child can earn points for choosing to play a physical game instead of something sedentary like computer gaming and watching television. One point will be earned for every half hour that is not spent in particular sedentary activities like computer gaming and watching television. Your child can then earn a second point if the alternative activity they choose is a physical activity. 

During the 'behavioural programme' your child will also need to keep a record of their daily after-school activity in a diary and they will wear a pedometer (which counts their steps) a daily total will be recorded. For every day that the child accurately records their afternoon activities they will receive an extra point.

Together with the help of the researcher you and your child will create a 'rewards list' which will have different values attached. Due to the aims and concerns behind this research food and sedentary type rewards will be avoided. Examples of activity based rewards for points earned might include:

- A family trip to the beach- 50 points or more
- Having a friend over to play-40 points or more
- A family trip to the park- 30 points



APPENDIX B

- A family game of spot-light- 25 points
- A family parent/child bike ride in the country- 20 points
- A family game of cricket on the lawn- 15 points

(Remember these are only examples- families will ultimately decide the rewards)

What would my commitments be?

The focus will be on the child's after school leisure hours from **approximately 3.30pm until 6.30pm** (excluding meal time) or another 3 hour period that is convenient for parents and caregivers **every school night** (Monday to Friday). During this time parents and caregivers will be continuing with their normal afternoon activities and at 15 minute intervals they will look at what their child is doing and write it down, this is called **data collection** and this kind of data collection is called momentary time sampling. **For this research you will need to be collecting data for about 5 to 7 weeks and your total involvement will be up to 9-12 weeks approximately- and this is a big commitment!** Also the researcher will need to contact you on a weekly basis to record the data you have collected and to check on how things are going.

'Baseline' data will be collected for all children before the 'behavioural programme' is started. 'Baseline' is just finding out what your child normally does before the 'behavioural programme' so that we can compare what your child does differently (if anything) during and after the 'behavioural programme'.

After all the data collection is finished parents and caregivers will be asked to participate in a half hour interview to ask them questions about what they thought of the 'behavioural programme'. About four weeks after the 'behavioural programme' is completed Parents will also be asked to collect one more weeks worth of 'follow-up' data, which be the same as collecting 'base-line' data at the beginning of the research .

Safe play will be discussed before the 'behavioural programme' starts but ultimately Parents will be responsible for their child's safety throughout the research course.



Parents and caregivers will be responsible for running the 'behavioural programme', 'data collection', and delivering rewards.

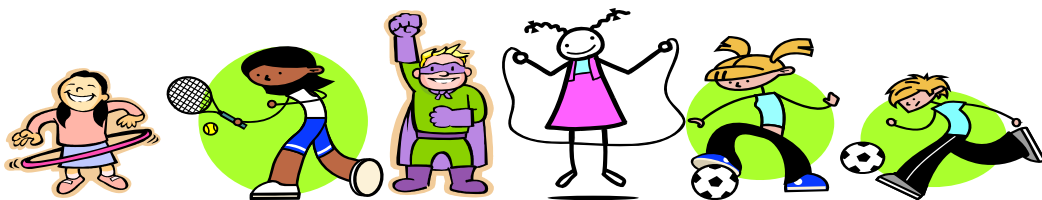


What are the researcher's responsibilities?

My job is to ensure that all participants understand the research requirements, to be available for any questions, and to provide the equipment and material needed to carry out the research. It will also be my job to interpret and analyse the results and to present parents views and concerns as part of the presentation of this research.

All participants will receive a summary of the results from this research and will be invited to a presentation of these results. I will also be available to the participants after the research to discuss and/or explain the outcomes and interpretations.

You will be provided with the appropriate contacts to assist you in the event that participating in this research raises issues or questions for your family/whanau or child regarding such things as exercise, nutrition, or behaviour.



APPENDIX B

Summary of information

- It's a 'behavioural programme' to increase physical play
- Its for kids who usually choose to do sedentary things, like watching TV or computer gaming, in their spare time
- Parents and caregivers will be in charge of running the 'behavioural programme'
- Families will need to be involved for about 12 weeks
- Parents and caregivers will need to collect data for about 5 to 7 weeks
- Parents and caregivers will need to keep an eye on their child for three hour period every school day afternoon AND record their activities at 15 minute intervals
- Parents and caregivers will need to talk to the researcher about once a week
- Each family will be provided with some basic home activities ideas and equipment and some basic games and sports gear to rotate with other participants

Interested in being considered for participation in this research?

That's easy, just fill out the slip below along with you contact details and return it to your school and your school will pass on your details to the researcher who will then make contact with you directly.

I want to be considered for participation in this research aimed at increasing children's physical play activity.

Child's Name _____ School _____

Parents/Caregivers Name _____

Address _____

Phone Number _____

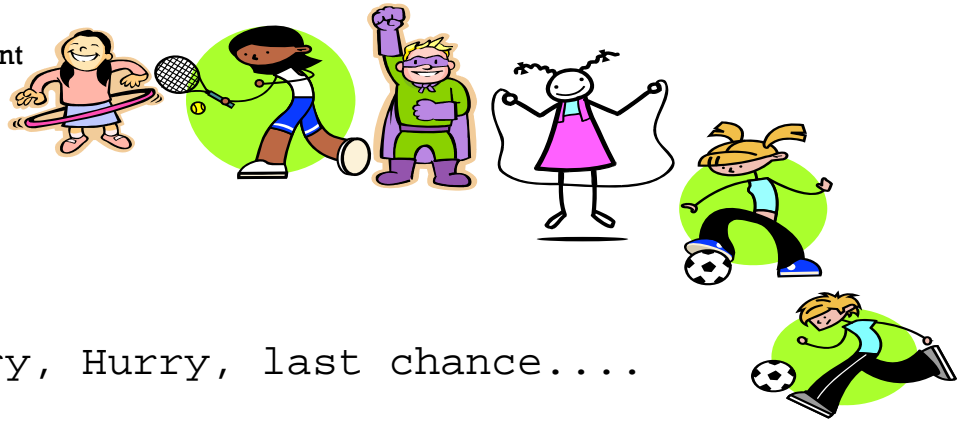
I agree I have read the information provided and I now wish to be considered for participation in this research and I give permission for my details to be forwarded to the researcher. Please sign your name in the space below

Parent/caregiver SIGNED _____

APPENDIX C

Joelene Howarth
c/o Psychology Department
University of Waikato
Private Bag 3105
Hamilton

May 2005



Hurry, Hurry, last chance....

Dear parents and caregivers,

Thank you all for showing so much interest in my Masters Thesis research, aimed at increasing children's physical play activity in their after school spare time. I am delighted at the number of responses and impressed by the concern parents are showing this issue. However at this point there are still three spaces left for participants and I would like to extend the closing date for being considered to participate to Friday the 27 of May. So if you are interested there is still time, please hand in the return slip provided below to your school.

I want to be considered for participation in this research aimed at increasing children's physical play activity.

Child's Name _____ Room Number _____

Parents/Caregivers Name _____

Address _____

I agree I have read the information provided and I now wish to be considered for participation in this research and I give permission for my details to be forwarded to the researcher. Please sign your name in the space below

SIGNED _____

APPENDIX D
Joelene Howarth
c/o Psychology Department
University of Waikato
Private Bag 3105
Hamilton



Participants wanted
Do you have inactive child between 8
and 10 years old?

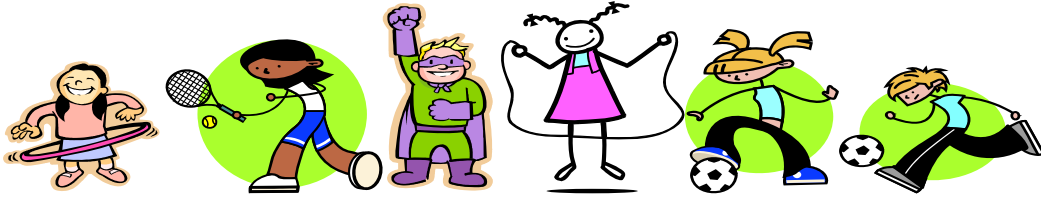
And do you have time to implement a
pilot intervention after school on week
days aimed at increasing physical
play?

For more information please pick up an
information pack from the psychology
secretaries office

Or you can contact me directly at
joeleneh@waikato.ac.nz or come and see me in
IJ.1.02.

Four course credits available to Psyc102
Students

Psyc102 students can also find the information pack on class
forum in the research folder.





An information package




What is this research for?

The main aim of this research is to see if parents and caregivers can get their children to be more active using a 'behavioural programme'. The second aim is to see if parents think this 'behavioural programme' is helpful.

The aims of the 'behavioural programme' are to

- To get your inactive child to be more active during their spare time 
- AND
- To get your child to choose less sedentary activities like computer gaming and watching television 


Other questions to be by this research include:

- What do parents and caregivers think about the behavioural programme?
- Do parents think that it worked?
- Did any changes last?
- What do parents and caregivers think needs improving, or needs to be changed to be more effective? 

How will the research be done?

The 'behavioural programme' will use a points system and parents and caregivers will run the programme for four weeks. The programme works by giving the child a chance to earn points which can then be exchanged for rewards. They can earn points by choosing to do more of the agreed upon physical activities and less sedentary activities like computer gaming and watching television. However it is important to note that children will NOT be punished for not choosing more physical activities. At the end of each week you will count the points your child has earned and they will receive rewards according to the number of points they have earned during that week. Rewards will be decided by each individual family with the help of the researcher, and will consider your family's resources and preferences. Each family will be provided with some basic home activities ideas and equipment and some basic games and sports gear to rotate with other participants.

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- A family trip to the park- 30 points



APPENDIX E

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- A family parent/child bike ride in the country- 20 points
- A family game of cricket on the lawn- 15 points

(Remember these are only examples- families will ultimately decide the rewards)

What would my commitments be?

The focus will be on the child's after school leisure hours from **approximately 3.30pm until 6.30pm** (excluding meal time) or another 3 hour period that is convenient for parents and caregivers **every school night** (Monday to Friday). During this time parents and caregivers will be continuing with their normal afternoon activities and at 15 minute intervals they will look at what their child is doing and write it down, this is called **data collection** and this kind of data collection is called momentary time sampling. **For this research you will need to be collecting data for about 5 to 7 weeks and your total involvement will be up to 9-12 weeks approximately- and this is a big commitment!** Also the researcher will need to contact you on a weekly basis to record the data you have collected and to check on how things are going.

'Baseline' data will be collected for all children before the 'behavioural programme' is started. 'Baseline' is just finding out what your child normally does before the 'behavioural programme' so that we can compare what your child does differently (if anything) during and after the 'behavioural programme'.

After all the data collection is finished parents and caregivers will be asked to participate in a half hour interview to ask them questions about what they thought of the 'behavioural programme'. About four weeks after the 'behavioural programme' is completed Parents will also be asked to collect one more weeks worth of 'follow-up' data, which be the same as collecting 'base-line' data at the beginning of the research .

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Parents and caregivers will be responsible for running the 'behavioural programme', 'data collection', and delivering rewards.

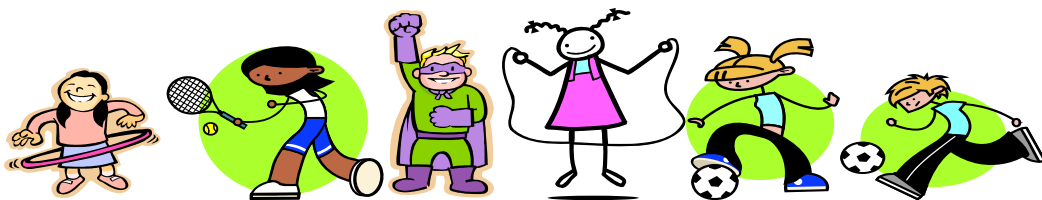


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You will be provided with the appropriate contacts to assist you in the event that participating in this research raises issues or questions for your family/whanau or child regarding such things as exercise, nutrition, or behaviour.



Summary of information

- It's a 'behavioural programme' to increase physical play
- Its for kids who usually choose to do sedentary things, like watching TV or computer gaming, in their spare time
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- Parents and caregivers will need to keep an eye on their child for three hour period every school day afternoon AND record their activities at 15 minute intervals
- Parents and caregivers will need to talk to the researcher about once a week
- Each family will be provided with some basic home activities ideas and equipment and some basic games and sports gear to rotate with other participants

Interested in being considered for participation in this research?

That's easy, just ask one of the psychology secretaries if you can put your name and contact details in the sign up folder and I will be in touch!

Physical Activity Questionnaire

The following questions ask about how often your child watches TV or videos or plays on a computer (or game console) when they are not at school.

To answer the questions tick the appropriate box.

1. Has your child watched TV or videos in the last seven days?

Yes No

☐ ☐

2a. Did your child watch TV or videos last Saturday?

Yes No

☐ ☐

2b. How many hours did your child watch TV or videos last Saturday?

☐ Less than one hour

☐ 1–2 hours

☐ 2–4 hours

☐ 4+ hours

☐ Don't know

2c. Did your child watch TV or videos last Sunday?

Yes No

☐ ☐

2d. How many hours did your child watch TV or videos last Sunday?

☐ Less than one hour

☐ 1–2 hours

☐ 2–4 hours

☐ 4+ hours

☐ Don't know

2e. Did your child watch TV or videos on school days in the last week?

Yes No

☐ ☐

2f. On how many school days did your child watch TV or videos?

☐ 5 days

☐ 4 days

☐ 3 days

☐ 2 days

☐ 1 day

☐ Don't know

2g. How much time does your child normally spend each day watching TV or videos on school days?

☐ Less than one hour

☐ 1–2 hours

APPENDIX F

- ☐ 2–4 hours
- ☐ 4+ hours
- ☐ Don't know

3. Has your child played computer or video games in the last seven days?

Yes No

- ☐ ☐

4a. Did your child play computer or video games last Saturday?

Yes No

- ☐ ☐

4b. How many hours did your child play computer or video games last Saturday?

- ☐ Less than one hour
- ☐ 1–2 hours
- ☐ 2–4 hours
- ☐ 4+ hours
- ☐ Don't know

4c. Did your child play computer or video games last Sunday?

Yes No

- ☐ ☐

4d. How many hours did your child play computer or video games last Sunday?

- ☐ Less than one hour
- ☐ 1–2 hours
- ☐ 2–4 hours
- ☐ 4+ hours
- ☐ Don't know

4e. Does your child play computer or video games on school days?

Yes No

- ☐ ☐

4f. On how many school days does your child play computer or video games?

- ☐ 5 days
- ☐ 4 days
- ☐ 3 days
- ☐ 2 days
- ☐ 1 day
- ☐ Don't know

4g. How much time does your child normally spend playing computer or video games on a school day ?

- ☐ Less than one hour
- ☐ 1–2 hours
- ☐ 2–4 hours

APPENDIX F

- ☐ 4+ hours
- ☐ Don't know

5. The following questions ask about the physical activities your child does in their spare time. Physical activity is described as 'sports, games, gym, dance or other activities that make your child breathe harder, make your child's legs feel tired or make your child sweat'. We are going to ask you how many times in the last seven days, after school and in the weekend, has your child done each of the activities described. Each activity is asked about in turn.

5a. How many times has your child played **active games**, eg, tag, go-home-stay-home or skipping in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5b. How many times has your child done **athletics** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5c. How many times has your child played **basketball or volleyball** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5d. How many times has your child gone **biking or cycling** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5e. How many times has your child been **climbing or tramping** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

APPENDIX F

5f. How many times has your child played **cricket** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5g. How many times has your child done **dancing or ballet** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5h. How many times has your child played **golf** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5i. How many times has your child done **gymnastics or trampoline** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5j. How many times has your child played **hockey** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5k. How many times has your child been **jogging or running or doing cross country** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5l. How many times has your child done **martial arts** in the last seven days?

APPENDIX F

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5m. How many times has your child **played netball** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5n. How many times has your child played **racquet sport**, eg, tennis, badminton, squash in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5o. How many times has your child played **rugby** (union or league or touch) in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5p. How many times has your child been skate **boarding or roller-blading or speed skating or riding a scooter** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5q. How many times has your child played **soccer** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5r. How many times has your child played **softball or t-ball** in the last seven days?

- ☐ None

APPENDIX F

- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5s. How many times has your child been **swimming or surfing** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5t. How many times has your child **walked for at least a 15-minute period** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5u. How many times has your child been involved in a **cultural group practice or performance** in the last seven days?

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

5v. Has your child done any **other physical activity** in their spare time in the last seven days that we have not mentioned?

Yes No

☐ ☐

5w. How many times has your child done this activity in the last seven days?

- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

6. How many times in the past week did your child **walk, bike, skate or scooter to or from school?**

- ☐ None
- ☐ 1–2 times
- ☐ 3–4 times
- ☐ 5–6 times
- ☐ 7+ times

APPENDIX F

7a. Do you think that your answers to all of the questions above, relating to the past 7 days, represent a **typical** week for your child?

- ☐ yes this is very typical
- ☐ moderately typical
- ☐ somewhat typical
- ☐ not very typical
- ☐ not typical at all
- ☐ not sure

7b. If you answered somewhat typical, not very typical, not typical at all, or not sure please briefly explain why? _____

Based on the Physical Activity section of the New Zealand Ministry of Health. National Children's Nutrition Survey 2002.

APPENDIX G

Physical Activity Readiness Questionnaire (PAR-Q) (Modified version)

There are potential risks in any physical activity program. The PAR-Q has been developed to identify people that may be at greater risk, or who should see a physician for advice prior to increasing their physical activity levels.

Child's Name _____ Date _____

Parents: Please read the PAR-Q carefully and respond honestly.

Yes No

- ☐ ☐ 1. Has your doctor ever said your child has a heart condition and recommended only medically approved physical activity?
- ☐ ☐ 2. Does your child have chest pain brought on by physical activity?
- ☐ ☐ 3. Has your child developed chest pain in the past month?
- ☐ ☐ 4. Does your child lose consciousness or lose his/her balance as a result of dizziness?
- ☐ ☐ 5. Does your child have a bone or joint problem that could be aggravated by increasing physical activity?
- ☐ ☐ 6. Is your child's doctor currently prescribing medication for your child? If so, list the medications and the reason for the medication.

Medication

Reason for Medication

7. Do you know any other reason why your child should not increase their physical activity? (if yes please state below)

This questionnaire is a modified version of the Carleton University Summer Camps Physical Activity Readiness Questionnaire (PAR-Q).

APPENDIX H

Interview questions

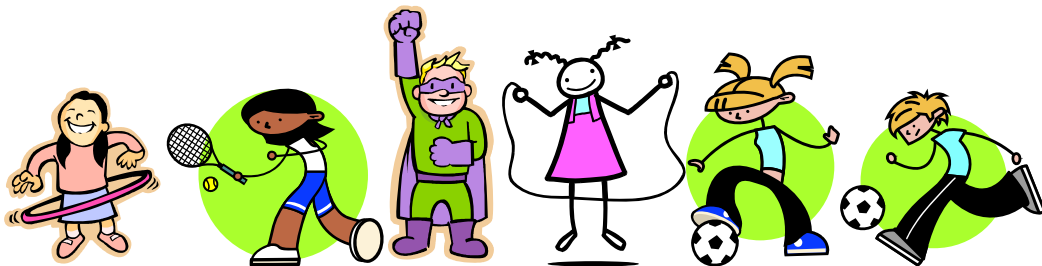
- How did you find this experience? (Both in relation to being a research participant and the programme)
 - What did you like/find helpful about the programme?
 - What was difficult?
 - What do you think could improve?
- Did you use your reward list?
 - In hindsight did you think the rewards that you chose were helpful in motivating your child
 - Would you do anything differently?
 - Did your child try to achieve the rewards?
 - Do you think the points or the rewards were more motivating for you child?
 - (I think I needed a weekly total point's page in the book!)
- Did you use the instructions and recording booklet
 - What was useful
 - What could be improved
- Did you use the child's daily diary
 - What was useful
 - What could be improved
- Did you use the wall chart
 - What was useful
 - What could be improved
- Did you use the resource box and sport equipment
 - What was useful
 - What could be improved
- Did you make use of the sports equipment?

Your overall comments- anything else you want to mention that I didn't ask you about?

**A parent administered programme to increase
physical activity and reduce sedentary activity in
after-school leisure time**

2005

**Instructions
and
Recording Booklet**



By Joelene Howarth

**Supervised by Professor Jane Ritchie
And Dr Jo Thakker**

**As part of the requirement for a Masters Thesis in Psychology at the
University of Waikato**

APPENDIX I

Introduction

This research will be conducted over three phases; the **baseline** phase, **intervention** phase, and the **post-intervention** phase. During all three of these phases you will be required to collect and record 'data' about the activities your child is involved in. At the end of each week the researcher will make contact with you, either by phone, email or mail, or another method that suits you, to gain a summary of the data you have collected over that week.

The research **intervention** phase will be behaviourally based using a points system, spanning three to four weeks. During this time your child will earn points for their participation in physical play activities. Their participation in physical play activities will be reinforced (that is they will be encouraged to continue to choose these activities); however no punishment will be implemented for not choosing these activities. At the end of each week children will receive rewards according to the number of points they have earned during that week.

The rewards will be determined by you, and your child and your family, so that they reflect your resources and preferences. Using a '**reinforcement menu**' you can assess your child's preferences and perceived value of the rewards you suggest. From this you will establish a '**rewards list**' and you will give each item an appropriate points value, according to the cost (time, effort, money etc.) and value to both you and your child.

Due to the aims and concerns behind this study food and sedentary type rewards (such as going to fast food restaurants or going to the movies) will be avoided. You will be responsible for administering the intervention, recording your child's behaviour, adding up the points and delivering the rewards.

Sedentary Behaviour and Physical Play Activity

The primary aim of the **intervention** is to encourage children, who spend a lot of their leisure in sedentary activities, such as watching TV or playing computer games, to choose to play more physical activities in their leisure time.

Target sedentary activities are those you would like to see your child replace with more physical play (at least some of the time) and non-target sedentary activities are those that you are happy your child is doing for example homework or reading a novel. In the appropriate spaces below list all the sedentary activities that you would like to see your child replace at least some of the time- these will become your **target sedentary behaviours**. Then list all the sedentary activities that you would not like to see your child replace- these will become your **non-target sedentary behaviours**.

<i>Target sedentary behaviours</i>	<i>Non-target sedentary behaviours</i>

APPENDIX I

For the purposes of this intervention the definition of **physical play activity** is going to be kept very broad and can include many activities as long as they involve the child moving much of their body and it does not matter whether this movement is at a fast or a slow rate or whether it makes them puff or not. It is only important that they are moving much of their body (this could include dancing or climbing a tree) or that one part of their body is moving a lot, for example the legs during bike riding.

In the spaces below list the inside and outside physical play activities that you would be a happy to encourage you child to do. Inside activities might include dancing to music or playing elastics and outside activities might include sports, biking or climbing. For the purposes of this research you will also be provided with a 'physical play ideas pack' and the opportunity to rotate basic games and sports gear (supplied by the researcher) with other participating families, on a weekly basis.

<i>Inside physical play activity</i>	<i>Outside physical play activity</i>

Baseline

You will be required to collect **Baseline** data **before** you begin the **Intervention Phase** and it is anticipated this will need to be collected for approximately 3 to 10 days (the researcher will inform you when you will need to change phases).

Baseline data simply gives us a measure of how long your child usually spends in sedentary and physical play during their afternoon leisure time. This gives us data to compare the intervention phase to.

During base line you will be required to simply record what your child is doing at 15-minute intervals in the recording sheets provided (there is an example filled out) and the recording is explained in more detail below.

If your child has been involved in particular activity and they get up to go to the bathroom, for example, when you are about to record an interval – simply wait until they have finished in the bathroom and record the activity that they take up when they return.

Recording

In the recording sheet you will be required to note the time you start recording in the first interval box. Next, note down the times you that you will be sampling your child's activities over the afternoon. The 'times' should be in 15 minute blocks, for

APPENDIX I

example if you start time is 3.30pm interval 2 will be 3.45pm and interval 3 will be 4.00pm and so on.

At each interval label the activity your child is involved in, then tick the appropriate box detailing whether the activity is a **target sedentary** activity, a **non-target sedentary** activity, or a **physical** activity. For example if you child is doing their homework at 3.45pm then write Homework and tick the **non-target sedentary** activity box. Each tick will be counted as 15 minutes involvement in that activity.

You will also need to ask your child to wear a pedometer at the start interval of the three-hour recording period in which you are recording what they are doing. The pedometer counts the number of steps your child takes and will provide another measure of your child's activity to compare to the intervention phase. At the end of each recording period record the number on the pedometer in the space provided at the bottom of your recording sheet.

Intervention

To begin this phase you will need to explain to your child the reasons you think physical activity is important, these can be many and varied according to your perspectives, values and life experience. Further explain to your child that you would like to put in place a 'reward system' for **four weeks** (to begin with) where they can earn points and gain rewards for **choosing** to do less sedentary activity (list your target sedentary activities) and **choosing** to do more physical play (and give them examples from you inside and outside play activity lists) during their after school time.

Points will be earned on the basis of time spent participating in either **target sedentary** activity, **non-target sedentary** activity or **physical activity**. **One point** will be earned for every **half hour** that is **not** spent in the **target sedentary** activities; a **second point** can be earned if the alternative activity your child is engaged in meets the criteria for **physical activity**. You will need to continue to use momentary time sampling (reviewing the child's activity every 15 minutes) to establish rates of participation in these activities. Tell your child that you will be monitoring and writing down what they do during the afternoon and avoid explaining in too much detail how **time sampling** works.

You will also need to ask your child to keep a record of their daily after-school activity in a diary and they will still need to wear the pedometer to record a daily total of steps. At the end of each day you and your child will need to discuss their activity for the afternoon and allocate the points accordingly and record them on the '**points chart**' provided. For every day that the child accurately records their activity they will receive an extra point. **Bonus points** can also be rewarded at the parent's discretion for honesty and effort (**only** relating to this **intervention**) or if the child chooses a **non-target** activity but is not for some reason able to do a physical activity instead (such as in the case of a big homework project or sickness).

See the **Points calculations** example over the page.

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Example: Points calculations (without bonus points)

- A three hour period/ 0.5hr = 6 possible points for **not** being involved in **target** sedentary behaviour.
- +
- A three hour period/ 0.5hr = 6 possible points for being involved in a **physical** activity.
- +
- For every day that the child accurately records their activity they will receive an extra point
- =
- A maximum of 13 points can be earned each day (without any additional bonus points)
- =
- Giving a weekly maximum of (13 points* 5 days) 65 point that can be earned

At the end of each week children will receive rewards according to the number of points they have earned during that week. You will need to explain to your child how this points system works.

Reinforcement Menu and Rewards List

Next you will need to determine the rewards to suit your needs and preferences and those of your child and family. To do this you will need to design a **reinforcement menu**. To begin with list the kinds of things that you would be happy to do or give to your child as rewards in the table below. At the same time think about the value or **cost (time, effort, money etc.)** that these rewards would mean to you. Rate the 'cost' from 1 to 10 with 10 being the most cost and 1 being no cost in the **cost** column of the table below. Those with 10 as the cost rating will require the child to earn a greater number of points to gain that particular reward. Try and have rewards that have a range of ratings.

<i>Rewards list</i>	<i>Points</i>

You will then need to give your child a list of the rewards that you have come up with and ask them to rate the rewards from their most preferred (or favourite) to

APPENDIX I

their least preferred or favourite , this will give you an idea of your child's perceived value of the reward. It is also helpful to ask your child if they have any other ideas for rewards (that are not food or sedentary type rewards).

The next step is to develop the **rewards list**. From your ratings of cost, together with your child's perceived value, you will need to assign points to the rewards. It is a good idea for you and your child to do this together (with you making the final decisions) so that you can explain to your child that if they earn X amount of points they can choose a reward with that value of points (or less). Below is an example of a **rewards list** with the amount of points that the child will need to earn to choose to receive that reward.

Examples of activity based rewards for points earned might include:

- A family trip to the beach- **50** points or more
- Having a friend over to play-**40** points or more
- A family trip to the park- **30** points or more
- A family game of spot-light in the evening- **25** points or more
- A family parent/child bike ride in the country- **20** points more
- A family game of cricket on the lawn- at least **15** points

<i>Activity based rewards</i>	<i>Cost</i>

IMPORTANT NOTE: the rewards the child earns should not be taken away as punishment for any behaviour. Any changes to the availability of the reward (due to unforeseen circumstances) should be renegotiated between you and your child and a compromise should be reached that suits you both.

Post-intervention

The post-intervention phase is just like the baseline phase, except that it is recording your child's activities after the intervention phase has finished, in other words- no more points and rewards (for now). This phase will last one week.

Once the research has finished you are welcome to use (and modify) the programme as you see fit.

APPENDIX I

Day **EXAMPLE**

Phase: Baseline / Intervention / Post-intervention

Cross out the phases that do not apply

Record the time in 15 minute blocks		Label the activity your child is presently doing at the specific time interval	If the activity is Sedentary tick the appropriate box below (target=activities to reduce)		If the activity is physical tick this box
Interval	Time	Activity	Target	Non-target	Physical play
1	Start 3:15	Watched TV	*		
2	3:30	Watched TV	*		
3	3:45	Watched TV	*		
4	4:00	Watched TV	*		
5	4:15	Watched TV	*		
6	4:30	Did homework		*	
7	4:45	Did homework		*	
8	5:00	Did homework		*	
9	5:15	Played on bike			*
10	5:30	Played on bike			*
11	5:45	Played on Computer	*		
12	6:00	Played on Computer	*		
Tick Totals			Target 7	Non-target 3	Physical play 2
Points			Total X 0 0	Total X 0.5 1.5	Total X 1 2
			Add any Bonus Points		
			Total Points		3.5
			Pedometer reading		896

At the end of each days recording period count the number of ticks in each column and write these into the **Tick Totals** boxes for Target Sedentary, Non-target Sedentary and Physical Play. To score the points, during the **intervention phase** take the number of Non-target ticks and multiply them by $\frac{1}{2}$ (or 0.5) and then add them to the number of physical activity ticks. You will also need to add on any **Bonus Points** you have awarded your child to calculate the **Total Points**. At the end of each recording period you will also need to record the number on the **Pedometer** that your child is wearing.

APPENDIX I

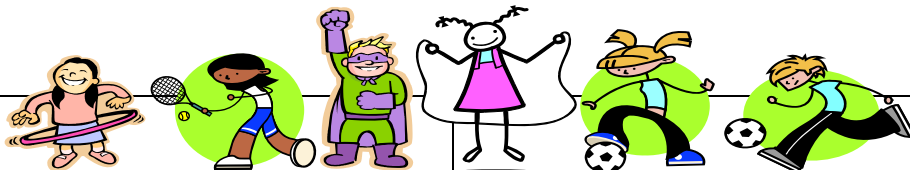
Day _____

Phase: Baseline / Intervention / Post-intervention

Cross out the phases that do not apply

Record the time in 15 minute blocks		Label the activity your child is presently doing at the specific time interval	If the activity is Sedentary tick the appropriate box below (target=activities to reduce)		If the activity is physical tick this box
Interval	Time	Activity	Target	Non-target	Physical play
1	Start				
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
Tick Totals			Target	Non-target	Physical play
Points			Total X 0 0	Total X 0.5	Total X 1
			Add any Bonus Points		
			Total Points		
			Pedometer reading		

At the end of each days recording period count the number of ticks in each column and write these into the **Tick Totals** boxes for Target Sedentary, Non-target Sedentary and Physical Play. To score the points, during the **intervention phase** take the number of Non-target ticks and multiply them by $\frac{1}{2}$ (or 0.5) and then add them to the number of physical activity ticks. You will also need to add on any **Bonus Points** you have awarded your child to calculate the **Total Points**. At the end of each recording period you will also need to record the number on the **Pedometer** that your child is wearing.



Week one

15					
14					
13					
12					
11					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
No. of points	Mon	Tues	Wed	Thurs	Fri

Points total for week one _____



Week two

15					
14					
13					
12					
11					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
No. of points	Mon	Tues	Wed	Thurs	Fri

Points total for week two _____



Week three

15					
14					
13					
12					
11					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
No. of points	Mon	Tues	Wed	Thurs	Fri

Points total for week three _____



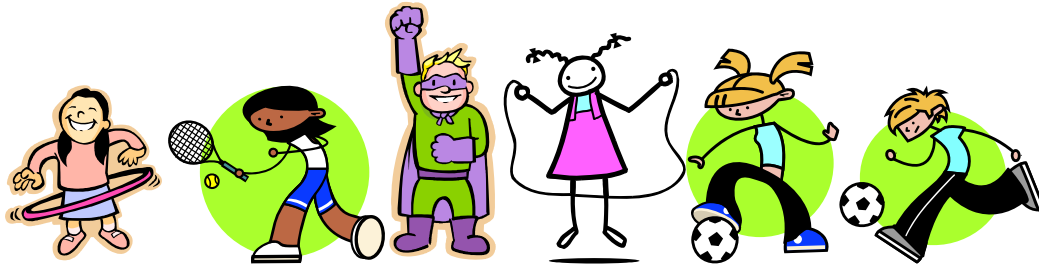
Week four

15					
14					
13					
12					
11					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					
No. of points	Mon	Tues	Wed	Thurs	Fri

Points total for week four _____



Child Activity Diary



My name is _____
and this is my daily afternoon activity
diary.

In this diary I write down all the things I did in
the afternoon after school.

By Joelene Howarth

**Supervised by Professor Jane Ritchie
And Dr Jo Thakker**

As part of the requirement for a Masters Thesis in Psychology at the University of Waikato

APPENDIX K

Please write down all your favourite things to do in the afternoon and beside them write how long you like to do them for.

favourite things to do	How long I like to do them
For example watching TV	2 hours

APPENDIX K

Every weekday after school please fill in the day number, the date and what the time was when you got home and then write down all the things you did that afternoon and how long you did them for if you can remember.

Day number_____

Date_____

Start time_____

What I did this afternoon.....



Day number_____

Date_____

Start time_____

What I did this afternoon.....



APPENDIX K

Every weekday after school please fill in the day number, the date and what the time was when you got home and then write down all the things you did that afternoon and how long you did them for if you can remember.

Day number_____

Date_____

Start time_____

What I did this afternoon.....



Day number_____

Date_____

Start time_____

What I did this afternoon.....



APPENDIX L

CONSENT FORM

PARTICIPANT'S COPY

Research Project: _____

Name of Researcher: _____

Name of Supervisor (if applicable): _____

I have received an information sheet about this research project or the researcher has explained the study to me. I have had the chance to ask any questions and discuss my participation with other people. Any questions have been answered to my satisfaction.

I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Research and Ethics Committee.

Participant's Name: _____ Signature: _____ Date: _____

E =====

University of Waikato
Psychology Department
CONSENT FORM

RESEARCHER'S COPY

Research Project: _____

Name of Researcher: _____

Name of Supervisor (if applicable): _____

I have received an information sheet about this research project or the researcher has explained the study to me. I have had the chance to ask any questions and discuss my participation with other people. Any questions have been answered to my satisfaction.

I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Research and Ethics Committee.

Participant's Name: _____ Signature: _____ Date: _____

PSYCHOLOGY DEPARTMENT

Appendix M

The Child Behaviour Check List

Due to copyright this assessment tool could not be reprinted.

For more information see:

Achenbach, T. M., & Edelbrock, C. 1983. *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Burlington, VT: University of Vermont Department of Psychiatry.