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ENGAGING ADOLESCENT GIRLS IN SCHOOL SPORT

A FEASIBILITY STUDY

By

DEAN DUDLEY

From

THE UNIVERSITY OF WOLLONGONG

FACULTY OF EDUCATION

2007

A research project submitted in partial fulfilment of the requirements

for the award of the degree

MASTER OF EDUCATION (RESEARCH)

Abstract

Aim: The purpose of this study was to determine the feasibility, acceptability, and potential efficacy of a school-based physical activity program delivered during programmed school sport time and designed to meet the needs and interests of adolescent girls, as well as function effectively within the constraints of the school environment.

Methodology: 38 adolescent girls (Year 11) were recruited to participate in the program as either intervention (n=17) or control group (n=21) participants. The intervention program aimed at increasing physical activity by improving enjoyment, physical self-perception and perceived competence. Baseline and follow-up (11 weeks) assessments included enjoyment of physical activity (PACES), physical self-perception (PSPP), and physical activity (accelerometers). The study also contained qualitative data collection to formulate the intervention design and quantitative data to allow for greater understanding of the needs and wants of adolescent girls with regard to their school sport programs. This qualitative data was collected through focus group interviews, observations, and teacher/student commentary.

Results: The results were reported in terms of comparison between intervention and control groups based on the analysis of data from each of the collection instruments. Results also contain a discussion on the formative qualitative data.

Conclusions: Data highlights major barriers confronting adolescent girls' participation in school sport. Some of these include teacher attitudes and support, activities and

programming, purpose and distinction, and student input. Negotiating these barriers and overcoming them in a school setting appears feasible with support from the entire school community.

Furthermore, the study showed that the intervention was able to achieve a positive medium effect on enjoyment of physical activity and perceived body image (0.42 and 0.50 respectively, using Cohen's d). A novel finding of this research was a slowing in the decline of physical activity even though intervention and control groups were engaged in programs with significantly different estimated rates of energy expenditure. Intervention and control group mean energy expenditure was 4.25 and 6.2 respectively indicating that future physical activity interventions should focus on interest and enjoyment rather than programming for increased levels of intensity.

ACKNOWLEDGEMENTS

I wish to acknowledge and thank the following people, who have made significant contributions to this thesis. Firstly, I would like to thank Dr Tony Okely and Dr Philip Pearson (supervisors of this project). Their willingness to share their expertise and knowledge as well as provide guidance and direction to the study made this a very life changing and enriching experience.

To Leslie Pennicook, Alison Traill, Sandra Georges, and Mariam Ibrahim for sharing your passion to make physical activity in your school a priority and the countless sacrifices you all made in order for this study to be successful.

To Professor Jan Wright, Dr Valerie Harwood and the Faculty of Education at the University of Wollongong for their support and direction in the two additional research subjects that I studied during this project. They have true insight into the field of educational research and special thankyou for the financial support received for this project.

To the staff and fellow research students in the Child Obesity Research Centre (CORe) at the University of Wollongong, special thanks, as your expertise and willingness to share that knowledge made this thesis possible.

Finally, to the some 160 girls who participated in this study in one facet or another. Thank you for allowing an unknown teacher to come and disrupt your already hectic academic and social schedules. I truly appreciate all the cooperation you have given me.

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Chapter One

1. Introduction

School sport is an integral part of secondary schooling from Years 7-11 in New South Wales (NSW), Australia. Whilst school sport may be meeting the needs of students who are successful in being selected in representative teams, for those students who are not involved in representative sport it is problematic in a number of areas.

Two separate and independent bureaucracies manage the delivery and regulation of education in NSW. Firstly, The NSW Department of Education and Training (NSW DET) delivers public education and training from early childhood (pre-school), through to the compulsory years of schooling (Kindergarten to Year 10), and senior secondary education leading to the award of the NSW Higher School Certificate (in Years 11 and 12) and is the largest single organisation, public or private, in Australia. With a recurrent budget of $10.7 billion, the Department is responsible for around one quarter of the State's total budget. Around 750,000 students are taught by over 50,000 full time teachers in more than 2,200 NSW Government schools - including pre-schools, primary schools, central schools, high schools, colleges and specialist schools (NSW DET, 2007).

Secondly, the Board of Studies NSW (NSW BOS) was established in 1990 to serve government and non-government schools in the development of school education for Years K-12. It provides educational leadership by developing curriculum and awarding secondary school credentials, the School Certificate and the Higher School Certificate (Board of Studies, 2007).

It is pertinent to the context of this study to understand the unique structure of education in NSW schools as it impacts on policy and delivery of physical activity. Personal Development, Health, and Physical Education (PDHPE) is just one of many subjects written and managed by the NSW Board of Studies. Its syllabi cover learning to be taught by teachers throughout the primary and secondary education institutions. According to the subject's rationale:

> "Personal Development, Health and Physical Education (PDHPE) contributes significantly to the cognitive, social, emotional, physical and spiritual development of students. It provides opportunities for students to learn about, and practice ways of, adopting and maintaining a healthy, productive and active life. It also involves students learning through movement experiences that are both challenging and enjoyable, and improving their capacity to move with skill and confidence in a variety of contexts. It promotes the value of physical activity in their lives" (Board of Studies, 2003 p.8).

It is important to note that participating in this subject at school (which is compulsory until the completion of Year 10) is not solely devoted to the delivery of physical activity in a school. It has a much broader sociocultural responsibility in educating students in the holistic value of good health and wellbeing.

The NSW DET as the managing agency for government schools in NSW does have policy regarding the delivery of physical activity in the form of school sport. That time is to be allocated above and beyond what is experienced by students in PDHPE classes. Specifically the policy states:

> "In secondary schools where an integrated sport pattern is utilised, two periods of 80 minutes per week is to be allocated or where a staggered or traditional sport pattern is preferred, then 2-3 periods or 80-120 minutes per week is required" (NSW DET, 1992 p.1).

The 'Active Schools Curriculum' implemented by the Australian Government (2005) sets out that all Australian schools must provide 120 minutes of physical activity per week in curriculum time from the start of 2005.

NSW schools will typically adopt one of three school sport program patterns: Integrated, traditional, or staggered. Integrated sport occurs when allocated sport time for students is incorporated into the Personal Development, Health, and Physical Education (PDHPE) teaching load. Students typically have an increase in PDHPE classes from Years 7-10. Traditional and staggered patterns usually involve most of the school's teacher (including non-physical education trained teachers) being allocated sport as part of their teaching load. Traditional formats have an entire afternoon (90-120 minutes) once a week allocated to school sport whereas a staggered format will have certain year groups having sport in different time allocations on the school timetable.

Recognising the importance of sociocultural, organisational and environmental influences on school-based physical activity behaviour will impact on a school's ability to run an effective school sport program. School sport can be problematic in its administration and operation. It is often taught and staffed by teachers from a variety of subject faculties, with a range of personal backgrounds and perceptions of sport. Teachers responsible for its organisation are confronted with many obstacles to

overcome, ranging from student participation, teacher supervision, budgeting, venue booking, truancy, timetabling, and uniform policies. This study focused on one particular school that expressed concern regarding its school sport program, but its issues are broader-reaching. Little-to-no research has been conducted on school sport curriculum and its implementation in secondary schools. Yet it remains as a focus of physical activity in most secondary schools in NSW.

Of particular concern is the decline in physical activity amongst adolescent girls once they reach Year 10 (Booth, Okely, Chey, Bauman, and Macaskill, 2002; Booth, et al. 2006). Specific demographics that display this trend include adolescent girls from non-English speaking (specifically Asian and Middle-Eastern) and lower socio-economic backgrounds. For this reason, it was prudent to select an environment that exhibited higher proportions of these demographics as the basis for the research conducted for this study.

1.1 Purpose and aims of the study

The purpose of this study was to determine the feasibility, acceptability, and potential efficacy of a school-based physical activity program delivered during programmed school sport time and designed to meet the needs and interests of adolescent girls as well as function effectively within the constraints of the school environment.

1.2 Research questions

The specific research questions were:

1. What are the physical activity needs and interests of adolescent females from non-English and low socio-economic backgrounds and how can these be negotiated to develop a program to increase enjoyment of and participation in physical activity?
2. Will the program be feasible (able to screen, recruit, assess, and randomise the specified number of participants)?
3. Will the program be acceptable to the participants and the school community (all sessions implemented; maintaining high levels of participation throughout the program; participant and staff satisfaction with the program)?
4. Will the program be potentially efficacious (program results increased enjoyment of physical activity, objectively measure physical activity, physical self-perception, and social support)?

1.3 Research hypotheses

Given the lack of statistical power and limited time frame of the study, outcomes will be evaluated on the basis of implementation measures and changes in outcomes.

Feasibility: It is hypothesised that the intervention would be a feasible program that will be able to:

H1: assess and randomise 40 participants to the intervention or control group;

H2: retain 75% of participants from baseline to follow-up measurement;

H3: successfully collect all baseline and follow-up measurement data (except for accelerometers, expecting 70% returned with valid data).

Acceptability: It is hypothesised that the intervention would be an acceptable program that that will be able to:

H4: implement 100% of planned sessions;

H5: have an average attendance rate of 70%;

H6: assess the enjoyment experienced by participants and the success of the program by staff and participants.

Potential efficacy: At follow-up, compared with girls who did not participate in the intervention, participants in the intervention will:

H7: show greater improvement in enjoyment of physical activity; objectively measured physical activity, physical self-perception, and social support.

Data gathered to provide answers to these questions were used for the purpose of testing the following research hypotheses:

1. There will be greater improvement in enjoyment of physical activity among girls in the intervention group compared with those in the control group.
2. There will be greater improvement in objectively measured physical activity among girls in the intervention group compared with those in the control group.
3. There will be greater improvement in physical self-perception among girls in the intervention group compared with those in the control group.
4. There will be greater improvement in social support of physical activity among girls in the intervention group compared with those in the control group.

1.4 Significance of the study

The answers to the research questions posed in this study have the potential to provide valuable information on the involvement and participation of adolescent girls in school sport. This in turn will lead to a greater understanding of the role of school sport and whether it is possible to develop, implement, and evaluate a program that can meet the needs and interests of adolescent girls, especially girls at high risk of not enjoying physical activity.

1.5 Overview of Methodology

This study used an experimental design to examine the nature of a school sport program run by a single sex girls high school situated in south-west Sydney. The participants were all Year 11 students at the school who displayed low levels of enjoyment in physical activity. Consenting students were randomised into control or intervention groups after baseline measurements were taken. After randomisation, the control group continued with the existing school sport program and the intervention group received a program that was based on current research ideas and formative data from the participants.

1.6 Limitations

The investigation undertaken in this study contributed to understanding the feasibility, acceptability, and potential efficacy of an intervention targeting adolescent girls within a school sport infrastructure. There existed, however, uncontrollable circumstances that may have affected the results of the study:

1. This study was not sufficiently powered to detect statistically significant differences. It was designed as a pilot Randomised Control Trial (RCT) to examine feasibility, acceptability, and potential efficacy (i.e. trends in behaviour outcomes) of the intervention.
2. Written permission from parents/guardians was required prior to student participation in the study, and students were allowed to decline participation in any of the tests, or to withdraw from the study at any time
3. Participants were targeted during their post-compulsory years of schooling. For this reason there would be an unpredictable number of participants who left the study because they had chosen to either change schools in order to complete their secondary studies, or leave school all together.
4. Instruments used to assess enjoyment of physical activity, physical self-perception, and social support were surveys and as such, are limited as the information they detail is contingent on the honesty of the respondent and the specific context for which they are designed for.
5. The study made no attempt to balance the Metabolic Equivalent (MET), a measure of intensity, of the activities program for the intervention group with the control group. Whilst control group activities were comparably similar to the MET value of the baseline measurements, intervention activities were considerably lower in MET than the control group and than that of the baseline measurements. This fact should be considered when interpreting these results.

1.7 Delimitations

The study was delimited in the following manner:

1. The subjects were Year 11 girls enrolled in a single sex high school from south west Sydney in NSW, Australia.
2. Measures of physical activity included the use of accelerometers during programmed school sport sessions once a fortnight over the period of 12 weeks. This measure was identified as a dependant variable.
3. Measurement of enjoyment of physical activity was via the Physical Activity Enjoyment Scale (PACES). This measure was identified as a dependent variable and used as a screening tool for participant eligibility in the study.
4. Measurement of physical self-perception was via the Physical Self-Perception Profile (PSPP). This measure was identified as a dependent variable.
5. Measurement of social support was via the Family and Peer Support Index (SS). This measure was identified as a dependent variable.

1.8 Definition of terms

Given the diversity of literature in the area, there is an excess of definitions used for some of the following terms. Therefore, it is important to clearly define them in the context of this study.

1. *School sport*: Those periods of timetabled lessons, other than physical education, dedicated to student participation in physical activity in either a representative or recreational manner. It will be a traditional, scattered, or integrated format. Traditional school sport would entail up to 120 minutes timetabled one day a week. In this format all students required to attend will participate in a sporting pursuit that is supervised by teachers across the entire teaching faculty. Scattered

school sport is identical to the traditional format except it is spread across the entire week and can be allocated to varied times. It is usually conducted in year groups. Integrated school sport exists when an increase of 120 minutes per week is allocated to the teaching load of the physical education teaching staff and they incorporate this time into their timetable physical education lessons.

2. *Feasibility:* the ability to screen, recruit, assess, and randomise the specified number of participants.
3. *Acceptability:* the ability to implement all sessions, and maintain high levels of participation throughout the program. Additionally, for participants and staff to enjoy the program.
4. *Potential efficacy:* the ability to increase enjoyment of physical activity, objectively measured physical activity, physical self-perception, and social support among the intervention group.

Chapter Two

2. Literature review

This literature review involved a comprehensive search of quantitative and qualitative research surrounding physical activity, sport, education, exercise and adolescence. It focused on the health benefits and determinants associated with physical activity in adolescent populations and their relationship with adult and lifelong health status. The literature review also examined school sport as an infrastructure for engagement in physical activity for adolescents.

2.1 What are the health benefits of physical activity for people?

In order to answer this complex question, the following diagram taken from Blair (1989) was used to describe the relationships between physical activity and health.

Please see print copy for figure 1

Figure 1: Model showing the relationship of physical activity and health (Blair, 1989)

Based on this model, this section will review

1. Relationship between adult physical activity and adult health (Relationship D in Figure 1)
2. Relationship between adolescent physical activity and adult health (Relationship B)
3. Relationship between adolescent physical activity and adult physical activity (Relationship C)
4. Relationship between adolescent physical activity and adolescent health (Relationship A)

2.1.1 Relationship between adult physical activity and adult health (Relationship D)

A review of the literature on the relationship between physical activity and adult health in the areas of all cause mortality (ACM), cardiovascular disease (CVD) prevention, obesity, diabetes, cancer, and mental health was conducted with the following conclusions.

Physical activity primarily reduces the risk of ACM by preventing the onset of cardiovascular disease. According to Lee and Skerrett (2001), there is a 30% risk reduction in ACM for those achieving the recommended levels of moderate-to-vigorous physical activity (MVPA) on most days of the week than for those who were categorised as inactive.

Cardiovascular disease is the most common cause of death in Australia and many other industrialised countries. A review conducted by Powell, Thompson, Casperson, and Kendrick (1987) clearly recognised the relationship between physical activity and incident/fatal cardiovascular disease. Many more recent studies refer to the relationship

between levels of physical activity/fitness and the incidence of cardiovascular disease or mortality showing a consistent pattern in the reduction of risk for those who participate in MVPA on most days of the week (Wannamethee & Shaper, 2001).

A recent review of the literature examing physical activity and weight management across the lifespan by Goldberg and King (2007), concluded that epidemiological and clinical studies suggest that 30 minutes of physical activity per day is critical in curtailing weight gain. It is further discussed that for weight loss to occur, interventions alone have only moderate results and are far better when combined with dietary interventions, especially when physical activity is in excess of 200 minutes per week. Finally, Goldberg and King (2007) state that weight loss maintenance requires higher levels of physical activity (e.g., 40 to 90 minutes per day).

Diabetes mellitus is characterised by the two factors of excessive levels of glucose in the blood and the inability of insulin to metabolise glucose. Physical activity is believed to be one of the most effective preventative treatments of non-insulin dependent diabetes mellitus (Type 2 diabetes). One of the most convincing studies was a randomised control trial conducted by Tuomilehto, et al. (2001) in Finland of 522 people with impaired glucose tolerance included an intervention of nutritional counselling and endurance exercise advice. Diabetes incidence was reduced by 58% more among the intervention group than the control subjects, and was directly related to lifestyle changes.

According to Bauman (2004), research is suggestive that mental health benefits are attributed to being physically active, but cannot be substantiated at this stage without

larger randomised control trials. Many studies to date have been small clinical trials but have shown links between physical inactivity and depression, self-esteem, cognitive function, and sleep quality.

Of all cancer types, colon cancer has shown the most consistent relationship with physical inactivity. Powell and Blair (1994) stated that there is a clear and consistent association with colon cancer, and that 32% of colon cancer-related deaths could be attributed to inactive lifestyles. There is also some evidence to suggest that moderately high physical activity may play a protective role in preventing breast cancer in premenopausal women (Steindorf, Schmidt, Kropp, & Chang-Claude, 2003).

2.1.2 Relationship between adolescent physical activity and adult health (Relationship B)

Many of the diseases and illness risk factors for physical activity have been shown to track from childhood through to adolescence and even to adulthood. Studies have shown that additional health-risk behaviours such as smoking and excessive alcohol consumption in later life are also linked to increased incidence of sub-optimal physical activity levels in children and adolescents (Bouchard, 2000).

Twisk, Van Mechelen, Kemper, and Post's (1997) longitudinal study suggested that daily physical activity during adolescence was related to a high-risk profile for body fat distribution in females. When long-term exposure of 17 years from adolescence to adult age was considered, daily physical activity was still related to a high-risk profile for body fat distribution in females.

2.1.3 Relationship between adolescent physical activity and adult physical activity (Relationship C)

In terms of sport and physical activity, the significance of age is self-evident; a considerable decline in physical activity is shown to occur between adolescence and adulthood (Sallis, Prochaska, & Taylor, 2000). According to Green (2002), a highly active minority remain physically active well into middle age and throughout their lives. It seems then, the significance of youth for lifelong participation is its likelihood to impact on leisure time behaviour in later life.

According to Roberts (cited in Green, 2002 p.173),

> "The best predictor of any individual's future uses of leisure is that same person's past behaviour"

A review paper conducted by Trost, Owen, Bauman, Sallis, and Brown (2002) found that past exercise behaviour and exercise habit were both consistent predictors of adult physical activity status. However, in numerous studies the longer the elapsed time between observations, the weaker the correlation between adolescent and adulthood physical activity became (Trudeau, Laurencelle, & Shephard, 2004). Part of this can be attributed to the lack of longitudinal studies measuring physical activity objectively. Much of the research in this field relies on physical activity recall surveys.

A longitudinal physical activity and sedentary behaviour trends study conducted by Gordon-Larsen, Adair, Nelson, and Popkin (2004) concluded that the transition time from adolescence to young adulthood is an important time to promote physical activity.

Among adolescents, very small portions of the population are adequately physically active and maintain an active lifestyle into adulthood.

2.1.4 Relationship between adolescent physical activity and adolescent health (Relationship A)

Low levels of physical activity have been shown to be associated with an increased risk of a number of lifestyle diseases and illnesses in children as young as 12 years of age (Baranowski, Bouchard, & Bar-Or, 1992). Some of these conditions include obesity/overweight, decreased bone density, and several psychosocial disorders (Boreham, 2001).

Physical activity during adolescence may reduce the risk for chronic diseases during adulthood. This is plausible because several common chronic diseases, particularly coronary heart disease and osteoporosis, are known to have their beginnings in childhood and adolescence (Sallis & Owen, 1999a).

According to Strong, et al. (2005), physical activity can have a range of positive health and behaviour effects in school-age adolescents. Moderate to vigorous aerobic physical activity conducted three to five days a week for at least 30 minutes will have a positive effect on the adiposity, blood pressure, high density lipid count, and triglyceride levels of adolescents (Strong, et al. 2005). Furthermore, non-specific amounts and varied modes of physical activity will have positive mental health benefits for adolescents. Some of the benefits include reduced anxiety and depression symptoms. They also include increased perceptions of global and physical self-concept (Strong, et al. 2005).

The literature for this relationship will now be examined in greater detail for adiposity, skeletal health, psychosocial health, and academic performance.

2.1.5 Relationship between physical activity and adiposity in adolescent girls

There is considerable research concerning whether energy expenditure and physical activity are related in context with adiposity. A study conducted by Ekelund, et al. (2002, p.935) concluded that

> "Obese adolescents are less physically active than normal weight adolescents, but physical activity-related energy expenditure is not significantly different between the two groups. The data suggest that physical activity is not necessarily equivalent to the energy costs of the activity".

In a cross sectional analysis on the physical activity habits of 5500 British adolescents (12 years of age), Ness, et al. (2007) measured physical activity using MTI accelerometers and found that there were strong negative associations between moderately vigorous physical activity and adiposity (fat mass and trunk fat) in adolescent girls.

A longitudinal study conducted by Berkey, et al. (2000) in a cohort of 6149 girls (aged 8-14 years) in the United States surveyed their body mass index (BMI), dietary intake, physical activity, and recreational inactivity over a twelve-month period. The findings of this study concluded that those girls who reported increased recreational inactivity or less physical activity displayed higher BMI measurements over the 12-month period.

A review of 45 randomised trials designed at determining the efficacy of exercise alone in treating overweight children and adolescents found that aerobic exercise prescription of 155-180 minutes per week at a moderate-to-high intensity was effective in reducing body fat in overweight adolescents (Atlantis, Barnes, and Fiatarone-Singh, 2006).

Gortmaker, et al. (cited in Lobstein, Baur, and Uauy, 2004) showed a strong relationship between time spent being inactive and the prevalence of being overweight, even after adjusting for previous overweight, baseline maternal overweight, socio-economic status, household structure, and ethnicity. Story, et al. (1991) also suggested that the caloric excesses which lead to weight gain in obese adolescent girls appear to arise from their low physical activity levels rather than a high caloric intake.

2.1.6 Relationship between physical activity and skeletal health in adolescent girls

Physical activity is thought to have benefits for skeletal health through the prevention of osteoporosis (Bauman, 2004). It is recognised that bone mineralisation peaks by the age of 20 in girls and that gradual bone loss thereafter contributes to osteoporosis and the risk of fractures. According to Bauman (2004), weight-bearing activities are believed to stimulate increased calcium uptake by the bones during adolescence. This research is supported by Kohrt, Bloomfield, Little, Nelson, and Yingling (2004) in their study finding that physical activity in adolescence exerts both short and long-term benefits on bone health.

2.1.7 Relationship between physical activity and psychosocial health in adolescent girls

According to Strong, et al. (2005) cross-sectional studies suggest weak positive associations between physical activity and lower scores on scales of anxiety and depression. Furthermore, the amounts of physical activity are non-specific and varied in mode.

In addressing the relationship of physical activity and psychosocial health, there must be a link between self-concept and self-esteem with physical activity. Cross-sectional and quasi-experimental studies suggest physical activity has moderate-to-strong effects on global and physical self-concept (Strong, et al. 2005).

Harter (1993) draws a direct relationship between sport competence and self-esteem. According to Weiss (2000), having low perceived sport competence impacts directly on physical activity. The important conclusion from the studies conducted by both Harter (1993) and Weiss (2000), is that low athletic competence and participating in less physical activity will result in provoking low levels of peer support and a combination of low self-esteem, depressed affect, and hopelessness.

According to Bunker (1998), involvement in sport and physical activity directly affects the development of an individual's self-concept and perception of self-esteem and competence. Sport and physical activity are considered a fundamental source of opportunity to challenge one's self, take controlled risks and develop skills that may lead to higher self-esteem. It is suggested that physical activity can play a role in helping adolescents suffering from a range of psychosocial health problems (such as

anxiety, depression, and other mental illness) to gain control of one aspect of their life, namely their physical self (Mutrie, 1997).

According to Biddle (1995), sport and physical activity provide one source of enhancing positive feelings about self, reducing depression, increasing alertness, and decreasing tension and anxiety. Supporting this concept of psychosocial health benefit, a large cross-sectional study of adolescents conducted in the United States by Harrison and Narayan (2003, p.113) stated:

> "Students involved in sports, alone or in combination with other activities, had significantly higher odds than the other two groups for…, healthy image and significantly lower odds for emotional distress, suicidal behaviour, family substance abuse, and physical and sexual victimisation".

Expressions of "being too fat" are cited as among the greatest concerns for adolescent girls (Rhea, 1998). In a study conducted to investigate the determinants of physical activity in an obese female population, it was reported that anxiety was far more prevalent in adolescent participants compared to older women (Treasure, Lox, and Lawton, 1998). This highlights the additional mental health burden associated with body image amongst adolescent girls.

2.1.8 Relationship between physical activity and academic performance

In a review of the literature conducted by Strong, et al. (2005), the addition of physical activity through physical education to a school curriculum results in small positive gains in academic performance. Taras (2005) review of literature surrounding physical activity and student performance at school supports this finding suggesting that the

short-term cognitive benefits of physical activity during the school day adequately compensate for the time spent away from other academic areas.

In addition, some quasi-experimental data suggest that allocating more curricular time to programs of physical activity does not negatively affect academic achievement, even when time allocated to other subjects is reduced.

2.2 Prevalence and patterns of physical activity in adolescent girls

Booth, et al. (2002) assessed physical activity in a population-representative sample of NSW school students in Years 8-10. This survey found around 80% of boys and girls reported levels of adequate physical activity in summer, with this prevalence remaining constant for boys but dropping to just 70% among girls in winter. Adequate physical activity was defined as participating in at least 30 minutes per day of moderate to vigorous physical activity or at least three sessions of vigorous physical activity per week. The NSW Schools Physical Activity and Nutrition Survey in 2004 reported by Booth, et al. (2006) found that the prevalence of adequate physical activity was just under 90% for Year 6 and 8 boys dropping to just under 80% for Year 10 boys and for girls, around 80% for Year 6 and 8, dropping to 60% for Year 10 girls. The differences between boys and girls are statistically significant in all years but the difference increases as young people progress from Year 6 to Year 10. This decrease is not linear but appears to be greatest from Year 8 to Year 10.

These participation rates however, drop significantly for adolescent girls from lower socio-economic or non-English speaking backgrounds as they progress through their secondary schooling (Booth, et al. 2002). Booth, et al. (2006) later confirmed this

finding that Year 10 girls prevalence of adequate activity was markedly lower among girls from Asian and Middle-Eastern cultural backgrounds compared with those girls from English-speaking and European backgrounds. The differences were statistically significant for Year 10 girls from Asian backgrounds.

2.3 Determinants of physical activity in adolescent girls

Diverse sets of determinants appear to influence the levels of physical activity in adolescents. According to the Ecological System Theory described by Davison and Birch (2001), these determinate factors can be categorised as individual, interpersonal, and environmental influences. This study also examined historical factors that have determined physical activity patterns in adolescent girls, as there is literature to suggest that girls have historically been precluded from the same opportunities to physical activity as boys (Adams, Schmitke, & Franklin, 2005).

2.3.1 Individual factors

Individual determinants of physical activity are concerned with the biological, ethnic, rurality, and socio-economic aspects of an adolescent. Booth, et al. (2006) report the associations of socio-economic status (SES), urban/rural place of residence and physical participation are neither strong nor consistent for Australian adolescents. One exception is amongst adolescent girls where SES and ethnicity have been found to be significant factors influencing the prevalence of physical activity.

According to Booth, et al. (2002), adolescent girls in Year 10 from low SES backgrounds were only 72% (summer) and 56% (winter) proportionally active in as opposed to adolescent girls from high SES backgrounds being 82% (summer) and 77%

(winter). However, this trend appears to be declining and there was no consistent association between socioeconomic status and physical activity during summer, and the only statistically significant association was in Year 6 where a greater proportion of girls from high socioeconomic backgrounds were active compared with girls from low and medium tertiles (Booth, et al. 2006).

The most substantial difference in prevalence of activity among Year 10 girls, however, is based on cultural background. Asian and Middle Eastern Year 10 girls are significantly less active than their English-speaking peers. Booth, et al. (2006) states that 65% of English-speaking year 10 girls are proportionally active. This is in stark contrast to Asian and Middle-Eastern girls being 22% and 36% respectively.

In light of these findings, emphasis should be placed on the need and interests of these adolescent girls with regard to physical activity (Booth, et al. 2002), especially as they move through their secondary school education. There also needs to be more research into the understanding of the factors that influence participation amongst adolescent girls of non-English speaking backgrounds. A study conducted by Telama, Nupponen, and Pieron (2005, p.132) stated,

> '…physical activity among adolescents can be a component of more than one lifestyle. Different lifestyles evidently represent different values, a fact that should be taken into account in physical education'.

The reasons for these results according to SES and cultural background are unclear, but there is a possibility that the social support structures of adolescent girls from Middle

Eastern, Asian, and low SES backgrounds, play a significant role in determining appropriate adolescent behaviour for girls. Lifestyle nonetheless plays a significant role in levels of physical activity. According to a study of 1131 adolescents conducted by Vilhjalmsson and Thorlindsson (1998), attitudes and beliefs related to physical activity are consistent with lifestyle and attitude-behaviour perspectives. Adolescents that are engaged in lifestyles where sport and health improvement were important were more physically active, suggesting that adolescents engage in physical activity both because they value it as such and because they see it as a means of improving their health or staying active. The issue of whether sport and health in relation to low SES and ethnicity are valued needs further exploration.

According to Trost (2003a), proficiency in fundamental movement skills is also hypothesised to be a strong influence on youth physical activity participation. Current evidence suggests a weak but positive association between physical activity and motor proficiency (Trost, 2003a). Okely, Booth, and Patterson (2001) assessed Year 10 students on six fundamental movement skills and had them report their physical activity using a self-report recall measure. Their study concluded that fundamental movement skills were significantly associated with adolescent participation in organised physical activity.

2.3.2 Interpersonal factors

Interpersonal factors such as family and peer support play significant roles in physical activity participation. Here interpersonal factors affecting adolescent physical activity participation are primarily examined.

Duda (2003) states peer relations and interactions, especially after early adolescence, can influence a young persons' perception of competence and potentially their achievement motivation in regard to sport and physical activity.

Tappe, Duda, and Ehrnwald (1989) studied perceived barriers to exercise amongst 236 US high school students. Major barriers to exercise were reported as 'time constraints', 'unsuitable weather', 'schoolwork', and 'lack of interest or desire'. Adolescent girls reported time, weather, and school as being the most significant barriers across the range but of particular note was that the low activity level group girls reported, in order of priority, 'time', interest' and 'school' as the most significant barriers. However, it should be noted here that teachers are not the sole motivator in adolescent physical activity in schools. According to the authors, physical education and sport programs need to be sensitive to the individual perspectives and needs of adolescents in regard to participation in regular exercise programs. A school sport program provides a potentially under-utilised physical activity infrastructure for less active adolescent girls as the 'time constraints' and 'schoolwork' barriers have been removed.

Wright, Macdonald, Wyn, and Kriflik (2005) discuss how young people negotiate their participation in physical activity in relation to other priorities in their lives. This study identified a decline in organised sport participation from Years 10 to 12 in an adolescent girl. In Year 10 she would have been considered moderately physically active with regular participation in swimming squad, surf club, gymnastics and tae kwon do. Her participation in these activities seriously declined in Year 12 as paid work, HSC study, partying, and time spent with her boyfriend became priorities.

The opportunity to become involved in engaging school sport also presides as an interpersonal factor. Wright, et al. (2005) discuss the case of an overweight adolescent girl who actively resists taking up the dominant discourses associated with physical activity. Her body size and shape are influencing her perceptions of health and physical activity. In a significant moment in this case, the adolescent girl recalls one of her, all but few, physical activity highlights as being able to play rugby in a school team. The team didn't last long due to lack of support but it may suggest that a school sport environment could be better structured to accommodate a range of body shapes and student interests.

2.3.3 Broader social and physical environmental factors

A host of environmental factors including physical community design, school infrastructure, and curriculum all play substantial roles in physical activity participation. Here we primarily examine school environments and infrastructure that affect adolescent physical activity participation.

Efforts to design appropriate physical activity environments for adolescents frequently lead to discussions on single-sex verses coeducational settings. According to McKenzie, Prochaska, Sallis, and LaMaster, (2004), found that boys engaged in more moderate to vigorous physical activity than girls in a middle school coeducational setting. McKenzie, et al. (2004) suggests that girls-only classes can provide more emphasis on the building of motor and sport skills that many girls may lack. Park (1999) suggests that the majority of girls are more comfortable when males are not present, however, a small percentage express enjoyment about participating with males in the class as it

gave them an opportunity to improve their social skills or learn from boys who may have more experience in a particular sport or activity.

Of the studies reviewed, few environmental interventions have incorporated a school-based strategy. In most western countries, schools are the primary societal institution with the responsibility for promoting physical activity. To this extent, the 'burden' has fallen on physical educators. The declining availability of physical education and school sport in the upper grades of high school is of concern if adolescents are finding participation in physical activity difficult outside of school due to their changing priorities.

The availability for physical activity in the school setting is primarily centred on structured classes in Personal Development, Health, and Physical Education (PDHPE) and School Sport in NSW. NSW Board of Studies requires that PDHPE remain a compulsory subject only until Year 10. School sport is of further concern as it is often run according to individual school policy.

There have been several dominant arrangements for school sport. They include the traditional model of an entire sport afternoon whereby students compete in either competitive interschool sport or recreation/house sport run at the school or local facilities. The traditional model usually requires the majority of the teaching staff (all faculties) to teach sport during this allocated time period. The integrated model has seen popularity in recent times whereby school sport is integrated into the PDHPE curriculum and taught by physical education teachers only. This method may be more beneficial in developing skills but requires more teaching time and staff to be allocated

to the PDHPE faculty. Integrated models are popular during the early years of secondary schooling. Finally the scattered method is a mix of the traditional and integrated models. Scattered models adopt the principle of having a dedicated block of time allocated to school sport but are usually year-based (i.e. Year 10 sport is on Wednesday morning from 9am -11am). This model is administratively difficult and is normally taught by teachers from a number of faculties who may have no interest in sport whatsoever. It provides limited interschool competition and competitive pathway infrastructure.

Thus, school sport may not be a source of effective physical activity for the majority of students. Changing the way educators think about and conduct school sporting programs may be an opportunity for engaging adolescent girls in physical activity both inside and outside a structured school environment.

2.3.4 Historical factors

According to Malaxo and Wedgwood (1997), sport has been a masculine, male-identified institution in the Western culture since the middle of the nineteenth century. According to Adams, et al. (2005) from its inception, sport and organised physical activity have provided a closely cultivated arena for males to demonstrate their privilege and power. The entrance of women into this arena has been historically carefully monitored and regulated. While individual women have continuously contested their exclusion from or limited entry into sport or organised physical activity, feminists and advocates of women's rights have expressed ambivalent feelings about women's entrance into the world of sport (Adams, et al. 2005). This ambivalence was evident in the early deliberations of many female physical educators who, on the one hand, pushed

for women to be physically active and, on the other hand, sought to remake sport and physical activity into a more feminine sphere by downplaying the competitive and aggressive aspects of sport (Cahn, 1994; Nelson, 1994 as cited in Adams, et al. 2005).

By the second wave of feminism in the 1960s and 70s, sport was seen as an arena for women to contest stereotypical images of the docile, passive, inert, incapable female body, thus challenging the patriarchal control and regulation of the female body (Adams, et al. 2005).

What this may mean is that adolescent boys and girls may construct the importance of sport and physical activity differently. Stoddart (as cited in Park, 1999) describes how sport in Australia developed into a catalyst for the transmission of the male orientated value system which society was and to a large extent is still based on. This is due to the fact that values such as independence, competitiveness, and individuality can be predominately attributed to males and not females.

According to Park (1999), whilst society in general has made significant improvements in trying to address the issue of female participation in sport and physical activity, there are still large discrepancies that exist between men and women in regards to opportunities, recognition, and resources in the sporting domain.

As this study was conducted in a single sex girls high school, the competition for opportunities, recognition, and resources in the sporting domain over boys was not an issue. The issue however, may exist in the minds of the faculty, school executive, parents, and students who still hold onto “traditional” attitudes and beliefs of what is

appropriate sporting behaviour for adolescent girls and how much of a role the school has to play in breaking those stereotypical roles that prevent participation in sport and physical activity.

2.4 Secondary schools as sites for physical activity interventions

According to Carroll (2001), the link between perceived physical competence and physical activity participation is well documented. A more significant justification for school being the environment to implement physical activity change in Carroll's finding that perceived physical competence in school physical education and sport is linked with volitional participation in physical activity outside school (Carroll, 2001). This point is an important position that should be acknowledged by teachers and health professionals alike who are attempting to influence physical activity levels for health benefits.

The Planned Approach to Healthier Schools (PATHS) run in the United States as discussed by Lounsbery, Gast, and Smith (2005), was a multi-component school program that aimed to establish and sustain a social norm consistent with physical activity and nutrition. This intervention was focused on teacher involvement in its implementation. Teachers were drawn from across the entire school teaching faculty. An English, Biology, Social Science and Physical Education teacher were finally selected to run the program for the students. Teachers were required to attend eight weekend workshops prior to its implementation. While significant increases were noticed in the physical activity levels of the intervention group over the control group, the most significant aspect of this study was that motivated teachers from any subject area are capable of improving physical activity if trained properly to do so.

The ‘Sport’, ‘Sport Plus’ and ‘Sport Plus Parent’ interventions conducted in the United States discussed by Werch, et al. (2003) aimed at increasing physical activity in adolescence and preventing alcohol use. The findings concluded that a sport-based program tailored to adolescent health habits and interests, with or without parental involvement, was significant in increasing exercise frequency among adolescents and in potentially reducing other risk taking behaviour such as alcohol abuse. However, this intervention was solely focussed on a consultation with the student and contained no actual implementation of a collaboratively constructed physical activity program.

Caldwell, Baldwin, Walls, and Smith (2004) examined how middle school adolescents in the United States use their leisure time and introduced an education program named ‘Timewise’. The most interesting aspect of this intervention was the identification of ‘Developing interests and managing boredom’. This concept is very closely related to school sport programs and disengagement of adolescent girls from school sport. Firstly, boredom is very closely linked to a number of behaviour problems, including school truancy and other risk taking behaviours (Brake, 1997; Caldwell & Smith, 1995; Isoaloha and Crowley, 1991; Orcutt, 1985, as cited in Caldwell, et al. 2004). Based on this concept, students who are either bored or have not been able to develop an interest in school sport will utilise this time in another (possibly dangerous) behaviour. As school sport opens itself to a variety of environments and school infrastructure, the possibility of this behaviour further increase (eg. as opposed to a student bored in a mathematics or science class where environments are controlled).

Secondly, interest development is linked with the concept of initiative (Bronfenbrenner & Morris, 1988; as cited in Caldwell, et al. 2004). Initiative occurs when preferred activity is selected, constraints to participation faced, the challenges are presented and overcome, allowing continued participation in the activity. This is highly important when designing an effective school sport program. Adolescents must feel that they have had some say in the nature of the activity in which they are expected to participate. This is also an important element of any quality teaching pedagogy. Even including them in the design of the program will allow the adolescent and sport developer to identify to understand the constraints and barriers that must be overcome to enhance participation.

"New Moves" was a multi-component, girls-only, school based program for obesity prevention among adolescent girls in the United States. Neumark-Sztainer, Story, Hannan, Tharp, and Rex (2003b) decided to ascertain if the program was feasible to be run in a high school setting. Whilst this program was implemented during physical education and not school sport time, Neumark-Sztainer, et al. (2003b, p.41) concluded that;

> "Schools have the potential to make valuable contributions to the prevention of adolescent obesity, and the promotion of physical activity, healthy eating, and a positive self image among youth".

Felton, et al. (2005) studied one school's success in increasing physical activity among the female population of the school using the Lifestyle Education and Activity Program (LEAP). The study was conducted with Year 9 girls in a high school in South Carolina. The study concluded that it was possible to reverse the rate of decline in girls'

participation in physical activity by effective implementation of the program. When examining what were identified as the ‘Essential Elements of the LEAP Intervention”, it is apparent that significant parts of the school environment, teacher involvement and administrative support played in a successful physical activity intervention.

While secondary schools may provide many opportunities to increase physical activity levels in adolescent girls, there are also significant disadvantages of schools being the setting for physical activity interventions. According to Booth and Okely (2005), lack of teacher competence, culture, curriculum demands, discretionary time, selective disengagement, and overall school organisation can inhibit the implementation of a successful physical activity intervention in a NSW school environment.

Additional research is needed to ascertain if school sport curriculum within NSW secondary schools fails to emphasise or pay enough attention to all these aspects of successful physical activity promotion. Furthermore, research needs to be conducted on school sport programs and not only physical education classes. To date, no intervention programs in Australia have targeted the time allocated to school sport within the curriculum. Neither have they sought to address the identified disadvantages in conducting physical activity research in a school setting.

2.5 School sport (an opportunity for improvement)

Recognising the importance of sociocultural, organisational and environmental influences on school-based physical activity behaviour will impact on a school’s ability to run an effective school sport program. Cale's (2000) study of a sample of secondary schools in central England showed that schools varied markedly in the amount and

nature of physical activity opportunities that were made available to their students. Similar to the situation in NSW high schools, variations were seen in general ethos and school policy, formal and informal curriculum, care and support available for physical activity promotion, the school environment and the community links they are able to establish.

As outlined earlier, it is clear that schools should be encouraged to familiarise themselves with and explore all available avenues for the promotion of physical activity. School sport in NSW is such an opportunity where a real and sustained impact on adolescent, and eventually adult, physical activity engagement and participation is possible. According the Cale (2000), the activities, initiatives and opportunities schools provide need to be balanced and broad-ranged to meet the development, needs, and interests of all students.

In a study of young women's perceptions of active lifestyles, Flintoff (2001) states that whilst the majority of adolescent girls could not see the purpose for physical education, they were also quite critical of the nature of sport offered by their school. Specifically, the choice of activities offered within the school program was a key source of discontent.

Research also highlights the importance of local context, including the particular sporting culture of the school. Of particular note found in qualitative research, is the quality or nature of the teacher-student relationships. According to Flintoff (2001), teachers who can provide a safe and supportive environment and recognise differing student aspirations are more successful that those who subscribe to hierarchical,

discipline-based relationships. It is suggested by Flintoff (2001), that those teachers who live physically active lifestyles are far more successful in encouraging similar behaviour in their students. Again, if teachers display that they live a sedentary lifestyle and yet are supervising a school sport activity, they can expect low levels of participation in their students unless they choose to model the expected behaviour. Several young women in the Flintoff (2001) study, mentioned a clear 'generational' or 'associative' gap between themselves and their supervising sport teachers.

Park (1999) makes the recommendation that school sport programs need to be flexible in nature to allow all students the opportunity to participate in a wide variety of activities. According to Park (1999), school sport initiatives must also involve students in the decision making process, so they can have the opportunity to contribute to both the activities being offered and how these activities will be organised.

In recent times, the concept of 'Sport Education' has emerged as an alternative teaching strategy for physical activity and physical education lessons. Sport Education is a curriculum and instructional model designed to provide students with a holistic experience of sport and the experiences it entails. Sport Education has six key features, which derive from how sport is conducted in community and interschool contexts (ie. they derive from the authentic form of the larger culture they belong to). According to Siedentop (1998), they are seasons, affiliation, formal competition, culminating events, record keeping, and festivity. Sport Education has important instructional implications that differ from traditional school sport programs. A program based on this model is largely achieved through a combination of direct instruction, cooperative small group

work, and peer teaching, rather than a total reliance on directive, drill-based coaching (Siedentop, 1998).

There has been support for the success girls are able to achieve in the 'Sport Education' model. Much of this research, however, has been limited to a Physical Education classroom setting. Hastie (1998) looked at the participation of young adolescents in a coeducational physical education class. The study noted the dominance of boys in key positions (i.e. coach, team captain, and referee) but girls still felt that they had a key role in the team success. Girls also reported enjoying many of the other roles (i.e. statistician, scorekeeper, or team manager) that would be considered sedentary or less active. An objective measure of physical activity in this model needs further exploration.

Brunton (2003) also states that there is a significant change in hierarchy of power evident when using the sport education model. Some of the benefits exposed by this model were that students reported having a better relationship with their teachers and more time to participate in physical activity. Girls especially expressed the advantages of having more responsibility. This in turn was perceived as achieving a more authentic sport outcome. There were several recommendations made that would improve the change in power hierarchies following a first time delivery of Sport Education. They included training students to perform duty jobs proficiently with informal assessment and confirmation that students selected are competent at their job. Encouraging a more democratic system for selecting jobs, with contracts set up for students to agree to their role and/or accountability system and using a wider form of assessment/record keeping, therefore enhancing positive motivation. It is also important to clarify the purpose of

Sport Education and student roles at the start and throughout the season to make explicit links to community sport and to train teachers how best to work as facilitators and how to deal with team conflict.

It is also worth discussing the teacher perceptions surrounding the use of the 'Sport Education' model as a means of alternate sporting instruction. Alexander and Luckman (2001) indicated that teachers believe sport education offers an inclusive and equitable addition to existing school programmes. Students are reported as being busier, happier, and better behaved, but they are perceived to be responsible, cooperative, and probably most importantly for this research, interested. Alexander and Luckman (2001) research, however, was limited to use in physical education curriculum.

While Sport Education may not provide a perfect model for a school sport program, some of the fundamental concepts of inclusion, such as adopting a variety of roles within a given sport or activity, may be applied to an intervention program model and adapted with student input to balance school curriculum needs and student interest and motivation needs.

2.6 Sport and physical activity in New South Wales secondary schools

The NSW Department of Education and Training published a number of strategies to promote physical activity for girls in the school environment. According to NSW DET (1998), these strategies encompass addressing whole school issues, however, there are several strategies that could be applied specifically to a school sport program for adolescent girls.

A summary of these strategies may include reviewing the existing opportunities for physical activity and sport in the school, encouraging whole-school reflection about current practices that may contribute to gender construction.

These strategies also include allowing girls to wear tracksuits, shorts or clothes in which they feel comfortable when they participate in physical activity. If uniform is an issue, allowing girls to be involved in designing or modifying the school PE and sports uniform to promote greater participation. Other ideas include organising for music and an indoor space to be available for girls to practice dance, aerobics or other physical activities they enjoy. Publishing articles in the school newspaper or newsletter about girls' participation and achievements in physical activity or even organising a high-profile female athlete as a guest speaker to address the school assembly or to target particular classes (NSW DET, 1997).

It is also important to involve girls in the development of sport policies and programs in the school to ensure that the activities are appropriate to the students' needs. Inviting students to lead physical activity or sport sessions, work with younger students or demonstrating skills in ways that do not reinforce stereotypes, dispelling any myths regarding girls' involvement in physical activity and provide positive feedback and encouragement for girls' active participation (NSW DET, 1997).

Schools should finally set realistic goals and ensure that all girls can experience success as well as a challenge in their experiences in physical activity.

2.7 Conclusions from literature review

Much of the epidemiological literature justifies the need for improving the physical activity participation of adolescent girls. Many of the studies suggest these girls are disengaging with physical activity as they move through their high school education. The reasons for this are varied and highly contested. Certain sources point to a lack of learning and acquiring the necessary skills to be competent in sporting activities, others argue that the perception, priorities, and interest of adolescent girls in physical activity shift during adolescence. Either way, school sport is a programmed block of school curriculum time that negates arguments surrounding 'lack of time' and 'other priorities' and school sport should be tailored to accommodate the developmental physical skills of all students.

Barnekow-Bergkvist, Hedberg, Janlerf, and Jansson (1996 p.368) stated

> "Early engagement in sports activities during leisure time in youth is more important for maintenance of physical activeness than attitudes towards sports activities and sports performance as indicated by grades obtained in physical education. This suggests that it is more important to afford opportunities for young people to participate in different leisure sports and recreation activities, which may be maintained in adulthood, than to encourage improvement in performance."

It is now a challenge for high schools to design school sport infrastructure with possibilities to develop comprehensive physical activity programs adapted to individual physical activity needs. Schools will need to provide a wide range of options and make maximum use of facilities, teacher education, and education infrastructure if school

sport is to achieve noticeable health benefits for all Australians. Kirk and Gorely's (2000) study of British and Australian sport development identified four essential components needed in order to make sport more inclusive. They are:

1. Clearly articulated pathways across levels of performance and age groups. This is particularly relevant in a school sport program that needs to provide opportunities for high achievers as well.
2. Widespread use of modified games and sports.
3. Teacher and coach education. This is another significant point considering the large number of untrained teachers teaching sport as part of their employment.
4. Coordination through intelligent policy development. This is another significant point as school sport policy in NSW is almost entirely run on a school-by-school basis, with no real state-based policy direction pertaining to school sport.

Of particular note is that only specialist PDHPE and primary education teachers receive physical education training in their teacher education programs. Secondary teachers in other specialties may only receive limited, if any, training in their teacher education program in NSW about their responsibilities in delivering school sport.

Several emerging themes provide strong justification for this study. Firstly, school sport programs are probably under-performing in their ability to promote enjoyment of and participation in physical activity to the vast majority of adolescents. There is little to no research into the effectiveness of high school sport curriculum in Australia to date. Secondly, adolescent girls are expressing that they want to be involved in the decision-making process with regard to their sporting curriculum. Thirdly, there are models of alternate sporting instruction and teaching pedagogy (eg. Sport Education) that have yet

to be experimentally tested or applied outside a physical education teaching environment.

2.8 Theoretical framework

2.8.1 Competency Motivation Theory

According to Biddle (1997), Harter has developed the most accepted contemporary interpretation of Competence Motivation Theory. Harter's theory suggests that individuals are motivated in achievement domains in which their competence can be demonstrated. In a physical activity context, successful mastery of a physical skill or action is associated with positive emotion and low anxiety.

Please see print copy for figure 2

Figure 2: Harter's Competency Motivation Theory adapted for the physical domain (Weiss, 2000)

Competence Motivation Theory (Harter, 1978) adapted for the physical domain by (Weiss 2000), as shown in Figure 2, posits that physical activity is influenced directly by enjoyment and physical self-esteem. In turn, physical self-esteem is influenced by perceived competence and social support from significant others.

According to Harter (1987), as cited in Weiss and Glenn (1992), Competency Motivation Theory believes self-efficacy and perceived competence impact directly on physical self esteem, which in turn impacts on adolescents' physical activity behaviour.

Harter's theory suggests that those high in perceived physical competence would be more likely than others to participate in physical activity and sport. Klint and Weiss (1987), as cited in Lyons-Daniels (1999), reported that individuals are motivated to be competent in the areas of sports and academics. They examined Harter's Competence Motivation Theory by explaining the relationship between perception of competence and student's motives of participating in sports. Harter's Self-Perception Profile for Children was administered to 67 students in a gymnastic program in the United States. Motives were ranked and competence related motives were tabulated. The list consisted of 32 items. Learning new skills and improving skills were listed among the top 10 in the ranked list. A factor analysis was conducted for each domain (physical, social, cognitive). The factor analysis for perceived physical competence was significant, thus supporting the relationship between participants' motives and self-perceptions of competency. When individuals believe they have demonstrated competence, they perceive themselves as successful.

What is of particular interest to this study is that the testing of Harter's theory in sport settings has been centered almost exclusively on children and youth in North America. The cross-sectional validity of the theory has not received a great deal of attention nor have they been tested in an experimental design (Biddle, 1997).

In Competency Motivation Theory, perceived competence is the key determinant of physical self-esteem and, in turn, of enjoyment of and participation in physical activity. For adolescents, especially girls, it is thought that they construct their perceptions of competence from feedback they receive from peers, teachers and coaches, from their perceptions of their performances in comparison to their peers, and from how they internalise their improvement and attainment of self-set goals.

Unfortunately, there are very few studies that have sought to test this theory among adolescent girls. Sallis, Prochaska, Taylor, and Hill (1999) found in a review of correlates of physical activity among adolescents that several constructs of Competency Motivation Theory (enjoyment, social support, and perceived competence) were related to physical activity. These findings indicate that Competence Motivation Theory, adapted for the physical domain (see Figure 2), may be helpful in informing the design of effective physical activity interventions for adolescents when development of lifelong physical activity patterns is likely to occur.

The critical next steps in the discovery process involve experimental studies to test this theory among adolescent girls, especially those from demographic groups with a lower prevalence of physical activity participation. Prior to these full-scale interventions,

small-scale pilot studies need to be conducted to determine the feasibility of physical activity programs among such groups.

2.8.1.1 Competency Motivation Theory's ability to explain physical activity behaviour

Competency Motivation Theory when used to promote physical activity amongst adolescents supports environments where adolescents can participate and have higher perceived self-competence and enjoyment. This research will look at reasons that adolescent girls give for participating in physical activity. When young athletes are questioned to give reasons for participating in physical activity, their primary response is expressed as "fun" or "enjoyment". According to Whitehead and Corbin (1997), research found that the feeling of fun or enjoyment depends primarily on a sense of skill mastery, personal accomplishment, and excitement. Since "skill mastery" and "fun" appear to be interconnected, future interventions should be focused at the development of skill in an enjoyable context. In theoretical terminology, it seems that an emphasis on skill mastery by coaches is one of the major factors that promote positive motivation and self-perception outcomes (Whitehead & Corbin, 1997).

However, traditional methods of skill acquisition and instruction may not be the most appropriate proposed physical activity intervention models. The major reasons for adolescent withdrawal from sports were identified as having no fun, or boredom. More specifically they were identified as lack of success, lack of skill improvement, overemphasis on competition and dislike of the coach. All these factors have a direct impact on the enjoyment of physical activity (Whitehead & Corbin, 1997).

For this study, Competency Motivation Theory was used to guide the focus and measures of the intervention. It is, however, limited in that Competency Motivation Theory fails to address many of the 'motivators' of physical activity. To include these aspects in the development and assessment of the intervention, Social Cognitive Theory was also used in the theoretical framework.

2.8.2 Social Cognitive Theory

Social Cognitive Theory proposed by Bandura (1986) assumes there is a dynamic relationship between the person, environment and behaviour (Figure 3). It is relevant to understanding the physical activity behaviour of adolescent girls firstly because the theory deals with cognitive, emotional factors and aspects of behavior for understanding behavioral change. Second, the concepts of Social Cognitive Theory provide ways for new behavioral research in physical activity and health education. Finally, Social Cognitive Theory has demonstrated efficacy in previous school-based behaviour change research (Bandura, 1997; Killen, et al. 1988) and allows ideas from other theoretical areas to provide new insights and understanding.

Please see print copy for figure 3

Figure 3: Social Cognitive Theory (Bandura, 1986)

Social Cognitive Theory explains how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies. From this theoretical perspective, human functioning is viewed as the product of a dynamic interaction of personal, behavioural, and environmental influences. For example, how people interpret the results of their own behaviour informs and alters their environments and the personal factors they possess which, in turn, inform and alter subsequent behaviours (Pajares, 2002). Evaluating behavioral change depends on three factors: environment, people, and behaviour (Figure 3). As environment and behaviour are seen as determinants of physical activity, Social Cognitive Theory provides a comprehensive framework for designing, implementing and evaluating intervention programs (McInerney & McInerney, 2002).

Social Cognitive Theory is useful in understanding human motivation. Motivation is a function of personal expectations and goals and self-evaluative processes. From this perspective, as people work to achieve goals they evaluate their progress. If the evaluation is positive, personal feelings of self-efficacy are enhanced, which sustains motivation (McInerney & McInerney, 2002). A central tenet of Social Cognitive Theory is the concept of self-efficacy. Self-efficacy is the degree to which an individual believes he or she can successfully engage in a specific behaviour in a particular situation with known outcomes (Dishman & Buckworth, 2002).

In his descriptions of Social Cognitive Theory, Bandura believes that students' beliefs in their efficacy regulate their own learning (McInerney & McInerney, 2002). Efficacy beliefs influence how people feel, think, motivate themselves and behave. Studies have shown that perceived self-efficacy is a significant determinant of performance that

operates partially independently of underlying skills (McInerney & McInerney, 2002). Most studies examining the determinants of physical activity among adolescent girls have been researched from a Social Cognitive Theory framework. Such studies have found that components of Social Cognitive Theory such as self-efficacy, social support, and opportunities to be physically active have been consistently related to physical activity among adolescent girls (Sallis, Prochaska, & Taylor, 2000).

2.8.2.1 Social Cognitive Theory's ability to explain physical activity behaviour

According to Bandura (1986), Social Cognitive Theory details four processes that may influence the learning and adoption of new behaviour. These are attention, retention, production, and motivation. These are particularly helpful for designing behaviour-change interventions (Robinson & Borzekowski, 2006).

All these four processes guided the development and implementation of this intervention. The activities engaged and directed the attention of the participants, activities matched the cognitive and behavioural skill levels of the participants, and provided sufficient time to engage and achieve some mastery in the activities.

Understanding the role motivation plays in adolescent behaviour was of particular focus in this study because, according to Robinson and Borzekowski (2006), physical activity interventions should be linked to both outcome expectations and perceived self-efficacy as they are strongly influenced by external, vicarious, and internal incentives.

The extensive and dynamic domain of motivators for physical activity in children (and even adults) include fun, challenge, choice, control, individualisation, fantasy, social

interaction, sense of accomplishment, personal appearance, peer pressure, parental/adult approval, and material rewards (Robinson & Borzekowski, 2006). Therefore, when designing interventions to modify physical activity behaviour in adolescent girls these motivators would be relevant incentives that are attractive to the participants and more likely to serve as prompts for action. This could be accomplished by creating opportunities to achieve peer or teacher approval for successfully performing the targeted behaviour, providing some extrinsic reward such as a formal qualification, having teachers model behaviour linked to desired outcomes, and emphasising personal choice and control. It is also important that the factors that have been demonstrated to enhance intrinsic motivation, such as personalisation, contextualisation, challenge, curiosity, and mastery be included in the considerations when designing such interventions (Robinson & Borzekowski, 2006).

Chapter Three

3. Methodology

The purpose of this study was to determine the feasibility, acceptability, and potential efficacy of a pilot intervention study on a school-based physical activity program among adolescent girls implemented in a single sex high school in South-Western Sydney.

This chapter will describe the research design, participants, instrumentation, procedures, and data analysis used to conduct this study.

3.1 Research Design of the Study

Bandura's Social Cognitive Model (Bandura 1986) and Competency Motivation Theory in the physical domain (Weiss, 2000), provided the underpinning framework for the design of this intervention by specifically attending to the relationship of personal, behavioural, and environmental factors.

For this study, data were collected from a population of Year 11 girls using a pilot randomised controlled trial design incorporating formative research/assessment (focus groups, interviews) and quantitative data collection. In this design, participants were randomly assigned to either the experimental group or the control group. The experimental group received the intervention and the control group continued in the normal school sport program. According to Mertens (2005), this design controls for the effects of history, maturation, testing, instrumentation, and experimental mortality by the use of control groups and for the differential selection by the use of random assignment to conditions.

This study also collected a significant amount of qualitative implementation process data from participants before randomisation occurred. According to Miles and Huberman (1994), there is potential to strengthen physical activity research by using both quantitative and qualitative research methods to better understand factors that mediate behaviour to help develop theories that can be used in research and interventions.

According to Mertens (2005), incorporating techniques from both quantitative and qualitative research traditions provides particular value to educational research by helping to understand complex educational and social infrastructures. This study relied upon experimental research to measure changes in two randomised groups but was substantially enriched by qualitative research in the formative and evaluation phases.

This was a pilot study with a small sample size, it was not designed to detect statistical significance in its findings. The design, however, allowed for the inference of causality and the calculation of effect sizes, providing valuable information in assessing the feasibility of a school sport intervention and guiding future research into school sport and physical activity.

The experimental design was used to determine the effect of the independent variables (Usual school sport program/School Sport Intervention) on five dependent variables:

- Physical Activity Enjoyment Scale (PACES)
- Physical Self Perception Profile (PSPP)
- Social Support (SS)
- Objectively measured physical activity (PA)

3.1.1 Sample Selection

3.1.1.1 Selection of School

A NSW Department of Education of Training (NSW DET) single sex high school, in South West Sydney participated in this study. The school was selected through an existing professional relationship with the researcher and members of the PDHPE faculty expressing an interest in restructuring their existing school sport program. The school used a staggered school sport pattern with Years 10 and 11 students participating on Thursday afternoons between 1330hrs and 1500hrs on a fortnightly rotation. The PDHPE faculty expressed concerns that students were not optimally engaging in school sport and sought suggestions for addressing this issue.

The school was also selected because of its high proportion of students from a low socio-economic status (SES) and non-English speaking backgrounds (See Table 1). While the school did not keep student records on cultural background or income of families, the majority of the student population resided in one of three local statistical areas (the names of these areas has been changed to maintain participant anonymity): Loyola, Xavier, and Faber. All three were compared in this study against Sydney averages sourced from the Australian Bureau of Statistics 2001 Census data.

Table 1: *SES and Cultural Background of Local Statistical Areas involved in study. (ABS, 2001)*

Please see print copy for table 1

* Lower IRSD scores indicates greater socio-economic disadvantage

Based on this information, the school selected for the study would appear to have adolescent populations consistent with those from socio-economic and cultural backgrounds that report lower levels of physical activity among adolescent girls (Booth, et al. 2002).

In order to minimise the barriers to intervention implementation and assessment, incentives were provided to the school in the form of purchasing equipment and resources for the school to implement the intervention and keep for later use. Casual staff was funded to cover permanent staff during periods of data collection or intervention design. Finally, a decision was made to adopt a proactive philosophy of minimising intrusion on the day-to-day running of school activities. The following strategies were employed to maintain school participation (McKenzie 2005).

3.1.1.2 Selection of Participants

The entire Year 10 (2005) population of the school, comprising 168 female students, was initially approached to participate in Phase One of this study. Informed consent was sought (Appendix A) to screen 168 students on their enjoyment of physical activity (Appendix B). Students were addressed by the researcher at a year assembly and then again during PDHPE class time explaining the nature of the study. After two weeks, a second information session was held during PDHPE class time. Information and permission packs were again made available to students who were not able to collect one during the first opportunity and for those students who had misplaced their initial pack. Daily reminders were posted in the student notices and follow-up reminders in PDHPE classes during this two-week period. In the final three days before the testing, a member of the PDHPE staff reminded individuals who were yet to return consent

forms. At the conclusion of the recruitment period all 168 students (100%) had received an information sheet and consent form. These information sessions were conducted by the researcher in conjunction with the respective PDHPE teachers for each class session. The researcher and the PDHPE Head Teacher conducted the year assembly information session.

At the end of four weeks, 121 students (72% response rate) had consented to participate in the study and were administered the Physical Activity Enjoyment Scale (PACES) questionnaire at the conclusion of an unrelated yearly examination.

Of the 121 students screened, those who scored below 60 were considered eligible to participate in Phase Two of the study and were given an information sheet and consent form regarding the study (Appendix C). Scores of 60 or less indicated that the majority of responses from a student would have been ‘Agree a little’ or ‘neither agree or disagree’ or lower.

Based on this information 60 students were eligible, with 38 (63% response rate) consenting to participate in the study. The PDHPE Head Teacher initially approached each of the 60 girls individually and explained the study and what would be required of them to participate.

After one week, 10 consent forms were returned prompting an alternative recruitment strategy. Many of the students approached about participating in the study displayed reluctance to wearing an accelerometer. Many of the girls from non-English speaking backgrounds refused because at the time of initial recruitment, they were in the middle

of the Ramadan religious fasting period and thought that they would be required to undertake additional physical activity than already expected of them at school.

Understanding these numbers were not enough to commence the study, 10 consenting girls wore an accelerometer for a school sport period (90 minutes). The girls commented on the non-invasiveness of the collection tool and conveyed (at researcher request) these sentiments to their peers. A 30-minute information session with all the eligible participants was held the following week. The researcher and a young female (27 years old) PDHPE teacher of Middle Eastern descent conducted this information session. The PDHPE teacher spoke to the eligible girls about participation and the researcher was available to address any specific issues relating to the study. The rapport this teacher had with the students was strong and positive. The students were very keen on the teacher's point of view and involvement in the study. After one week, the number of consenting participants increased from 10 to 38 (63% response rate).

3.2 Phase One Instruments

3.2.1 Physical Activity Enjoyment Scale (PACES)

The Physical Activity Enjoyment Scale (Appendix B) includes 18 bipolar items on which individuals rate themselves on a 7-point Likert scale. The scale measures the amount of enjoyment individuals perceive themselves to have experienced during an exercise activity. Motl, et al. (2001) found PACES to be a reliable measure of physical activity enjoyment and concluded that the scale had both factorial and construct validity.

PACES was developed to measure physical activity enjoyment using university-aged students (Kendzierski, 1991). Kendzierski (1991) conducted two validation studies of PACES with a Cronbach's coefficient alpha .96 in both studies. Several modifications for the application to adolescents were made to the original PACES based on a study by Krueger (1988). He removed two of the original 18 items and rewrote others to improve comprehension by eighth grade girls.

The PACES adolescent version uses a five-point Likert-type rating scale with semantic anchors ranging from one to five. It includes statements such as, "When I am active, I find it fun". With the following five response choices: 1 = disagree a lot, 2 = disagree a little, 3 = neither agree nor disagree, 4 = agree a little, and 5 = agree a lot.

According to Motl, et al. (2001), when the modified PACES was used on adolescent populations, the Cronbach's alpha was .87.

The results reported by Motl, et al. (2001) support the validity of scores from the PACES as a measure of physical activity enjoyment among African-American and Caucasian adolescent girls. They also state that the significant relationships that exist among scores from the measures provide convergent evidence of the construct validity of PACES scores in adolescent girls.

3.3 Phase Two Instruments

3.3.1 Physical Self Perception Profile (PSPP)

The Physical Self Perception Profile (PSPP) (Appendix D) is a self-report questionnaire that consists of five, six-item subscales. The PSPP permits the application of recent

advances in self-esteem theory to the study of self perception in the physical domain (Fox & Corbin, 1989). Four subscales are designed to assess perceived bodily attractiveness, sports competence, physical strength, and physical conditioning along with a general physical self-worth scale. In a three tier hierarchical organisation of self-perceptions, each domain flows into the global self-esteem of the individual. This organisation is represented in Figure 4.

Please see print copy for figure 4

Figure 4: Three-tier hierarchical organisation of self perceptions (Fox & Corbin, 1989)

The five subscales measured by the PSPP are;

a) Sports competence (Sport),
b) Physical condition (Condition),
c) Body attractiveness (Body),
d) Physical strength (Strength), and
e) Physical self worth (PSW)

According to Fox (1990), there has been a tendency for items designed to measure aspects of self-perception to elicit socially desirable responses. Subscales in the PSPP have shown that they are sensitive to a wide range of individual differences and do not appear to be highly susceptible to social desirability, and are stable over a three-week period (Fox, 1990).

The PSPP is successful in distinguishing between individuals involved in low and high levels of physical activity. Fox (1990) states that in a study of 1191 subjects, 70 % of active females and 63% of active males were accurately categorised using the PSPP. According to Fox (1990), the PSPP was also able to correctly classify active/non active individuals (71% females and 70% of males).

Internal consistency reliability of the PSPP was addressed in Fox's study for each of the subscales using Cronbach's alpha (Fox, 1990). The PSPP's internal consistency reliability scores high for females, with a range of .81 to .92. Contribution of items to internal consistency is indicated by the correlation of the item to scale total (after elimination of the item). These range between .5 and .7, with a mean corrected item-total correlation score for all subscales of .69 for females. All items, therefore, contribute consistently well to the functioning of their subscale (Fox, 1990).

According to Fox and Corbin (1989), the test-retest reliability of the PSPP showed correlation coefficients with a range of .74 to .89 on 40 subjects after 16 and 23 days, indicating that the responses are stable over a 2 to 3 week period.

Predictive and construct validity have been provided in the PSPP for strength, sport, and condition subscales as they have been successful in discriminating between active and sedentary as well as high and low active individuals in a manner consistent with Competency Motivation Theory (Fox & Corbin, 1989).

3.3.2 Social Support Survey (Family and Peer Support Index)

The Family and Peer Support Index (Sallis, Prochaska, Taylor, Hill, & Geraci., 1999b) (Appendix E) is a self-report survey with 15 items measuring family support and four items measuring peer support. Each of the family support questions is divided into male support, female support, and other children.

Each response is rated with a six-point Likert scale ranging from never to daily. A higher score indicates greater family support of physical activity and involvement in sport.

The scale was piloted with 63 parent-child pairs in the United States (Sallis, Taylor, Dowda, Freedson, & Pate, 2002). Two week test-retest reliability of the scale was strong (ICC=.88). Parent and child reports correlated significantly ($r=.61$, $p<.001$). Internal consistency of the items was evaluated at $\alpha=.77$ (Sallis, et al 2002). The reliability of the parental measure is supported by Trost, et al. (2003b) stating that internal consistency of the instrument on the parental support scale measured a Cronbach alpha of .78 with one-week test-retest reliability at $r=.81$.

The 4-item peer support questions were developed to assess encouragement, participation, praise, and the adolescent's encouragement of peers to be physically

active. For example, questions include: Do you encourage your friends to do physical activities or organise games or sports? These are rated on a six-point Likert scale ranging from never to daily. In a study conducted by Sallis, et al. (2002), 2-week test-retest reliability was strong (ICC=.86), and child reports correlated significantly (r=.57. p<.001). The original instrument included the 4th item that assessed peer teasing related to physical activity. However, with the inclusion of this item, internal consistency was reduced to α=.54 from α=.81 when replaced with a peer praise item (Sallis, et al. 2002). For this reason, the 4th item pertaining to peer teasing was removed during the analysis phase. Again the reliability of the parental measure is supported by Trost, et al. (2003b) stating that internal consistency of the instrument on the parental support scale measured a Cronbach alpha of .78 with one-week test-retest reliability at r=.81.

3.3.3 Accelerometry (MTI Actigraph)

MTI (formally known as the Computer Science and Applications Inc. [CSA] 7164) Actigraph (MTI Health Services, Fort Walton Beach, Florida, USA) accelerometers were used to assess the physical activity levels of the participants in school sport. In the case of this study, they were used for 90 minutes of scheduled school sport time on fortnightly Thursday afternoons from 1330 to 1500 hours. Monitors were calibrated before each assessment using Actigraph's CAL71 calibrator for the MTI 7164 accelerometer in accordance with the Calibrator's Operation Manual. Monitors were only initialised for use if battery life was >600 min.

The Actigraph is a uniaxial accelerometer designed to detect vertical accelerations ranging in magnitude from 0.05 to 2.00 ‘g’ with a frequency response of 0.25-2.50 Hz. These parameters allow for the detection of normal human motion and will reject high-

frequency vibrations encountered during activities such as operation of a lawn mower. The filtered acceleration signal is digitised, rectified, and integrated over a user specified period. At the end of each sampling interval or "epoch", the summed value or "activity count" is stored in the memory and the integrator is reset. For this study, a one-minute epoch was used. Before the commencement of each school sport session, the Actigraph was initialised according to the manufacturer's specifications and attached to a flexible elastic belt that was fastened firmly around the waist of the participant. The Actigraph was positioned on the right midaxilla line at the level of the iliac crest.

Puyau, Adolph, Vohra, and Butte (2002) examined the validity of the MTI Accelerometer against energy expenditure using room calorimetry in 26 children and adolescents in the United States aged 6 to 16 years. Accelerometer-based activity monitors proved to be valid and useful devices for the assessment of children and adolescent physical activity when defined as body movement produced by skeletal muscles resulting in energy expenditure. The high correlations between the activity count, energy expenditure, and heart rate demonstrate accelerometer-based activity monitors strongly reflect energy expended in activity. In this study, MTI accelerometer counts correlated significantly with energy expenditure ($r = 0.66$).

3.4 Formative Research

The purpose of these focus groups was to ascertain the needs, interests, and barriers of participation in school sport for adolescent girls. They specifically sought to enquire about the nature of school sport in their school and physical activity in their community. All interviews were recorded on a digital audio recorder and transcribed by an independent agency soon after to increase validity and reliability. Audiotaping provided

an accurate account of the interviews, and guarded against the interviewer substituting her own words for those of the interview participants.

The informal group discussion atmosphere of the focus group interview structure encouraged participants to speak freely and in-depth about behaviours, attitudes and their opinions on school sport (Berg, 2001). According to Berg (2001), focus groups allow for interactions between group members to take place and in many instances students brainstormed together, allowing for a larger number of ideas, issues, topics and solutions to a problem to be generated through the group.

According to Hannabuss (1996), cited in Torrens and Baxter-Mogolda (2002) group dynamics and power roles need to be considered and accounted for when conducting focus group interviews. In order to promote a relaxed environment, the researcher trained an existing teacher in the school. This teacher was trained prior to the focus groups in finding a balance between engaging in discussions and was able to reflect on the implications of questions, redirect questions when necessary, and maintain the quality of the research.

All focus group questions were asked from a pre-written script. Lists of the questions asked of staff and students at both the beginning and end of the program appears in Appendices F and G, respectively.

3.4.1 Staff Focus Group Interview

A PDHPE faculty focus group was conducted on 24th November 2005 between 1500 and 1600 hours. This focus group was conducted by the researcher's supervisor and

consisted of four participating staff members. The purpose of this focus group was to ascertain how school sport was currently being run in the school. It also attempted to highlight the barriers preventing the program from engaging students in physical activity. Each of the discussion questions (Appendix F) was read from a pre-written script and digitally audiotaped.

3.4.2 Participant Focus Group Interviews

A trained female PDHPE teacher of Middle Eastern descent conducted the participant focus group discussions. Each of the discussion questions was read from a pre written script (Appendix G) and digitally audiotaped. These audiotapes were later independently transcribed and proofread by an independent transcription agency. The proof written transcripts were given to the participants to verify that they were a true and accurate record of the focus group discussion. If there were discrepancies in the transcription, corrections were made according to the participant's wishes.

Participants were asked to volunteer to participate in a 40-minute focus group discussion regarding the current school sport program and how it may be modified to increase their participation in school sport. This was done for two reasons: firstly so the intervention could be designed to cater for the needs and interests of the participants; and secondly, so the participants would have some degree of perceived ownership of the intervention program.

Focus group interviews took place with the volunteering participants during Week 7 of Term 4, 2005. The researcher selected the periods of the day that would create the least disruption to the school (final week for Year 10). There were six focus groups, with

two to four students participating in each. Focus group interviews occurred in a classroom at the school.

After transcribing and analysing each focus group interview, the researcher and a member of the school's PDHPE faculty used this information to complement the content of the intervention. The researcher and the participating teacher conducted this by reviewing the focus group interview content independently and searching for common themes. Both the researcher and the participating teacher then discussed the common themes and discussed what initiatives would be feasible in an intervention and how best to implement them. Both the researcher and the participating teacher agreed upon all themes before they were included in the proposal.

The researcher then discussed the proposals with the PDHPE Head Teacher. This conversation was an opportunity for the PDHPE Head Teacher to review the themes from the focus group interviews and discuss how best to implement the intervention within the existing school policy, infrastructure, and environment.

Finally, the proposed school sport intervention study was presented to the school principal. This was an opportunity for the researcher and the PDHPE Head Teacher to negotiate aspects of the proposed intervention and determine their feasibility with the school executive.

The changes that were permitted by the school principal were then incorporated into the intervention design. Initially the design focussed on activity choice. All of the participants in the intervention study were asked what activities they would like their

sport program to consist of. They were given choices from a range of activities that girls mentioned they would enjoy during the focus group interviews. The range of choices was rugby, tennis, aquatics, martial arts, Pilates, yoga, and dancing. Each of the choices was accompanied with an information package on how each activity would be conducted and where it would take place.

3.5 Procedures

3.5.1 Authorisation

Authorisation to conduct this study was sought and gained from the University of Wollongong Human Research Ethics Committee, the NSW Department of Education and Training, the participating school, and the participating students and their parents. (See Appendices H and I)

Participants

During Phase One of the study, information sheets and consent forms were provided to all Year 10 students at the participating school. Participants were informed that the results of the study would remain confidential and that their withdrawal from the study at any stage would not jeopardise their current or future relationship with the University of Wollongong or the school. Participants were given ways to express their concerns regarding the study through the University of Wollongong Human Research Ethics Committee. Only those girls who returned consent forms prior to the testing date were eligible to participate. The same process was followed during Phase Two of the study (see Appendix A and C).

3.6 Data Collection

The investigation followed the following data collection procedure:

- Quantitative baseline (pre-test) data collection (PACES, SS, PSPP, PA)
- Formative research to guide design of the intervention
- Implementation of intervention
- Post-test data collection and evaluation of intervention

Objectively measured physical activity (PA), Physical Activity Enjoyment Scale (PACES), social support (SS), and Physical Self-Perception Profile (PSPP) were the dependant variables. The two programs 'School Sport Intervention' or usual school sports were the independent variables. Pre-test and post-test data were collected at baseline (Term 4 2005) and follow-up (Term 1 2006).

As discussed previously, this study was conducted in several phases. Table 2 shows the timeline for the study.

Table 2: *Timeline for the Study*

	Timeline	**Activity**
1	Week 1 – Week 5 Term 3 (2005)	Recruitment (Phase One)
2	Week1 – Week 10 Term 4 (2005)	Baseline assessments (Phase One and Two)
3	Week 5 Term 4 (2005)	Focus groups & interviews (Phase Two)
4	Week 6 Term 4 (2005)	Intervention design & negotiation (Phase Two)
5	Week 1 Term 1 (2006)	Start of intervention (Phase Two)
6	Week 11 Term 1 (2006)	Final week of intervention (Phase Two)
7	Week 12 Term1 (2006)	Evaluation of intervention (Follow up assessments) (Phase Two)

3.6.1 Baseline Data Collection

The baseline measures for the consenting participants commenced in Week 4 of Term 4, 2005. The measures taken were physical activity enjoyment scale (PACES), physical self-perception profile (PSPP), and social support (SS) using a survey/questionnaire approach.

The first self report questionnaire to be administered was the PACES. It was administered at the conclusion of an unrelated yearly examination. The researcher attended the examination facility and read instructions for completing the questionnaire from a pre-written script. The participants were seated at separate desks and told if they had any questions they were to raise their hands and the researcher would come and answer their question personally.

The remaining self-report questionnaires (PSPP and SS) were administered during timetabled PDHPE class time. The researcher attended each PDHPE class and read instructions for completing the questionnaires from a pre-written script. Each questionnaire was administered, explained, and completed before commencing the next. Each of the participants were seated at a separate desk and told to raise their hands and have the researcher come and answer their question personally.

Objectively measured physical activity was measured during school sport using Actigraph accelerometers. This was conducted during three randomly selected school sport sessions in Term 4, 2005 (Thursday, Week B 1330hrs-1500hrs). Accelerometers were placed on consenting participants and the sport they participated in during that session was also recorded. All attending participants wore accelerometers.

A female PDHPE staff member demonstrated how to wear the accelerometer in front of the participants. Each of the participants then were handed an accelerometer and allowed to go and attach it when they changed into their sporting attire. Once the accelerometer was attached, a female PDHPE teacher checked it was attached properly.

These baseline accelerometer measurements occurred on the 20/10/05, 3/11/05, and 1/12/05 (Week –10, Week –8, Week –4,).

3.7 The Intervention Program

Social Cognitive Theory (Bandura, 1986) provided the holistic framework for the implementation of this intervention, attending to the dynamic relationship of personal, behavioural, and environmental factors within school-based research. The use of Social Cognitive Theory was necessary in order to negotiate and understand the feasibility of school-based intervention studies because understanding change in one aspect (person, environment, and behaviour) is linked directly to how the three factors interact with each other.

This model suggests that the four processes of attention, retention, production, and motivation are vital in the learning and adoption of new behaviours (Bandura, 1986). According to Robinson, et al. (2003), the development and implementation of interventions can be organised around these four processes. Attention regulates exploration and perception, and is high influenced by factors such as salience, conspicuousness, functional value, affective valence, and attractiveness. The processes of symbolic coding, organisation of information, cognitive or imagined rehearsal, and active rehearsal influence retention. Production is the dialogue of conceptual representations into actions, and is influenced by immediate and extrinsic feedback. Motivation is strongly influenced by external, vicarious, and internal incentives (Robinson, et al. 2003).

Competency Motivation Theory in the physical domain (Weiss, 2000) was used to guide the design and measure the outcome variables of the study. This model suggests that the four processes necessary to affect their physical activity behaviour are enjoyment, self-esteem, perceived competence, and social support. Each of the measures taken (Objective Physical Activity using accelerometers, Social Support using the Family and Peer Support Index, Physical Self Perception using the Physical Self Perception Profile, and Enjoyment using the Physical Activity Enjoyment Survey) reflect the measurement of the outcome variables.

The School Sport intervention program was run concurrently with the existing school sport program over the course of an 11-week school term. There were six classes over the course term with each session lasting 90 minutes from 1300 to 1400 hours on Thursdays. School sport was programmed to take place immediately after the scheduled lunch break. A young female PDHPE teacher who was involved in the development of the program and recommended by the school for her rapport with the students led the delivery of the intervention program. This teacher ran structured and prepared classes using easily attained resources from within the school and within the immediate neighbourhood. Her role was to act as a facilitator and role model of physical activity, not simply a directing teacher. For example, whilst each of the sessions was planned, she had the flexibility to negotiate changes in the actual delivery of the sessions based on participant feedback.

To incorporate the complexity of Asian, and Middle-Eastern cultures, this intervention was designed to address both the interests of adolescent girls and the sensitivities of dealing with such populations. To address the larger issues confronted by adolescent

girls as a whole, participants were given the opportunity to select all the activities. The deeper cultural values, norms, attitudes, and expectations were integrated into the goals and strategies of the intervention. In an attempt to be sensitive to these issues, the intervention did not focus on obesity prevention. The formative research in this study suggested that the emphasis of school sport should be on enjoyment of physical activity (as opposed to skill development), a break from classroom routine, fitness, providing challenging physical experiences and exposure to new activities.

Each of the intervention activities is listed below along with timetabling and a detailed description of the activity and its associated costs.

Table 3: Intervention Timetable

Activity	**Yoga**	**Aquatics**	**Tennis**	**Pilates**
Dates	2nd Feb 06	16th Feb 06 2nd Mar 05	16th Mar 06 30th Mar 06	13th April 06

Pilates

The Pilates program consisted of purchasing a commercially available Pilates DVD (cost approximately $35.00 AUD). An air-conditioned demountable classroom had all the chairs and tables moved to the side of the class and gymnastics floor mats placed on the ground. A television and DVD player were set up in the room and the students participated in the instruction from the DVD along with their sport teacher. While this is a reusable resource that could potentially be used for a number of years, the cost per student equated to $1.94 AUD based on the resource only being used once.

Aquatics

The aquatics program was run at a nearby council operated swimming pool. The facility consisted of both indoor and outdoor swimming facilities. Aquatic equipment such as pool noodles, dive sticks, beach balls, and pool ponies were purchased for the school to conduct several game and pool fitness activities. These activities included:

a) Dolphin relays: Students are divided into two teams. The first student from each team will race down and back the length of the pool while pushing a beach ball with their nose and forehead. If they touch the ball with their hands or any other part of their body they must go back to where that took place and start again. The next student will do the same until one team is the winner.

b) Seahorse races: Each student is given a pool noodle and starts at one end of the pool. Students sit on the pool noodle like you would a horse. Students race the length of the pool where they change ‘horses” with the next student in their team. The first team to the end of the pool with all their players wins.

c) Beach ball relay: Similar to the seahorse races, except students sit on a beach ball and race in a relay format from one end of the pool to the other. The first team to have all their participants go through was declared the winner. This task requires core stability and upper body strength.

d) Pool volleyball: A volleyball net or length of rope is strung up across the width of the pool. Students play according to Newcombe ball rules as they are allowed to catch the ball rather than simply hit it. If the ball touches the water on your side of

the net, you lose the point and service to the other team. Sets consist of 21 points and teams change ends at the end of each set.

e) Standing water polo: Played with two goals at either end of the shallow end of the pool, either team scores by throwing a ball into the opponent's goal. The team at the end of the game with the highest score wins.

These activities were designed by the researcher and cooperating teacher to focus on enjoyment of aquatic activities. None of the activities required a great deal of physical proficiency and were conducted without an emphasis on the competitive nature of the activities.

Total cost for these aquatic activities came to $5.63 AUD per student, which included all the reusable equipment and two 90-minute sessions at the local council swimming pool.

Tennis

The tennis program was run over two consecutive sport lessons whereby professional tennis coaches from NSW Tennis put the participants through an Orientation to Tennis Coaching course. This course was run at a local tennis court approximately 200 metres from one of the school's entry points.

The inclusion of this aspect of the intervention was to assess whether the Sport Education model could be adopted in a school sport program. Rather than a player orientated school sport session that usually occurs during school sport, participants were

instructed on coaching and officiating in tennis. The objective was not simply to focus on athletic participation, but rather give the students the skills necessary to coach the skills of this sport to others.

Participants completed a number of coaching activities and were taught how to teach the basic skills of tennis. The Tennis NSW coaches used a Teaching Games for Understanding approach and a series of improvised games for teaching these skills. At the conclusion of the two sessions, students were presented with a Certificate of Participation and an instructional CDROM program on tennis coaching.

The courts were run by the local city council and offered a school rate of $12.50 AUD per court for up to two hours. During the course, the school hired two courts per session, costing $25.00 AUD per lesson and a total cost of $50.00 AUD. The coaching supplied by Tennis NSW cost a total of $180.00 AUD for two coaches for two 90-minute lessons. Total cost of the course for court hire, coaching, course completion certificates, and Tennis NSW accreditation was $230.00 AUD. The cost per student for this aspect of the program equated to $12.77 AUD.

Yoga

The Yoga program consisted of purchasing a commercially available Yoga DVD (cost approximately $30.00 AUD). An air-conditioned demountable classroom had all the chairs and tables moved to the side of the class and gymnastics floor mats placed on the ground. A television and DVD player were set up in the room and the students participated in the instruction from the DVD along with their sport teacher. While this is

a reusable resource that could potentially be used for a number of years, the cost per student equated to $1.94 AUD based on the resource only being used once.

Estimated Rates of Energy Expenditure

Using Ainsworth, et al.'s (2000) comparison of MET intensities, Table 4 is a comparison of control and intervention group activities for the duration of the study. MET intensities are also listed for the activities conducted in the baseline testing.

Table 4: *Estimated rates of energy expenditure during study period. Based on (Ainsworth, et al,. 2000).*

Baseline Period (prior to randomisation)					
	Basketball	Aerobics	Bowling	Ice skating	**Mean**
MET	8.0	7.0	3.0	7.0	**6.25**
Intervention Period					
Control Group	Ball games	Touch football	Basketball	Power walking	**Mean**
MET	5.0	8.0	8.0	3.8	**6.2**
Intervention Group	Pilates	Tennis	Aquatics (Aqua aerobics used as proxy)	Yoga	
MET	3.5	7.0	4.0	2.5	**4.25**

3.8 Implementation of Intervention

At the conclusion of Term 4 2005 participants of the study were randomised by computer-generated algorithm into either Intervention or Control groups. The intervention commenced in Week 1, Term 1, 2006 and was run parallel with the regular Year 11 School Sport program that the control group participated in. A total of six one and a half hour sessions were completed during Phase Two.

3.9 Intervention Evaluation

At the conclusion of Term 1 2006, all of the study participants were administered the identical battery of PACES, PSPP, and Social Support surveys that were administered in the baseline phase of the study. This allowed determination of the differences between the control and intervention groups as a result of the intervention program.

Along with this battery, all intervention participants were asked to complete a process evaluation form (Appendix J) and to participate in a focus group facilitated by the researcher. The focus group questions asked in the evaluation phase appear in Appendix K.

3.10 Data Entry and Analysis

3.10.1 Survey Data

All data collected from PACES, PSPP, and Social Support surveys was transferred into a Microsoft Excel spreadsheet. Identification numbers were substituted for each participant's name (Beck, 2002) and data were entered for each participant accordingly.

3.10.2 Accelerometry Data

Accelerometry data collected using MTI Accelerometers was downloaded immediately after the collection period and converted into Microsoft Excel format. Total epoch scores were calculated for the school sport period between 1330hrs and 1500hrs and entered into a separate Microsoft Excel document.

3.10.3 Analysis of Survey and Accelerometry Data

Survey data were analysed using the statistical analysis program (SPSS version 13.0 for Windows). The computer program SPSS (originally, Statistical Package for the Social Sciences) is used for statistical analysis in social science and education research. SPSS may be used for many univariate and multivariate statistical analyses and has facilities for sorting and merging files and manipulating data.

Data were analysed using intention-to-treat principles. As the variables were approximately normally distributed with no influential outliers, means and standard deviations (SD) were used to describe the distribution of baseline and follow-up data in the two study groups. To test for an intervention effect, between group differences at follow-up were examined using independent samples t-tests. Analysis of covariance (ANCOVA) was also used to adjust follow-up measurements for baseline differences before testing for a between group difference. Scatter plots were used to plot follow-up measurements against baseline measurements with the regression plotted as an aid to interpreting the results.

In addition the mean difference (change) between the baseline and follow-up measurements was calculated in individuals and the mean difference and 95% confidence interval (95% CI) in change scores between groups was computed with an independent t-test used to determine the significance of differences. Finally, as this study was a preliminary RCT and was not sufficiently powered to show that small between group differences were statistically significant, an effect size was calculated using Cohen's d. Effect size was computed as the mean difference divided by the control group standard deviation

3.10.4 Focus Group Data

Audiotapes were used to record focus group interviews. These were transcribed into a Microsoft Word document during the data collection process. These transcripts were prepared by an independent transcription service and presented to the researcher.

3.10.5 Analysis of Focus Group Data

Mertens (2005) suggests that qualitative data be triangulated to check for consistency of evidence. In this study, the researcher, participating teacher and research supervisors independently reviewed focus group transcripts. Common themes were extracted and agreed upon allowing for data analysis to be credible and trustworthy (Leydens, 2004). All qualitative analysis was conducted manually without the aid any software package.

Audiotapes were independently transcribed and proofread by an independent transcription agency. The proofread transcripts were given to the participating staff to verify that they were a true and accurate record of the focus group discussion. If there

were discrepancies in the transcription, corrections were made according to the teacher and participant wishes.

Chapter Four

4. Results

A study was undertaken to investigate the feasibility, acceptability, and potential efficacy of a school sport program for adolescent girls. Data were gathered and analysed with the results being reported for each of the research questions that guided the development of this study.

4.1 Participants

The population consisted of 161 adolescent girls selected from a NSW Department of Education and Training single sex high school in South West Sydney. The numbers of students who were screened to participate in the study are shown in Table 5.

Table 5*: Details of the Participants*

Year Enrolment	Not consented	Absent	Number Participated	Response Rate (%)
161	40	0	121	75

All consenting participants completed the Physical Activity Enjoyment Survey (PACES), which was used as a screening tool for participation in the study. Of the 121 students surveyed, those who scored below 60 were invited to participate in the study (n=60). Scores of 60 or less indicated that the majority of responses to this questionnaire would have been ‘Agree a little’ and ‘neither agree or disagree’ or lower. Figure 5 displays the flow of participants through the study.

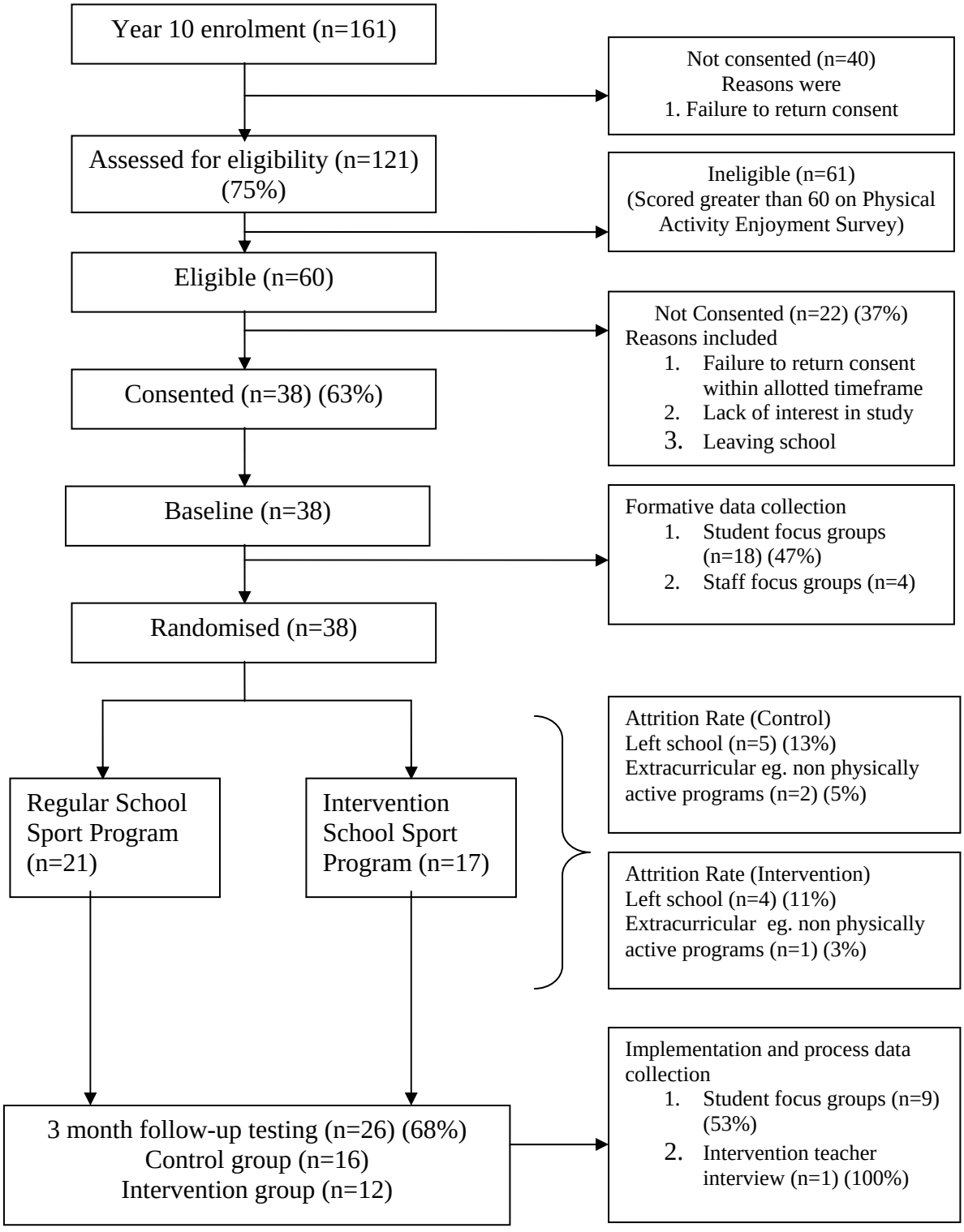

Figure 5: The Study Design

Information was also collected on the participant's age and their socio-economic status based on their suburb of residence (SEIFA index) for baseline comparison. The results of these baseline characteristics are in Table 6.

Table 6*: Baseline group characteristics. Mean ± (standard deviation).*

	Intervention Group	Control Group	P value
Number of Participants	17	21	
Age in years	16.45 (0.22)	16.57 (0.28)	.238
Enjoyment of Physical Activity using PACES	49.2 (10.1)	51.1 (6.8)	.142
Socio-economic Status using SEIFA Index	958.86 (62.52)	957.66 (47.32)	.169

There were no differences between the two groups for age, enjoyment of physical activity or socio-economic status.

4.2 The research questions

The major focus of this study was to investigate the feasibility, acceptability, and potential efficacy of a school-based physical activity program targeting school sport amongst adolescent girls. In order to examine this research question, data were collected to investigate the variables of interest.

4.2.1 Research question one

Research question one investigated the physical activity needs and interests of adolescent females from non-English and low socio-economic backgrounds and how these can be negotiated to develop a program to increase enjoyment of and participation in physical activity.

Formative data were obtained through a series of focus group interviews that asked participants about their interests in physical activity and how they would like to see school sport structured in their school. It also investigated the positive and negative aspects of the existing school sport program.

Data were also collected via focus groups conducted with the PDHPE faculty, who were responsible for coordinating school sport (subject to school executive approval), as to how the current school sport program was developed and negotiated with the school executive.

Participating staff and students were asked to volunteer for focus group interview to discuss the themes and issues surrounding the delivery of their existing school sport program. A 27-year-old female PDHPE teacher from a Middle Eastern background conducted the focus groups for the students and a member of the Education Faculty from the University of Wollongong conducted the staff focus groups.

4.2.1.1 Themes relating to adolescent girls participation in school sport

During the design of this study, several focus group discussions were undertaken and the transcripts were examined and interpreted by the researcher and the school

cooperating teacher. The following themes emerged: teachers, type of activity, purpose and programming and student input.

Theme one: Teachers

Several sub themes emanated from interviewed students regarding teachers and their role in school sport programs.

Firstly, teacher knowledge of sport was a major theme emphasised by interviewed students. Students commented that participation in particular school sport lessons was less if the teacher had little or no understanding of the activity they were supposed to be participating in. This was particularly prevalent in non-PDHPE trained staff.

> "She kind of tries and make us do it and because she actually doesn't know anything about it, it makes it worse. Maybe they should actually know something about sport if they're doing a sport class". (Student comment).

Secondly, students commented that teachers provided little in the way of motivation to participate in school sport. Of particular mention is that many staff failed to be punctual to the beginning of a school sport class, were unprepared for the lesson in terms of curriculum, attire, and equipment, and refused to participate in the activity with the students. Several students did not think that teachers set a positive role model for sport and physical activity when teaching in the school sport program.

Discipline is inconsistent between teachers and because teachers change from class to class on a regular basis. The expectations of the teachers in regard to behaviour and

participation varied greatly as did the disciplinary actions taken. Students commented that they felt that some students were permitted not to participate while others were threatened with disciplinary action if they did not participate. Other students commented that some staff allowed eating during the lesson and would even allow students to purchase food from a local convenience store if they were participating in an activity outside the school.

> "…I was feeling sick and he made me play and every five seconds he threatened me with a detention".

> " When other groups have to do more than another group like one might be up playing sport because the teacher's like saying they have to do it and others get to sit around and that and not have to do it". (Student comments)

Many interviewed students commented on how they enjoyed it when staff participated in the sporting activities with them. This was mainly because the staff would then be able to perceive what was being asked of the students.

> "Well, I like it when the teachers all participate in sport". "I really like it when teachers get more involved in the games and join in… and not just sit around or get someone else to do their job". (Student comment)

Theme two: Type of activity

Interviewed students spoke about the types of activities that were available during school sport. There were several major themes that emanated regarding school sport activity type.

Students stated that the opportunity to participate in recreational physical activities would be more favourable than engaging in competitive school sport. They also stated that these activities should have a focus on fitness as opposed to skill development.

Many students stated that school sport was more enjoyable when there was no direct focus on individual performance. Sports such as cricket and softball were less favoured as there was unwanted attention drawn to these students during the batting phase of these activities.

> "I don't like sports where you're put on the spot like cricket or the other bat game where everyone is looking at you if you don't hit it or that or you miss it and they don't get angry at you but you feel bad…"

> "I don't like softball it's really boring half the time you're standing there… in the sun or you are standing against the wall not doing anything". " I like sports [where] everybody is moving around". (Student comments)

Students also stated that the school needed to offer activities outside the school grounds and make more use of the local external sporting and recreational facilities. Some other

interesting points raised were that activities during school sport should prevent girls from getting hot and sweaty and include music.

Theme three: Purpose and programming

Students stated that there needed to be a clear distinction in purpose between school sport and a PDHPE class. The interviews also revealed that both staff and students needed to understand clearly the purpose of school sport. They felt that the purpose of school sport as opposed to a PDHPE class should be:

a) an opportunity to be physically active and break from normal classroom routine
b) an opportunity to get fit
c) an opportunity to participate in challenging physical experiences
d) an exposure to new activities

> "It should be a fun way for us to do exercise and for us to actually enjoy [physical activity], and not go "oh we've got sport" you know we want to enjoy it". (Student comment)

The interviews also highlighted issues surrounding the programming of school sport. Some of the programming issues discussed included making the most of the time allocated to school sport. Students complained that they spent far too much time having to get changed into sport uniform and that staff often were late to the commencement of the activity. The activities often required some setting up and planning that often did not occur and the teachers were unprepared with both equipment and skills to conduct the particular sport.

> “I think they should have PE teachers teaching the sport [lessons] because they have teachers from other faculties and they don’t know what they are doing. Honestly, they are so clueless they don’t even know the rules…they are just making it up as they go along”. (Student comment)

Theme four: Student input

Students expressed several ideas surrounding their ability to provide input into the school’s sporting curriculum.

Firstly, uniform was a major cause of concern for most interviewed participants. Students were upset about the fact that they were not permitted to wear their sports uniform all day on their sports day. They mentioned that it is additional weight to carry two uniforms around and the time it takes to get changed erodes the little time they already have allocated to sport.

> “I think we should just wear sport uniform for the whole day ‘cause I hate getting changed”. “If the uniform doesn’t fit in your bag you don’t take it. It’s just a hassle”. “The main reason [I dislike sport] – I don’t want to carry the uniform”. (Student comments)

Some interviewed students even commented on how they will avoid bringing the sport uniform to school in order not to do school sport.

> “Mum I can’t fit this in my bag can we write a note”. (Student comment)

Student participants also commented on the design and fabric of their existing school sports uniform. They complained of the uniform being ugly and the fabric irritating when you become hot and sweaty.

> "…and the sports uniform it's ugly and it's uncomfortable. It really is and when it's really hot it's a really heavy fabric, it sticks to you". (Student comment)

Interviewed participants frequently thought they should choose the sports they got to participate in and for how long. Many mentioned doing a particular activity for only one week was not enough time to understand or enjoy the activity.

Some participants also wanted to be able to be in sporting groups with their friends but others suggested this would be counter productive as they know girls that would be less likely to be physically active if this was the case.

Implementation of Intervention and Formative Data Outcomes

Based on the formative data collected, a school sport intervention program was developed. The program had several key features as discussed below.

1. The participating intervention teacher needed to be PDHPE trained or enthusiastic about teaching sport. To negotiate this, a teacher from the PDHPE faculty was asked to volunteer to deliver the intervention program over Term 1 2006. The school negotiated the timetable and teaching load for the selected teaching to undertake this task.

2. Participants allocated to the intervention group were to be allowed to wear school sports uniform to and from school on sport days: To negotiate this, the school would have inform the parents of the participants in the intervention group and other staff members as to the reasons this change was being made for these 17 participants.

3. Participants allocated to the intervention group were to be involved in the decision making process concerning which sport they would be able to participate in and the content of those sessions: To negotiate this, the study participants would have had the same teacher for the duration of the intervention and continually negotiated and determined the nature of their school sport sessions. Participants were also asked to express their physical activity preferences prior to commencement so their wishes could be incorporated into the intervention design.

These three proposals were taken to the school principal by the researcher and the PDHPE head teacher and proposed as possible strategies to increase the levels of physical activity in adolescent girls. The three proposals were only to be implemented on the 17 participants allocated to the intervention study for the duration on one school term (11 Weeks).

Each proposal bar point two regarding uniform were accepted by the school principal and executive staff. The school principal was unwilling to allow the intervention participants to wear their school sport uniform for the duration of the school sport day. While the possible benefits to the study were discussed and argued for this allowance by the researcher and the PDHPE head teacher, the school principal felt that this change would have a disruptive effect on the entire school community.

With regard to the other two points, a young female (25 years of age) PDHPE teacher was timetabled to work with the intervention participants during school sport during Term 1, 2006. Intervention participants were also given a wide range of activities they could participate in and the participating teacher constantly adapted each lesson to meet their needs.

4.2.2 Research question two

Research question two investigated the feasibility of the physical activity program used to engage adolescent girls in school sport. This study was designed to ascertain whether it was possible to collect data from the selected population within a school infrastructure.

4.2.2.1 Student participation

Enjoyment of physical activity was collected using PACES on 161 phase one participants, 60 (37%) of whom were considered eligible for the study based on their responses in the PACES. Of those eligible, 38 (63%) consented to participation in the study. All 38 participants were then tested for social support of physical activity and physical self-perception. At follow-up however, only 26 (68%) were assessed. This was due to students leaving the program because of involvement in extra-curricular activities, namely the Schools Community Involvement Program whereby students participate in a number of community service-related endeavours (8%) or leaving school all together (24%). These two reasons explain why these students were not assessed at follow-up. No students actually dropped out of the study because they no longer wanted to be a part of it.

During baseline measurements of physical activity, usable accelerometry data were collected on 30 (79%) of the 38 recruited participants. These data are indicative of the high rate of absenteeism exhibited by girls at this school during school sport. Three cases of accelerometer error were recorded during this period due to accelerometer malfunction.

The intervention phase saw usable accelerometry data being collected from an average of 10 out of 17 (57%) intervention participants. Control group participants' attendance averaged at 8 students out of 21 (39%). Again, these statistics are indicative of poor attendance by girls at this school during school sport. It is however important to note the higher rates of attendance by girls participating in the intervention program. No cases of accelerometer malfunction were recorded during this period and collection rates were solely influenced by attendance.

4.2.2.2 Teacher participation

The participating intervention teacher and PDHPE staff completed all (100%) programmed activities. This included focus group interviews, design of intervention, implementation of intervention, and follow-up focus group interviews.

4.2.3 Research Question Three

Research question three investigated if the school sport program intervention was acceptable to teaching staff and students. Acceptability was determined if the study was able to implement the programmed sessions and if the program was deemed satisfactory to staff and students for implementation in a school curriculum.

This study saw all six (100%) intervention sessions implemented with an attendance mean of 4.3 sessions for participants randomised into the intervention group. Study participants in the control group participating in the regular school sport curriculum had a mean attendance of 3.6 sessions during the term.

At the completion of the study period, the researcher conducted focus group interviews and discussions with the intervention group and their participating teacher. The focus groups were conducted independently of each other to allow both the participants and the participating teacher to express their feelings concerning the program. Fifty-three percent of intervention participants (n=9) volunteered to participate in a one-hour focus group discussion with the researcher. The participating teacher also participated in an identical interview with the researcher. A list of the focus group questions is attached as Appendix J.

4.2.3.1 What worked well in the intervention?

Teacher involvement

According to the teacher and the students, teacher involvement, knowledge and participation were major influences on the amount of enjoyment and physical activity students experienced during the school sport intervention.

> "They needed a lot more encouragement and only if I was doing it with them and we were pumping them to keep on going". (Teacher comment)

> "If I didn't do it, they didn't do it" (Teacher comment).

> "…because she knew what she was doing it was better because she teaches us more like when you've got teachers that don't know the rules and ask us for the rules. It's really slack of them." (Student comment)

The participating teacher also commented that the planning for each session in advance, made a substantial improvement in the participation of the participants in the program. So even though there was a constant negotiation with the participant, structure had to be instigated by the teacher.

> "I had a lesson plan for each one. You have to make it structured for those girls so that the more time you waste they get distracted and they'll pass straight away." (Teacher comment)

> "If you go in there not knowing what you're doing by the time you work it out the girls have lost track and are not interested". (Teacher comment)

Types of activities

The intervention teacher and students also commented on the types of activities that were offered during the program. They specifically commented on how the activities were fun and enjoyable as well as being something different from their regular school sport program.

> "[we liked that] they had like different things that we didn't have before in school so we had a variety of different activities in place".(Student comment).

Sport structure

Students commented that having a smaller group and not the amalgamated class structure that commonly occurs in their regular school sport program positively affected their school sport experience, as did the ability to engage in local venues outside school grounds and receive tuition from external sporting agencies.

> " I think being in smaller groups is good for people with the bigger groups everyone sticks to their own friendship but in a smaller group everyone is just like friends. Everyone gets to know each other…they're smaller than normal sport because they put the groups together". (Student comment).

Philosophy and purpose of sport

The philosophy and promotion of healthy physical activity also made a considerable contribution to the involvement of the students in the intervention program. Using the underlying principles of Sport Education in a school sport program allowed girls with a wider range of motivations to become engaged in the program.

> " One would do it because they learn how to develop their own skills straight from the start so even though they're learning how to teach it to someone else it's in a roundabout way of teaching themselves like they thought it was getting to coach others but they were developing their own skills and learning how to do it properly. But then you have all the really competitive girls who would want to get a qualification in it that would do it as well". (Teacher comment).

4.2.3.2 What improvements could have been made to the intervention?

Sport structure

The girls having to change into sport uniform on an allocated sport afternoon presented a common source of discontent and obstacle of participation for students and the teacher in the intervention sport program.

> "If the girls were allowed to wear their uniform from the morning like a whole day there is less of a chance of them forgetting it and they didn't have to carry it around so a lot of them purposely didn't bring it 'cause they don't want to carry it around so if they could wear it to school it would have been a lot easier". (Teacher comment).

> " You have to carry everything in your bag". (Student comment)

> " There are not enough lockers for everyone in the school". " You have to get changed back after sport and then the toilets are too small". (Student comment)

4.2.3.3 What was preventing school sport from being an effective source of physical activity in this school?

Philosophy and purpose of sport

According to data collected during this study, the students and the teacher in the intervention saw the school personnel's underlying poor attitude and unwillingness to change as being a major barrier to engaging adolescent girls in effective physical activity during school sport.

"Staff attitudes need to change. Too many staff turn up not dressed appropriately or don't know the proper rules to the sport or just completely lack interest they'd rather go out there and sit and don't encourage the girls at all…They don't value sport… They see it as a chore". (Teacher comment)

"They think that they shouldn't be out there teaching it or the opposite think that it's their two free periods and they go out there because there's no preparation. They think there's no preparation for it. You just turn up and the kids should know what to do because they should get to it in PE". (Teacher comment)

"…the value of sport to the students health as well as the staff, like encouraging them to participate for their own health benefit". (Teacher comment)

"The school is very stuck in their ways and it's hard to make changes". (Student comments)

4.2.4 Research question four

Research question four investigated the potential efficacy of a school sport program developed to increase the enjoyment of and participation in physical activity?

Whilst a pilot study of this size was not designed to detect statistically significant differences, several emerging and encouraging trends in the outcomes were found. The differences between intervention and control groups at baseline and follow-up for the primary and secondary outcomes are shown in Table 7.

There were greater increases in enjoyment of physical activity among girls in the intervention group compared with those in the control group. The intervention groups scores increased by a mean of 7.5 (13%) whereas the control group scores increased by 3.7 (6.75%).

Compared with the control group, there was a much smaller decline in physical activity during school sport in the intervention group. These results were particularly encouraging given the estimated rates in energy expenditure between the two groups. The intervention group participated in less vigorous activities such as yoga, pilates, aquatics, and tennis whereas the control group were involved in activities that are considered to be more vigorously active such as touch football, powerwalking, ball games, and basketball. Based on this fact alone, the data should have seen greater amounts of vigorous physical activity in the control group. This, however, was not the case.

Across all domains of social support there were no differences between the intervention and control groups.

In the Perceived Self-Perception Profile, the intervention groups showed greater improvement in all domains. This was encouraging given that the intervention participants had higher baseline values in some of the domains eg (sporting competence, and physical self-worth). Changes in body image were particularly noteworthy with the improved in the intervention group approaching statistical significance (P=0.15). All other domains showed positive trends that would indicate the intervention had a small effect of enhancing physical self-perception.

Table 7*: Mean values of baseline and follow-up outcome measurements by group. P value for comparison between intervention and control groups at follow-up testing after adjusting for baseline differences in outcome measurement.*

	Baseline		**Follow-up**				
	Intervention Mean (SD)	Control Mean (SD)	Intervention Mean (SD)	Control Mean (SD)	Unadjusted Intervention/Control Difference Mean (95% CI)	Effect Size (SD)	P value
Total number	*17*	*21*	*17*	*21*			
Physical Activity Enjoyment Survey							
Enjoyment of Physical Activity	49.2 (10.1)	51.1 (6.8)	56.8 (9.3)	54.8 (10.0)	3.8 (-2.4, 10.1)	0.42	0.30
Accelerometry							
PA counts (mean/1000)	85.3 (45.0)	91.7 (49.3)	82.1 (17.6)	75.0 (37.0)	13.6 (-21.8, 48.9)	0.24	0.45
Family and Peer Support Index							
Social Support Male	6.8 (3.9)	6.0 (4.1)	6.6 (5.6)	5.8 (4.8)	0.05 (-2.4, 2.5)	0.01	0.94
Social Support Female	10.0 (3.9)	6.4 (3.5)	8.9 (4.5)	7.2 (4.2)	-1.9 (-5.0, 1.3)	0.34	0.94
Social Support Child	8.1 (4.2)	5.6 (4.0)	6.4 (4.8)	5.1 (4.0)	-1.3 (-3.7, 1.2)	0.32	0.68
Social Support Others	3.7 (2.2)	3.1 (2.3)	4.1 (2.2)	3.8 (2.0)	-0.3 (-1.4, 0.9)	0.19	0.96
Physical Self Perception Profile							
Sporting Competence	13.8 (3.0)	11.9 (2.8)	14.1 (3.0)	12.0 (3.3)	0.2 (-1.1, 1.5)	0.13	0.50
Physical Conditioning	12.4 (2.7)	12.2 (2.9)	13.7 (4.2)	12.9 (3.5)	0.6 (-0.9, 2.0)	0.35	0.46
Body Image	12.3 (4.0)	12.0 (3.3)	13.6 (4.5)	12.3 (3.6)	1.0 (-0.4, 2.3)	0.50	0.15
Strength Competence	13.1 (2.2)	12.7 (1.8)	13.6 (3.2)	12.8 (3.0)	0.4 (-0.9, 1.8)	0.20	0.62
Physical Self Worth	13.4 (3.2)	12.4 (3.1)	14.1 (3.6)	12.8 (3.6)	0.3 (-1.0, 1.6)	0.21	0.66

Chapter Five

5. Discussion

The results from this pilot intervention are highly promising and demonstrate the feasibility, acceptability, and potential efficacy of implementing a school sport program designed to meet the needs and interests of the participants as well as function effectively within the constraints of the school environment.

This chapter will discuss how this study's findings relate to previous research conducted in the field, explain the results against the backdrop of current literature, as well as provide recommendations for further research. It is further envisaged that teacher training institutions, teachers, students and secondary schools will use the information in this study to re-examine current thinking regarding the effectiveness of current school models in promoting physical activity during school sport among adolescent girls from low socio-economic and non-English speaking backgrounds.

5.1 Research question one

Research question one investigated the physical activity needs and interests of adolescent girls from non-English speaking and low socio-economic backgrounds and how these could be negotiated to develop a program to increase enjoyment of and participation in physical activity.

Several themes emanated from this research that suggest teachers, type of activities, purpose and programming, and lack of student input are distinct barriers preventing adolescent girls engaging in school sport.

Firstly, teacher knowledge of sport was a major theme emphasised by interviewed students. Students commented that participation in particular school sport lessons was less if the teacher had little or no understanding of the activity. Many teachers provided little in the way of motivation to participate in school sport and failed to attend on time at the beginning of a school sport lesson. Some teachers were often unprepared for the lesson in relation to program, attire, and equipment, and then would not participate in the activity with the students.

Many students did not think that teachers set a positive role model for sport and physical activity when teaching in the school sport program. Discipline and behavioural expectations between staff varied greatly.

Students stated that the opportunity to participate in recreational physical activities would be more favourable than competitive school sport. They stated that these activities should have a focus on fitness as opposed to skill development. School sport was more favoured when there was no direct focus on individual performance and traditional sports such as cricket and softball were less favoured. Students also stated that the school needed to offer activities outside the school grounds, including music, and should prevent girls from getting hot and sweaty.

The interviews also revealed that both staff and students needed to clearly understand the purpose of school sport. They felt that the purpose of school sport as opposed to a PDHPE class should be:

a) an opportunity to be physically active and break from normal classroom routine
b) an opportunity to get fit

c) an opportunity to participate in challenging physical experiences

d) an exposure to new activities

Some of the programming issues discussed included making the most of the time allocated to school sport. Students complained that they spent far too much time having to get changed into sport uniform and that staff were often late to the commencement of the activity. The activities generally required pre-planning and setting up but teachers were frequently unprepared with both equipment and skills to conduct the particular sport.

5.1.1 Comparison with literature and explanation of findings

This study confirms findings from the NSW Department of Education and Training (1998), that most adolescent girls play sport to keep slim and fit, to socialise and have fun, to learn new skills, and to relax. It also confirmed the view of Malaxos and Wedgwood (1997) in that girls want to see a wider variety of sports and activities offered to them in school sport.

Whilst having more female PE teachers and sporting roles models was seen as a barrier to girls not engaging in physical activity (Malaxos & Wedgwood, 1997; NSW DET, 1998), this study demonstrated that having knowledgeable and enthusiastic teachers of any teaching speciality who choose to participate with their students may be more influential in motivating adolescent girls to participate in physical activity.

This finding concurs with Park and Wright (2000) in that gender construction is perceived as a barrier to participation in school sport. Teachers potentially perpetuate socially constructed gender roles. Teacher involvement will support the acceptance of social meanings that expand the physical activity options open to these adolescent girls.

According to the findings in this study, some teachers are still holding onto “traditional” attitudes and beliefs of what is appropriate physical activity behaviour for adolescent girls. The question now exists: how much of a role does the school have to play in breaking those stereotypical roles that prevent participation in sport and physical activity?

5.1.2 Recommendations

This study has raised some concerns into the effectiveness of integrated school sport being taught by staff from all faculties on three specific issues. Firstly, is a school sport program effective if staff with no formal physical education training, expertise, or even interest in the area conduct it? The cooperating teacher and the participating students stated very clearly that teacher involvement, knowledge and participation were a major influence on the amount of enjoyment they had and of the amount of physical activity they undertook during the school sport intervention. The concept of having teachers and students actively involved in planning and participating in school sport may have many positive implications on the current conduct of school sport and the efficacy of their students.

Secondly, school sport programs need to be programmed and prepared by teachers conducting the sessions. The teacher working with the intervention group repeatedly stated that planning for each session in advance made a substantial improvement in the participation of the students in the program. Even though there was a constant negotiation with the participants of the group, structure had to be instigated by the teacher conducting the session.

Thirdly, this study suggests that teachers of school sport should be actively participating in the sporting program with their students. This concept appears to be unfamiliar and/or unwelcomed by non-physical education staff, although this study would suggest that active participation is more important than their teacher training qualification and may enhance the participation in the activity.

Similar to the literacy and numeracy argument occurring in many schools around whose job is it to teach student's literacy and numeracy skills? Similar arguments occur pertaining to healthy lifestyles. Is it the responsibility solely of physical education staff or do all teachers have a responsibility to contribute to the well being of their students?

Ownership and decision making pertaining to sport in schools needs to be transferred from school executives to the teachers involved in delivering the programs and the students for whom the programs serve. Teachers responsible for the delivery of these programs need to have appropriate training and substantial interests in their delivery.

Programming of school sport should ensure there is substantial collaboration between staff and students. Activities should be active, challenging and give girls the opportunity to engage in activities outside those they may examine in the PDHPE syllabus.

5.2 Research question two

Research question two investigated the feasibility of the physical activity program used to engage adolescent girls in school sport. This study was designed to ascertain whether data could be collected from the selected population within a school infrastructure.

This study demonstrated how difficult it is to collect data from this population of girls and to maintain their participation. When collecting survey data, only 63% (n=38) of eligible candidates consented to participation in the intervention phase of the study. Of those 38 participants, only 26 (68%) were retained for follow-up assessment at 12 weeks.

The low retention rate for the study cannot be attributed to dissatisfaction with the program, but rather girls leaving school. Of the 12 girls who dropped out of the study, nine (75%) had left the school. The high proportion of girls who left the school during the intervention was unexpected and future research studies need to consider the possibility that interventions conducted with Year 11 girls from low socio-economic and non-English speaking backgrounds may have high dropout rates. For this reason, future research will need to take this into account when recruiting for studies during the post-compulsory years of schooling. Specifically, studies should identify students that may be leaving the school or seek a commitment of participation for those who choose to remain with the study.

The use of accelerometers proved difficult in the initial stages of the study. Prior to initial finalised recruitment and baseline measures, 10 students volunteered to wear the accelerometers during their school sport sessions. These students reported back to the other participants in the study during an information session on their relative non-invasiveness. As a result, all consenting participants wore the accelerometers. Ninety percent of the accelerometry data (34/38) collected a baseline was usable.

At the time of the study, water resistant accelerometers were not available so accelerometry data was not able to be collected from the intervention participants during their aquatic sessions of the intervention.

This study also saw all six (100%) intervention sessions implemented with an attendance mean of 4.3 sessions for participants randomised into the intervention group. Participants in the control group had a mean attendance of 3.6 sessions during the term. This is also a strong indicator that participants did not leave the study because of the intervention as it saw higher attendance rates than the existing school sport (control) program.

5.2.1 Comparison with literature and explanation of findings

There have been very few physical activity studies using an experimental design among adolescent girls within a school infrastructure. “New Moves” was a multi-component, girls-only, school based program for obesity prevention among adolescent girls in the United States. Neumark-Sztainer, et al. (2003) decided to ascertain if the program was feasible to be run in a high school setting. The ‘New Moves’ study initially recruited 201 girls and was able to collect follow up data on 180 participants four months later. Whilst this program was implemented during physical education and not school sport time it saw follow-up data being collected on 89% of participants.

The fact that this program was inculcated into physical education time may explain the higher retention rates at follow-up. The study also did not actively recruit ‘at risk’ girls who were less likely to be physically inactive going into the intervention. According to the Centers for Disease Control and Prevention (cited by Powell, Slater, Chaloupka, and Harper, 2006) 41.2% of Black youths, 36.5% of Hispanic youths, and 31.9% among White youths are considered physically inactive. The “New Moves” study conducted by Neumark-Sztainer, et al. (2003) had white girls making up 60.4% of the intervention group but only 26.7% of the control group. American youth populations expected to have lower

levels of physical activity were disproportionately represented in the control group. This study was also conducted during the compulsory years of schooling whereas the school sport intervention study was not.

According to Nutbeam, Smith, Moore, and Bauman (1993), not all young people enjoy being at school and therefore will be less likely to be influenced by a school-based intervention program. Specifically, those who like school the least are the least likely to be influenced by school-based intervention programs.

This study would concur that selective disengagement is a major barrier to the acceptability of a school-based physical activity intervention program. Both the control and intervention groups had comparatively similar attrition rates from the study. The primary reason for leaving the study was the participant had left school (attributing to 13% and 11% of attrition in the control and intervention group respectively). Leaving the program to become involved in other non-physically active extracurricular activities accounted for only 5% and 3% in the control and intervention groups respectively. Whilst not significantly different, the trend would indicate that this intervention program was more acceptable than existing school sport programs in terms of selective disengagement. If the intervention program was the reason why participants dropped out of the program, one would expect to have seen a greater dropout in the intervention group as opposed to the control group who did their normal school sport program. This however, was not the case.

American studies such as Robinson, et al. (2003) have successfully recruited participants from adolescent populations known to be largely physically inactive. However, the intervention and research were conducted outside a school environment. There have been

no Australian studies to date that have investigated the feasibility of investigating the nature of physical activity in these demographics and using an intervention program within a school sport context.

By comparison, this study actively sought to recruit participants from a school with high proportions of girls that are known to be physically inactive; that is, those from Middle-Eastern, Asian, and low socio-economic backgrounds (Booth, et al. 2002). It also conducted the data collection within the complexities of day-to-day school business. This may go some way to explain the lower than expected recruitment and retention rates.

Park and Wright (2005) may give some insight into why adolescent girls from low SES and NESB are particularly difficult to retain in studies of this nature. It appears the girls from low SES and NESB may not place the same health emphasis on physical activity as other members of the Australian population their age. These reasons could range from the perceived high cost of participating in school sports (eg uniforms, trips away, and administration fees) to time constraints, family responsibilities, and culturally appropriate recreational pursuits.

It is important to note that the adolescent girls involved in this study were no longer required to stay in school. Year 10 sees a percentage of students change schools in order to complete their NSW Higher School Certificate Studies in another secondary institution. According to the Australian Bureau of Statistics (2006), nearly one quarter of female students will not finish their secondary schooling in NSW. All of the study's participants were well into the post compulsory secondary studies and this could be a reason for explaining the lower than expected retention rates. Control group and intervention group

lost 13% and 11% respectively of participants because they chose to leave the school for another secondary institution or finish their secondary studies all together. This attrition percentage was outside the control of the researcher and occurred externally to the study.

5.2.2 Recommendations

The Australian Bureau of Statistics (2006) report that NSW secondary schools can expect a 75% retention rate of female students through to Year 12. Young people who leave school early do so for a variety of reasons. According to Tresidder, Macaskill, Bennett, and Nutbeam (1997), the reported reasons why young people drop out of school at or before Year 10 (age 15-16 years) include expectations to enter employment (46%), poor experiences at school (39 %) and family difficulties (16 %).

Whilst this study has demonstrated that it is possible to collect data from the selected population within a school infrastructure, greater attention should be placed on retention rates in future studies. This study is consistent with Australian Bureau of Statistics (2006) data indicating a 24% (n=9) loss of participants through normal NSW secondary schooling attrition.

Future studies may have to consider the introduction of incentives or commence recruitment once students have commenced studies into Year 11 in order to retain larger number of participants. They may also have to recruit up to an additional 30% of consenting participants to stay ahead of the expected attrition experienced in NSW secondary schools during this period.

The fact that this intervention program was sustained over the period of a school term does demonstrate its feasibility and this approach to research in existing school sport curriculum. Strengths of the program evaluation include the collection of information from different sources using both quantitative and qualitative methodologies. Data gathered pertaining to such a diverse and complex group, using an experimental study format, provides valuable insight and vision for future physical activity interventions run within school environments.

5.3 Research question three

Research question three investigated if the school sport program intervention was acceptable to teaching staff and students. Acceptability was determined if the study was able to implement the programmed sessions and if the program was deemed satisfactory to staff and students for implementation in a school curriculum.

This study successfully implemented 100% of the programmed intervention sessions across a school term of 11 weeks and based on the majority of the qualitative data was an acceptable method of conducting a school sport program. This study also saw all six (100%) intervention sessions implemented with an attendance mean of 4.3 sessions for participants randomised into the intervention group. Participants in the control group participating in the regular school sport curriculum had a mean attendance of 3.6 sessions during the term.

According to the interview data of this study, the majority of the intervention participants reported that the school sport program helped them to increase their enjoyment of physical activity; they felt better about participating in school sport and themselves in general. Most

of the school PDHPE teachers similarly perceived that the program had had a positive impact on their students.

5.3.1 Comparison with literature and explanation of findings

Booth and Okely (2005) identified significant disadvantages of schools as a setting for a physical activity based intervention, which may lead to a decline in the acceptability of such programs. Some likely obstacles could include selective disengagement, curriculum issues, teacher competence, and culture. Examination of these reasons may provide some insight into the potential acceptability of a school sport intervention program.

According to Booth and Okely (2005), the enormous demands made on schools can create a phenomenon known as 'curriculum crowding'. If an intervention program is placing more demands on school time, then quite often it will be at the expense of another area of the curriculum. These curriculum issues can create a certain amount of conflict with the day-to-day operation of a school and confusion to students who are asked to alter their schedules to accommodate an intervention program run during their normal school day.

The acceptability of this study was highlighted by its ability to have very little impact on the existing curriculum infrastructure within a school. It identified time already allocated to physical activity within the school. The only concerns pertaining to curriculum demands arose during the timetabling, teacher preparation, participant screening and recruitment phases. To reduce the impact of timetabling and teacher preparation, the researcher asked the school to allocate the teacher selected to run the intervention to Year 11 school sport prior to the end of the previous school year. Teacher preparation time and consultation with the researcher was supplemented by the study by providing funds for the school to cover

the participating teacher's classes with casual teacher coverage. Participant screening and recruitment phases were conducted during periods of year assembly or during timetabled PDHPE classes with consultation of the respective staff. This proved to be an effective and relatively non-invasive means of achieving these aspects of the study within existing curriculum demands.

Although most secondary schools have specialist physical education teachers, they are not always responsible for the delivery of all physical activity based programs within a school. Many teachers from non-physical education backgrounds may have low levels of perceived competence in their ability to teach school sport. This would be supported by similar research (Rowling, 1995, as cited in Colquhoun, Goltz, and Sheehan, 1997) involving primary school teachers who are forced to teach across a number or learning areas and not simply in a single subject specialisation.

This study highlighted the importance of teacher competence in relation to the acceptability of a physical activity intervention program within a school. Teachers delivering these types of programs in schools need to feel competent at performing or at the very least facilitating the necessary skills and activities they are being asked to teach. They also need to have been given adequate time to properly plan and have some adequate training in this field of expertise. Having identified and catered for these concerns by providing trained teaching staff and giving them time to plan through release time from other teaching duties contributed to the acceptability by staff and students of this intervention program.

Booth and Okely (2005) identified that competitive sport and belonging to a team are aspects of a school sporting culture that do not necessarily suit all students. It is not

uncommon for the primary focus of sport in schools to be in the form of organised competition. This study would concur in that many students who do not enjoy physical activity report that a reason for this is that their skills are often on public display. Of particular note, activity where students are required to perform a skill in front of their peers (eg, batting in cricket or softball) is a particularly daunting task for many adolescent girls who do not already enjoy physical activity.

The Stanford GEMS (Robinson, et al. 2003) intervention also sought to measure the acceptability of a pilot physical activity intervention program for girls. Whilst their treatment intervention consisted of after-school dance classes and a younger demographic of students (8-10 year olds), some comparisons can be made in terms of acceptability. The Stanford GEMS Study (Robinson, et al. 2003) found that the use of focus groups in formative phases of an intervention study enabled researchers to identify the potential benefits and barriers to acceptability. According to Robinson et al (2003), the delivery of their intervention was highly successful with the girls and the staff involved. This study would concur with Robinson, et al. (2003) in further suggesting that ownership and the collaborative nature of the qualitative formative phases increase participant ownership and acceptability. Hence, a study can expect greater acceptance in experimental studies when using a similar model for its research.

A large part of the acceptability of this study can be linked to the careful programming that took place in collaboration with the students and the member of the PDHPE staff. The activities were given a non-competitive and non-team focus. None of the activities required a singular student to perform an activity in isolation under the scrutiny of their peers.

Teacher participation also contributed greatly to the acceptability of the program in this regard as a culture of equality was fostered amongst the intervention participants.

5.3.2 Recommendations

If school sport is to be an effective means of physical activity for adolescent girls, further investigation is required into the infrastructure responsible for delivering it. No studies exist to date that examine the effectiveness of school sport programs in NSW high schools.

There is an underlying premise of school sport programming that needs to focus on attaining effective and authentic opportunities in sport and physical activity for adolescent girls. Effective and authentic sport means providing adolescent girls with access to a full range of opportunities and choices that meet their needs and enable them to achieve the social, psychological and physical benefits possible through sport and physical activity. Therefore, schools at the organisational and behavioural levels need to address barriers and create environments where adolescent girls can make positive choices and build a foundation for active living.

In the format currently used by the school in this study, school sport is planned and organised by a single teacher but conducted by most members of the teaching faculty across all subject areas. This would be considered a ‘scattered’ school sport format whereby year cohorts complete their sport allocation throughout the timetable in a scattered arrangement. After conducting this study, there are obvious limitations in being able to provide an effective school sport program if schools choose to conduct school sport in this manner.

Programming for school sport needs to be programmed in the same manner as any other subject or co-curricular activity in the school. From the evidence provided in this study, it is apparent that it is detrimental to the involvement of adolescent girls if extensive programming is not conducted for each session. Furthermore, the sessions obviously need to be run by knowledgeable and enthusiastic teachers who are willing to participate with their students. The qualitative interview data was very strong on this particular point. Whilst extensive programming was conducted for the intervention, the participation of the teacher with the girls during the session proved to be a decisive influence on the girls' level of physical activity.

5.4 Research question four

Research question four investigated the potential efficacy of a school sport program developed to increase the enjoyment of and participation in physical activity.
Whilst a pilot study of this size is not designed to detect statistically significant differences, several emerging and encouraging trends in the outcomes were found.

There were greater increases in enjoyment of physical activity among girls in the intervention group compared with those in the control group. The intervention group scores increased by a mean of 7.5 (13%), double the increase of the control group that scored 3.7 (6.75%).

Compared with the control group, there was a much smaller decline in physical activity during school sport in the intervention group. These results are particular encouraging given the estimated rates in energy expenditure between the two groups.

In the Perceived Self Perception Profile, the intervention groups showed greater improvement in all domains. This was encouraging given that the intervention participants had higher baseline values in some of the domains eg (sporting competence, and physical self worth). Changes in body image were particularly noteworthy with the improvement in the intervention group approaching statistical significance (P=0.15). All other domains showed positive trends that would indicate the intervention had a small effect on perceived self-perception. All domains of social support, however, showed no differences between the intervention and control groups

This study demonstrated that an effectively planned and organised school sport program could increase the enjoyment of and slow the decline in physical activity of adolescent girls. It will also have mediating effects on their body image and physical conditioning.

This study had little effect on the social support parameters associated with physical activity but this can be attributed to the fact that parents and the wider school faculty were not involved in the delivery of this feasibility study.

5.4.1 Comparison with literature and explanation of findings

Dishman, et al. (2004; 2005) evaluated whether targeting changes in factors influencing enjoyment of physical education, physical activity, and self-efficacy beliefs about participating in physical activity mediated the effect of The Lifestyle Education for Activity Program (LEAP) conducted in US high schools. The direct effect of the LEAP intervention on physical activity ($\gamma 72=0.10$) and the effects of enjoyment ($\beta 75=0.06$) and self-efficacy ($\beta 76= 0.14$) on physical activity are similar to those reported by other studies into the

social-cognitive correlates of physical activity among youth populations. The findings presented in these two papers suggest that there is experimental evidence linking enjoyment and self-efficacy with physical activity among fifth and sixth grade girls. This study did not however, provide sufficient data to allow an effect size comparison using Cohen's d between LEAP and this study.

Robinson, et al. (2003) in the Stanford GEMS study conducted a treatment intervention for girls from racially diverse and low socio-economic backgrounds consisting of after school dance classes at three community centres offered five days a week, and a 5-lesson intervention delivered in the participant's home that was designed to reduce small screen recreation time. This study provided some pertinent comparison data and used a similarly structured study. Both studies were run over a comparatively similar time frame, but the school sport intervention was only delivered once a fortnight (a total of 6 sessions) and was a modification of existing school curriculum.

It was found that modifying school sport in such a manner will have a similar standardised effect on objectively measured physical activity (0.21 and 0.24 respectively) in the Stanford GEMS study and this School Sport intervention. It also had relatively similar effects on participants' satisfaction with their body shape. Stanford GEMS reported a 0.60 effect size compared with the School Sport intervention of 0.50 effect size using Cohen's d.

Even more encouraging for this study is that it had double the effect on the participant enjoyment or liking of physical activity. Stanford GEMS reported 0.21 effect size whereas this School Sport intervention study recorded a 0.42 standardised effect using Cohen's d. Given the links between enjoyment and physical activity in recent studies such as LEAP

(Dishman, et al. 2005), the effectiveness of impacting on this variable using a school-based approach emphasises the important roles school have to play in delivering effective school-based physical activity programs if we are to engage female populations in lifelong physical activity.

As with the LEAP intervention, this study would concur that enjoyment of physical activity can be increased by an effective school-based intervention. This study would also concur with the finding that an effectively programmed school-based intervention can successfully influence the enjoyment of physical activity and self-efficacy across cultural boundaries.

This study however, has added another important element into understanding enjoyment of physical activity in adolescent girls. Unlike the LEAP intervention (Dishman, et al. 2005), this study was also able to influence the effects of enjoyment of adolescent girls from lower socioeconomic backgrounds which is also a known factor contributing to the physical inactivity of adolescent girls (Booth, et al. 2002). Furthermore, physical activity interventions do not need to be limited to physical education settings in order to influence these enjoyment effects. In fact, NSW secondary schools may need only to re-examine the methods used to implement existing school infrastructure to achieve these results.

A study of almost 1000 German adolescents examining the relationship between physical activity and self image (Kirkcaldy, Shepard, & Siefen, 2002) found that regular practice of physical activity and exercise was related to a more positive self image. Kirkcaldy, Shepard, and Siefen, (2002) concluded that discussion of recreation physical activity and exercise may provide a useful point of entry for facilitating dialogue among adolescents about concerns relating to their body image and self-esteem.

This study would concur with Kirkcaldy, Shepard, and Siefen, (2002) in identifying the potential efficacy of mediating the self-perception of adolescent girls through a physical activity intervention. To our knowledge, there are no other studies that have examined the effects of a school-based physical activity intervention and its ability to impact on a variety of self-perception sub-domains. This study has shown that an effective school-based intervention can have a positive effect on the perceived physical conditioning and body image of adolescent girls.

The school sport intervention has demonstrated that it is possible to slow the decline of physical activity regardless of the programmed level of intensity for an activity. In fact, the control group maintained a comparatively similar estimated MET value of activities from baseline to follow-up of 6.25 and 6.2 respectively. The intervention group however, had a markedly lower estimated MET value of 4.25, based on the type of programmed physical activity, at follow-up and still recorded higher levels of physical activity than the control group. This is the first study that has demonstrated that programming vigorous physical activity may not be successful in achieving greater amounts of physical activity within a school-based intervention approach with adolescent girls.

According to Neumark-Sztainer, et al. (2003), the effectiveness of interventions aimed at increasing physical activity among adolescent girls might be enhanced by engaging support from friends, family, and caring adults. This study however, focused much more on the other aspects Neumark-Sztainer, et al. (2003) highlight in running a successful school-based intervention such as helping girls feel more confident about themselves and their ability to engage in meaningful physical activity.

This study achieved no noteworthy or statistically significant findings in any of the social support variables. It is hypothesised that this occurred because the instrument used to collect this data (Family and Peer Support Index) and the study were not compatible. The Family and Peer Support Index quantifies social support an individual receives from other children, and significant male and female adults within the subject's household. This study conducted no treatment of any household-based variables. Social support that the participants receive from teachers and from within their school-based peer group would, however, provide valuable insight into the investigation of physical activity behaviour of adolescent girls. Future studies should endeavour to develop instruments sensitive to the nature of social support adolescent girls receive in relation to their involvement in physical activity in school-based environments. This study was unable to ascertain if any such instruments existed.

5.4.2 Recommendations

Often when examining the effectiveness of interventions aimed at modifying deeply entrenched behaviour in adolescent girls and that changes school policy and attitudes, results are disappointing. It may be that the measures taken are unable to detect changes in such a short period of time. This is particularly evident when trying to measure physical activity levels objectively using accelerometers. The large standard deviation between participants indicates that probably a longer period of measure is needed in order to interpret meaningful results. It may also be the broad nature of many of the measures, (i.e. trying to measure enjoyment of *physical activity* when one is really interested in their enjoyment of *school sport*).

This study has demonstrated that a properly planned and implemented school-based physical activity intervention run during school sport time can potentially have the ability to effect changes in enjoyment, perceived self perception, and levels of physical activity.

The effect on perceived body image was a surprising result given the size and nature of this intervention. However, it does pose some interesting questions for future studies and highlight the psychological importance of having an effective school sport program that is capable of engaging all adolescent girls within the student body. Given that images portrayed in the media often set unrealistic standards in regard to body image for many adolescent girls, schools need to address the social messages and provide opportunities for these to be challenged. According to this research, that may be possible in an effective school sport infrastructure.

Future studies should consider the sensitivity of instruments used to collect data, namely social support and enjoyment of physical activity. Whilst the measurement of enjoyment of physical activity showed medium effect size (0.42), it is hypothesised that this result could be even greater if the instrument was able to measure change specifically within the school environment.

Conversely, social support measures were unable to detect whether there was any noteworthy support received by the participants from the teaching staff. Data of this type would provide valuable insight into degree in which human school environments can facilitate change of adolescent girls' physical activity patterns.

It is also the recommendation of this study that future research be directed toward investigating the relationship between estimated MET rates of physical activity and total energy expenditure. This study has highlighted that it is far better to cater for the enjoyment of the activity than be overly concerned with the vigorous nature of it. It may be prudent for future studies to consider the lifelong effects this may have on the physical activity patterns of adolescent girls.

5.5 Strengths of the study

The school sport intervention program and its evaluation have a number of strengths. A major strength of running a physical activity initiative targeting adolescent girls is its accessibility to the targeted demographic, since it is timetabled in normal school curriculum. It is able to effectively target adolescent girls most likely to have lower levels of physical activity and those who are not likely to seek opportunities to participate in organised physical activity outside school hours. Furthermore, this study highlighted that there had been little to no change in the social support given at home for participants in either intervention or control to become more physically active.

A particular strength of this intervention was that students were given a degree of ownership over their school sport program. Unlike many other school-based physical activity interventions, the adolescent girls targeted in this study were not only more likely not to be physically active, the vast majority was from lower socio-economic and non-English speaking backgrounds. According to Au and Kawakami (1991), students from minority backgrounds should have the opportunity to learn and value mainstream curricula. It could be argued that affluent and English-speaking backgrounds place a tremendous importance on athletic ability. In fact, by meeting or exceeding these mainstream goals and

values, minority students may enjoy a wider range of opportunities, even when faced with discrimination and bias. Au and Kawakami (1991) however, argue that to offer the same curricula is not nearly enough. Teachers need to attend explicitly to the minority students' ownership of what is being learnt or valued. Based on these assumptions, it is little wonder that Middle Eastern and Asian adolescent girls are less active than their European peers (Booth, et al. 2002). Allowing the intervention participants to be actively involved in the decisions made about their program definitely contributed to the success of the school sport program. It could be further argued, based on the qualitative data, that the one element that the school refused to compromise on (that being the issue of wearing sport uniform to school on sport days) became the single biggest barrier to active participation in school sport.

Strength of conducting school sport for adolescent girls in this manner is an inclusive and supportive environment that accommodates for varied levels of skill and ability. Paramount to that occurring is the relationship the teacher is able to establish with the participants and the organisation they bring to the activities. There also was a need for a great deal of sensitivity when dealing with girls who may be overweight as well as from culturally diverse backgrounds or from low socio economic status families. For these reasons, it is even more important to consider the teachers that are being required to conduct school sport.

Finally, the school sport intervention program is innovative in that it addresses a broad range of physical inactivity health concerns through the integration of concepts from obesity, physical activity, gender equity and educational literature all of which are needed if adolescent girls are to be engaged in school sport and wider physical activity.

5.6 Weaknesses of the study

It is important to note that that this study is not sufficiently powered to detect statistically significant differences. It was designed as a pilot program to examine trends in behaviour outcomes.

The lack of statistically significant data impacts on the range of outcome variables suggesting a need for larger, more intensive, and longer interventions in future studies. Future plans include a multi-site randomised controlled trial using schools in similar socio-economic and cultural demographics to this study. A longer course of study and greater variety of activities would also need to be incorporated. Limitations of the current study's evaluation design include its limited statistical power to detect changes due to the size of the study sample. There is also a lack of measures sensitive enough to detect changes in enjoyment of the school sport session only, as opposed to physical activity as a whole. The uses of accelerometers when objectively measuring physical activity needs to be conducted over a longer time span in order detect significant changes in actual physical activity. The nature of physical activity also needs to be recorded and interpreted with reference to the activities being conducted by the control group. This then needs to be interpreted based on the MET value of the activity so they may be evenly assessed and interpreted accordingly.

5.7 Conclusions

Physical inactivity is a major public health concern that needs to be addressed. The fact that adolescent girls, especially those from Middle Eastern, Asian, and low socio-economic backgrounds are proportionally less active than other adolescent girls makes them a

demographic at higher risk of illness and disease associated with physical inactivity (Booth, et al. 2006). If this health concern is going to be addressed it needs interventions that are effective, sensitive and capable of reaching such a complex demographic. This study was developed based upon input from adolescent girls from diverse cultural backgrounds and low socio-economic families. It also drew upon the vast knowledge of PDHPE teachers working within the constraints of school environment and policy to ensure it was practical, feasible, and sustainable. The effect of conducting a physical activity intervention within an existing school infrastructure indicates that it is feasible to engage adolescent girls in school sport and that enjoyment of physical activity, lower reduction in participation in physical activity and increased perceived positive self body image may be some of the possible outcomes of a successful program.

School sport has the potential to make valuable contributions to the long term health and wellbeing of adolescents from diverse social, economic, and cultural backgrounds. Examining and redefining the processes and outcomes in the manner in which it is implemented within every school, are challenges for education and health professionals alike.

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Appendix A

Phase One Information Sheet and Consent Form

Phase One Information Sheet

University of Wollongong 

The feasibility of a school-based physical activity intervention for adolescent girls during school sport

INFORMATION SHEET FOR PARTICIPANTS & PARENTS

What are we trying to do?

We are trying to better understand what motivates adolescent girls to be physically active during school sport.

What is the purpose of this study?

The purpose of this study is to determine the impact of a school-based physical activity program on participant's physical activity levels, perceived physical competence, enjoyment, and social support of school timetabled sporting programs.

All questionnaires will be run at East Hills Girls Technology High School during timetabled PDHPE classes.

What will participants be asked to do?

Research staff from the University of Wollongong will visit the school during one allocated PDHPE class and participants will complete a questionnaire designed to ascertain their enjoyment of physical activity and school sport.

From this information, we will invite 60 girls who have reported that they do not enjoy physical activity as much as their peers to participate in a specially designed physical activity program. These girls will be asked what they would like to have in this program, which will be run during normal school sport time.

What are the risks of the study?

Parents

- There are no risks to parents in this study

Participant's completing questionnaire about perceived physical competence and enjoyment of physical activity

- There are no risks to participants in this study

Participation in the study

Please understand that participation in this project is entirely voluntary. If you are happy for your daughter/ward to participate in this project, please discuss the project with them to establish if they wish to be involved. You and your daughter/ward will be free to discontinue participation at any time. Discontinuation of involvement in this study will not jeopardise your daughter/ward(s) current or future relationship with the University of Wollongong.

What will happen to the information participants provide?

All information collected during this study will be kept strictly confidential and be stored in a locked office. Participant names will not be revealed or used in the study and will only be seen by the researchers involved in the study. The results of the study will be used as part of a thesis research project and also presented at conferences and in formal reports.

Who is conducting the study?

The people in charge of the study from the University of Wollongong are:

- Dr Tony Okely
    - Senior Lecturer in Health & Physical Education (Faculty of Education)
- Dr Phil Pearson
    - Lecturer in Health & Physical Education (Faculty of Education)
- Dean Dudley
    - Master of Education Research Student (Faculty of Education)

If you and your daughter/ward agree to participate, could you please complete the attached consent form and return them to the PDHPE faculty as soon as possible. After receiving your signed consent form, you will both be informed of your allocated group and given specific assessment times. If you have any questions regarding the study, please contact Dean Dudley on 0410475493 or his supervisor Dr Phil Pearson on (02) 4221 3889, or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, University of Wollongong on 42214457.

.

Yours sincerely,

Dr Tony Okely	Dr Phil Pearson	Dean Dudley

University of Wollongong 

PARENT AND PARTICIPANT CONSENT FORM

The feasibility of a school-based physical activity intervention for adolescent girls

Dean Dudley, Dr Tony Okely & Dr Phil Pearson

I have been given information about *the feasibility of a school based physical activity intervention for adolescent girls* and discussed the research project with Dean Dudley who is conducting this research as part of his Master of Education thesis supervised by Dr Tony Okely and Dr Phil Pearson in the Faculty of Education at the University of Wollongong.

I understand that, if I consent to my daughter/ward participating in this project she will be asked to:

- Complete a questionnaire asking about their enjoyment of physical activity;

I have been advised of the potential risks and burdens associated with this research, and have had an opportunity to ask Dean Dudley any questions I may have about the research and my participation.

I understand that my child's participation in this research is voluntary, I am free to refuse her participation and I am free to withdraw her from the research at any time. My refusal to her participation or withdrawal of consent will not affect hers or my relationship with the Department of Education or the University of Wollongong.

If I have any enquiries about the research, I can contact Dean Dudley on 0410475493 or his supervisor Dr Phil Pearson on (02) 4221 3889, or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, University of Wollongong on 42214457.

By signing below I am indicating my consent to participate in the research *The feasibility of a school based physical activity intervention for adolescent girls,* conducted by Dean Dudley as it has been described to me in the information sheet and in discussion with Dean Dudley. I understand that the data collected from my participation will be used for his MEd thesis, and may also be used in journal publications and conference presentations, and I consent for it to be used in that manner.

By signing below I am indicating my consent to participate in the research *The feasibility of a school based physical activity intervention for adolescent girls,* conducted by Dean Dudley as it has been described to me in the information sheet and in discussion with Dean Dudley. I understand that the data collected from my participation will be used for his MEd thesis, and may also be used in journal publications and conference presentations, and I consent for it to be used in that manner.

Parental Consent

I, (Parent's/Guardian's Name)....., agree for my child (Participant's Name)..... to take part in the study titled

"THE FEASIBILITY OF A SCHOOL-BASED PHYSICAL ACTIVITY INTERVENTION FOR ADOLESCENT GIRLS"

Does your daughter/ward suffer from any physical/medical conditions that will affect their participation in this study? YES/NO (Please circle one)

If so, please detail

.....

.....

.....

Surname:..... Given Name:.....

Address:.....

Phone:..... Child's DOB:.....

Parent's/Guardian's Signature:.....Date:.....

Participant Consent

I, ... have read the *Information Sheet for Participants.* I understand what is required of me and agree to participate in this Study.

Child's Signature:.....Date:.....

Appendix B

Physical Activity Enjoyment Survey (Motl, 2001)

School:_____ Class: _____

Student name: _____ Age: _____Years _____Months

PHYSICAL ACTIVITY ENJOYMENT SCALE

For each statement below, select the response which best represents how much you "disagree" or "agree" with the statement. Mark your response by ticking (4) in the box in the correct column.

When I am active...	 **Disagree a lot**	 **Disagree a little**	 **Neither agree nor disagree**	 **Agree a little**	 **Agree a lot**
1. ...I enjoy it.					
2. ...I feel bored.					
3. ...I dislike it.					
4. ...I find it fun.					
5. ...it's not fun at all.					
6. ...it gives me energy.					
7. ...it makes me depressed.					
8. ...it's very pleasant.					
9. ...my body feels good.					
10. ...I get something out of it.					
11. ...it's very exciting.					
12. ...it frustrates me.					
13. ...it's not at all interesting.					
14. ...it gives me a strong feeling of success.					
15. ...it feels good.					
16. ... I feel as though I would rather be doing something else.					

Appendix C

Phase Two Information Sheet and Consent Form

University of Wollongong 

The feasibility of a school-based physical activity intervention for adolescent girls during school sport

INFORMATION SHEET FOR PARTICIPANTS & PARENTS

What are we trying to do?

We are trying to better understand what motivates adolescent girls to be physically active during school sport.

What is the purpose of this study?

The purpose of this study is to determine the impact of a school-based physical activity program conducted during school sport, on participant's physical activity levels, perceived physical competence, enjoyment, and social support of year 11 girls.

To test this program, participants will be randomly assigned to either:

a) School-sport intervention program OR
b) Continue with their normal integrated school sport program.

Please note: As we would like to know how effective the intervention program is in promoting the enjoyment and participation in physical activity, we cannot place participants in the group of their choice. To ensure the results of the study are not affected by participant motivation to either program, or by our control of who participates in each program, participants will be randomly placed into either one of the above 2 groups. If your or your daughter/ward agree to participate in this project by completing and returning the attached consent form provided, you will be advised which program your daughter/ward has been placed.

Both programs will be run at East Hills Girls Technology High School during timetabled school sport.

The School-Sport Intervention Program

This program we be designed in conjunction with students and PDHPE staff and aims to:

a) Increase perceived physical competence and self-esteem in sport
b) Increase enjoyment of sport across a range of learning and participation activities
c) Increase levels in physical activity in school sport

The Normal-School-Sport Program

This program will be what is currently offered by East Hills Girls Technology High School to year 10 & 11 students.

What will participants be asked to do?

There are 2 key requirements for involvement in the School-Sport Feasibility project:

1. **Assessment** – a range of measurements will need to be taken and all participants, regardless of program allocation, will be required to complete the same tests.
2. **Participation in 1 of 2 programs** – the level of involvement required by the participants will depend upon which program they have been randomly allocated.

Assessment

To test how effective the programs are we would like to take some assessment measures before and after the programs. As changes in enjoyment of physical activity generally take time to influence physical activity participation, we will survey your enjoyment of physical activity to determine how effective the program is in the long-term. All assessments will take place during normal school sport or PDHPE class time. None of the assessments can hurt participants – in fact, you may be interested in their results.

All participants will be asked to complete a survey to ascertain the amount of social support they receive from peers, teacher, and adults to be physically active. They will also be surveyed to ascertain their Perceived Physical Competence and how much they enjoy sporting activities.

Girls assigned to the intervention group will then be asked participate in a 30-40 minute focus group discussion with a teacher from the school's PDHPE faculty on the nature of current school sport programs and how they might be modified to accommodate their physical activity needs and interests. A new school sport program will then be designed based on the information received from the girls during the focus group discussions and interviews.

Following this process, all participants will be asked to wear a small 'activity monitor' called an accelerometer (approximately 5.1 x 4.1 x 1.5 cm, 43 grams) that is worn like a belt under their clothing. The monitor automatically records body movement, and we would like you to wear this during three school-sport sessions in Term 4 2005 and in five more session in Term 1 2006.

What are the risks of the study?

Parents

- There are no risks to parents in this study

Measurements and surveys of participants

- There are no risks to participants in this study

University of Wollongong 

PARENT AND PARTICIPANT CONSENT FORM

The feasibility of a school-based physical activity intervention for adolescent girls

Dean Dudley, Dr Tony Okely & Dr Phil Pearson

I have been given information about *the feasibility of a school based physical activity intervention for adolescent girls* and discussed the research project with Dean Dudley who is conducting this research as part of his Master of Education thesis supervised by Dr Tony Okely and Dr Phil Pearson in the Faculty of Education at the University of Wollongong.

I understand that, if I consent to my daughter/ward participating in this project she will be asked to:

- Participate in a specially designed physical activity program during Term 1 2006;
- Complete a questionnaire asking about their perceptions of their physical competence, social support for and enjoyment of physical activity;
- May be interviewed or asked to participate in a discussion about physical activity with a member of the school staff. This may be audio taped.
- Wear a physical activity monitor during school sport

I have been advised of the potential risks and burdens associated with this research, and have had an opportunity to ask Dean Dudley any questions I may have about the research and my participation.

I understand that my child's participation in this research is voluntary, I am free to refuse her participation and I am free to withdraw her from the research at any time. My refusal to her participation or withdrawal of consent will not affect my relationship with the Department of Education or my relationship with the University of Wollongong.

If I have any enquiries about the research, I can contact Dean Dudley on 0410475493 or his supervisor Dr Phil Pearson on (02) 4221 3889, or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, University of Wollongong on 42214457.

By signing below I am indicating my consent to participate in the research *The feasibility of a school based physical activity intervention for adolescent girls,* conducted by Dean Dudley as it has been described to me in the information sheet and in discussion with Dean Dudley. I understand that the data collected from my participation will be used for his MEd thesis, and may also be used in journal publications and conference presentations, and I consent for it to be used in that manner.

Parental Consent

I, (Parent's/Guardian's Name)....., agree for my child (Participant's Name)..... to take part in the study titled

"THE FEASIBILITY OF A SCHOOL-BASED PHYSICAL ACTIVITY INTEREVENTION FOR ADOLESCENT GIRLS"

Does your daughter/ward suffer from any physical/medical conditions that will affect their participation in this study? YES/NO (Please circle one)

If so, please detail

.....

.....

.....

Surname:..... Given Name:.....

Address:.....

Phone:..... Child's DOB:.....

Parent's/Guardian's Signature:.....Date:.....

Participant Consent

I, ... have read the *Information Sheet for Participants.* I understand what is required of me and agree to participate in this Study.

Child's Signature:.....Date:.....

Appendix D

The Physical Self Perception Profile (Fox, 1990)

THE PHYSICAL SELF PERCEPTION PROFILE (PSPP)

WHAT AM I LIKE?

These are statements which allow people to describe themselves. There are no right or wrong answers since people differ a lot.

First, decide which one of the two statements best describes you.

Then, go to that side of the statement and check if it is just "sort of true" or "really true" FOR YOU.

Really True for Me	Sort of True for Me	EXAMPLE			Sort of True for Me	Really True for Me
☐	☐	Some people are very competitive	BUT	Others are not quite so competitive	☒	☐

REMEMBER to check only ONE of the four boxes

1.	☐	☐	Some people feel that they are not very good when it comes to playing sports	BUT	Others feel that they are really good at just about every sport	☐	☐
2.	☐	☐	Some people are not very confident about their level of physical conditioning and fitness	BUT	Others always feel confident that they maintain excellent conditioning and fitness	☐	☐
3.	☐	☐	Some people feel that compared to most, they have an attractive body	BUT	Others feel that compared to most, their body is not quite so attractive	☐	☐
4.	☐	☐	Some people feel that they are physically stronger than most people of their sex	BUT	Others feel that they lack physical strength compared to most others of their sex	☐	☐
5.	☐	☐	Some people feel extremely proud of who they are and what they can do physically	BUT	Others are sometimes not quite so proud of who they are physically	☐	☐
6.	☐	☐	Some people feel that they are among the best when it comes to athletic ability	BUT	Others feel that they are not among the most able when it comes to athletics	☐	☐

	Really True for Me	Sort of True for Me			Sort of True for Me	Really True for Me
7.	☐	☐	Some people make certain they take part in some form of regular vigorous physical exercise	BUT Others don't often manage to keep up regular vigorous physical exercise	☐	☐
8.	☐	☐	Some people feel that they have difficulty maintaining an attractive body	BUT Others feel that they are easily able to keep their bodies looking attractive	☐	☐
9.	☐	☐	Some people feel that their muscles are much stronger than most others of their sex	BUT Others feel that on the whole their muscles are not quite so strong as most others of their sex	☐	☐
10.	☐	☐	Some people are sometimes not so happy with the way they are or what they can do physically	BUT Others always feel happy about the kind of person they are physically	☐	☐
11.	☐	☐	Some people are not quite so confident when it comes to taking part in sports activities	BUT Others are among the most confident when it comes to taking part in sports activities	☐	☐
12.	☐	☐	Some people do not usually have a high level of stamina and fitness	BUT Others always maintain a high level of stamina and fitness	☐	☐
13.	☐	☐	Some people feel embarrassed by their bodies when it comes to wearing few clothes	BUT Others do not feel embarrassed by their bodies when it comes wearing few clothes	☐	☐
14.	☐	☐	When it comes to situations requiring strength some people are one of the first to step forward	BUT When it comes to situations requiring strength some people are one of the last to step forward	☐	☐
15.	☐	☐	When it comes to the physical side of themselves some people do not feel very confident	BUT Others seem to have a real sense of confidence in the physical side of themselves	☐	☐
16.	☐	☐	Some people feel that they are always one of the best when it comes to joining in sports activities	BUT Others feel that they are not one of the best when it comes to joining in sports activities	☐	☐

	Really True for Me	Sort of True for Me			Sort of True for Me	Really True for Me
17.	☐	☐	Some people tend to feel a little uneasy in fitness and exercise settings	BUT	Others feel confident and at ease at all times in fitness and exercise settings	☐ ☐
18.	☐	☐	Some people feel that they are often admired because their physique or figure is considered attractive	BUT	Others rarely feel that they receive admiration for the way their body looks	☐ ☐
19.	☐	☐	Some people tend to lack confidence when it comes to their physical strength	BUT	Others are extremely confident when it comes to their physical strength	☐ ☐
20.	☐	☐	Some people always have a really positive feeling about the physical side of themselves	BUT	Others sometimes do not feel positive about the physical side of themselves	☐ ☐
21.	☐	☐	Some people are sometimes a little slower than most when it comes to learning new skills in a sports situation	BUT	Others have always seemed to be among the quickest when it comes to learning new sports skills	☐ ☐
22.	☐	☐	Some people feel extremely confident about their ability to maintain regular exercise and physical condition	BUT	Others don't feel quite so confident about their ability to maintain regular exercise and physical condition	☐ ☐
23.	☐	☐	Some people feel that compared to most, their bodies do not look in the best of shape	BUT	Others feel that compared to most their bodies always look in excellent physical shape	☐ ☐
24.	☐	☐	Some people feel that they are very strong and have well developed muscles compared to most people	BUT	Others feel that they are not so strong and their muscles are not very well developed	☐ ☐
25.	☐	☐	Some people wish that they could have more respect for their physical selves	BUT	Others always have great respect for their physical selves	☐ ☐
26.	☐	☐	Given the chance, some people are always one of the first to join in sports activities	BUT	Other people sometimes hold back and are not usually among the first to join in sports	☐ ☐

	Really True for Me	Sort of True for Me			Sort of True for Me	Really True for Me
27.	☐	☐	Some people feel that compared to most they always maintain a high level of physical conditioning	BUT	Others feel that compared to most their level of physical conditioning is not usually so high	☐ ☐
28.	☐	☐	Some people are extremely confident about the appearance of their body	BUT	Others are a little self-conscious about the appearance of their bodies	☐ ☐
29.	☐	☐	Some people feel that they are not as good as most at dealing with situations requiring physical strength	BUT	Others feel that they are among the best at dealing with situations which require physical strength	☐ ☐
30.	☐	☐	Some people feel extremely satisfied with the kind of person they are physically	BUT	Others sometimes feel a little dissatisfied with their physical selves	☐ ☐

Appendix E

Family and Peer Support Index (Sallis, 1999)

PHYSICAL ACTIVITY SOCIAL SUPPORT SCALE

During a typical week, how often has a member of your household OR school:
(Tick (4) in the box for each type of person).

	None	Once	Sometimes	Almost Daily	Daily	Don't Know
1. Encouraged you to do physical activities or play sports?						
A. Male adult(s)						
B. Female adult(s)						
C. Other children						
2. Done a physical activity or played sports with you?						
A. Male adult(s)						
B. Female adult(s)						
C. Other children						
3. Provided transportation to a place where you can do physical activities or play sports?						
A. Male adult(s)						
B. Female adult(s)						
C. Other children						
4. Watched you participate in physical activities or sports?						
A. Male adult(s)						
B. Female adult(s)						
C. Other children						
5. Told you that physical activity is good for his or her health?						
A. Male adult(s)						
B. Female adult(s)						
C. Other children						

During a typical week how often:
(Tick (4) in one box for each question):

	None	Once	Sometimes	Almost Daily	Daily	Don't Know
6. Do you **encourage your friends** to do physical activities or organise games or sports?						
7. Do your **friends encourage you** to do sports or physical activities?						
8. Do your **friends do physical activities** or play sports with you?						
9. Do your friends or classmates **tease you** about not being good at physical activities or sports?						

Appendix F

Staff Focus Group Questions

East Hills Girls Technology High School

School Sport Intervention Study (University of Wollongong)

Focus Group Questions

PDHPE Faculty Questions

1. What do you see as the purpose of school sport for adolescent girls?
2. How was/is the existing school sport program developed?
3. What are the advantages/disadvantages of the current school sport program?
4. What changes could be made to increase the participation and enjoyment of school sport for students and staff?
5. What barriers are preventing participation and enjoyment of school sport for your students?
6. What additional resources would be needed to make school sport more enjoyable?

Appendix G

Participant Focus Group Questions

East Hills Girls Technology High School

School Sport Intervention Study (University of Wollongong)

Focus Group Questions

Student Questions

1. What do you see as the purpose of school sport for adolescent girls?
2. What things do you find enjoyable/not enjoyable about the current school sport program?
3. What prevents you from being more physically active during school sport?
4. What type of physical activities would you like to see included in school sport?
5. What can the staff and school do to make school sport more enjoyable?

Appendix H

University of Wollongong Ethics Approval

University of Wollongong

INITIAL APPLICATION APPROVAL
In reply please quote: HE05/157
Further Enquiries Phone: 4221 4457

21 July 2005

Mr D.Dudley
1 Darling St
PENRITH 2650

Dear Mr Dudley

I am pleased to advise that the Human Research Ethics application referred to below has been **approved**.

Ethics Number:	HE05/157
Project Title:	The feasibility of school-based physical activity interventions for adolescent girls.
Name of Researchers:	Mr Dean Dudley, Dr Anthony Okely, Dr Philip Pearson
Approval Date:	21 July 2005
Expiry Date:	20 July 2006

This certificate relates to the research protocol submitted in your original application as modified in your letter of **13/07/05**. As a condition of approval, the Human Research Ethics Committee requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforseen events that might affect continued ethical acceptability of the project.

You are also required to complete monitoring reports annually and at the end of your project. These reports are sent out approximately 6 weeks prior to the date your ethics approval expires. The reports must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

Yours Sincerely,

Dr Garry Hoban
Chairperson
Human Research Ethics Committee

cc: Dr Tony Okely, Education

Research Services

Appendix I

NSW Department of Education and Training Approval

PLANNING AND INNOVATION

COPY

NEW SOUTH WALES DEPARTMENT OF EDUCATION AND TRAINING

Early Childhood and Primary Education
Secondary Education
Technical and Further Education
Vocational Education and Training
Higher Education
Adult and Community Education

Mr Dean Dudley
1 Darling St
PENRITH NSW 2750

Dear Mr Dudley

SERAP Number: **05.118**

I refer to your application to conduct a research project in NSW government schools entitled *The feasibillity of school-based physical activity interventions for adolescent girls.* I am pleased to inform you that your application has been approved. You may now contact the Principals of the nominated schools to seek their participation.

This approval will remain valid until 20 July 2006.

This approval covers the following researchers and research assistants to enter schools for the purposes of this research: *Dean Dudley* only.

You should include a copy of this letter with the documents you send to schools.
I draw your attention to the following requirements for all researchers in NSW government schools:

- School Principals have the right to withdraw the school from the study at any time. The approval of the Principal for the specific method of gathering information for the school must also be sought.
- The privacy of the school and the students is to be protected.
- The participation of teachers and students must be voluntary and must be at the school's convenience.
- Any proposal to publish the outcomes of the study should be discussed with the Research Approvals Officer before publication proceeds.

When your study is completed please forward your report marked to General Manager, Planning and Innovation, Department of Education and Training, GPO Box 33, Sydney, NSW 2001.

Yours sincerely

Brian Davis
for

Dr Christine Ewan
General Manager, Planning and Innovation
15 August 05

• Level 6, 35 Bridge Street • Sydney NSW 2000 • GPO Box 33 • Sydney NSW 2001 •
• *telephone* 02 9561 8744 • *facsimile* 02 9561 8941 • www.det.nsw.edu.au •

Appendix J

Evaluation Focus Group Questions

East Hills Girls Technology High School

School Sport Intervention Study (University of Wollongong)

Evaluation Focus Group Questions

1. What did you like about the new school sport program?
2. What didn't you like about the new school sport program?
3. How could the program have been improved?
4. Has the school sport program we run last term had any effect on your physical activity outside of school and if so how?

Appendix K

Evaluation Survey Form

Evaluation of the School Sport Intervention Program

Thank you for taking part in the school sport study. We want to know what you thought of the program and would be grateful if you could complete the following short questionnaire. Your response will help us improve the program for the future.

Please say how much you agree with the following statements by circling the most appropriate response where:

SD = Strongly Disagree, D = Disagree, A = Agree and SA = Strongly Agree

Please be honest in your reply. All responses will be treated in confidence.

		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
	The teachers/instructors				
1)	The teachers/instructors had a high level of knowledge	SD	D	A	SA
2)	The teachers/instructors had good communication skills	SD	D	A	SA
3)	The teachers/instructors were approachable	SD	D	A	SA
	The program content				
4)	The content of the program was relevant	SD	D	A	SA
5)	The content of the program was interesting	SD	D	A	SA
6)	The content of the program was easy to understand	SD	D	A	SA
7)	The content of the program was challenging	SD	D	A	SA
8)	The content of the program was enjoyable	SD	D	A	SA

The collection of data

9)	The wearing of accelerometers is comfortable	SD	D	A	SA
10)	The wearing of accelerometers is embarrassing	SD	D	A	SA
11)	The interviews allowed me to express my ideas	SD	D	A	SA
12)	The surveys were easy to understand	SD	S	A	SA

Please add any comments about the program (e.g. anything you would have liked covered or think could have been left out).

_____

_____

_____

_____

_____

_____

_____

_____

_____

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE.
YOUR COOPERATION IS GREATLY APPRECIATED.