The impact of a moderate physical activity session on Year Two students' subsequent classroom behaviour

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Statement of Original Authorship

The work contained in this thesis has not been submitted previously for a degree or a diploma at any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously written or published by another person except where due reference is made.

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Abstract

Objective: The purpose of this study was to examine the impact of a moderate physical activity (PA) session on Year Two students' subsequent classroom behaviour.

Methods: Three teachers and 48 students from three Year Two classes at a NSW private school participated in the study. *Phase 1:* Each teacher was interviewed in an attempt to gather information about their individual class, behaviour management style and personal view on PA as it relates to behaviour. *Phase 2:* The researchers observed two separate lessons in each classroom (30 minutes duration) for four weeks. A lesson that directly followed PA and one that did not was observed. For each condition researchers recorded the number of disciplinary comments that were directed at individual students (Individual Disciplinary Corrections) and to the class as a whole (General Disciplinary Corrections). *Phase 3:* The students responded to a questionnaire relating to their classroom behaviour, self-efficacy for PA as well as participation in PA.

Results: There was a 49 percent decrease in disciplinary corrections ($p = 0.012$) after a PA session. Additionally the teacher's attitude toward PA's influence on behaviour impacted the rate of on-task behavioural improvement following a PA session. Finally, both boys and girls improved similarly in on-task classroom behaviour following PA.

Conclusions: A moderate PA session has a positive effect on Year Two students' classroom on-task subsequent behaviour. These findings may provide educators with an effective strategy to increase student classroom on-task behaviour.

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Chapter 1
- Introduction to the Study -

Introduction

There are many benefits of regular physical activity. Psychologically, research has shown that taking part in physical activity (PA) on a regular basis can reduce stress, increase self-esteem (Haas & Nigg, 2009) and lower anxiety as well as depression (NSW Premier's Council for Active Living, 2007). PA also strengthens the heart and lungs, bones, muscles and joints. PA helps to maintain a healthy weight, good sleep patterns (ACHPER, 2008), aids in the prevention of diabetes as well as colon cancer and osteoporosis. There is evidence that it also lowers blood pressure, decreases the risk of heart disease and improves the lipid profile (NSW Health, 2009). In regards to cognition, studies show that PA has the ability to increase cognitive functioning abilities and academic results (Bates, 2006). Morgan and Hansen (2008) conducted a study into the cognitive benefits of being physically active and found that a large sample of practicing teachers noted significant increases in student concentration, readiness to learn and increased ability to retain learned material. Furthermore, on a behavioural level, research indicates that being physically active improves student on-task behaviour. In Morgan and Hansen's (2008) study regarding teacher's perceptions of how PA affects their students, the majority of teachers perceived PA to improve behaviour. Teachers observed that excluding PA from a regular school day resulted in increased behavioural problems amongst their students. Additionally, Mahar, Murphy, Rowe, Golden, Shields and Raedeke (2006) found that by including classroom-based low intensity PA breaks into learning sessions of 10 minutes, students improved their on-task behaviour by eight percent. Similar to conclusions found in Morgan and Hansen's (2008) study, teachers in the

Mahar team (2006) study also reported positive improvements in student on-task behaviour after PA and declared it “evident”.

Research Questions

The study addresses the following research questions:

1. Does the impact of a moderate intensity PA session (30 minute duration) have a positive impact on subsequent classroom behaviour in Year Two students?
2. Does the attitude of teachers toward PA affect student classroom behaviour and if so, to what degree?
3. Is there a difference in the classroom behaviour of boys to girls following a PA session?

To examine the notion that a moderate PA session has a positive affect on a Year Two student’s subsequent classroom behaviour, we performed a study where student behaviour was recorded in a classroom environment with and without prior PA. A positive effect was characterised by a reduction in off-task behaviour as measured by the number of disciplinary comments the teacher had to make.
All data gathered through interviews, observations and questionnaires was then analysed fittingly. The anecdotal data collected from each teacher interview was examined and compared to reveal individual ideas and collective trends or themes amongst the three Year Two teachers. The data analysis sought to prove whether teacher perceptions found in Morgan and Hansen’s (2008) study could actually be methodologically proven and, if by increasing the intensity and time of PA compared

with the Mahar (2006) teams study, on-task behaviour could exceed an eight percent on-task behavioural improvement.

Importance of the Study

If the study reveals that a moderate PA session proves to significantly improve a Year Two student's subsequent classroom behaviour, it may change the way that the teaching community chooses to address behaviour in the classroom environment. Teachers may choose to alter their daily routines as well as their yearly programming to incorporate a proactive PA behaviour management style of which teachers include an increased number of moderate intensity PA sessions at calculated times during the school day to combat student off-task behaviour. In addition to the behavioural rewards that the PA behaviour management style would achieve, it would also provide and maintain the student's psychological and physical health as well as assist them academically.

Thesis Structure

The thesis is separated into six chapters. The present chapter has introduced the topic deliberated and has given a succinct background of the affects PA has on students and why the relationship between PA and behaviour is potentially significant. Chapter 2 examines the literature relating to PA, behaviour and the classroom environment. Throughout Chapter 3, the method of data collection is described specifically as well as a description of participants, study designs and protocols, and statistical analysis. The results of the study are acknowledged in Chapter 4 and the implications of the results found are discussed throughout Chapter 5 in relation to the research question introduced in Chapter 1. Finally,

Chapter 6 concludes the thesis by identifying practical implications of the study findings and makes further recommendations for research.

Chapter 2

- Review of Literature -

Introduction

Physical inactivity is a national epidemic in Australia. More recently, the Australian Government is focusing on Australian children and their increasing involvement in sedentary activities (NSW Department of Education & Training (DET), 2005). Children of this generation compared to previous generations are subject to an emerging labour-free, convenient lifestyle of physical inactivity. Children are spending more time playing computer games and more time watching television. Rather than walking to school or riding a bike to their friend's house; they are travelling using private and public transport (Australian Council for Health, Physical Education and Recreation (ACHPER), 2008). If you combine these new lifestyle habits with frequent consumption of easily accessible fast food, it creates the disturbing statistic that approximately one in five Australian children are classified as being overweight (NSW DET, 2005).

As our nation (not just our children) becomes less active, attention is being given to the effects of physical inactivity. Obesity is one well known visible physical effect of physical inactivity. However, there are many more negative health effects which have proven to be potentially fatal. Physical inactivity, through obesity, is the likely contributor of heart disease, diabetes, colon cancer and osteoporosis (NSW Health 2009). Furthermore, from 2004 to 2005 the Australian Bureau of Statistics (ABS)

(2008) found that 41 percent of Australian children under 15 years old live with a long-term health conditions which could be easily prevented. NSW Health (2009) calculated the percentage of deaths that are related to physical inactivity by using information collected from the risks of not being physically active. The results showed that approximately one quarter of deaths are caused by avoidance of PA. Additionally, physical inactivity has the potential to increase blood pressure and diminish mental health (NSW Health, 2009).

Not only is Australia suffering from a PA famine, so are other nations around the world. Governments all over the globe are recognising the need to increase PA amongst their populations. Authorities are now publically identifying the link that PA has with preventing illness and disease. A need for change has now become apparent and governments all over the world are starting to promote PA and advertise the benefits it produces (Department of Health & Aging (DHA), 1999).

Benefits of Physical Activity

The ABS (2008) describes PA as a bodily movement performed by skeletal muscles resulting in the expenditure of energy.

PA is an essential component to having a healthy lifestyle and there are many logical reasons to invest more time into daily PA (National Heart Foundation of Australia, 2009). Research has shown that PA can reduce stress and increase self-esteem (Haas & Nigg, 2009) as well as lower anxiety along with depression (NSW Premier's

Council for Active Living, 2007) and even fight disease (U.S. Department of Health & Human Services, 2002). It can also help to strengthen the heart and lungs, bones, muscles and joints. Not only this but it also plays a major contribution to maintaining a healthy weight, good sleep patterns (ACHPER, 2008), works to prevent diabetes, colon cancer, osteoporosis as well as lowers blood pressure, decreases the risk of heart disease and improves the lipid profile (NSW Health, 2009).

Over the last 10 years there has been an increasing amount of research conducted in the area of PA and cognitive functioning regarding people of varying ages. Recent studies by Heyn, Abreu and Ottenbacher (2004) as well as Laurin, Verreault, Lindsay, MacPherson and Rockwood (2001) have revealed that PA can improve cognitive performance not only for those with healthy cognition function but also in those suffering from dementia and other types of memory dysfunctions. The studies found that PA could help to protect dementia sufferers from further memory decline. Furthermore, Castelli, Hillman, Buck and Erwin (2007) found that students who were physically fit achieved higher outcomes in literacy as well as numeracy compared with their unfit counterparts. In addition, studies demonstrate that participating in PA will have positive short term affects on consequent cognitive functioning and academic achievement (Bates, 2006; Tomporowski, 2003). Research by Morgan and Hansen (2008) found that the probable cause of enhanced cognitive abilities is related to how PA serves as a break in concentration and brain cognition. Morgan and Hansen's study into the cognitive benefits of being physically active, found that a large sample of practicing teachers noted significant increases in student concentration, readiness to learn and increased ability to retain learned material.

They saw PA as an integral part of education and viewed it as an opportunity for optimising learning capacity and enhancing concentration.

In regards to student behaviour, Morgan and Hansen (2008), as well as Mahar et al. (2006), found PA actually improved student behaviour. In fact when PA was excluded from a school day, teachers reported enhanced behavioural problems amongst their students (Morgan & Hansen, 2008). Additionally, Mahar et al. (2006) found that by incorporating a 10 minute low intensity PA break in the classroom between lessons, student on-task behaviour improved on average by eight percent.

This research illustrates how PA plays an important part in the retention of information and improvement of student behaviour. This information could prompt teachers to re-evaluate how they structure their timetable in regards to when and how they will incorporate PA into their students' school day.

Physical Activity Recommendations

To reap the rewards of being physically active, the NSW DET (2005) have created Australia's PA Recommendations for Children and Young People. In the recommendations the Australian Government has outlined that children and young people should partake in moderate to vigorous intensity activity for at least 60 minutes per day.

Moderate intensity refers to any activity which will raise the heart rate to that of a fast walk, a bike ride or any low key activity or game. Vigorous intensity refers to an activity that would make a child exercise their lung capacity to a greater extent causing them to perspire and can include things like running, dancing, climbing and any games where students are required to move separate body parts (Haskell, Lee, Pate, Powell, Blair, Franklin, Macera, Heath, Thompson & Bauman, 2007; NSW DET, 2005).

The NSW Board of Studies (BOS) Personal Development, Health and Physical Education syllabus (PDHPE) encourages all students to be as active as possible every day in a variety of ways. Because the Australian Government has re recognised the benefits of PA, its Active School Curriculum now lists as a requirement that both public and private primary and secondary schools include a minimum two hours of planned PA each week. This requirement is in addition to the recommended 60 minutes per student per day outlined by the NSW DET (ACHPER, 2008).

The requirements set by the Board of Studies and the recommendations made by the NSW DET are somewhat encouraging but not fully effective in increasing PA amongst all young people. A survey on Children's Participation in Cultural and Leisure Activities found that out of the 2,095, 000 children that were surveyed regarding a two week period, 42 percent of them (880,000 children) were not involved in any organised sport or PA during the fortnight (Australian Institute of Health & Welfare, 2008).

Not only are Australian children failing to satisfy the recommendations set by the NSW DET, it was also found in an American study published in The Journal of School Health (Lee, Burgeson, Fulton & Spain, 2007) that although many schools are consistent in teaching PE, few schools provide students with PE on a daily basis. The report found that part of the reason for the lack of daily PE in schools is because teachers did not obtain staff development in a variety of crucial areas. Suggestions were made by the researchers to the educational providers that policies should be implemented so that staff can be better trained in order to increase opportunities for students to partake in daily PE. The study also recognises the significance of students learning about how essential it is to be physically active so that they may continue this trend into adulthood.

Terminology

The terms Physical Education (PE) and Physical Activity (PA) often get confused. The distinct difference between the two is that PE is a subject with the purpose of giving students knowledge, ideas and abilities to lead a healthy and dynamic life. In contrast, PA is the physical movement of the body to exert energy by participating in physically active activities (Bates, 2006; Trudeau & Shephard, 2008). PA should be a significant component of PE.

Intervention Programs

There are multiple benefits of increasing PA in a young person's life. Several different studies implemented into the school environment support this.

In 2003, Alberta Education (Bates, 2006) conducted an intervention strategy with the key aim to increase the amount of PA that school students were involved in on a daily basis. The study was conducted as an outcome of the increasing awareness of the effects of physical inactivity.

Alberta Education in cooperation with Dr. Lyle Oberg, the Minister of Learning, ran an intervention program for all the schools in the city of Alberta, Canada. There was a great concern for the health of the children and youth in Canada as its youth were known for their high levels of inactivity and increasing sedentary behaviour which had the potential to pose serious health threats (Bates, 2006). The intervention ran for a period of one month and during this time Alberta Education implemented a program for all students' grades one to nine. Students were involved in PA for a minimum of 30 minutes per day through school organised activities with the aim of improving their short and long term health (Bates, 2006).

Students of Alberta recorded their levels of activity using different measuring implements such as pedometers, checklists, questionnaires, accelerometers and heart rate monitors amongst other things which were made accessible during the initiative (Bates, 2006). The study was quite successful and suggested that active living should be made a priority for the Alberta community (Bates, 2006).

Intervention programs like these often act as an agent to change. Recently the University of Wyoming in America conducted a study on rural communities in Idaho,

Montana and Wyoming. The university research team created a project called ‘Win the Rockies’ which promoted PA, healthy diet and positive body image. The intervention program was specifically targeted at primary school students with a small focus on their communities. It allowed students and communities access to intervention techniques such as community exercise programs. Billboards and motivational paraphernalia were displayed in the communities to motivate and encourage those partaking in the initiative (Kish, 2008).

The University of Wyoming found that all who were involved in the ‘Win the Rockies’ intervention project acted as a catalyst for change in their communities. The study found that just over five percent of those involved in the initiative changed their health habits to those promoted in the intervention program. The University of Wyoming concluded that the intervention program had a positive impact on the rural communities and those changed are now positively impacting others in the community (Kish, 2008).

Misbehaviour

General Misbehaviour

The ABS (2008) recorded that from 2004 to 2005, seven percent of Australian children suffered from behavioural problems. This finding is indicative of the diagnosed cases that were actually reported. In reality, teachers deal with students who have diagnosed behavioural problems as well as those who have suspected behavioural problems within their classrooms on a daily basis.

Misbehaviour is defined by Overall and Sangster (2003) as behaviour which is deemed inappropriate within its occurring context. They describe how misbehaviour fits into four main categories. These categories are aggression, immorality, class disruption and off task behaviour.

Aggression and immorality are the most serious forms of misbehaviour when referring to the specific act of the misbehaviour, though in general they are not the most disrupting when it comes to learning. Class disruptions and being off-task take the highest toll on quality student learning as these forms of misbehaviour are more frequent making the impact of this type of misbehaviour more damaging (Mackenzie, 2008; Overall & Sangster, 2008). Overall and Sangster (2008) indicate that because of the common nature of class disruptions and student off task behaviour, teachers should try to judiciously manage classroom teaching and student learning. A further implication discussed is that teachers need to consider implementing prevention strategies or programs that will reduce disruptive and off task behaviour.

On a more statistical and significant level, Mackenzie's (2008) Three Tiered Model of Positive Behaviour Support shows the average percentages of students showing appropriate behaviour. This model shows that approximately 80 to 85 percent of students behave in the manner their school expects. On average five to 15 percent of students need extra assistance from classroom behaviour support programs. Finally, only one to seven percent of students have acute behaviour problems and

need individually tailored and intense intervention programs. Interestingly this figure coincides with the ABS' (2008) recorded findings on behavioural problems.

From the information in Mackenzie's (2008) Three Tiered Model of Positive Behaviour Support, it is easy to see that most students do actually behave well most of the time. This finding should be taken into account when considering the behaviour of the average child.

The notion of self-efficacy is also inter-related with changes in behaviour. Self-efficacy as described by Bandura (1977), is a person's belief that they are able to perform a certain action or behave in a certain way in order to produce a desired outcome. A finding by Connor and Norman (1995) indicates that a strong sense of self-efficacy is related to improved health, higher achievement and increased social assimilation. This theory has been applied to such areas as school achievement, mental and physical health as well as behavioural disorders.

Gender and Misbehaviour

Most students behave well most of the time (Mackenzie, 2008) however, research shows that boys are more likely to be responsible for misbehaviour than girls (Gilbert, 2002; Rollins, 2003).

Gilbert (2002) shows that developments in neuroscience allow us to see that the male and female brains not only operate and look different but the variation in physical features between the sexes has a great deal to do with the behavioural differences between boys and girls. Furthermore, Gilbert demonstrates that boys have more nervous energy and are naturally more aggressive than girls. She suggests that behaviours are not just developed differently internally but also externally in both males and females. The study shows that parents play a significant part in establishing their child's temperament as well as behavioural traits. Whether they are aware on not, parents actually treat their child differently according to gender. Gilbert explains that parents tend to give a male less attention than a female child in fear that it will hinder their independence and masculinity which in turn affects various characteristics such as speech, independence and temperament. Furthermore, it is articulated that boys are affected the most by the discipline style adopted and administered by their parent. Smacking, loud verbal disciplinary corrections and threats are more likely to develop a long-term aggressive temperament in boys than in girls. In addition, research done by Rollins (2003) supports Gilbert (2002) both agreeing that more boys are suspended from school, repeat grades and leave school voluntarily at a younger age than girls. Rollins (2003) found that boys are four times more likely than girls to be diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). Boys also tend to require more special education services, are more likely than girls to be involved in criminal and drug offences and have an increased rate in alcohol abuse when out of school. The increased aggression rate in boys compared to girls suggests that boys are more likely to misbehave in any given situation including the educational environment.

Research on Behaviour and Physical Activity

A minimal amount of research has been done on the effects PA has on student behaviour, making the topic quite valuable and fresh. There are gaps in research and in attempt to fill those gaps, this study will examine the hypothesis that there is a significant connection between PA and how it positively affects behaviour.

From the research conducted on behaviour and its relationship with PA, there are several notable insights into how classroom behaviour and PA are interrelated most of which incorporate short classroom-based PA breaks.

Mahar et al. (2006) conducted a study on the *effects of a classroom-based program on PA and on-task behaviour*. The Mahar team study was conducted in a public school in America where 243 students aged 8 to 11 were seen in a typical classroom situation as well as prior and post the researchers' classroom-based PA observations.

The researchers required all student participants to wear pedometers whilst at school. The control group was made up of 108 students who were excluded from the researchers' classroom-based PA program. The intervention group was made up of 135 students who participated daily in the classroom-based PA program of which 62 students were randomly selected to be observed (Mahar et al., 2006).

The intervention group participated in the classroom-based PA program daily where the classroom teacher would engage students in a 10 minute low intensity PA session as specified by the researchers for the duration of 12 weeks. During this time the randomly selected 62 students were observed in each class 30 minutes before and after the classroom-based PA program. Researchers were looking for off-task behaviours which the researcher specified as *on-task* or *off-task motor*, *noise or passive as well as other off-task*. Steps from the pedometer on both the control group and the intervention group were recorded daily and compared at the end of the data collection period (Mahar et al., 2006).

The study found that students in the intervention group had taken significantly ($p<0.05$) more steps than those in the control group It was also noted that on-task behaviour after the classroom-based PA session was improved on average by eight percent ($p < 0.017$) amongst students. Teachers' attitudes were also noted and teachers were asked to report whether they felt student's behaviour was improved after the classroom-based PA session. Teachers reported that improvement in classroom behaviour was evident where students were given more PA in the school day. However, this may have been open to teacher bias (Mahar et al., 2006).

In 2009, Grieco, Jowers and Bartholomew (2009) conducted a study on how physically active academic lessons could be used to improve time on task for students of varying Body Mass Indexes (BMI's).

An additional focus of the Grieco team (2009) study was to examine more closely how students with a higher BMI responded after a PA academic lesson. The Grieco team's pre-research findings indicated that students who are obese tend to score lower in intelligence tests than students that are not obese. Students with a higher BMI than that of their counterparts achieve lower academically in English and Maths and are more likely to need extra assistance academically. These pre-research findings were the Grieco team's foundation to a study that aims to determine if subjects of higher BMI will have greater time-on-task results post the PA academic lesson.

Grieco et al. (2009) conducted the study on consenting students in nine grade three classes within American schools. Teachers of participating classes were trained as to how the PA academic lessons should be administered. The PA academic lessons required students to be involved in moderate intensity to vigorous intensity PA. Grieco et al. had a research team observe before and after PA academic lessons as well as before and after a non-PA academic lessons, both for the duration of 15 minutes.

Grieco et al. (2009) established that all student time-on-task was greater after a PA academic lesson than before. Students with a higher BMI were found to show the greatest increase in time-on-task levels after the active lesson.

The above two studies show that there are ties between PA and behaviour. Both studies done by Grieco et al. (2009) and Mahar et al. (2006) show that by breaking up two sedentary academic lessons with an in-class PA activity, students show increased levels of on-task behaviour in the sedentary lesson following the PA activity. This research suggests that there is value in incorporating PA into daily educational routines.

Further insight into the PA and behaviour connection is found in a study conducted by Morgan and Hansen (2008). The teachers' perceptions on the benefits of being physically active were derived from the teachers' professional experience and observation. In addition the study examined 1) whether the schools provided the adequate amount of PA, 2) the benefits of being active and, 3) the success of programs implementing PA. Morgan and Hansen (2008, p.179) describe PE as a "vehicle for promoting PA among children".

Data was collected both qualitatively and quantitatively. The first part of the research was in the form of a questionnaire (Morgan & Hansen, 2008). A random 72 NSW primary schools were approached to be part of the study, and of these, 40 consented to participate (60%). From this sample 56 teachers agreed to be part of the second research technique involving a telephone interview. From those teachers who consented, a group were selected based on their questionnaire responses. This was done to gain a variety of insight into positive and negative PA experiences and also

to avoid the collection of biased information. The interview ran for 30 to 40 minutes and 78.5 percent of the teachers interviewed were female.

The results of the study are insightful and show connections between PA and positive classroom behaviour. Amongst other things, Morgan and Hansen's (2008) study found that one of the most common beliefs amongst teachers was that when students were physically active, it positively affected the student's learning and on-task behaviour. The majority of teachers felt that PA was a means of energy release in which students can let off steam. Teachers reported that in the instances where PA was missed, the students were not so manageable, showing negative behaviour problems.

In Morgan and Hansen's (2008, p. 201) study, one teacher reported that students are more "settled" and ready to learn after being active. This teacher and others also articulated how they believe PA classes should be scheduled for morning sessions. Teachers claimed that PA wakes their students up, increases blood flow and makes them more alert to learning. Furthermore, the study showed that a significant amount of teachers used PA as a reward for positive, on-task, appropriate behaviour.

From research done on PA there have been two notable, reoccurring discoveries. Studies done by Bates (2006), Kahan (2008) as well as Morgan and Hansen (2008) have found that there is a strong connection between PA and academic performance. In regards to PA and behaviour, in Morgan and Hansen's (2008) study

teachers described that students appear to be better behaved in-class directly after a session of PA. This concurs with the Mahar teams (2006) findings regarding teacher attitudes toward increased in-class on-task behaviour. Finally, studies done by Grieco et al. (2009) and Mahar et al. (2006) show that by incorporating a PA session either prior to or during an academic lesson, students display increased levels of in-class on-task behaviour.

Research shows that there is a certain link between PA and increased in-class on-task behaviour.

Summary

Physical inactivity is a national and international concern. Combined with unhealthy eating and increasing sedentary behaviour trends, our nation is being set up for disaster. There is an increasing amount of information showing that physical inactivity can lead to not only short but long term health problems. Because of this, families and schools are being asked to make positive changes now before it is too late.

Being physically active has many long and short term health benefits. Research has shown that PA can reduce stress, increase self-esteem, lower anxiety and depression as well as fight disease (NSW Premier's Council for Active Living, 2007).

More recently research shows that being physically active can positively influence behaviour (Maher et al., 2006) and cognitive functioning (Bates, 2006).

As most students behave well most of the time, the issue being addressed is not what needs to be done to make large changes to students' behaviour but rather how much a modest use of PA can have on subsequent student on-task behaviour in the classroom. If the effects of PA on classroom on-task behaviour are proven to be positive, educational providers may judiciously insert PA with benefits to the students.

Research suggests that if students are involved in PA on a daily basis (Morgan & Hansen, 2008) they will be more receptive to learn, more able to concentrate, show improvement in fine motor skills and produce higher quality work.

Furthermore, PA proves to positively affect student in-class on-task behaviour (Bates, 2006; Grieco et al., 2009; Kahan, 2008; Mahar et al., 2006; Morgan & Hansen, 2008) and more specifically, research shows that students can improve in-class on-task behaviour by eight percent simply by incorporating 10 minute low intensity in-class PA sessions daily into the classroom routine (Mahar et al., 2006).

If the Mahar (2006) team's study demonstrated increased student in-class on-task behaviour, would a PA session which has a higher intensity and longer duration

carried out prior to an academic lesson have the ability to improve in-class on-task behaviour beyond eight percent? The current study will attempt to examine this in light of the Mahar team's findings.

Chapter 3

-Methods-

Study Participants

Participants of the study included teachers and students from three Year Two classes at a NSW private school. Sixty four Year Two students and three Year Two teachers were invited to participate in the study.

Parents of students invited to participate in the study received an Information Letter (Appendix I), Invitation to Participate (Appendix I), as well as a Consent Form (Appendix I) which both they and their child were asked to sign. This packet of information was given to the child by the teacher and brought home to the parent by their child. The 49 students (77 %) who returned their signed consent form made up the sample in the study. It should be noted that one of the 49 students from Class A that consented to participate in the study needed to be excluded from the mainstream results because of a diagnosed behavioural condition.

The Year Two teachers were also given an Invitation to Participate (Appendix I), Information Letter (Appendix I) and were requested to sign the specified Consent Form (Appendix I). All three Year Two teachers agreed to participate in the study.

The study procedure was conducted in compliance with the Avondale College Human Research and Ethics Committee from which ethical clearance and approval of all supporting documents was obtained.

Study Design and Protocols

Data collection occurred over a seven week period in three phases.

Phase 1 – Week 1

At the commencement of the data gathering period, semi-structured interviews were carried out with the three Year Two teachers. Interviews were arranged with teachers during release from face-to-face (RFF) teaching and ran for approximately 30 minutes each. The key questions in the interview focused around the teacher's personal view on PA, student in-class behaviour and any relationship between the two (Appendix III). All data collected by the researcher was in the form of field notes with no audio-recorded files created. Field notes were then converted to a Microsoft Office Word (A word processing software package) document where themes could be easily observed and recorded.

Phase 2 – Week 2 - 6

The observation of students and teachers followed the teacher interview period. Prior to this, observation times were arranged with the class teachers. The researchers liaised with the teachers regarding times that would suit them for the varying observations with and without PA prior. It was imperative for the researchers to schedule observation times so that all comparison class observations occurred at the

same time during the day and so that observations had the least amount of interruption and most consistency to avoid introducing other variables. To familiarise the researchers with the setting and the procedures incorporated in observing and recording the observations, several class periods were used as practice sessions.

The four week data collection period, in the form of observations, commenced at the beginning of week two. Each individual class was observed for 30 minutes during a standard in-class session which did not directly follow PA, recess or lunch. These lessons observed with no PA influence served as the comparison group.

During in-class observations the researchers would position themselves in an inconspicuous place in the classroom. Whilst in the classroom the researchers made efforts to avoid interference with the regular management and operations that occur in the classroom environment.

When observing lessons with no PA prior, all disciplinary corrective words or actions from the teacher were recorded by the researchers on the student observation chart labelled Observation of Lesson with no prior PA Influence (see Appendix IV). For each observation the researcher listed on the top of the Observation of Lesson with no prior PA Influence chart, the class being observed, date of observation, lesson observed during observation, observation start and finish time, weather and observation number. Disciplinary corrections were recorded in timed intervals of one minute using a standard timing device and student behaviour was observed for general disciplinary correction (GDC) and individual disciplinary correction (IDC). Where more than one disciplinary correction occurred during a one minute interval,

disciplinary corrections were documented accordingly. GDC describes any comment made to the class collectively by the teacher with the intent of correcting the class' behaviour. IDC refers to any comment made to a specific student by the teacher with the intent of correcting the student's behaviour. When a GDC occurred during the observation period the acronym *GDC* was recorded in the top GDC division of the chart at the minute interval that the GDC occurred. Where an IDC was issued to a student by the teacher, the students name was recorded in the bottom IDC division of the chart at the minute interval their behaviour was addressed. At the end of the 30 minute observation session GDCs and IDCs were tallied up and recorded onto the table labelled Student Observation Table (Appendix IV). The GDC number for each observation was recorded at the bottom of the Student Observation Table in the *Total GDCs Over Eight Observations* sector. The number of GDCs for each observation was recorded under the observation number in a column labelled *No PA* column or *PA*. At the conclusion of the observation period all GDC and IDC numbers were added to give two individual total scores that are recorded on the left hand side of the sheet in the *No Prior PA Total* or *PA Prior Total* column.

The above observation procedure was replicated in the same class on another day after a PA session and results were recorded on the observation chart labelled Observation of Lesson with PA Influences (Appendix IV) and the final tallies were documented on the same Student Observation Table that was utilised during observation of the control group.

PE classes in which students participated in prior to observations ran for the duration of 30 minutes. During this time the PE teacher encouraged moderate intensity

participation. The PE lessons were structured so that students would begin with a warm up and then participate in an activity that helped to develop their PE skills. Key learning areas throughout the duration of this study included catching, hitting, fielding, jumping, balancing, rolling and landing.

Researchers observed 24 sessions (total 12 hours) for each individual class over the four week observation period.

Phase 3 – Week 7

During this final stage, questionnaires were completed by the students participating in the study. The questionnaire (see Appendix II) was distributed to Year Two students post the observation period. It sought to gather data on the students' behaviour, compliance, attitudes on school sport, occurrence and regularity of independent PA sessions as well as attitudes on the subsequent impact of PA.

The questionnaire asked student participants six questions of which the participants were required to respond "Never', 'Sometimes', 'Most of the Time' and 'Always'. Students indicated their response to each question by colouring the circle under the question that corresponded with their answer.

After briefing classroom teachers on how the questionnaire was to be carried out, teachers then disseminated the questionnaires to their students and students completed them under the supervision of their teacher.

Student questionnaires were collected by the class teacher, transferred to the researchers, and data was then analysed accordingly.

Statistical Analyses

According to the type of data collected, information was analysed appropriately.

Student Participants

Data concerning students was collected by means of questionnaires and observations as documented in previous section “Study Design and Protocols”.

a) Questionnaire:

All student responses were manually tallied by the researchers for classes A, B and C. All tallied data was then entered into a Microsoft Office Excel (2003) spreadsheet and graphs were generated so that the questionnaire responses could be visually compared between classes A, B and C.

b) Observations:

All IDC and GDC data collected from the observation of participants was analysed using Microsoft Office Excel (2003) and data from the observations was analysed using tables, column graphs and a paired T-test analysis. The paired T test was used to determine differences in the number of disciplinary corrections given by the

teachers for observations with and without PA prior. The descriptive statistical analysis involved mean ± standard deviation and the 0.05 level of significance was implemented.

Teacher Participants

Data concerning teacher participants in the study was collected by way of an interview as documented in the previous section “Study Designs and Protocols”.

a) Interviews:

All information from the field notes taken during the teacher interviews was transferred into Microsoft Office Word.

Thematic analysis was employed where the researchers analysed responses to closed and open-ended questions hoping to find broad common ideas emerging from information given in the interviews which supported ideas and research in the topic area. The data collected from the interviews was compared to the data in the Review of Literature in Chapter 2. The data collected from the interviews gave the researchers some insight into behaviour trends amongst classes A, B and C and made data collected from observations easier to analyse because teachers provided background information on individual students and the class as a whole. The data collected from the interviews provided the researchers with underlying reasons for student off-task behaviour and gave an explanation as to why some students, such as those with suspected or diagnosed behavioural conditions, had a high level of IDCs compared with others.

Chapter 4

- Results -

Demographics

a) Student Participants

The study involved 48 students from three Year Two classes. There were 20 girls (41%) and 28 boys (59%) participating in the study involving 29 seven year olds and 19 eight year olds (Figure 1).

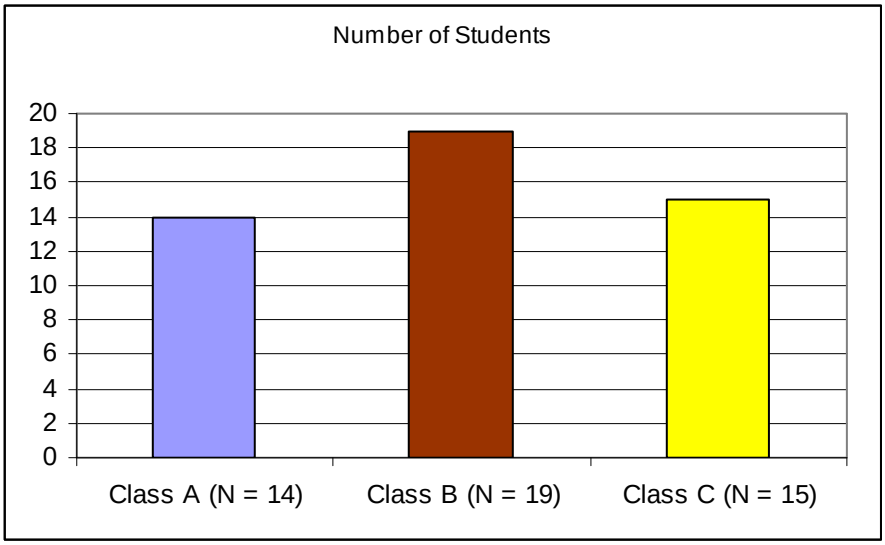


Figure 1: Class participation rates

b) Teacher Participants

Teachers from classes A, B and C were interviewed individually prior to the observation period. All three teachers were female and had a minimum of seven years teaching experience.

Student Attitudes

From the administered questionnaire completed by students the data was collated. Figures 2 to 7 show Class A, B and C's responses for the items asked in the questionnaire.

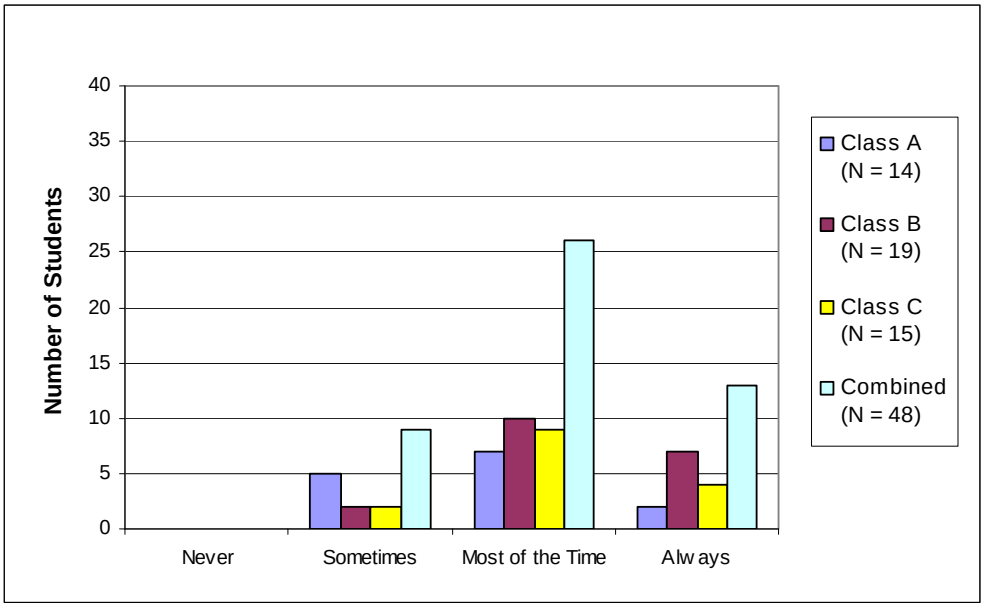


Figure 2: Student responses to Q1: "I behave well."

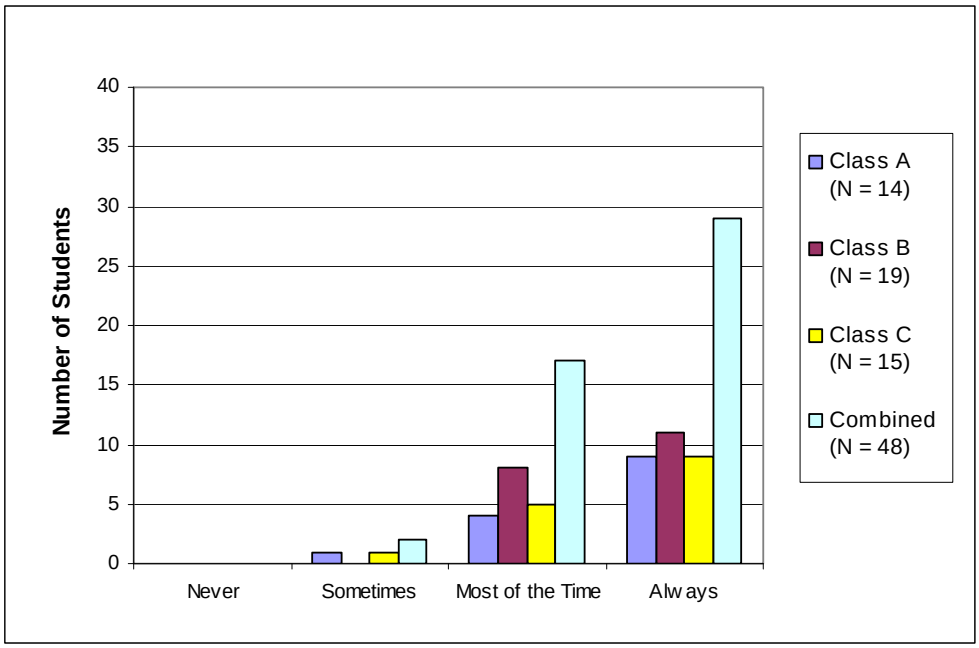


Figure 3: Student responses to Q2: “I do what the teacher says.”

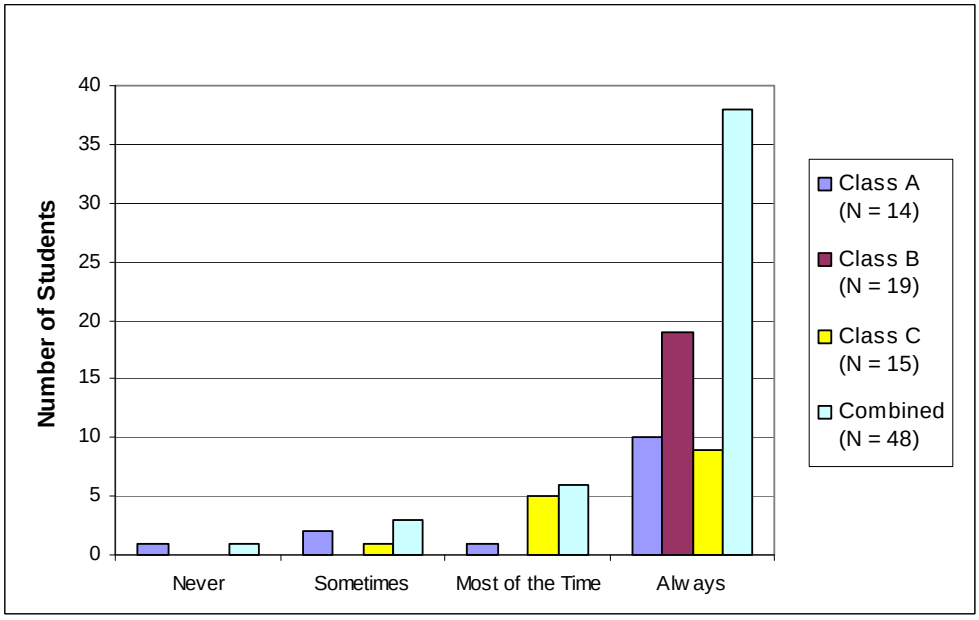


Figure 4: Student responses to Q3: “I look forward to PE and school sport.”

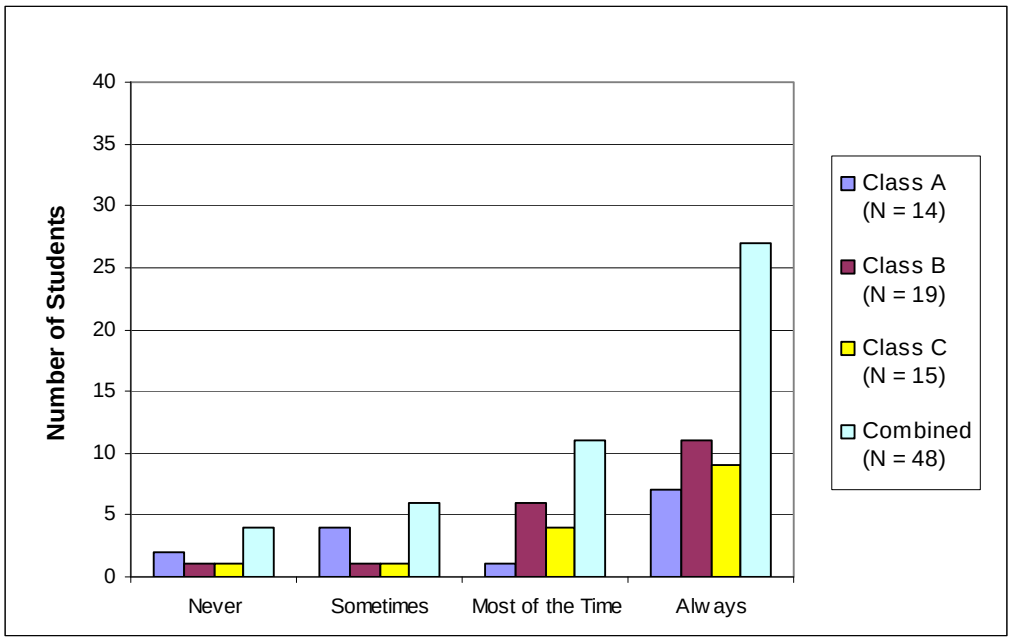


Figure 5: Student responses to Q4: "I like to play activities that make me huff and puff."

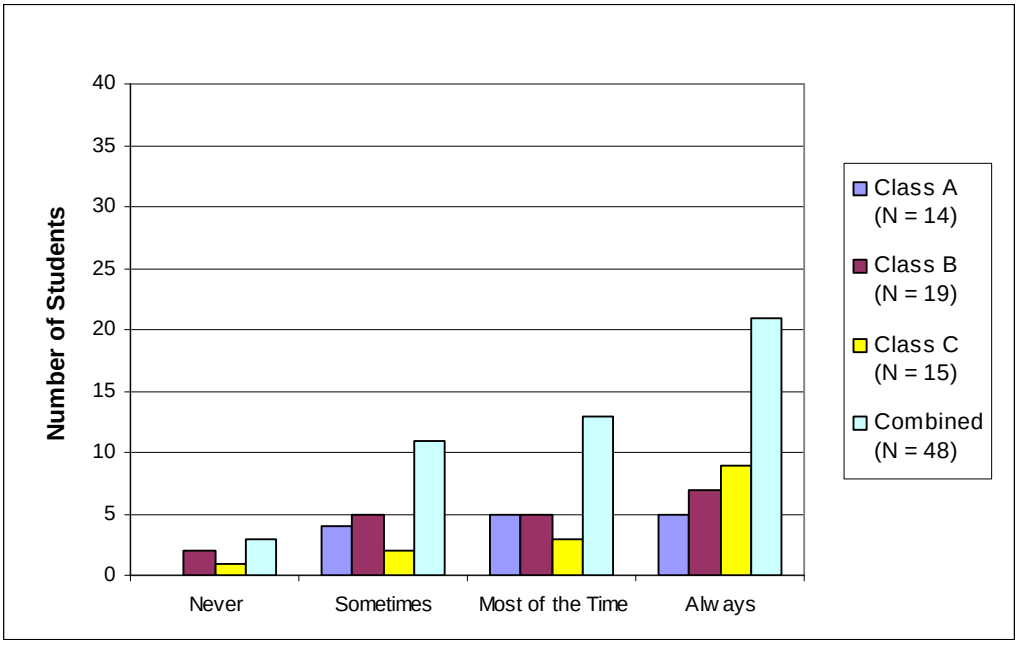


Figure 6: Student responses to Q5: "I am physically active or play sport outside of school."

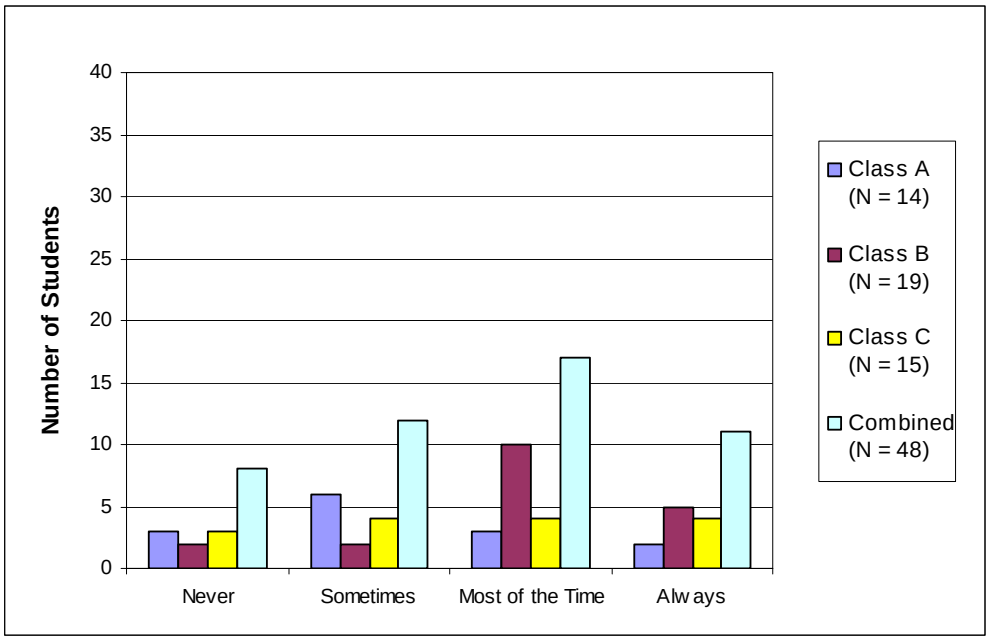


Figure 7: Student responses to Q6: "I concentrate better on my class work after doing sport."

Results in the six survey questions varied amongst classes. In the responses for questions one to four (Figures 2 – 5) the combined totals were easy to differentiate and these graphs show an obvious preferred response.

The preferred response to Q1. I behave well was *Most of the Time*, preferred response to Q2. I do what the teacher says was *Always*, Q3. I look forward to PE and school sport was *Always* and Q4. I like to play activities that make me huff and puff was *Always.*

The results for Figures 6 and 7 however were mixed and there was a more even range of answers compared to Figures 2 – 5.

Figure 6 illustrates answers to responses for Q5. I am physically active or play sport outside of school, were similar for the response *Sometimes* and *Most of the Time.* The graph shows that 11 students responded *Sometimes* and 13 responded *Most of the Time*. In saying this, *Always* proved to be the preferred response which was selected by 21 students.

Figure 7 shows responses for Q6. I concentrate better on my class work after doing sport. The graph shows only a small variation between all response rates. Eight students responded *Never*, 12 responded *Sometimes*, 17 responded *Most of the Time* and 11 responded *Always.*

Classroom Results

The effects of PA on students' individual disciplinary corrections (IDCs) as well as general disciplinary corrections (GDCs) with and without PA influence can be found in the following graphs (Figures 8 - 11).

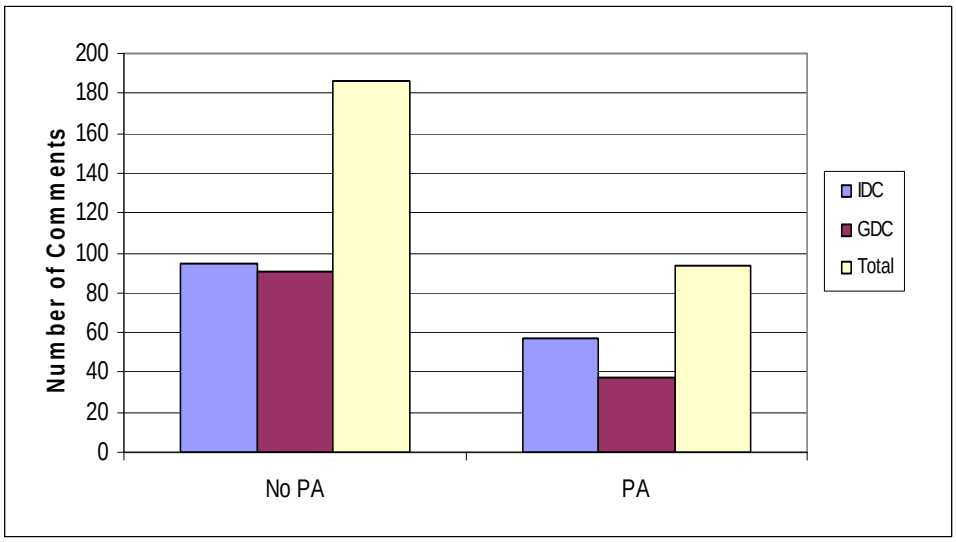


Figure 8: Comparison of IDCs, GDCs and total disciplinary corrections for full sample.

Figure 8 shows the levels of student IDCs and GDCs as well as the total of the two for the full sample. There was a 40 percent decrease in IDCs with PA prior to observation ($p = 0.008$), 59 percent decrease in GDCs with PA prior to observation ($p = 0.003$) and an overall decrease in disciplinary corrections by 49 percent with PA prior to observation ($p = 0.012$).

On average, the number of IDCs and GDCs decreased during observation sessions where PA occurred prior. The total number of disciplinary corrections for

observations with PA prior is 94 compared with the increased rate of 186 total disciplinary corrections for observations with no PA prior.

When comparing the total number of disciplinary corrections, 34 percent of all disciplinary corrections occurred in the observations when there was prior PA.

Results show that PA has a positive effect on the students' subsequent classroom behaviour.

Figure 9 displays the breakdown of change of IDCs for the full sample. (No prior PA minus prior PA).

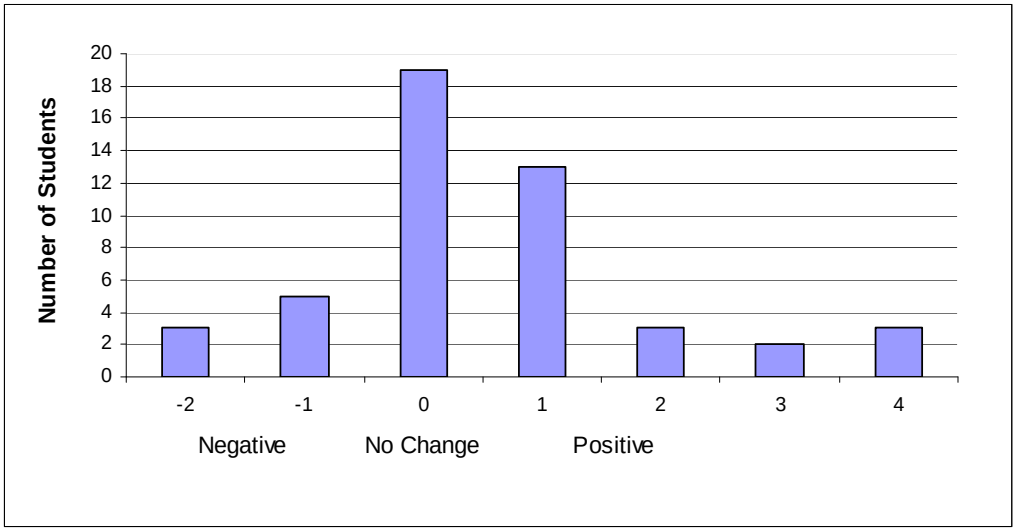


Figure 9: Effects of PA on IDCs for full sample.

Figure 10 displays the summary of changes of IDCs for the full sample.

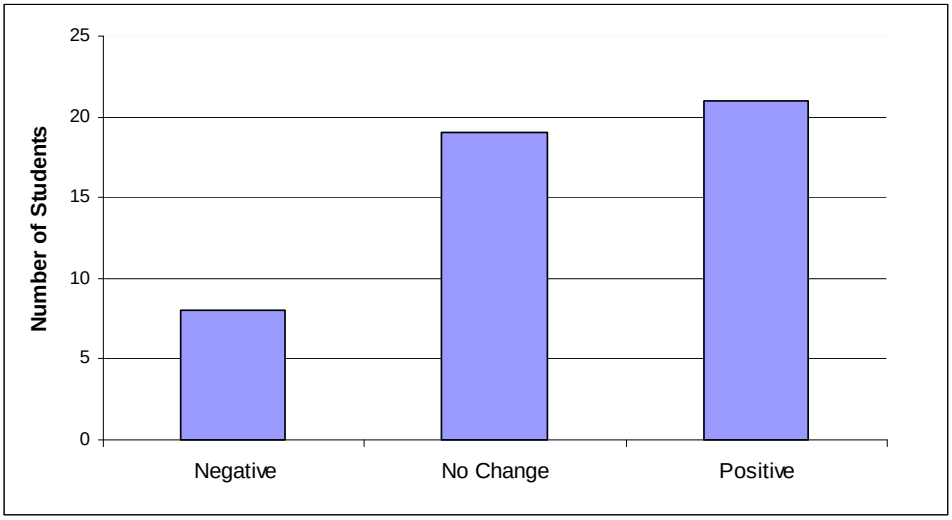


Figure 10: Summary of effects of PA on IDCs for full sample.

During the observation sessions on average 19 out of 48 students (40 %) from the sample showed a neutral change in behaviour with and without PA influences. On average there was a larger amount of positive change compared to negative change regarding the influences of PA before observation sessions (see Figure 10). The results showed that after a PA session 44 percent of students had a decline in IDCs compared to 16 percent of students who had an increase in IDCs.

Overall, the students individually had less in-class off-task behavioural corrections in observations influenced by PA compared to observations that were not influenced by PA.

Figure 11 describes differences in disciplinary corrections between individual class observations.

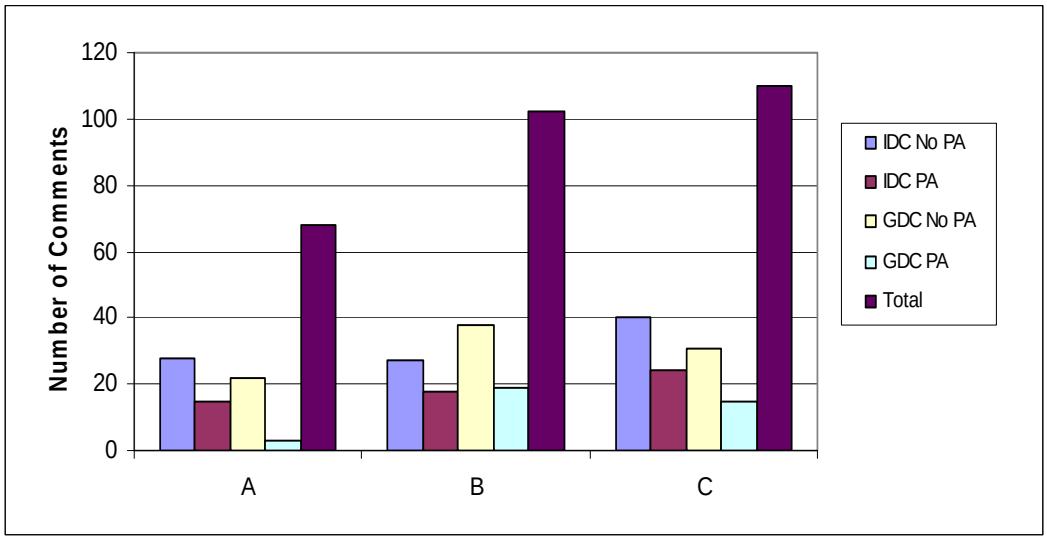


Figure 11: Comparison of IDCs, GDCs and total disciplinary corrections for classes A, B and C.

Figure 11 illustrates that Class C had the highest number of combined IDCs and GDCs with 110 disciplinary corrections over the observation period. Class B followed with 102 disciplinary corrections and Class A had the lowest number of disciplinary corrections of 68.

Figure 11 also demonstrates that Class C had the highest levels of IDCs with and without PA prior observation. Class C totalled 40 IDCs for observations without PA prior compared with Class A having 28 and Class B having 27.

Class C had the greatest improvement in IDCs overall where IDCs improved by 16 compared with Class A by 13 and Class B by 9.

Classes A and B had an equal improvement in GDCs after PA sessions where both classes improved by 19 GDCs on average compared to an improvement of 16 GDCs for class C.

Figures 12 and 13 display how gender relates to total disciplinary corrections throughout the observation period.

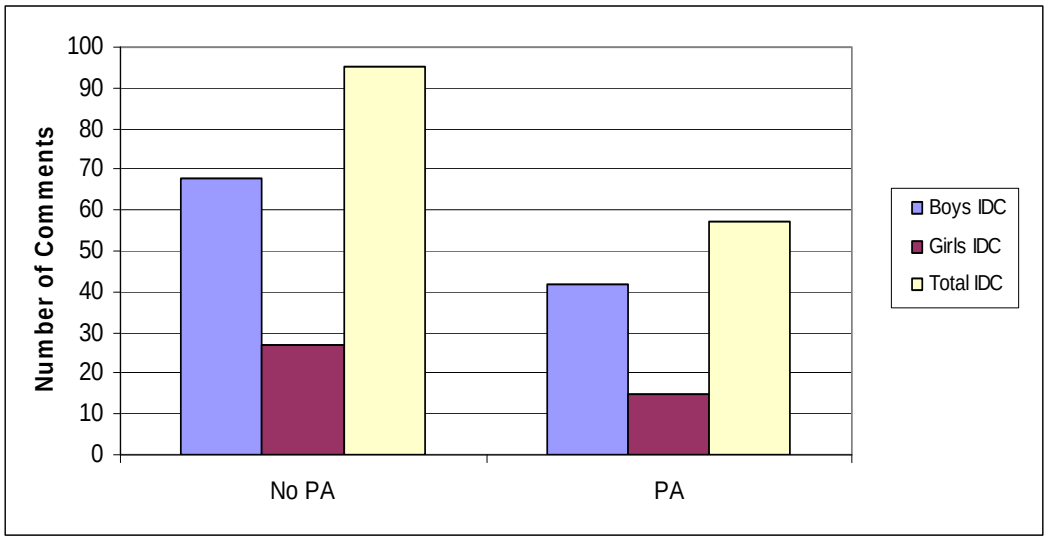


Figure 12: Gender comparison of IDCs for full sample.

Figure 12 shows that the number of IDCs given to boys is greater than IDCs to girls for both observations with and without PA prior.

The results in Figure 12 demonstrate that 63 percent of IDCs with no PA prior to observations are attributed to the boys in the study where 37 percent of IDCs are attributed to girls.

In both cases boys and girls decreased in IDCs where PA occurred prior to observation sessions.

Boys IDCs improved by 26 fewer disciplinary corrections (38%) and girls improved their IDCs by 12 fewer disciplinary corrections (44%) in instances where PA occurred prior to observation sessions.

Figure 12 shows that PA is marginally more effective in improving IDCs in females than males.

Figure 13 depicts variations in increased and decreased IDCs when comparing gender.

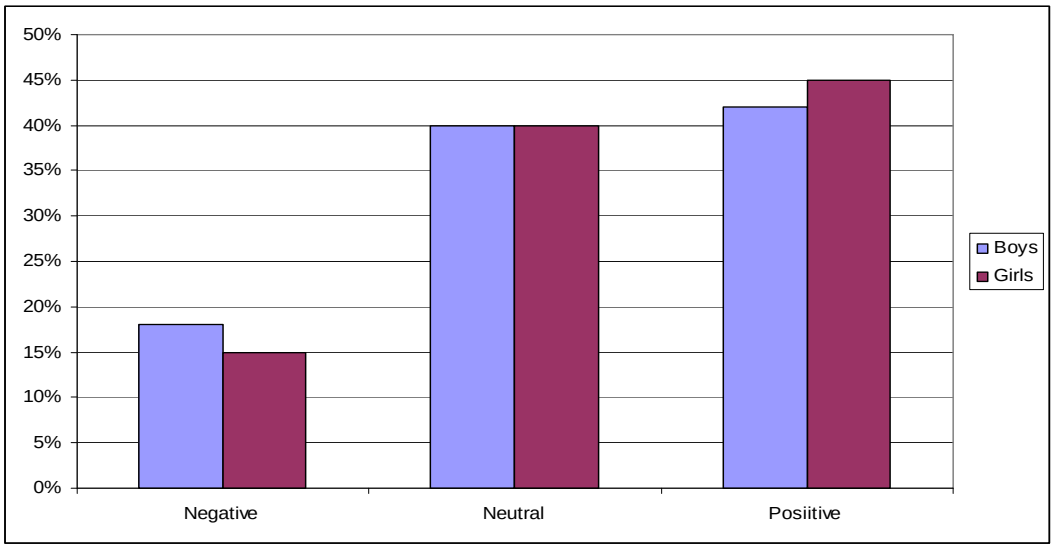


Figure 13: Affects of PA on IDCs – gender comparison of broad changes.

Results in Figure 13 show that not all students had an improvement in IDCs during observations where PA occurred prior.

Out of the 28 boys and 20 girls in the study, five boys and three girls had an increase in IDCs after PA, 11 boys and eight girls showed no increase in IDCs after PA and 12 boys and nine girls showed a decrease in IDCs after PA.

Teacher Interviews

Results from the teacher interviews were analysed for themes. The following themes and results emerged.

Demographics

Teachers A, B and C were all female and all had a minimum seven years teaching experience.

Causes of Inappropriate Behaviour

All teachers agreed that their lessons need to have a variety of activities to prevent boredom amongst students. It was suggested by the teachers that this boredom usually brought on unsettled behaviour.

Time of Day

All teachers believed that students in their classes are most settled at the start of the day. Teacher A believed that students in her class were mainly unsettled directly before lunch. Teacher C believed students in her class were most unsettled toward the end of the day. Teacher B had mixed thoughts and said that student unsettled behaviour varied from day to day.

Behaviour Management Styles

All teachers implemented a team reward system which they all believed improves student behaviour. The team reward system worked by giving student teams points for doing the right thing. The team that had the most points at the end of the week gained a reward such as free playtime.

Teachers B and C implemented similar behaviour management systems where behaviour is managed using warnings and consequences.

In contrast, teacher A has chosen not to adopt this style of behaviour management and rather treats students individually and manages students as she feels is needed.

When teachers were asked whether they notice changes in behaviour from their students in the classroom after they have been active, responses varied. Results from the interviews revealed teacher views on PA and its affects on subsequent in-class student behaviour. Teacher A believed PA improved students in-class behaviour, teacher B was not convinced that PA improved or disrupted in-class behaviour, and teacher C believed that PA certainly disrupted student in-class behaviour.

Teacher A reported that students were able to settle, focus and concentrate more effectively in class after being active compared to when students have not been active. When asked what the ideal time would be to have PA during the day, teacher A responded “between recess and lunch”. When asked why, teacher A replied

“because this session requires a high level of concentration. The break would help them get through English.” Teacher A believes PA prevents unsettled in-class behaviour.

Teacher B reported that student in-class behaviour varies from day to day and there is no noticeable constant. When asked what the ideal time would be to have PA during the day, teacher B responded “just before lunch or just after lunch.” When asked why, teacher B said before lunch because “the students need a break by then” and after lunch because “it’s not convenient to have it at the start of the day as this is prime learning time.” Teacher B believes PA sometimes promotes unsettled behaviour in class and sometimes prevents unsettled behaviour in class.

Teacher C reported that after lunch, recess and school sport, students are generally unsettled in class. When asked what the ideal time would be to have PA during the day, Teacher C responded by saying “at the very end of the day”. When asked why, teacher C said it was because students become “unsettled and chatty after sport”. Teacher C holds the view that PA promotes unsettled behaviour in class rather than prevents it.

Chapter 5

- Discussion –

Introduction

This study was undertaken with the intent of uncovering the effects of PA on student's subsequent behaviour whether it be a negative, neutral or a positive effect. The data collected was analysed for general effects of PA on students as well as comparing the effects of PA between genders and teacher attitudes. This chapter provides a brief overview of the limitations involved, discussion of findings of the research in relation to the question posed in Chapter 1 and implications for further study.

Limitations to the Study

Weather was an expected limitation during the study and varied throughout. During various observations weather changed where some days it rained, was windy, cloudy or sunny as well as variations in the temperature. Despite this variation in the weather, students continued to participate in PA (even if PA was performed undercover) before all observations which required PA influence.

Observation times varied to fit individual class schedules. However, although observation times varied amongst classes, times remained constant for each individual class. Observation sessions were scheduled for each class during the

same subject to increase credibility. Researchers ensured that observation sessions did not come after recess, lunch or other breaks and that PA was included consistently where required during the four week period.

All teachers encouraged their students to participate in a moderate intensity PA session of 30 minutes. Teachers could not force students to maintain a moderate PA standard and so there is the likelihood that students may have been exercising at different intensities.

Student Attitudes

It was evident from the results found in Figures 2 – 5 that the children in the study try to do the right thing, obey teachers instructions, enjoy PE and school sport as well as like to be involved in PA that makes them huff and puff. These findings suggest that the students in the study had high self-efficacy. According to Connor and Norman's (1995) study, this strong sense of self-efficacy may help these children have improved health, higher achievement and increased levels of social participation.

Responses for question five (Figure 6) were more spread than questions one to four with responses ranging from *Never, Sometimes, Most of the Time,* through to *Always.* It is thought that responses for question five were more evenly spread because of different external family influences. For a Year Two student to participate in PA or play sports outside of school they need not only their parent's permission but sometimes transport to and from the sport as well as monetary resources. Parents also want to be assured that the child's safety is accounted for.

Results for question five show that PA outside of school is not a priority for students who participated in the study. This result is in line with the Australian Institute of Health and Welfare's (2008) survey results that found 42 percent of children were not involved in any PA external to the school environment. The lack of involvement in external PA also supports research by ACHPER (2008) that shows children are spending more time playing computer games and watching television rather than engaging in PA.

Individual class responses for question six (Figure 7), *I concentrate better on my class work after doing sport,* were also spread amongst responses. This may in part be due to the students being too young to fully process this question and understand its implications. Marginally, the response *Most of the Time* resulted in being a majority amongst answers for this question which sits with Morgan and Hansen's (2008) findings that PA assists in student concentration.

Classroom Results and Thematic Trends

Comparison of IDCs, GDCs and total Disciplinary Corrections

The study revealed that there was a significant decrease in IDCs and GDCs during observations that followed PA where drops in IDCs and GDCs ranged from 40 percent to 59 percent (Figure 8). A drop in IDC and GDC was predicted by the researchers however the extent of the drop was significantly higher than expected when compared with the Mahar team (2006) findings on student on-task behaviour after classroom-based PA sessions. In the present study students' on-task behaviour increased by a mean 49 percent ($p = 0.012$) which compared with the Mahar team's findings of eight percent ($p < 0.017$) increase in on-task behaviour after PA. This significant increase indicates that by increasing the intensity and duration of PA there will be consequently a significant increase in student in-class on-task behaviour.

The breakdown of individual IDCs showed that not all students have a positive response to PA (Figure 9). This was to be expected with this heterogeneous sample of students as each child has different personalities. Interestingly there was only a small portion of students (16 %) that had a negative response to PA. A moderate number of students (40%) had a neutral response to PA and results conclude that 44 percent of students had an improvement in their on-task behaviour. This result concurs with the Grieco team's (2009) and the Mahar team's (2006) general findings on behaviour after PA as well as gives statistical evidence to Morgan and Hansen's (2008) reported teacher attitudes that students behave better after PA.

Researchers noticed that some students had a much higher number of IDCs for the observation period compared with other students for observations with and without PA influence. It is suspected that this has occurred for two reasons and the first can be seen in student attitudes toward PA that were exposed in student questionnaires. Figure 7 shows that 17 percent of students responded *Never* to question six *I concentrate better on my class work after doing sport,* and 16 percent of students were recorded in Figure 9 to have had a negative response to PA.

As well as student attitudes, high levels of IDCs also are believed to be the result of underlying undiagnosed behavioural problems suspected by teachers as revealed in teacher interviews. To further support the notion that increased IDCs after PA may be caused by underlying undiagnosed behavioural problems, it is noted that the student who was excluded from the results of the study also showed to have an increase in IDCs in observations after PA.

The student that consented to participate in the study but was discarded because of a diagnosed behavioural problem, showed significantly more recorded IDCs in all observations compared with the average observed student. This student significantly decreased on-task behaviour in observations after PA compared to observations where PA had not occurred. From data gathered on this student (but discarded from results), researchers can draw conclusions that that students with higher IDCs and students that had a decrease in on-task behaviour after PA may perhaps have undiagnosed behavioural problems.

In relation to individual classroom results for IDCs, GDCs and total disciplinary corrections, results show different levels of disciplinary results with and without PA for each individual class. Researchers speculate that it may be possible that the results of Class A, B and C correspond with the attitudes of the individual class teachers.

Class A showed to have a significantly lower total disciplinary correction rate (total 68) compared with classes B (102) and C (110). Interestingly the teacher of Class A expressed during teacher interviews that she believes PA prevents unsettled behaviour and uses PA to combat classroom off task behaviour. Furthermore, the teacher of Class C had the highest rate of disciplinary corrections compared with classes A and B. It is also of interest that the teacher of Class C expressed a negative view on PA's affects and believes that PA promotes unsettled behaviour. Finally Class B had more disciplinary corrections than Class A but marginally less than Class C (Figure 11). Data collected from teacher interviews noted that Class C teacher held the view that PA sometimes promotes unsettled behaviour and sometimes prevents unsettled behaviour. By comparing individual results of classes A, B and C it appears that there may be a relationship between teacher attitudes toward PA along with its effects on behaviour and the number of total disciplinary corrections. The attitude of the teacher toward PA influences student behaviour. Teachers from classes A, B and C all reported that they try to incorporate a variety of activities into lessons to prevent boredom. However, it is probable that the teacher who believes PA has a positive affect on behaviour may incorporate more PA activities into lessons which consequently decrease IDCs and GDCs on a whole.

In terms of improvement, Class A and Class C both had total disciplinary corrections decrease by 32 corrections for observations after PA. This however, translates as Class A having a 47 percent improvement in behaviour, and Class C a 29 percent improvement in behaviour. It should be noted however that even though Class C had the most disciplinary corrections, it also shared the same numeric improvement rate with Class A for disciplinary corrections where PA fell prior to observations. Results showed that Class B had the lowest improvement rate on disciplinary corrections where there was PA prior to observations with an improvement of 28 disciplinary corrections overall (27 % improvement). These results suggest that PA has a positive effect on student behaviour despite the teacher's attitude however, the extent of the positive effect will be smaller where teacher attitudes are negative toward PA and its positive effects on behaviour. There are gaps in this area of research and further research regarding teacher attitudes toward PA and student behaviour would be needed to properly conclude with this suggestion.

Even though total IDCs and GDCs varied amongst classes, reduction in total IDCs and GDCs were comparative and all classes appeared to decrease IDCs and GDCs by 28 to 32 corrections. These findings show that PA has a positive widespread comparative affect on behaviour amongst the three Year Two classes. From these results it can be speculated that PA effectively improves on-task classroom behaviour despite a variation between teacher attitudes toward PA and positive behaviour, teaching styles, behaviour management styles and individual classroom environments.

Comparison of IDC Between Genders

Figure 12 shows that both boys and girls had an improvement in on-task behaviour where observations fell after a PA session. Notably it shows that boys accounted for more IDCs during observations with and without PA influences. The improvement in IDCs between boys and girls is almost comparable in regards to percentage of improvement where boys IDCs (where PA was prior observation) improved by 38 percent and girls IDCs (where PA was prior observation) improved by 44 percent.

When IDCs were compared between genders in (Figure 12), findings mirrored Rollins' (2003) research and notions were supported by Gilbert's (2002) study which expressed boys were more aggressive, had more nervous energy thus were more likely to be responsible for misbehaviour than girls.

Furthermore, Figure 13 shows that more boys had a negative improvement in behaviour after PA sessions than girls. The difference is only small (A negative improvement of 15% for girls and 18% for boys) but can be supported by Gilbert's (2002) findings that boys are more likely to be responsible for misbehaviour than girls. The three percent increase in negative behaviour for boys compared to girls is justified as Gilbert suggests that it is only natural for more boys to react negatively in any given situation.

Chapter 6

- Conclusions –

Summary and Conclusions

The current study only included a small sample size however the findings are significant and their implications may change the way that educators choose to address behaviour in the classroom environment.

In response to the research questions identified in Chapter 1, the following conclusions can be drawn:

1. *Does the impact of a moderate intensity PA session (30 minute duration) have a positive impact on subsequent classroom behaviour in Year Two students?*

The results found that when PA occurs before an in-class academic lesson, teachers can expect student in-class behaviour to improve by up to 49 percent. In-class observations found that there was an overall decrease in disciplinary corrections during observation periods after PA sessions ($p = 0.012$).

2. *Does the attitude of teachers toward PA affect student classroom behaviour and if so, to what degree?*

The study found that teacher attitudes toward PA influence the number of disciplinary corrections a student will receive in an in-class lesson following PA. The

teacher who believed that PA had a positive affect on student in-class behaviour had the most significant decrease in disciplinary corrections during observations after a PA. This teacher also had the lowest overall disciplinary corrections in all observations compared with the two teachers who had uncertain and negative attitudes toward PA's effects on behaviour.

Despite teacher attitudes toward PA and its behavioural implications, all classes showed a decrease in disciplinary corrections during observations after a PA session. The study results suggest that PA will have a positive affect on student behaviour despite a teachers' attitude however, the extent of the positive effect will be smaller where teacher attitudes are uncertain or negative toward PA and its positive effects on behaviour.

3. *Is there a difference in the classroom behaviour of boys to girls following a PA session?*

The study revealed that both boys and girls improved in on-task classroom behaviour where observations were done after a PA session. Rates of disciplinary corrections for boys and girls with and without PA prior were similar however boys had a slightly lower improvement rate in observations post PA.

Practical Implications

Revealed from the findings of the study are the following practical implications that may be relevant in an educational setting:

- When teachers schedule PA before an in-class academic lesson, they may expect to see a significant improvement in student on-task behaviour.

- Teacher programs can be adjusted to allow for a PA break in the middle session of the day to encourage student in-class on-task behaviour.

- Teachers should adjust their attitudes toward PA and its positive effects if they wish to increase the positive influence that it has on students' subsequent classroom behaviour.

- Curriculum planning administrators should consider providing schools with a flexible curriculum that allows teachers to incorporate PA sessions on a daily basis so that on-task classroom behaviour is improved.

- Students should not be deprived of the right to have PA and teachers should not exclude students from PA as a form of behavioural punishment as it is likely to serve as a corrective medium for the students' in-class on-task behaviour.

Future Directions

There are several questions that arise from the results of this study, some of which have been mentioned in the discussion chapter. Many of these questions may perhaps be addressed by performing a study similar in design to the current one, but of a larger degree. A study such as this may provide a better perspective on how teacher attitudes toward PA affect in-class on-task student behaviour amongst other things.

Other interesting questions that arise from the study include:

If the intensity and duration of a PA session is increased, will it result in on-task behaviour that exceeds the 49 percent level of improvement found in the current study? Is there a point at which PA ceases to positively impact on-task behaviour and could too much PA have an undesired effect on student behaviour? It would be interesting to find the ideal intensity and duration that will provide students and teachers with the highest level of student in-class on-task behaviour.

PA showed to aggravate student behaviour for some students a few of which were suspected by the class teacher to have behavioural problems. One issue which could be addressed in much more depth would be the effect that PA has on specific diagnosed behavioural problems. Does PA adversely affect different behaviourally diagnosed students or was it incidental that the one behaviourally diagnosed student in the study had more disciplinary corrections following a PA session?

Finally, further research on the effect that PA has on gender and on-task behaviour is needed. Would boys and girls have comparative improvements in behaviour after PA similar to the current study or would a bigger sample size show results to be different? Also, students of varying ages could be studied to determine whether age would alter the impact that PA has on subsequent classroom behaviour.

There is undoubtedly potential for further research exploring the nature of behaviour, PA and the relationship between the two. Further studies would provide more insight into how PA can be manipulated to provide positive outcomes in an educational environment.

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Appendix I

Appendix I:

a) **Information Letter - Parents**

b) **Invitation to Participate - Parents**

c) **Consent Form – Parents**

d) **Information Letter - Teacher**

e) **Invitation to Participate - Teacher**

f) **Consent Form - Teacher**

INFORMATION STATEMENT TO PARENTS/GUARDIANS

RESEARCH TITLE:

The impact of a moderate physical activity session on Year 2 students' subsequent classroom behaviour.

RESEARCHERS' NAMES:

Principal Investigator:	Claire Beer
Supervisor:	Wendi Herman

Your child is invited to participate in a research project that examines the relationship between physical activity (PA) and behaviour in the school setting. To help us improve our understanding of the impact that PA has on a child's subsequent behaviour a sample of students and staff of Avondale Primary School will be surveyed and observed. This project is being conducted by an education honours student from Avondale College.

PURPOSE OF THE PROJECT

The purpose of this study is to research the impact that physical activity has on a child's classroom behaviour.

PARTICIPATION CRITERIA

Participants invited to partake in the study will be:

- 64 students and their teachers from three of the Year Two classes.

WHAT PARTICIPATION INVOLVES

The students' and teachers' class routine and schedule will not be interrupted or changed. Data for this study will be collected by way of observation. The researcher will sit in an inconspicuous place in the classroom and record in written form both the teacher's verbal corrections and the children's response. Following these observations the students will complete a short questionnaire.

POSSIBLE RISKS OR INCONVENIENCES

We are required to notify you of possible risks and inconveniences should you agree for your child to take part in the research. We believe the only inconvenience will be the student completing the 10 minute questionnaire. The classroom teacher has made arrangements for this to occur during normal class time.

BENEFITS

Although there are only minor direct benefits to your child participating in the research, the main benefit of the research will be to inform educators about the relationship between PA and behaviour which could positively influence the future of successful education. Administrators and teachers can use the information gathered to improve their programming.

CONFIDENTIALITY AND DISCLOSURE INFORMATION

Data collected from your child during the research will remain within the confidence of the researchers. Reports will not identify individual teachers, children (or schools). Data will be kept secure within a locker in the classroom of the Principal Investigator at Avondale College and stored for five years after completion of the study.

DISSEMINATION OF RESULTS

The data collected will be presented in a thesis for the researcher's honour's program. In addition it may be used for scholarly journals and professional conferences. Confidentiality of individual participants and organisations will be assured. In any publication, information will be provided in such a way that your child cannot be identified. The school will be sent a summary of the final results.

FREEDOM OF CONSENT

Your child's participation in this study is voluntary and there is no payment to subjects for their participation. Please note that the students are free to choose not to take part in this research and you may withdraw your child at any time without providing a reason. Withdrawing will not disadvantage your child.

Any questions about the above information can be obtained by contacting

Claire Beer at Avondale College, PO Box19, Cooranbong, NSW, 2265

Phone: 0405458218 or email S073733@avondale.edu.au

This research project has been approved by the Avondale College Human Research Ethics Committee (HREC). Avondale College requires that all participants are informed that if they have any complaint concerning the manner in which a research project is conducted it may be given to the researcher, or if an independent person is preferred, to the College's HREC Secretary, Avondale College, PO Box19, Cooranbong, NSW, 2265 or phone (02) 4980 2121 or fax (02) 4980 2117 or email: research.ethics@avondale.edu.au

INVITATION TO PARTICIPATE IN RESEARCH

May 17, 2010

Dear Parents,

A research study is under way in which we are looking at the relationship between physical activity and behaviour. In order to learn more about this we are asking Avondale Primary Year Two students and their teachers to partake in this research study. Both students and teachers will be observed in their normal routine for one hour a week for the duration of 4 weeks. As well as student and teacher observations, students will complete a questionnaire and teachers will participate in a semi-structured interview.

Enclosed you will find a letter explaining the research to be conducted and two consent forms for you and your child to sign.

If you agree to your child participating in this project and have spoken to your child and they agree, please sign both copies of the consent form and have your child sign the bottom portion. Please retain one copy for your records and have your child return the other **Consent Form** to their classroom teacher by **Friday, May 21**, **2010**

Please note that you can withdraw your child at any time and any information will be held in strict confidence and will only be accessed by the researcher.

Thank you,

Claire Beer

(Avondale College Honours Student)

Parent/Guardian Consent Form

RESEARCH TITLE: The impact of a moderate physical activity session on Year 2 students' subsequent classroom behaviour.

RESEARCHER'S NAME: Claire Beer

I agree for my child _____ to participate in the above research project and give my consent freely.

I have read and understood the information provided in the Information Statement.

I understand that the project will be conducted as described in the Information Statement, a copy of which I have been given to keep.

I understand I can withdraw my child from the project at any time and do not have to give any reason for withdrawing.

The procedures required for the study and the time involved have been explained to me in the information letter. I have been given the opportunity to ask questions and have had them answered to my satisfaction.

I understand that my child's personal information will remain confidential to the researcher/s.

Print Name: _____

Signature:_____ Date: _____

Student Consent Form

I, _____ agree to participate in the project (on physical activity and behaviour) that Mrs Beer and my classroom teacher has told me about.

I have had the project explained to me and I understand what is going to happen in the study.

I understand that the project will be conducted as described in the Information Statement, a copy of which has been given to my parent to keep.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I have had the opportunity to ask questions and have had them answered to my satisfaction.

I understand that my personal information will remain confidential to the researcher/s.

Print Name: _____

Signature: _____ Date: _____

INFORMATION STATEMENT TO THE TEACHER

RESEARCH TITLE:

The impact of a moderate physical activity session on Year 2 students' subsequent classroom behaviour.

RESEARCHERS' NAMES:

Principal Investigator:	Claire Beer
Supervisors:	Wendi Herman

You are invited to participate in a research project that examines the relationship between physical activity (PA) and behaviour in the school setting. To help us improve our understanding of the impact that PA has on a child's subsequent behaviour, a sample of students and staff of Avondale Primary School will be surveyed and observed. This project is being conducted by an education honours student from Avondale College.

PURPOSE OF THE PROJECT

The purpose of this study is to research the impact that physical activity has on a child's behaviour.

PARTICIPATION CRITERIA

Participants invited to partake in the study will be:

- 64 students and their teachers from three of the Year Two classes.

WHAT PARTICIPATION INVOLVES

It is hoped that your class routine and schedule will not be interrupted or changed. Data for this study will be collected by way of interview, observation and questionnaire. The researcher will sit in an inconspicuous place in the classroom and record both your verbal corrections and the children's response. The students will complete a short questionnaire at a convenient designated time by you. You will be asked to participate in a short (15- 30 minute) semi-structured interview at your convenience.

POSSIBLE RISKS OR INCONVENIENCES

We are required to notify you of possible risks and inconveniences should you agree to take part in the research. We believe the only inconvenience will be the time needed to participate in the interview.

BENEFITS

Although there are only minor direct benefits to you participating in the research, the main benefit of the research will be to inform educators about the relationship between PA and behaviour, which could positively influence the future of successful education. Administrators and teachers can use the information gathered to improve their programming.

CONFIDENTIALITY AND DISCLOSURE INFORMATION

Data collected from you during the research will remain within the confidence of the researcher/s. Reports will not identify individual teachers, children or school. Paper copies of any results (including questionnaires) will be kept in a locked cupboard in the locked research room of the Education Faculty. During the course of the data collection, analysis and writing, the electronic data will be stored on a password protected computer as an encrypted file. After the completion of the study and thesis, all data will be transferred to the care of the supervisor and will reside in a locked cupboard in the staff research room. All data will be destroyed after 5 years.

The data collected will be presented in a thesis for the researcher's honours program. In addition it may be used for scholarly journals and professional conferences. Confidentiality of individual participants and organisations will be assured. In any publication, information will be provided in such a way that your child cannot be identified. The school will be sent a summary of the final results.

FREEDOM OF CONSENT

Your participation in this study is voluntary and there is no payment to subjects for your participation. Please note that you are free to choose not to take part in this research and you may withdraw at any time without providing a reason. Withdrawing will not disadvantage you.

Any questions about the above information can be obtained by contacting

Claire Beer at Avondale College, PO Box19, Cooranbong, NSW, 2265

Phone: 0405458218 or email S073733@avondale.edu.au

This research project has been approved by the Avondale College Human Research Ethics Committee (HREC). Avondale College requires that all participants are informed that if they have any complaint concerning the manner in which a research project is conducted it may be given to the researcher, or if an independent person is preferred, to the College's HREC Secretary, Avondale College, PO Box19, Cooranbong, NSW, 2265 or phone (02) 4980 2121 or fax (02) 4980 2117 or email: research.ethics@avondale.edu.au

INVITATION TO PARTICIPATE IN RESEARCH

May 17, 2010

Dear Staff,

A research study is under way in which we are looking at the relationship between physical activity and behaviour. In order to learn more about this we are asking Avondale Primary Year Two students and their teachers to partake in this research study. Both students and teachers will be observed in their normal routine for one hour a week for the duration of 4 weeks. As well as student and teacher observations, students will complete a questionnaire and teachers will participate in a semi-structured interview.

Enclosed you will find a letter explaining the research to be conducted and two consent forms for you to sign.

If you agree to participate in this project, please sign both copies of the consent form. Please retain one copy for your records and return the other **Consent Form** to Mrs Ruth Webster by **Friday, May 21, 2010**. Staff who are willing to consent will be interviewed within the next two weeks.

Please note that you can withdraw at any time and any information will be held in strict confidence and will only be accessed by the researcher.

Thank you,

Claire Beer

(Avondale College Honours Student)

Staff Consent Form

RESEARCH TITLE: The impact of a moderate physical activity session on Year 2 students' subsequent classroom behaviour.

RESEARCHER: Claire Beer

I, _____ agree to participate in the above research project and give my consent freely.

I have read and understood the information provided in the Information Statement.

I understand that the project will be conducted as described in the Information Statement, a copy of which has been given to me to keep.

I understand I can withdraw from the project at any time and do not have to give any reason for withdrawing.

The procedures required for the project and the time involved have been explained to me. I have had the opportunity to ask questions and have had them answered to my satisfaction.

I consent to participate in a 15-30 minute interview at which time the researcher will take written notes of my responses.

Print Name: _____

Signature: _____ Date: _____

Appendix II

Appendix II: Student Questionnaire

Name: _____ Date:_____

Student Questionnaire

Please answer the following questions by <u>colouring in</u> the circle that is next to your answer.



1. **I behave well:**

○	○	○	○
Never	Sometimes	Most of the time	Always

2. **I do what the teacher says:**

○	○	○	○
Never	Sometimes	Most of the time	Always

3. **I look forward to PE and school sport:**

○	○	○	○
Never	Sometimes	Most of the time	Always

4. I like to play activities that make me huff and puff.

○	○	○	○
Never	Sometimes	Most of the time	Always

5. I am physically active or play sport outside of school.

○	○	○	○
Never	Sometimes	Most of the time	Always

6. I concentrate better on my class work after doing sport.

○	○	○	○
Never	Sometimes	Most of the time	Always



Appendix III

Appendix III: Teacher Interview

Teacher Interview

(complete before 4 week observation)

Date:

Teacher:

Grade:

1. How many years have you been teaching?

2. What do you find are some of the causes of students acting inappropriately?

3. Which of these causes would you consider to be the most predominant?

4. What parts of the day do you find the students are most likely to act inappropriately?

5. What time of day do you find students are best behaved?

6. Are there specific students in your class who will act inappropriately more than others and if so is there a reason?

7. What do you do when students act inappropriately?

8. What helps students to change their behaviour and act appropriately?

9. Do you notice any changes in behaviour from the students in your class after they have been active, wether it be from recess/ lunch or scheduled PA (e.g. PE and sport), if so what?

10. Has this been your experience with previous classes?

11. If you could choose an ideal time during the day to have scheduled PA, what would it be and why?

12. Would you ever consider implementing short breaks of PA into school days to combat student fatigue and inappropriate behaviour?

Appendix IV

Appendix IV:

g) **Student Observation Chart**

h) **Student Observation Table**

Observation of Lesson with no PA Influences – Class A Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC			
Time	0 Min	10 Min	20 Min 30 Min
IDC			

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Observation of Lesson with PA Influences – Class A Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC			
Time	0 Min	10 Min	20 Min 30 Min
IDC			

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Observation of Lesson with no PA Influences – Class B Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC	I I I I I I I I I	I I I I I I I I I	I I I I I I I I I
Time	0 Min	10 Min	20 Min 30 Min
IDC	I I I I I I I I I	I I I I I I I I I	I I I I I I I I I

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Observation of Lesson with PA Influences – Class B Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC			
Time	0 Min	10 Min	20 Min 30 Min
IDC			

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Observation of Lesson with no PA Influences – Class C Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC			
Time	0 Min	10 Min	20 Min 30 Min
IDC			

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Observation of Lesson with PA Influences – Class C Weather: _____

Date: _____ Lesson Observed: _____ Lesson Start/ Finish: _____-_____ Observation No. _____

GDC			
Time	0 Min	10 Min	20 Min 30 Min
IDC			

Key: GDC = General Disciplinary Correction IDC = GDC = Individual Disciplinary Correction Initial = Student Name

Class A – Student Observation Chart

❑ = Didn't Consent (8) - Excluded ❑ = Behavioural Condition (1) - Excluded

❑ = Consented (14) - Included

Class A Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
1.					1	3	1	1	2	4
2.									0	0
3.	1	1			1		1		2	2
4.	1	2		1	1				3	3
5.					1				1	0
6.									0	0
7.		1					1		1	1
8.									0	0
9.	2					2		1	2	3
10.	1							1	1	1
11.			2		2	1	2		6	1
12.	1							1	1	1
13.					1				1	0
14.					3			1	3	1
15.									0	0
16.					1				1	0
17.					1			1	1	1
18.									0	0
19.									0	0
20.					1				1	0
21.			1			1	1		2	1
22.									0	0
23.	2								2	0

Class A Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
Total GDCs over 8 Observations	8	0	7	1	4	1	3	1	22	3
Total IDCs over 8 Observations									28	15

Class B (DV) – Student Observation Chart

❑ = Didn't Consent (2) - Excluded

❑ = Consented (19) - Included

Class B Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
1.	2	1	3						5	1
2.					4				4	0
3.	2				1		3	2	6	2
4.						1			0	1
5.		1						1	0	2
6.	1			1					1	1
7.	1								1	0
8.									0	0
9.						1			0	1
10.									0	0
11.									0	0
12.		1							0	1
13.			2	1				3	2	4
14.									0	0
15.	1								1	0
16.	2		1	1		1	2	1	5	3
17.			1						1	0
18.									0	0
19.		1	1					1	1	2
20.									0	0
21.									0	0

Class B Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
Total GDCs over 8 Observations	11	4	13	4	9	6	5	5	38	19
Total IDCs over 8 Observations									27	18

Class C – Student Observation Chart

❑ = Didn't Consent (5) - Excluded

❑ = Consented (15) - Included

Class C Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
1.	1			2	1		1		3	2
2.									0	0
3.									0	0
4.	1	1					1		2	1
5.	2			1	1	4	2		5	5
6.					1		2		3	0
7.									0	0
8.	1	2			2	1	2	1	5	4
9.			1						1	0
10.	2	5	1			2	3	1	6	8
11.								1	0	1
12.			2				1	1	3	1
13.									0	0
14.	2			1					2	1
15.		1	1		2		1		4	1
16.							1		1	0
17.	1		1				1		3	0
18.			1						1	0
19.			1						1	0
20.									0	0

Class C Student	No PA 1	PA 1	No PA 2	PA 2	No PA 3	PA 3	No PA 4	PA 4	No Prior PA Total	PA Prior Total
Total GDCs over 8 Observations	7	3	7	4	10	4	7	4	31	15
Total IDCs over 8 Observations									40	24