

The impact of physical education and sport on education outcomes: a review of literature

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1.0 Summary

- well-controlled longitudinal studies generally support cross-sectional research, suggesting that academic achievement is maintained or enhanced by increased physical education, physical activity or sport
- when a substantial proportion of curricular time (up to an extra hour per day) is allocated to physical education, physical activity or sport, learning seems to proceed more rapidly per unit of classroom time
- A positive relationship exists between physical activity and cognition with primary and middle-school age children gaining the most benefit in terms of enhanced cognitive function
- Perceptual skills, attention and concentration are all improved by a bout of physical activity, but perceptual skills seem to benefit the most from prior exercise
- There are no differences between the acute and chronic effects of physical activity on cognition so it is unclear if there are any additional benefits of a longitudinal programme or whether children simply benefit from each bout of exercise undertaken
- Prior exercise may be beneficial for cognitive function in both the morning and the afternoon as studies have shown an improvement in adolescents' performance on visual search and attention tests in the morning and on children's performance in mathematics after an afternoon walk
- Further research is needed to establish the optimal intensity and duration for cognitive stimulation in young people

- As little as 10 minutes of additional organised physical activity in or outside the classroom implemented into the school day improves classroom behaviour, and consequently may enhance academic performance
- The addition of break times when physical activity is undertaken improves classroom behaviour and consequently may enhance academic performance
- There is a positive association between physical activity and several components of mental health, including self-esteem, emotive well-being, spirituality and future expectations all of which may impact on academic achievement
- Physical activity has a positive impact on anxiety, depression, mood, and wellbeing, all of which may impact on academic achievement
- Young individuals who participate in organised sport demonstrate lower rates of anti-social behaviour which may result in less disaffection from school
- Large cross-sectional studies have shown a positive relationship between participation in sports programmes and school attendance and between physical fitness and school attendance
- In the UK the nationwide School Sports Partnership programme has shown a positive impact on attendance
- To impact on whole school attendance, physical education and school sport programmes should be innovative, engage the whole school in daily or weekly activity programmes and, importantly, be fully integrated within a multi-dimensional school aim of improving attendance, increasing attainment, and changing attitudes to learning

- physical education, physical activity and sport have been shown to impact positively on the extent to which young people feel connected to their school; the aspirations of young people; the extent to which positive social behaviours exist within school; and the development of leadership and citizenship skills

2.0 Introduction

The time allocated to physical education in the majority of western schools has declined over the last decade, with a consequent increase in time allocation for other academic subjects (Hillman et al., 2008). Budget restraints and pressure to meet academic targets have caused schools to cut back on physical education, with the aim of improving academic performance. There was even a perception amongst key decision makers that time spent on non-academic pursuits might impact negatively on academic achievement (Lidner, 2002). However, advocates of school-based physical activity have suggested that physical education, physical activity and sport may contribute to the enhancement of academic performance either directly or through the achievement of wider social outcomes which, in turn, may impact on academic achievement.

One area of recent current interest has been whether or not participation in sport and other forms of physical activity can enhance cognitive function, including memory and concentration. Large, all encompassing reviews examining this relationship between physical activity and learning behaviour have suggested that school children may indeed derive cognitive benefits from participation in physical activity including sport (Sibley and Etnier, 2003; Tomporowski, 2003b). Associated with these cognitive benefits it has been suggested that physical education, physical activity and sport may enhance classroom behaviour contributing to the enhanced academic achievement of pupils (Mahar et al., 2006).

Furthermore, it has been suggested that physical education, physical activity and sport have the potential to impact on school attendance (Long et al., 2002) which in turn could impact on academic achievement. For example, there is a strong relationship between attendance and exam performance, even after prior attainment is taken into account and significant relationships have been identified between attendance and skill acquisition, knowledge and

understanding, behaviour, personal development, relationships, parents' views on the school and also pupils' attitudes to school (Schagen, 1996).

Finally it has been argued that the potential psychological and social benefits of physical education, physical activity and sport may indirectly enhance academic performance by enhancing mental health, improving feelings of feelings connectedness with school and by enhancing positive social behaviours (Trudeau and Shephard, 2008, 2010).

The purpose of the this review is to examine the impact of physical education and sport on academic achievement and on those wider social outcomes which might impact on academic achievement and other aspects of school performance. For young people sport forms a major component of physical activity and therefore those studies which have examined physical activity in the broadest sense are included in the review. The review includes academic peer-reviewed journal articles and other sources of information such as published reports.

3.0 The impact of physical education, physical activity and sport on academic achievement

A recent thorough review (Martin 2010)¹ examining the literature relating to 'physical activity, fitness and academic achievement' provided the following key points:

- The large majority of university-based, internationally published research in this field has found a positive association between children's physical activity participation and academic achievement
- A two year physical activity intervention led to significant improvements in children's maths scores (Hollar et al., 2010)
- Academic achievement of children in a case study group (who received extra physical education) was significantly higher than children who were in a control group (who did not receive extra physical education) in a second year follow-up (Shephard et al., 1994)
- Greater vigorous physical activity out of school resulted in higher test scores (Coe et al., 2006)
- Physical activity was a significant positive predictor of academic achievement. Body mass index, diet and physical activity explained up to 24% of the variance in academic achievement after controlling for gender, parental education, family structure and absenteeism (Sigfusdottir et al., 2006)
- There was a significant positive link between physical activity participation and academic performance (Lidner, 2002)
- Higher physical fitness, physical capacity and physical activity were associated with higher rating of scholastic ability (Dwyer et al., 2001)
- Students who reported a great level of exercise spent more time in sport and achieved higher grade point averages (Field, 2001)

¹ Not yet published in an academic peer-reviewed journal

- Children can spend less time in academic learning and more time being physically active during the school day without affecting academic success or progress (Coe et al., 2006; Ahamed et al., 2007; Dwyer et al., 1979; Dollman et al., 2006; Sallis et al., 1999, Shephard, 1997).
- Some intervention research indicates that increased participation in physical activity leads to enhanced learning and better grades (Hollar et al., 2010; Shephard et al., 1994)
- A threshold amount of physical activity may be necessary to acquire learning benefits (Davis et al., 2007)
- Participation in vigorous physical activity may enhance learning (Coe et al., 2006)
- Some studies have failed to find a relationship between physical activity and learning (Fisher et al. 1996, Tomporowski, 1986) and one study has identified the relationship only for girls (Carlson et al. 2008).

This is a thorough review and highlights the strengths and limitations of the studies cited. One of the limitations of many of the studies is the failure to control substantial influencing variables such as socioeconomic status, which is the strongest predictor of academic achievement (Willms, 2003). It is thought that socioeconomic status is a leading influence of academic achievement due to the increasing opportunities and environments provided for learning with higher levels of socioeconomic status. However, one recent North American study on public school children has shown that the relationship between fitness and academic achievement remained significant after controlling for both socioeconomic status and race/ethnicity (Chomitz et al., 2009). Furthermore, as cited in the review by Martin et al. (2010) the relationship between physical activity and academic achievement was still evident after parental education had been controlled for (Sigfusdottir et al., 2006).

A further problem with the majority of the literature concerning physical education, physical activity and sport in school and academic performance is the use of cross-sectional designs. It cannot therefore be suggested that any observed relationships between physical education, physical activity, sport and academic achievement are causally related. Therefore, the remainder of this section has a focus on longitudinal intervention studies, several of which have been well-controlled.

Several key longitudinal studies have used physical education as an intervention, whilst monitoring its impact on academic achievement. The Vanves study in France (Fourestier, 1996), the Trois Rivieres study in Quebec (Shephard & Lavallee, 1994), and project SPARK in California (Sallis et al., 1999) all reported no decline in youth academic performance as a result of an additional 60 minutes per day (on average) allocated to physical education. Australia's SHAPE study (Dwyer et al., 1983) implemented an additional 42 minutes per day (on average) of physical activity per week and found no significant differences in academic achievement after the intervention. Despite this, a promising 2-year follow-up on the SHAPE project found that intervention schools had in fact developed an advantage in arithmetic and reading scores over control schools (Shephard, 1997) as summarised in the Martin (2010) review. Collectively, these studies suggest no decline, or an improvement in academic achievement with additional physical education, even when this replaced academic subject lesson time.

Some of these longitudinal studies are subject to methodological limitations however. For example, the SHAPE (Dwyer et al., 1983) and SPARK (Sallis et al., 1999) studies failed to randomise participants to intervention and control groups and the SHAPE study academic test results were also subject to possible bias from subjective grading by teachers. Additionally, the Vanves study (Fourestier, 1996) could not attribute the results entirely to additional physical activity as nutritional supplements were also administered as part of the intervention.

The following longitudinal studies appear to have been well-controlled:

In the **Trois Rivières** study (Shephard & Lavallee, 1994) primary school students in an experimental group were subjected to an additional hour of physical education each day compared to a control group, who received a single period of 40 minutes non-specialist education. The additional physical education in the experimental group was provided by a specialist educator, and as a consequence the experimental group received 14% less academic instruction than the control group. Academic performance was provided as a mean of annual scores obtained in French, English, maths, science, and overall conduct. Results showed that girls gained a larger academic advantage than boys from the additional physical education provided in the experimental group. Children in the experimental group had significantly higher academic performance than controls in grades 2-6.

Project SPARK (Sallis et al, 1999)

For elementary school children, spending more time in physical education did not have harmful effects on academic achievement when measured using a standardised test. The 2-year follow-up of the physical education program showed pupils in the experimental group did significantly better in achievement tests when compared to controls.

SHAPE (Dwyer et al.,1983)

A total of 519 ten year old south Australian school children took part in The School Health Academic Performance and Exercise (SHAPE) study, which involved 45-60 minutes of additional physical education each day. The findings from the study indicated health benefits from daily physical activity. There was no evidence of any loss of academic achievement, measured by arithmetic and reading tests, despite less time dedicated to classroom teaching.

Ahamed et al., (2007)

In this study 50 minutes of additional physical activity per week (i.e. 10 minutes per school day) was administered to children in grades 4 and 5 at intervention schools. After 16 months the results of a standard academic test did not significantly differ between intervention and control schools, despite the intervention group losing academic lesson time ($P < 0.05$) (Ahamed et al., 2007). Ten minutes per day of additional physical activity may not have been long enough to elicit any academic benefits, but it is sufficient to provide health advantages to the children (WHO, 2010). The study is widely applicable as a simple intervention, as it was designed to supplement the existing Canadian curriculum, and was conducted by generalist teachers who received additional training and resources.

Coe et al., (2006)

In American middle school children, Coe et al. (2006) found that academic achievement was not related to enrolment in physical education, but interestingly it was associated with the total amount of vigorous activity performed by the children. Subsequent analysis of a 55 minute physical education class revealed that only 19 minutes of this time was spent in moderate to vigorous activity, and it was suggested that this was not sufficient vigorous activity to impact on academic achievement. It could be that a threshold activity level is required to positively influence academic achievement (Shephard, 1996).

From analysing these longitudinal physical education interventions, it has been suggested that As a result, academic performance matches or exceeds that of controls. Children receiving additional physical education appear to show accelerated psychomotor development, which could provide a mechanism for accelerated learning of academic skills.

Thus in summary:

- well-controlled longitudinal studies generally support cross-sectional research, suggesting that academic achievement is maintained or enhanced by increased physical education, physical activity or sport
- when a substantial proportion of curricular time (up to an extra hour per day) is allocated to physical education, physical activity or sport, learning seems to proceed more rapidly per unit of classroom time

4.0 The impact of PE, physical activity and sport on cognitive function.

There is an extensive literature concerning the effect of single bouts of physical activity on cognitive function in young people and some studies examining the longitudinal (or chronic) impact of undertaking extra physical activity over or example a few months on cognitive function. It is important to include such information in this review as each physical education lesson or sport activity represents a bout of physical activity which might impact on learning on that day and indeed over a period of time. Cognitive function is often examined using computer tests and may include tests of memory, attention, perceptual skills and occasionally in longitudinal, studies IQ tests.

Three meta-analyses (statistical analysis of several earlier studies) have previously been conducted on physical activity and its influence on cognitive processes in youth. Etnier et al. (1997) investigated the effect of long-term and acute exercise on cognition, resulting in an overall effect size of 0.25 when reviewing 134 studies (in this case effect size refers to the impact of physical activity on cognition with 0.2, 0.5 and 0.8 respectively referring to a low, medium and high impact on cognition). They concluded that physical activity has a small, positive effect on various aspects of cognition. However, the authors did notice that as the experiments became more tightly controlled, the effect sizes consequently decreased (less of a positive effect).

In 2003, Sibley and Etnier published a further meta-analysis on the relationship between physical activity and cognition in children, due to a resurgence of study and interest in the area. The authors reviewed 44 studies, and found an overall effect size of 0.32. The largest relationship between physical activity and cognition was found in middle- school and young elementary children (effect size=0.40). The authors concluded that there was a significant, positive relationship between physical activity and cognition. The positive effects were task dependent, with the largest effect sizes found on perceptual skills (effect size=0.49) and IQ (effect size=0.34). No difference was found between acute or chronic interventions. Of particular interest, the

study claimed that unpublished studies had a larger effect size than published work, indicating that no bias had occurred against the publication of non-significant results. However, only 9 of the studies used were reported in peer-reviewed journals and many used questionable methodology (Tompsonski et al, 2008).

Most recently, a comprehensive review by Tomporowski et al. (2008) was conducted regarding exercise and cognition in youth, finding that systematic exercise programmes may enhance the development of specific types of mental processing which are considered important for both academic achievement and for cognitive function across an individual's entire lifespan.

Despite such large scale reviews, few intervention studies have been conducted where a physical activity programme is integrated into the school day, and its effect on cognition is monitored. As highlighted by Trudeau & Shephard (2010), a common assumption made in review papers is that different physical activity forms provide similar stimuli for the learning process, though realistically this seems unlikely. Key studies in the area of physical activity and behaviour for learning are therefore individually reviewed below.

Trois-Rivieres (Shephard, 1997)

A total of 546 Canadian primary school children participated in a quasi-experimental study, where the impact of an additional hour each day of vigorous physical education, taught by a professional instructor was investigated. The control groups were from classes immediately above and below the experimental group, whom received 40 minutes per week of physical education from their academic teacher. Despite the experimental group receiving 14% less academic instruction, their academic performance significantly increased relative to controls. In the initial months of the intervention, the experimental group experienced accelerated development of various psychomotor skills such as perception, though control students caught up later into the study.

McNaughten and Gabbard (1993)

Immediate, short term responses to physical activity were monitored in 120 male and female, grade 6 school children. Participants walked for 20-40 minutes depending on the trial allocated, followed immediately by a 90 second maths computer test. This was carried out 3 times a day for 3 weeks. Improved mathematical performance was witnessed immediately following 20-40 minutes of afternoon walking, although no significant difference was noticed when performing the same intervention in the morning. This suggests that physical exertion may help to sustain appropriate cognitive functioning in the afternoon.

Budde et al. (2008)

This study showed that attention and concentration are enhanced following acute bouts of either coordinative exercise or normal sport lessons provided in physical education class in adolescent children. A total of 115 pupils aged 13–16 years of an elite performance school were randomly assigned to an experimental and a control group and were tested for attention and concentration. Both groups performed the attention and concentration test after a regular school lesson (pre-test) and then after either 10 minutes of coordinative exercise (experimental group), or following a normal sport lesson (control group). Concentration and attention task scores were higher following either coordinative exercise or a normal sport lesson, in comparison to following a regular school lesson. Larger test score improvements were observed in the coordinative exercise group in comparison to the normal sport lesson group, though heart rate was similar in both groups. The authors suggested that the coordinative component of the exercise may explain the significant performance differences. Coordinative exercise may activate parts of the brain responsible for attention and concentration.

Jarrett et al. (1998)

In this intervention study, a break-time period was introduced once a week at an American primary school which was normally opposed to such practice. A total of 44 boys and girls were their own controls on non-break-time days, and were assessed in classroom behaviour areas of working, fidgeting and

listlessness. Over half (60%) of the participants (including those with attention deficit disorder) benefitted considerably, working more, fidgeting less, or both, on break-time days. The authors suggested that the break-time period serves a positive purpose in the primary school curriculum, contrary to the practice of minimising recess in many schools across North America and the UK.

Hillman et al. (2009)

This study examined the impact of 20 minutes of treadmill walking at 60% maximum heart rate, followed by cognitive testing, on 20 preadolescent children. The results showed an improvement in response accuracy and academic achievement on the exercise trial relative to a resting control trial. The findings indicated that single, acute bouts of moderately-intense aerobic exercise (i.e., walking) may improve the cognitive control of attention in preadolescent children, and further supports the use of moderate acute exercise as a contributing factor for increasing attention and academic performance. However, there was no increase in arithmetic performance following exercise.

Caterino and Polak (1999)

This experimental study investigated the effects of directed physical education activities and classroom activities on concentration levels of second, third, and fourth grade children. The physical activities group performed 15 minutes of walking and stretching in the gymnasium before completing a concentration test. The classroom activities group went straight from class to take the concentration test. The authors discovered that children in grade 4 experienced an immediate increase in concentration following 15 minutes of directed physical activity, whilst no detrimental effects were observed on the remainder of experimental participants from grades 2 and 3. It was suggested that the absence of improvement in grades 2 and 3 may indicate that development is a factor in concentration ability, and that the type of physical activity may influence the effect on concentration levels.

Cooper et al. (2010)

A total of 45 British adolescent school children performed visual search and attention tests before and after 10 min of jogging/walking exercise at an average heart rate of 172 beats.min⁻¹. At 60 minutes after the exercise intervention the response times were faster after the exercise intervention, but the effect on accuracy was equivocal.

The mechanism by which exercise may improve cognitive function is possibly increased blood flow to, and greater arousal of, the brain (Shephard, 1997). The brain may also benefit indirectly from physical activity due to time away from study, providing boredom relief and consequentially higher attention levels when returning to classroom instruction.

As a review on exercise and child cognition by Tomporowski et al (2008) highlights, several experiments provide evidence to suggest that physical activity induces specific, not global, effects on children's cognitive function. Not all areas of cognitive processing experience improvement with physical activity, but the literature certainly indicates that physical activity can positively impact on both specific cognitive processes (perceptual skills, concentration, response time) and general learning behaviour (fidgeting, disruptive behaviour). There is no evidence to suggest any negative effects on learning behaviour from conducting physical activity beforehand. However, further research is needed to establish the optimal intensity and duration for cognitive stimulation in young people.

Thus in summary:

- A positive relationship exists between physical activity and cognition with primary and middle-school age children gaining the most benefit in terms of enhanced cognitive function
- Perceptual skills, attention and concentration are all improved by a bout of physical activity, but perceptual skills seem to benefit the most from prior exercise
- There are no differences between the acute and chronic effects of physical activity on cognition so it is unclear if there are any additional benefits of a longitudinal programme or whether children simply benefit from each bout of exercise undertaken
- Prior exercise may be beneficial for cognitive function in both the morning and the afternoon as studies have shown an improvement in adolescents' performance on visual search and attention tests in the morning and on children's performance in mathematics after an afternoon walk
- Further research is needed to establish the optimal intensity and duration for cognitive stimulation in young people.

5.0 The impact of physical education, physical activity and sport on classroom behaviours that may impact on academic achievement.

Physical activity has a positive effect on classroom behaviour according to the data presented in extensive reviews on the topic (Strong et al., 2005; Trudeau & Shephard, 2008). According to several authors, young people undertaking additional physical activity during the school day generally demonstrate increased brain function, improved self-esteem and better behaviour (Cocke, 2002; Tremblay et al., 2000; Shephard, 1997).

Three longitudinal intervention studies from France (Fourestier et al, 1996), Australia (Dwyer et al., 1983) and Canada (Shephard & Lavalee, 1994) on schoolchildren were consistent in showing that when the amount of time dedicated to physical activity was increased, the teachers reported better behaviour and higher motivation in pupils towards their academic work.

However, the teacher assessments and behavioural opinions collected from such studies may partly reflect teacher attitudes towards the intervention. For example, in the Trois Rivières study which increased time dedicated to physical education at the expense of academic instruction, 80% of the teaching staff were in favour of the activity programme, with the remainder holding a neutral point of view (Shephard, 1997). Whilst teachers suggested that the activity programme substantially improved behaviour, objective class reports did not support the teacher suggestions.

Some of the stronger studies in the field are listed below:

SHAPE study (Dwyer et al., 1983)

In South Australia, 500 pupils participated in the SHAPE trial, which added 1.25 hours of endurance fitness training each day to the school programme for 10-year olds. The control group continued the normal curriculum receiving academic instruction whilst the experimental group participated in training. A two year follow-up indicated beneficial effects on teachers' ratings of classroom behaviour in the experimental group relative to controls.

The Qualifications and Curriculum Authority survey into the effects of physical education and school sport (2001)

This UK-based study reported (as a result of survey findings) that physical education and school sport had made successful contributions to behavioural improvements and that negative behaviour and exclusions were on the decline. This trend was identified as a direct consequence of more structured and purposeful active break-times and opportunities to practice skills linked to the physical education curriculum.

BSkyB's 'Living for Sport' programme (Armour et al., 2008) This programme consisted of a physical activity and sport programme developed to target pupils displaying poor class behaviour and other characteristics such as disaffection from school. Following the intervention pupils' attitudes and behaviour had improved in school-life.

The 'class moves' initiative' (Lowden et al., 2001)

Small, classroom based interventions can also have an effect on classroom behaviour. The 'class moves!' initiative demonstrated that physical activities designed to promote relaxation increased not only class behaviour but concentration and focus (Lowden et al., 2001).

Mahar et al. (2006)

This unique physical activity programme was both simple and effective at improving school behaviour, therefore creating both physiological and psychological advantages for the participants. A 12 week classroom-based physical activity intervention with the primary aim of monitoring the resultant on-task behaviour during academic instruction was conducted on 243 children. The intervention group was subjected to 'energisers', short classroom-based physical activities lasting 10 minutes and consisting of grade appropriate learning resources. This enabled children to increase daily physical activity whilst still under academic instruction. The energisers required no equipment and little preparation. On-task behaviour generally improved following the energisers (improvement in on-task behaviour by 8%

compared to pre-energisers, $P=0.017$), though the most disruptive children showed even greater behavioural improvements (20% increase post-energiser activity). The intervention group also took more in-school steps (assessed via pedometer). In this study children remained in the classroom, but performed physical activity combined with academic work, which also increased on-task behaviour (by up to 20%), suggesting it is not the environment, but the physical movement which promotes the on-task behaviour.

Barros et al. (2009)

The amount and duration of breaks from academic study varies widely between schools in both the UK and North America. A large cross-sectional study of over 10,000 U.S children aged between 8 and 9 years old examined each pupil's rating of classroom behaviour (as assigned by their teacher) and the amount of recess permitted by the school they attended. Classroom behaviour scores were higher for children with recess in comparison to those with either no breaks or minimal breaks. However, a dose response effect was not observed for those experiencing various recess durations. Socioeconomic status was also associated with behaviour, with lower SES individuals having lower classroom behaviour scores. Those who received no recess were much more likely to be from lower socio-economic backgrounds which limits the significance of the findings of the study.

Pellegrini & Davis, 1993; Pellegrini et al., 1995; Jarrett et al., 1998

Several studies have shown that student's on-task and classroom behaviour was superior following a period of recess (break). Similarly children became more fidgety and inattentive on days when recess was not permitted or was delayed and after the recess period, students were more attentive and less fidgety. Despite such research being conducted on individual schools and limited sample sizes, the coherence of findings suggests that recess may play a part in increasing class behaviour. In Pellegrini & Davis (1993) and Pellegrini et al (1995) however, children involved with the studies were accustomed to having recess and so the anticipation caused by delaying recess may lead to increases in fidgeting and inattentiveness. In contrast,

similar positive findings were observed by Jarrett et al. (1998) in a school which did not include recess during the school day except during the intervention. Thus, being confined to a classroom for continuous instruction appears to lead to an inattentive state and less efficient work.

Thus in summary the weight of available evidence would suggest that:

- As little as 10 minutes of additional organised physical activity in or outside the classroom implemented into the school day improves classroom behaviour, and consequently may enhance academic performance
- The addition of break times when physical activity is undertaken improves classroom behaviour and consequently may enhance academic performance.

6.0 The impact of physical education, physical activity and sport on psychological and social benefits which may impact on academic achievement.

Mental health including self-esteem and confidence

The US National Longitudinal Study of Adolescent Health reported a positive association between physical activity and several components of mental health, including self-esteem, emotive well-being, spirituality, and future expectations (Trudeau & Shephard, 2010). Similarly it has been stated that the positive impacts of physical activity on anxiety, depression, mood, and wellbeing are not disputed (Tomporowski, 2003a).

Regular physical activity in adolescents is significantly related to a favourable self-image, in addition to physical and psychological well-being (Kirkcaldy et al., 2002). A study on German adolescents observed lower anxiety and depression scores, as well as less social behavioural inhibition, than their less active peers. The significant relationship between physical activity and self-image also remains after controlling for socioeconomic status (Tremblay et al., 2000).

There is a wealth of literature to suggest that physical activity is significantly related to increased self-esteem and speculated 'knock-on' effects of this are benefits in all aspects of school life, including improved classroom behaviour and academic performance (Shephard, 1996). The influence of physical activity on self-esteem may be influenced by the activity mode undertaken, although positive cognitive behavioural modifications have been observed across aerobics, strength, dance, and flexibility activities (Strong et al., 2005). One recent well-controlled study has shown improvements in self-esteem following running activities in girls (DeBate et al. 2009). Psychosocial and behavioural changes amongst girls participating in two developmentally focused youth sport programmes were assessed. Girls in grades three to eight participated in 'Girls on the Run' and 'Girls on Track'. The programmes aimed to increase physical activity during the greatest age-related activity

decline, whilst also addressing gender barriers. The programmes resulted in beneficial increases in global and specific self-esteem, enhanced satisfaction with body image, and increased physical activity frequency and commitment.

It is of particular interest that increased self-esteem is often thought to provide the impetus to participate in physical activity and sport, and that low-self esteem is often a key barrier preventing participation. Thus, development and inclusion orientated interventions shown to increase self-esteem could be the trigger for increasing youth engagement in physical activity. Conducting such interventions in schools means that little effort is required for pupils to become involved (compared to specialist, out of school clubs), and could provide the catalyst for the cyclical trend of increased self-esteem leading to increased participation. Further longitudinal research is required to firmly establish this concept however, as cross-sectional studies which observe high-exercise groups with lower levels of depression and high self-esteem cannot ascertain the direction of such a relationship (Field et al, 2001; Tremblay et al, 2000).

There is evidence that taking part in sport and physical activity programmes can improve confidence. It was reported by Jeanes et al. (2009) in relation to the Cricket Foundation Chance to Shine programme that:

- Teachers reported that girls who would not normally have participated in team sports or extra-curricular activity were now regular attendees at the girls cricket club, explaining it had given some girls the opportunity to "find something they are good at and hadn't realised."

- The value of the cricket sessions for improving girls' confidence was notable. Asian girls discussed being reluctant to take part in sport previously, but due to the cricket sessions being structured and delivered in a way that helped them negate previous barriers they had overcome their lack of confidence and were now extremely enthusiastic and motivated about playing. Many of the girls spoken to discussed how playing cricket had helped them overcome restrictive gender beliefs about their capabilities and in doing so had gained confidence in other aspects of school.

Anti-social behaviours

A report by the World Health Organisation (Jones-Palm & Palm, 2004) found that young individuals who participate in organised sport demonstrate lower rates of anti-social behaviour and teenage pregnancy. Furthermore, they are less likely to smoke cigarettes or use drugs than non-sports participants. Similar intoxication findings emerged from a behavioural investigation survey of 1000 German adolescents, which found a strong association between sports participation and resistance to drug and alcohol addiction (Kirkcaldy et al, 2002). Lower rates of anti-social behaviour are likely to result in lower disaffection from school and thus enhanced academic performance.

Thus in summary:

- There is a positive association between physical activity and several components of mental health, including self-esteem, emotive well-being, spirituality, and future expectations
- Physical activity has a positive impact on anxiety, depression, mood, and wellbeing
- Young individuals who participate in organised sport demonstrate lower rates of anti-social behaviour

7.0. Impact of physical education, physical activity and sport on school attendance.

Although there are problems with the way in which absenteeism is defined including the use of authorised absence or not and in the length of absence recorded (Atkinson et al, 2000) there is sufficient consistency in the literature to draw some valuable conclusions regarding the effect of physical education and sport on attendance.

A recent literature review of school-based interventions has suggested that 'sport and physical activities' are able, to some degree, to facilitate personal and social development in some disaffected young people under some circumstances' (Sandford et al., 2006). By providing target groups with social capital through physical activity it may therefore indirectly enhance school attendance. School connectedness and school satisfaction, two outcomes linked with successful school sport and physical education programmes, are known to prevent drop-out from school (Libbey, 2004) and some studies have already shown positive improvements in attendance and personal development following the introduction of sports schemes (Long et al., 2002).

Some of the stronger studies examining the relationship between sports participation and attendance at school are out-lined below:

Melnick et al. (1992)

Sports participation was associated with a lower drop-out rate from school in a study of 3,686 African-American and Hispanic students, although no relationship between academic attainment and sports participation was observed. This study supported the suggestion that school connectedness encouraged retention (Melnick et al., 1992).

Maryland Adolescent Development in Context Study (Hawkins and Mulkey, 2005)

This longitudinal study included 67% African-Americans and 33% European-Americans and found that sports participation resulted in a reduction in absenteeism from school, but only in females.

Welk (2009)

A total of 2.4 million Texas students in grades 3-12 took part in a series of Fitnessgram® tests during 2007-2008. One of the outcomes from the data analysis was that higher physical fitness achievement was associated with better school attendance rates. Of particular note is that this key finding remained true after controlling for potential confounding variables including socio-economic status, ethnicity and school size.

McKenzie et al. (2004)

This two-year intervention study involving a physical education curriculum change showed a small increase in moderate and vigorous physical activity over control subjects, but no effects on enjoyment of PE or attendance in classes according to follow-up student surveys. However, the authors suggested that in the particular school used, the baseline levels for enjoyment of PE and attendance were particularly high, leaving little room for improvement.

Houlihan et al. (2009)

The School Sport Partnership (SSP) programme initiative in England was central to the Labour governments Physical Education, School Sport and Club Links national strategy, which set out to address participation, inclusion, and coherence between sporting opportunities. Joining this partnership meant additional funding was provided each year so the school could increase sporting opportunities for all. The vast majority of English schools participated in the programme and the impact of the scheme was assessed by the Loughborough partnership (2009).

Key findings included:

- 48% of head teachers reported that school attendance had improved 'slightly' or 'markedly' since their school had become involved in the SSP with most of the remainder reporting no change (45%).
- Case studies indicated the programme caused an increased motivation to attend school amongst pupils, giving them opportunities and events to look forward to through increasing PE and sport/extra-curricular activities.
- Attendance data in one school which increased curriculum PE and sport increased from 89.9% in 2000/1 to 94.2% in 2005/6. In another case study school where a swimming pool was constructed 42% of children self-reported that they were more on time for school, while staff commented in a further case study example that the introduction of a morning activity programme had resulted in better punctuality and attendance from pupils.
- Head teachers and school staff felt that SSP activities had enhanced motivation for school, particularly amongst target groups.
- 57% of head teachers reported that the School Sport Partnership programme had had a 'slight' or 'substantial' positive impact on attendance in their school
- Overall increasing PE and school sport appeared to be an effective strategy for improving attendance, especially where it was part of a wider package aimed at whole school change.

The study concluded that: to impact whole school attendance, physical education and school sport programmes should be innovative, engage the whole school in daily or weekly activity programmes and, importantly, be fully integrated within a multi-dimensional school aim of improving attendance, increasing attainment, and changing attitudes to learning.

Chance to Shine programme (Jeanes et al., 2009)

This school-based programme supported by the Cricket Foundation aimed to provide greater access to cricket at an all-inclusive level. An external, well qualified coach would come into the school every week to teach cricket to the children. Beyond the obvious impact on PE provision in schools, responses from a pupil survey indicated that significantly more pupils looked forward to school and enjoyed attending when 'Chance to Shine' was taking place than when it was not (53% and 36% looking forward to school respectively).

Youth Sport Trust/BSkyB 'Living for Sport' (Armour et al., 2007)

School attendance increased from 89.6% to 92.6% in the 35 schools taking part in the programme that provided baseline and end-of-project attendance data.

Thus in **summary**:

- large cross-sectional studies have shown a positive relationship between participation in sports programmes and school attendance and between physical fitness and school attendance
- In the UK the nationwide School Sports Partnership programme has had a positive impact on attendance
- To impact whole school attendance, physical education and school sport programmes should be innovative, engage the whole school in daily or weekly activity programmes and, importantly, be fully integrated within a multi-dimensional school aim of improving attendance, increasing attainment, and changing attitudes to learning

8.0 Impact of physical education, physical activity and sport on wider social outcomes which may impact on academic achievement.

The World Health Organisation (WHO, 2010) suggests that physical activity participation assists social development of young people by promoting self-expression, social interaction, and social integration. They further suggest that physically active youth more readily adopt other healthy behaviours such as avoidance of drugs and cigarettes. This section of the report examines the extent to which physical education, physical activity and sport can impact on:

- the extent to which young people feel connected to their school,
- the aspirations of young people
- the extent to which positive social behaviours exist within school
- volunteering and the development of leadership and citizenship skills

School connectedness

School connectedness and satisfaction have been postulated as determinants of academic achievement, regardless of ethnic group (Trudeau & Shephard, 2008). Furthermore, such positive associations with the school help to prevent drop-out according to a review of student-school relationships by Libbey (2004). Regular physical activity or sport has been previously associated with increased school connectedness and satisfaction (Brown and Evans, 2002), which may therefore suggest that regular physical activity or sport also helps to prevent drop-out. From the limited literature in this area however, the evidence is not so straightforward. A questionnaire administered to 245 Finnish adolescents observed no association between physical activity levels and school satisfaction (Katja et al., 2002). Despite this, the same study found that physical activity was correlated with global satisfaction, with school dissatisfaction appearing as one of the strongest predictors for global dissatisfaction amongst girls. The authors therefore highlighted the importance of positive attitudes towards school life. A more recent study

showed that whilst students participating in extracurricular physical activities did not achieve academic scores any different to their peers, they did feel a greater engagement with their institution. It was suggested this may be due to greater attention directed towards such children, and the increased amount of interactions with significant adults that extracurricular physical activities entails (Trudeau & Shephard, 2008).

Aspirations of young people

Marsh and Kleitman (2003) examined the effects of athletic participation on growth and change during high school by using data from the National Education Longitudinal Study database. They found that school sport participation benefitted academic grades, educational aspirations, self-esteem, college applications and enrolment, and such trends were consistent for participants throughout their high school years. The authors suggested that participation in sport promoted identification with the school, and a commitment to school-related values which consequently benefit both academic and non-academic outcomes. Nelson & Gordon-Larsen's work (2006) analysing data from the National Longitudinal Study of Adolescent Health also found positive associations between physical activity and several components of mental health including well-being, future expectations, and academic achievement.

Positive social behaviours in school

Long-standing beliefs suggest that engagement in physical education and sport fosters desirable pro-social behaviours. In the UK, government policies have significantly increased funding towards physical activity in schools, with the hope that such avenues can be used to reduce anti-social behaviours and develop well-rounded young citizens. It has been suggested that sport and physical activity might be an ideal vehicle for engaging the most vulnerable young people in society (Sport England, 1999).

Some authors believe that physical education is an appropriate environment for socio-moral development (Miller et al, 1997) and for developing responsibility (Wild, 2002). Effective activities to promote positive social

benefits range from basketball (Hawkins, 1998) to outdoor adventure activities (Priest & Gass, 1997). The skills such activities are believed to develop appear infinite according to published research, and include self-esteem (Nichols, 1997), team-building skills (Priest & Gass, 1997), communication skills (Priest & Gass, 1997) and a sense of community (Ennis, 1999).

Well researched examples of successful models are 'Sport Education' (Siedentop, 1994), and 'Teaching Personal and Social Responsibility' (Hellison, 1995). Using structured games and situations, Sport Education encourages the development of several key characteristics such as physical and organisational skills, fair play, self-responsibility and respect for others (Sandford et al, 2006). Teaching Personal and Social Responsibility, on the other hand, is based on the teaching of constructive principles associated with personal and social well-being.

However, researchers assessing the social impacts of physical activity are clear that physical education and sport programmes do not carry 'miracle cures' for what are actually entrenched, multi-dimensional social problems (Sandford et al, 2006). Further, differentiating views about the social value of physical activity interventions are rife amongst researchers, largely due to a lack of systematic and credible research into their effectiveness (Nichols, 1997; Long & Sanderson, 2001; Morris et al., 2003). As a result, few programmes have achieved the difficult task of identifying a clear and sustainable positive impact upon youth behaviour which is attributed directly to the physical activity intervention.

According to Sandford (2006), for socio-moral development through physical activity:

- The focus must be clearly on teaching life skills through them (Danish, 2002)
- The relationships between individuals are conducive to promoting a positive social environment (Shields & Bredemeier, 1995)
- The young people feel personally empowered (Coakley, 2002)
- The intervention is considered in relation to other areas of young people's lives (Cameron & MacDougall, 2000)
- Or the activities are specifically tailored to the needs of the individuals involved (Andrews & Andrews, 2003)

Thus, the development of a pro-social school ethos requires a more holistic, multi-dimensional approach in which physical activity may be one aspect (Macquarrie et al, 2008; Miller et al, 1997). Sport appears to be most effective when combined with programmes that seek to address wider personal and social development (Collins, 2002). Future programmes need to be sustainable after the intervention period, with an increased focus on the legacy of an intervention.

Example of successful initiatives are the Youth Sport Trust/BSkyB 'Living for Sport' and HSBC/Outward Bound projects, which have involved over 7,000 young people and which appear to provide support for the positive outcomes of physical activity programmes. Common findings were that the projects facilitate positive personal and social development, improving behaviour, confidence, and developing communication and leadership skills (Sandford et al, 2004). Additionally, attendance, engagement in lessons, relationships with teachers and peers were all improved and have more crucially been sustained.

Volunteering and the development of leadership and citizenship skills

A number of studies have examined the potential impact of volunteering in sport on wider social outcomes. Although the reported impact on young people is overwhelmingly positive, one limitation is that young people of higher socio-economic status and white ethnicity do tend to be the ones most likely to volunteer (Coalter, 2007).

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Millennium Volunteers (Eley et al., 2001)

This was a nation-wide government initiative to encourage citizenship in young people by providing volunteering opportunities in the community. A sub-sample of the initiative focused on young sport leaders (n= 306) across England who were assessed on their motives and attitudes to volunteer work, and their perceptions of leadership skills over 9 months. Leadership skills and volunteer motivations increased while the importance of, and attraction to, volunteering also changed over time (i.e. good citizenship). The study highlighted the advantage of using sport and volunteering for encouraging pro-social behaviour and citizenship, resulting in a positive impact on the volunteer.

Step into Sport (Bradbury and Kay 2009)

This study took the form of a secondary analysis of data collected through the monitoring and evaluation programme for the Step into Sport Volunteer Training Programme. The project had two key components. Firstly, it offered five programmes for young people aged 14-19 years, providing progressive training and experience in sports leadership and volunteering: Sport Education, Level One Sports Leadership, Top Link, Level Two Community Sports Leadership and Community Volunteering. The programmes were facilitated by physical education (PE) teachers in schools within the national school sports partnership framework with the support of the Youth Sport Trust and Sports Leaders UK. Secondly, the project involves the development of capacity building networks involving School Sports Partnerships, local

authorities, county sports partnerships, national governing bodies of sports and Sport England, to help strengthen local sports infrastructure and provide high quality volunteer placement opportunities for young volunteers. The programme thus addresses both personal development and skill development, and provides opportunities for social connectedness in a distinctly sports environment.

The programme enhanced confidence and leadership skills and generated all-round individual and community benefits:

“My confidence has gone up loads and loads. I used to be really nervous about planning a session and now it just seems like nothing. I don’t get nervous at all anymore and I’m not worried about speaking in front of big groups of people, I just get on with it now whereas before I wouldn’t even speak in front of two people!”

(Female, age 20)

“I really enjoyed volunteering at my placement, as there was such a variety in abilities, attitudes and activities. I was forever kept on my toes and always learning something new. My leadership skills and confidence have grown enormously in all areas and not just in the sporting environment. Step into Sport has given me the chance to grow as an individual whilst doing something good for the community.”

(Female, age 20)

British Council Dreams and Teams Project Young Leaders Programme

(Eley, 2003)

Young leaders from the UK, Egypt, South Africa and Columbia took part in the project. Questionnaires about leadership, culture and other nations involved in the project were administered prior and post- leadership training. The questionnaires assessed any the impact of the training course and interviews were used to verify trends. The young leaders from the UK appeared considerably more naïve about the world around them prior to training, and

their cultural awareness greatly increased by the end of the project. Increased awareness, responsibility, and inclusion issues and an overall better understanding of leadership and the qualities required were all positive outcomes from the study.

Thus **in summary**:

- physical education, physical activity and sport have been shown to impact positively on the extent to which young people feel connected to their school; the aspirations of young people; the extent to which positive social behaviours exist within school; and the development of leadership and citizenship skills

9.0 Reference List

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