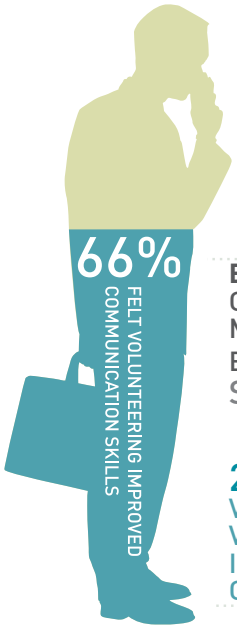
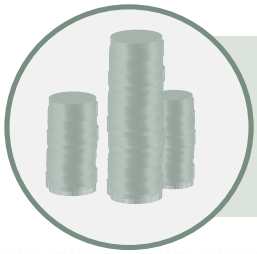
PHYSICAL ACTIVITY, EMPLOYMENT & EDUCATION





30 MINUTES 3 X A WEEK COULD TRANSLATE TO
C.7.5%
INCREASE IN EARNINGS

EMPLOYERS IDENTIFY COMMUNICATION AS THE MOST IMPORTANT SKILL FOR EMPLOYMENT (AVERAGE SCORE OF 8.8 OUT OF 10)

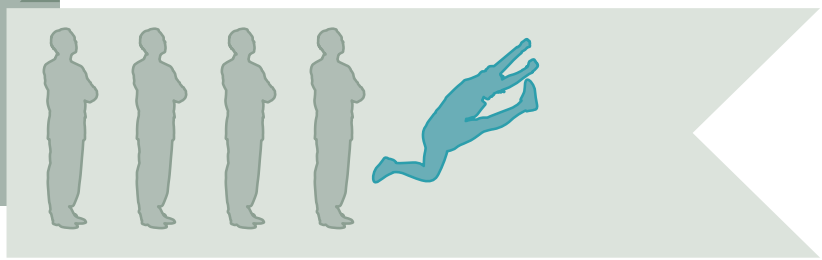
2 IN 3 EMPLOYEES WHO VOLUNTEER (66%) FELT VOLUNTEERING HAD IMPROVED THEIR COMMUNICATION SKILLS

1 IN 10
16-18 YEAR OLDS = NEET

AVERAGE COST IN PUBLIC FINANCING PER NEET OVER A LIFETIME
= £56,000

80%
EMPLOYERS VALUE VOLUNTEERING ON A CV
AND
9 IN 10 (87%)
EMPLOYERS BELIEVE THAT VOLUNTEERING CAN HAVE A POSITIVE EFFECT ON CAREER PROGRESSION

THE AVERAGE SPORTS CLUB HAS
20 VOLUNTEERS.
OF THE **23.7%** OF ADULTS IN ENGLAND WHO VOLUNTEER
1 IN 5 VOLUNTEER IN SPORTS AND RECREATION.



EMPLOYERS AREN'T SATISFIED WITH THE SKILLS OF SCHOOL/COLLEGE LEAVERS:

- EMPLOYERS NOT SATISFIED WITH GRADUATES' SELF-MANAGEMENT SKILLS — **61%**
- EMPLOYERS NOT SATISFIED WITH GRADUATES' PROBLEM SOLVING SKILLS — **46%**
- EMPLOYERS NOT SATISFIED WITH GRADUATES' TEAM-WORK SKILLS — **32%**

CHILDHOOD MEMBERSHIP OF A SPORTS CLUB INCREASES LIKELIHOOD OF BEING ACTIVE AS AN ADULT

AGE 14

20 MINUTES
SPORTS AND RECREATION
ONCE A DAY

EDUCATION AND YOUTH PARTICIPATION IN SPORTS AND RECREATION A+

PHYSICAL ACTIVITY POSITIVELY EFFECTS COGNITION IN CHILDREN.

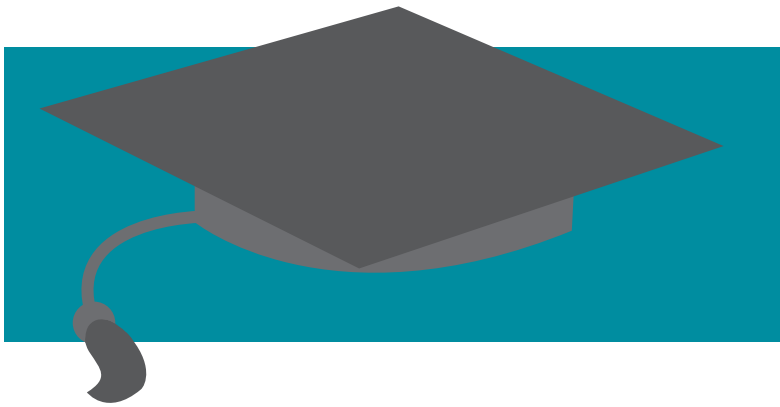
BEING PHYSICALLY ACTIVE RELEASES HORMONES, NEUROTRANSMITTERS AND A PROTEIN RESPONSIBLE FOR LEARNING, MEMORY AND HIGHER THINKING.

SPORT AND RECREATION CAN ALSO LEAD TO INCREASED SELF-ESTEEM AND THE DEVELOPMENT OF MOTIVATION AND DETERMINATION - THESE SKILLS ARE USEFUL FOR ACQUIRING NEW INFORMATION FOR PASSING EXAMS.

AGE 31

MEN:
4 X MORE LIKELY TO PARTICIPATE IN SPORT AND RECREATION FOR **20 MINUTES 4 X A WEEK +**

WOMEN:
3 X MORE LIKELY TO PARTICIPATE IN SPORT AND RECREATION FOR **20 MINUTES 4 X A WEEK +**



PHYSICAL ACTIVITY, EDUCATION AND EMPLOYMENT

EDUCATION: INTRODUCTION

Education is compulsory for children aged five to 16 in the UK and is essential for tackling poverty and social exclusion. Basic educational attainment will help in finding well paid employment in adulthood, but the children of those in poverty are less likely to reach this level, thus contributing to intergenerational poverty (New Policy Institute, 2011). In addition, leaving school without qualifications doubles the likelihood of depression as young adults. At age 23, men without qualifications have a 7% chance of being depressed compared to a 3% chance in all men, whilst women at this age without qualifications have a 17% chance compared to a 9% chance amongst all women (London School of Economics, 2007).

In 2010/11 58% of pupils achieved five or more A* to C grade GCSEs or equivalent, including maths and English (Department for Education, 2012a), meaning that two in five pupils are leaving school at 16 without five good GCSEs. This has contributed to disengagement amongst 16 to 18 year olds who leave school with no direction and minimal qualifications and find themselves not in employment, education or training (NEET). The first quarter of 2012 saw one in ten (9.8%) 16 to 18 year olds in England categorised as NEET (Department for Education, 2012b). In an economic climate where the rate of youth unemployment is 21.9% (Rhodes, 2012) and an average of 73 students are thought to be applying for every graduate position (Association of Graduate Recruiters, 2012), young people need to arm themselves with all the educational qualifications and training they can.

Being NEET seriously influences the long term life chances of individuals, reducing earnings over a lifetime and increasing the likelihood of mental illness and a criminal record. For example, over their lifetime, men who have experienced time as NEET are five times more likely to have a criminal record and three times more likely to have depression. Furthermore, the cost to society over a lifetime will be significant. It is estimated that each young person classed as NEET in 2008 will go on to cost an average of £56,000 in public finance costs (e.g. welfare payments, loss of tax, etc.) and £104,000 in opportunity costs (e.g. loss to the economy, welfare loss to individuals and their families, etc.). The total estimated lifetime costs for this cohort is more than £35 billion (Audit Commission, 2010).

The National Curriculum states that children should participate in PE but doesn't specify how many hours PE or out of hours school sport children should be taking part in. In the academic year 2009/2010, just over half (55%) of pupils in Years one to 13 participated in at least three hours of PE and out of hours school sport (Quick et al. 2010). Yet in addition to the physical and mental health benefits physical activity is proven to have, evidence also suggests that physical activity can benefit academic performance and behaviour in class. For example, a 12 week study with 243 schoolchildren aged nine-ten years old found that daily ten minute physical activity breaks significantly increased on-task behaviour by 8% on average, and that the average was a much higher 20% for the least on-task pupils, whilst those who took a ten minute break without being physically active demonstrated a 3% reduction in on-task behaviour (Mahar et al., 2006).

The brain is high in plasticity during childhood and adolescence as functions and structures change alongside individual development. It is not suggested that physical activity in itself can make children cleverer, but that physical activity releases hormones, neurotransmitters and a protein which are responsible for learning, memory and higher thinking. Physical activity also increases cellular components that (amongst other things) support the systems in the brain that are responsible for learning, decision making and memory. Increased physical activity can also lead to increased self-esteem as a result of better body image and accomplishing physical achievements. This can help children to develop motivation and determination, skills which are particularly useful in acquiring new information for passing exams.

IMPACT ON ACADEMIC ATTAINMENT

An association between school sports and academic achievement was first proposed in 1934 by Davis and Cooper. There is now a wide range of research into this relationship with the consensus that in the majority of instances physical activity enhances school performance and that where it has not been evidenced to do so, school performance has not suffered conversely. In considering the additional benefits of physical activity (such as physical and mental health) it is therefore still a worthwhile and beneficial inclusion to the curriculum. The most recent review of the evidence around physical activity levels and school performance focuses on ten observational studies and four intervention studies conducted between 1990 and 2010. These involved children aged between six and 18 with sample sizes varying from 53 to over 12,000 and durations of between eight weeks and five years. Singh et al. (2012) conclude that there is a positive relationship between participation in physical activity and academic performance in children but that many studies into this relationship are not of a high enough quality and that the dose-response relationship is not sufficiently understood.

An earlier meta-review of 14 studies conducted between 1967 and 2006 with a total sample of almost 60,000 students found that in 11 of the studies regularly participating in physical activity had a positive association with academic performance (Active Living Research, 2009). One study cited was carried in out in the United States in 2006 with almost 12,000 students and found that participation in PE and team sports at school or playing sports with parents was associated with a 20% increase in the likelihood of achieving an A* in maths or English when compared to sedentary peers (Ibid).

INCREASED PHYSICAL ACTIVITY CAN ALSO LEAD TO INCREASED SELF-ESTEEM

A cross sectional study of 1,820 Spanish adolescents (aged between 13 and 18.5 years old) measured cognitive performance and participation in leisure time physical activities. Verbal, numeric and reasoning abilities were tested to determine an overall cognitive performance score. Leisure time spent studying, watching television, playing video games and participating in physical sports were self-reported by participants at levels of not at all, three hours a day or less and more than three hours a day. Participants were also assessed for cardiorespiratory and muscular fitness and were categorised by weight (underweight, normal weight, overweight or obese). Ruiz et al. (2010) found that independent of potentially confounding variables (such as socioeconomic status), participating in physical activity was significantly associated with better cognitive performance, with an overall cognitive performance effect size of 0.32 (classed as a medium effect). Interestingly, this research found that neither fitness nor weight were related to cognitive performance, suggesting that the physiological processes related to the activity itself have more of an impact on ability to learn than overall fitness does. The researchers found that physical activity was the only leisure time activity to have an association with cognitive performance – even studying during leisure time wasn't seen to influence cognitive performance.

The study also found no relationship either way between participating in physical activity in leisure time and spending time studying, in that being active did not detract time from studies or make children more likely to spend time studying. However, it did find that being active lowered the odds ratio for watching television for three or more hours a day (odds ratio of 0.63 for those who participated in physical activity compared to a non-participant reference point of 1). This suggests that physical activity in adolescents can contribute to preventing the detrimental effects of time spent being sedentary.

Sedentary behaviour, rather than being the converse of physical activity, is time spent being largely inactive, such as sitting watching television or socialising with family. The negative effects of sedentary behaviour are thought to be independent of participation in physical activity and include an increased risk of type 2 diabetes, cardiovascular disease and mortality. It has been argued that childhood is a key time for targeting and reducing sedentary behaviour given that evidence shows sedentary behaviour patterns to be fairly stable over time during childhood and adolescence. Children in England aged between four and seven spend a total of between six and seven hours a day sedentary, and this increases to between eight and nine hours at age 12 to 15 (British Heart Foundation, 2012). Given that it is possible for someone to spend high levels of time being both physically active and sedentary, the relationship found by Ruiz et al. (2010) is encouraging as it indicates that amongst adolescents physical activity precludes sedentary behaviour. Not only could physical activity interventions increase educational attainment amongst young people, there is also the potential that they could help to establish good habits for reduced sedentary behaviour, which would be beneficial over a lifetime.

In fact, longitudinal and cohort studies have found that participation in sport and recreation at school age influences levels of physical activity as adults. A Finnish sample of 7,794 men and women was surveyed at age 14 and 31 to understand the type, intensity and duration of physical activity they participated in. Tammelin et al. (2003) then classified respondents into one of four activity level groups defined as very active, active, moderately active and inactive. The very active group was characterised by brisk exercise for a minimum of 20 minutes four times a week or more, whilst the active group exercised at the same level on two to three occasions a week. Moderately active participants were those who were active once a week at a brisk level, or more often than once a week but for less than 20 minutes at a time, or in light physical activity on four or more occasions, whilst the inactive group participated in brisk activity less than once a week and light activity less than four times a week.

The researchers found that in comparison to those who participated in activity less than once a week at age 14, men who were physically active at least twice a week at this age and women who were active at least once a week were more likely to be active or very active at age 31. Men who were physically active every day at aged 14 were around four times as likely to be very active at age 31 compared to the least active, and women almost three times as likely. Interestingly, membership of a sports club as a child increased the likelihood of continuing to be active as adults amongst this sample. This was also found by Kjønniksen, Anderssen and Wold (2008) in their smaller study based in Norway. The researchers conducted a longitudinal study over ten years with a final sample of 630 people, assessing activity levels and engagement with physical activity eight times between the ages of 13 and 23. They too found that levels of organised physical activity in childhood positively influenced participation in leisure time physical activity as a young adult and that membership of a sports club, the age of initial involvement in physical activity and the duration of involvement in physical activity as a child influenced activity levels as a young adult, concluding that membership of organised youth sports at an early age continued through adolescence increased the likelihood of being physically active at age 23.

Taras (2005) reviewed the association between physical activity and student performance at school. He states that it has widely been perceived as common sense that physical activity helps children perform better in school. This is based on the evidence that physical activity improves circulation and blood flow to the brain, thus raising levels of norepinephrine and endorphins which may reduce stress, improve mood and have a calming effect, thereby increasing academic performance. From reviewing 14 pieces of research conducted between 1987 and 2003, again with a total sample of almost 60,000 school aged children (aged between five and 18 years old), nine studies were seen to show a significant relationship between physical activity level and academic performance, although often this was weak, and the remainder showed no correlation. Evidence was focused more on the immediate effects of physical activity on learning, such as improved concentration directly following activity, as opposed to any longer term benefits from physical activity.

Concerns have been expressed in the past by teachers and parents alike that time spent undertaking physical activity at school results in less time spent undertaking academic studies and will therefore negatively impact academic performance. An increasing body of evidence is showing that whilst participation in physical activity means that less time is spent studying, the rate of academic learning is higher so the same results are achieved with less time studying. Some of the earliest studies to explore this are covered by Shephard (1996).

The main study considered by Shephard involved 546 primary school students in Québec who were followed from grade one until grade six and who received an additional one hour of physical activity a day. The classes directly preceding and succeeding these students were used as a control group; they spent 13%-14% more time learning academically than the physical activity students. 2,282 report cards were evaluated to give an overall student performance score for the year. Initially, students in the control group had better grades but in grades two through to six, students who were exercising for an hour a day significantly outperformed the control students. For example, in maths the average score was 23.8 amongst the active participants and 18.5 in the control group. However, languages and overall intelligence were not seen to improve (Shephard et al., 1984, cited in Shephard, 1996). In another study conducted on school students in Paris, half of each school day was assigned to physical activity, described as gymnastics, swimming, physical training, sport and athletics. The students who participated in these levels of activity received 26% less academic teaching time than the control group, but this was found to have no detrimental impact on academic attainment (Hervet, 1952, cited in Shephard, 1996).

In a broad literature review into the impact of physical activity, nutrition and obesity on cognitive ability and school performance, Burkhalter and Hillman (2011) conclude that the evidence supports a positive association between physical activity participation and increased cognitive health and function, and, furthermore, that obesity is associated with poor cognitive health. The review concludes that evidence for the relationship between physical activity and cognitive health either shows a positive relation or none at all, but that on balance because participating in physical activity doesn't detract from educational performance and has additional health benefits, the relationship can be perceived as a positive one. This supports the findings of Trudeau and Shephard's (2008) review of school-based physical activity, school sport, physical education and academic performance. From their review the researchers conclude that, *"physical activity can be added to the school curriculum by taking time from other subjects without risk of hindering student academic achievement. On the other hand, adding time to 'academic' or 'curricular' subjects by taking time from physical education programmes does not enhance grades in these subjects and may be detrimental to health"* (Trudeau and Shephard, 2008, n.p.).

Concerned only with research that involved sports or physical activity within a school context, Trudeau and Shephard identified seven quasi-experimental studies with a total sample of 2,560 pupils and ten cross-sectional studies with a total sample of more than 15,500 pupils. Although causality can't be proven with quasi-experimental studies, the findings are positive. Children who spent less time on academic tuition in order to spend more time being physically active achieved at least equal scores, and in some instances better scores, as the control children, despite the reduction in teaching time. This again suggests an increase in learning efficiency. For example, 287 nine to 11 year old students in British Columbia spent 47 extra minutes a week participating in a variety of physical activities for 16 months, and this time was previously spent in academic lessons. Academic performance was measured by the Canadian Achievement Test, the scores for which didn't show a correlating decrease to the reduction in time spent learning academically. Instead the average test score for schools that participated in the intervention rose from 1,595 to 1,672 (Ahamed et al., 2007, cited in Trudeau and Shephard, 2008).

From the cross-sectional studies reviewed, Trudeau and Shephard found that six of the ten supported a significant positive association between physical activity and academic performance, whilst two showed no association and the remaining two a negative association.

It should be noted, however, that it is difficult to control for any potential bias with cross-sectional studies, and in particular the researchers highlight socioeconomic status as a potential confounder given that it is a strong predictor of both academic achievement and participation in physical activity for children. Nevertheless, in the studies where confounding variables were controlled the results remained true. A cross-sectional survey of 9,000 Australian schoolchildren aged between seven and 15 found that academic achievement was positively associated with physical activity and that this was statistically significant for girls and boys (Dwyer et al., 2011, cited in Trudeau and Shephard, 2008).

With a large sample of 884,715 students in the 5th, 7th and 9th grades in Californian schools, Grissom (2005) found that students with the highest scores in a fitness test also had the highest scores for maths and reading in SAT tests and that greater benefits could be seen amongst girls. This study does not assess for many confounding variables or establish causality so the findings should be treated with some caution. However, follow on research using the same methodology but with a smaller sample size of 259 younger students controlled for more variables and also supported the relationship between physical fitness and academic test performance, although only the aerobic activity component of physical activity was found to be significant in this relationship (Castelli et al., 2007).

Focusing on overweight children (as defined by BMI scores) aged seven to 11, a randomised controlled trial explored the impact of exercise on executive function, defined as the supervisory control of cognitive functions for achieving a goal. As part of the process for achieving goals the brain will need to allocate attention and memory and engage in response selection and inhibition, goal setting, self-control, self-monitoring and strategising (Davis et al., 2011). 171 children were randomised to either a low dose 20 minutes a day aerobic exercise programme, a high dose 40 minutes a day aerobic programme (delivered as two 20 minute sessions) or a control group for an average of 13 weeks. The exercise programmes took place after school with an emphasis on enjoyment and intensity rather than competition or skill enhancement. Activities included running games, modified football and basketball and jump rope, and children wore heart rate monitors and were rewarded for keeping their heart rate above 150 beats per minute. Davis et al. (2011) assessed cognition and academic achievement before and after the interventions, with testers being unaware of which group the children had been assigned to and as many conditions as possible (tester, time of day, location of test, etc.) remaining constant for both tests in the majority of cases. The research found that there was a positive dose-response relationship for aerobic exercise on cognitive function, with higher planning and maths scores in the low and high dose exercise programs when compared to the control group. For example, the mean planning scores were 3.8 points higher in the high-dose exercise group when compared to the control group. Whilst the positive relationship between exercise and cognition was anticipated, such a clear dose-response relationship wasn't. Further research into this dose-response relationship and how it differs by weight would provide greater insight into the body of evidence that suggests that children's physical and mental health can benefit from regular physical activity.

Also focusing on overweight and obese children but with a different type of physical activity intervention, Donnelly et al. (2009) conducted a three year cluster randomised controlled trial aimed at promoting physical activity and reducing overweight and obesity amongst young children in 24 primary schools. On completion the sample consisted of 1,490 children, 698 of whom were controls. The intervention involved 90 minutes a week of academic lessons across the curriculum including physical active of moderate-to-vigorous intensity.

These activity bouts were delivered intermittently throughout the school day in addition to the existing 60 minutes of physical education the children were receiving each week. This study was primarily concerned with changes in body mass index but also explored secondary outcomes, including changes in academic achievement. In a sub sample of 203 children, 86 of whom acted as controls, academic achievement was assessed through a robust and established test that measured reading, writing, maths and oral language skills to produce an age-based score allowing comparisons over time. The data shows significant improvements in academic achievement in all areas, and particularly in maths, for those who participated in physical activity across the curriculum. At an overall level the more active students saw a 5.5 point increase in their academic scores compared to a decrease of 0.5 for the control students. In maths there was an 8.0 point increase for the active students compared to 1.4 for control students, whilst reading and spelling saw increases for the active students compared to decreases amongst the control groups. Again, this research demonstrates that increasing the academic curriculum time spent on physical education doesn't have an adverse effect on learning.

In contrast to Ruiz et al. (2010), earlier research by Chomitz et al. (2009) using a cross-sectional study found that physical fitness supports academic attainment. The study used 2004 to 2005 public school data in North Eastern America in order to generate a sample of 1,841 students between grades four and eight, inclusive. 'Fitness Achievement' was measured by how many fitness tests were passed out of five, covering cardiovascular endurance, abdominal strength and agility. Academic achievement was measured through English and maths proficiency using annual tests conducted with all public school students in Massachusetts known as the MCAS. Chomitz et al. found that the likelihood of passing the maths and English achievement tests increased with the number of fitness tests passed, and that this relationship was stronger for maths. 35% of those who passed no fitness tests passed maths, compared to 80% of pupils who had passed all five fitness tests. Further analysis calculated that after controlling for variables, the odds of passing the maths test increased by 38% for each increase in number of fitness tests passed. For English, 73% of pupils who didn't pass fitness tests passed English compared to 93% of those who passed the five fitness tests. Again from further analysis the researchers calculated that after controlling for variables, the odds of passing the English test increased by 24% for each increase in number of fitness tests passed. Unfortunately the research gives us no understanding of why maths performance was more positively affected by physical fitness and cannot establish causality, but it may be that individuals who are more motivated to achieve academically are also more highly motivated to achieve in fitness tests.

It is also worth noting that the majority of studies included here use maths and English performance as a measure of overall academic performance. This may not be a true reflection of children's academic abilities, however these subjects are essential for good prospects for the future and other studies included within this chapter highlight the evidence for improvements to attitude and attention span in younger children as a result of being more physically active; these improvements would apply to any subject being studied. More detail around the impact of increased physical activity levels across different subjects in the curriculum could provide further insights as to how physical activity can influence better performance in schools and academically. One of the most prominent theories suggests that academic performance is enhanced because of physiological changes in the brain that result from the physical changes in the body associated with exercise. Another proposes that the process of physical activity provides children with learning experiences and the opportunity to develop mechanisms that aid proper cognitive development and which can be transferred into other areas of life (Sibley and Etnier, 2003).

PHYSIOLOGICAL CHANGES

The chapter on mental health evidences that physical activity is beneficial for general wellbeing and can help to reduce the risk of dementia, which has been shown to be two to three times higher amongst the least active. For example, Kramer, Erickson and Colcombe (2006) reviewed a number of studies focusing on the effects of exercise in old and young rats or mice. The evidence is clear that in both young and old animals physical activity increases cognitive performance. Levels of mRNA[39] and protein levels of brain derived neurotrophic factor[40] are increased through exercising; these may contribute to the neurogenesis[41] seen in the dentate gyrus[42]. In addition, neurotransmitter systems[43] are positively affected by physical activity. All of these processes demonstrate that physical activity can cause changes in the brain that lead to enhanced neurochemical capacity for memory, learning and higher thinking. It is therefore not surprising that physical activity can also bring about benefits in the cognitive development of children and adolescents, whose brains have high levels of plasticity, meaning that they are highly able to change and adapt through learning and experience.

PHYSICAL ACTIVITY CAN ALSO BRING ABOUT BENEFITS IN THE COGNITIVE DEVELOPMENT OF CHILDREN AND ADOLESCENTS

Although many studies are not able to establish causality and not enough is understood about the neurocognitive function in young adults, the cardiovascular fitness hypothesis proposes that physical exercise improves cognitive performance because of cardiovascular fitness. The physiological process of cardiovascular fitness is thought to increase the circulation of a number of substances that have a positive impact on brain plasticity and cognitive function. One of the most established meta-analyses of the relationship between physical activity and cognition in children was conducted by Sibley and Etnier (2003). Taking 107 effect sizes of physical activity on cognition from 44 studies, Sibley and Etnier found a mean overall significant effect size of 0.32, which can be classed as medium. The effect size was even greater when looking at mentally or physically disabled students, 0.43 and 0.40 respectively, but the sample sizes were very small amongst these groups.

39 mRNA stands for messenger ribonucleic acid. Ribonucleic acid is one of three main very large molecules essential for life. Messenger ribonucleic acid is a molecule of ribonucleic acid that carries a genetic code for a protein which it will be translated into when it reaches the cells that synthesise protein chains (a ribosome). mRNA is used by all cellular organisms to carry genetic information for synthesising proteins.

40 Brain derived neurotrophic factor is a secreted protein found in the brain. Alongside other proteins it induces the survival, development and function of neurons – the cells responsible for processing and transmitting information. Specifically, brain derived neurotrophic factor acts on neurons in the central and peripheral nervous system and is active in the areas that are key for learning, memory and higher thinking (the hippocampus, cortex and basal forebrain). It is particularly important for long term memory.

41 Neurogenesis is the process of generating new neurons in the brain.

42 The dentate gyrus is a brain structure consisting of three layers of neurons. It is found in the hippocampal formation – the area of the brain responsible for memory, spatial navigation and control of attention. Amongst the roles of the dentate gyrus is the formation of new memories. High rates of neurogenesis are possible in the dentate gyrus.

43 Neurotransmitter systems transmit signals from a neuron to a target cell through a synapse in the nervous system.

More recently, Hillman, Erickson and Kramer (2008) examined the positive effects of aerobic physical activity on cognition. Drawing on animal and human studies they explored the molecular, cellular, system and behavioural level changes to brain functioning resulting from aerobic physical activity in both young children and older adults.

From a thorough assessment of human studies involving neuroimaging, the researchers believe there to be sufficient evidence for physical activity enacting a number of changes in the brain. Studies support physical activity being able to influence baseline functioning of electrical activity in the cerebral cortex[44] and hence influence cognitive functioning. Increased brain volume in the prefrontal and temporal grey matter[45] and the anterior white matter[46] has been evidenced in people with high levels of fitness and in older adults this has been a predictor of performance. Furthermore, variations in the decision making component (P3) for responding to stimulus (known as event related potential) has been proven to be particularly sensitive to changes in physical activity levels and aerobic fitness in terms of the amount of the P3 component and the time taken between a stimulus and the response to it. The P3 component is thought to be generated by a network of neural structures that are involved in cognitive operations such as processing stimuli and updating memory. There is strong evidence across a range of cognitive tasks for larger amounts of P3 and shorter response to stimulus times in those with high aerobic fitness when compared to unfit participants.

In addition to the changes evidenced through neuroimaging, further light is cast from animal studies, which allow for more direct examination of changes in the brain. In support of Kramer, Erickson and Colcombe (2006), Hillman, Erickson and Kramer (2008) found that the evidence is consistent for increased growth and survival of cells in the dentate gyrus, and that this can occur at many stages of development – two studies even found that newborn rat pups from mothers who had carried out aerobic activity during pregnancy showed a higher number of surviving cells in the hippocampus than pups born from sedentary mothers (Kim et al., 2007 and Lee et al., 2006, cited in Hillman, Erickson and Kramer, 2008). It is thought that these newborn cells could facilitate learning, although the functional significance in relation to physical activity and cognition is not well

44 The cerebral cortex is a sheet of neural tissue and is where information processing occurs in the brain. It is vital for memory, attention, perceptual awareness, thought, language and consciousness.

45 Grey matter is part of the central nervous system and contains neural cell bodies. This part of the brain is involved in process and cognition, for example, tasks such as muscle control and sensory perception.

46 White matter is also part of the central nervous system. It transmits signals around the brain and affects how the brain learns and dysfunctions.

understood. This research also further supports earlier work with the evidence that physical activity increases hippocampal volume through higher circulation levels of insulin-like growth factor 1[47], brain derived neurotrophic factor[48] and vascular endothelial growth factor[49].

Taking this as their starting point, Åberg et al. (2009) carried out a cohort study on 1,221,727 Swedish men born in 1950 through to 1976 who were enlisted in military service at age 18. Using data on physical fitness and intelligence from conscription examinations along with other national data on school achievement and socioeconomic status, the researchers found that after adjusting for confounding variables, cardiovascular fitness was positively associated with overall intelligence, and in particular logic and verbal intelligence, but that muscle strength was not. For comparison purposes, fitness and intelligence scores were calculated using a stanine scale, which places test scores between one and nine with a mean score of five. The data shows that an increase of 1 stanine unit in cardiovascular fitness was associated with a change of 0.22 stanine units in overall intelligence. Additionally, analysis revealed that changes in cardiovascular fitness between the ages of 15 and 18 years predicted cognitive performance at age 18, in that an increase in cardiovascular fitness during this time was associated with an increase in intelligence, and that cardiovascular fitness at age 18 predicted educational achievements and occupation later in life. This large study is focused only on men, however, making it difficult to know if the same relationship would be evidenced in women.

47 Insulin-like growth factor 1 is a protein similar in structure to insulin and is an important hormone in children for growth.

48 Brain derived neurotrophic factor is a secreted protein found in the brain. Alongside other proteins it induces the survival, development and function of neurons – the cells responsible for processing and transmitting information. Specifically, brain derived neurotrophic factor acts on neurons in the central and peripheral nervous system and is active in the areas which are key for learning, memory and higher thinking (the hippocampus, cortex and basal forebrain). It is particularly important for long term memory.

49 Vascular endothelial growth factor is a signal protein that contributes to restoring the oxygen supply to tissues when blood circulation is not sufficient. It creates new blood vessels and new muscle after exercise.

By analysing data for the twins within the cohort the researchers have evidenced that environmental factors are responsible for the association between increased cognition and higher levels of fitness. Given that the researchers found no association between muscle strength and intelligence, this research supports the cardiovascular fitness hypothesis and the evidence seen in animal studies.

A limited number of studies have focused on the effects of physical activity on academic engagement for children with autism spectrum disorder, although understandably sample sizes in such studies are smaller. From a review of seven studies, Petrus et al. (2008) examined data from 25 children: 22 were aged between six and 15 and the remaining three were aged between three and five, and all had a disorder on the autism spectrum. Predominantly the studies explored the role of physical activity in increasing on-task behaviour and reducing stereotypic behaviours[50] which can distract from learning. However, three studies did also measure academic performance following physical activity, two of which found improvements in academic responses following 20 minutes of jogging (Rosenthal-Malek and Mitchell, 1997; Kern et al, 1982, cited in Petrus et al., 2008). Findings across all seven studies showed a decrease in stereotypic behaviours from aerobic activities and hydrotherapy, although the impact was temporary. Findings were not conclusive about the impact of physical activity for increasing on-task behaviour. In the studies reviewed, higher intensity activities such as jogging had a positive impact on reducing stereotypic behaviours but less vigorous activities such as walking and ball playing didn't. Petrus et al. therefore propose that aerobic exercise may cause physiological changes that can control stereotypic behaviours in those with autism spectrum disorder.

50 Stereotypic behaviours are found in people with intellectual disabilities including autism spectrum disorder. They involve repetitive movements or speaking such as rocking or spinning the body, finger licking or flapping hands and arms.

The studies assessed by Petrus et al. are however limited in their quality and the dates of publication ranged from 1980 to 2003. Much more research of better design is therefore needed in this field in particular into the impact of longer interventions and longer term effects and the possibility of exercise as a prescription for children with autism spectrum disorder. A more recent and scientific study has monitored activity in the brain for people with an intellectual disability following moderate running for 30 minutes. Researchers found that activity in the brain demonstrated enhanced self-confidence, social acceptance and positive mood from this activity, but no noticeable changes relating to cognitive tasks (Vogt et al., 2011). Increased motivation and self-esteem however are both attributes that are beneficial in the classroom in approaching learning and exams.

Chaddock et al. (2010) attempted to better understand the neurocognitive benefits of physical activity that have been evidenced in animal studies and with older adults by investigating aerobic fitness, hippocampal volume and memory performance in preadolescent children. To do so, the researchers utilised magnetic resonance imaging to assess differences in hippocampal volume amongst nine and ten year old children with low and high levels of fitness. These differences were then explored for a relationship with performance on an item and relational memory task on the basis that relational memory is primarily supported by the hippocampus whilst item memory is not. Whilst the methodology of this research is sophisticated, the sample was fairly small, with 28 children in the lower fitness group and 21 in the higher fitness group; in each group ten of the children were male. It should also be noted that confounding variables such as genes or nutrition were not controlled for in this study. Fitness levels were determined by VO2max scores, heart rate and perceived exhaustion during a treadmill session running at a constant speed with grade increments of 2.5% every two minutes until the child expressed exhaustion. A VO2max score above the 70th percentile according to already established normative data classified the child as being of high fitness, whilst a score below the 30th percentile was classed as low fitness; children with scores in between were excluded from the study.

As hypothesised, Chaddock et al. found that children with higher levels of fitness clearly showed greater hippocampal volumes on both sides and performed significantly better in the relational memory task than the lower fitness children but that no relationship with item memory was evident. Children with higher fitness levels had a mean total hippocampal volume of 7,772.60mm^3 compared to 6,854.09mm^3 for those with lower fitness levels.

Whilst there were no differences in response speed for either memory test, those in the higher fitness group were more accurate on the relational memory test with a mean accuracy of 61% compared to 54% accuracy for the lower fitness group. The researchers found a positive relationship between hippocampal volume on both sides and accuracy in the relational memory task. Further analysis and linear regression showed that hippocampal volume mediated the relationship between aerobic fitness levels as measured by VO2max scores and relational memory, whilst no relationship was seen for aerobic fitness, nucleus accumbens volume[51] and memory, suggesting that aerobic fitness directly affects the structure and function of the hippocampus in children, and this is responsible for greater cognitive performance. There is a lack of well-designed experimental research in this area with this work providing some of the most robust evidence for the ability of physical activity to bring about positive effects in the brains of young children. Developing the methodology to include a larger sample with randomisation and controls to account for potential selection bias could produce conclusive and compelling evidence for the relationship between aerobic fitness and hippocampal structure/function in children. Further avenues for research would be around the frequency and duration of activity over a longer time period and the impacts of different types of physical activities on the brain.

AFTER SCHOOL PROGRAMMES AND SCHOOL-CLUB LINKS

Sport and recreation activities are typically enjoyable for the children who participate in them, particularly when the activities are team-based with their friends and peers. Much in the same way that antisocial behaviour and crime can be tackled by using sport as a hook for teaching other life skills (see the chapter on antisocial behaviour and crime), physical activity programmes run in conjunction with schools can operate as an incentive to encourage students to complete homework, attend a certain proportion of their classes or put in the work to achieve target grades. This utilises the desire to participate in the sporting activity to create greater commitment to schoolwork, which can lead to better learning and overall academic performance. This was found by Hritz et al. (2010) in their evaluation of an American after school football programme (further details in the chapter on physical activity, antisocial behaviour and crime). This approach is in fact particularly popular in America where three common academic eligibility standards are used with additional sports or recreation participation.

These are the pass-to-play approach, a minimum requirement for grade point average and a cap on the number of failing grades one student can have (Callari, 2002).

Two initiatives aimed at improving attendance, behaviour and attitude at school in the UK were evaluated by Sandford et al. (2008). The HSBC and Outward Bound project was a five year residential outdoor and adventure activity programme with pupils from five schools in London Docklands. This resulted in improvements to baseline profiles and outperformance of pupils compared with the control group. Alongside this the researchers evaluated the Youth Sport Trust and BSkyB Living for Sport programme, which was nationwide and which encouraged schools to run their own activity-based programmes. The principles underpinning the Living for Sport programme are that any structured physical activity can help students to increase their confidence and self-discipline and build self-esteem and self-awareness. In addition, students learn important skills for transferring to other areas of life such as loyalty, teamwork and leadership. The final advantage to after school sporting programmes is that they provide a new means of communication for teachers and students, in particular disruptive or demotivated students. The most recent evaluation of the Living for Sports Programme has shown that students who participated have on average performed 14% higher in English compared to the national average, which they were previously in line with, and 4% higher in maths. In addition, almost nine in ten (87%) demonstrated positive improvements in their self-confidence and self-esteem and eight in ten (83%) positively improved their attitudes to learning[52].

The FairPlay programme run by the Rugby Football Union (RFU) in conjunction with Barclays Spaces for Sport and Wooden Spoon (a children's charity for rugby) utilises rugby to improve behaviour amongst disruptive pupils and create school-club links. The two year programme targeted hard to reach young people through rugby in order to work on their behaviour and social skills. It ran 99 eight week sessions with a total of 1,058 young people, of which 69% (729) attended a minimum of 75% of the sessions. Participants were aged between 14 and 18, had been excluded from mainstream education and were attending Pupil Referral Units (PRUs). These units are run by local authorities for children who are unable to attend or who have been excluded from mainstream schools. Local authority data suggests that it costs between £13,000 and £18,000 a year to send one pupil to a PRU compared to £5,200 per pupil at a mainstream secondary school (Corporate Citizenship, 2012). The cost per pupil for the FairPlay programme was £311, which went up to £451 when looking only at those who completed the programme – a fraction of the cost of Pupil Referral Units.

Significant increases were seen in a number of skill areas, with 60% of participants reporting quite a bit or a lot more knowledge of anger management after the programme compared to 31% beforehand. Knowledge of problem solving similarly increased from 38% to 64% of participants, whilst asking questions increased from 41% to 66% and getting on with people from 46% to 71%. In addition, half of the pupils reported feeling better about themselves (49%) and feeling more confident (47%) as a result of participating. Improvements in these behavioural traits can translate into better attitudes and behaviour in class, which can result in better opportunities for learning. Given the behavioural problems with pupils in referral units, any gains in behaviour can be treated very positively. Staff at the Pupil Referral Units assessed the performance and behaviour of those who participated in the programme. Staff noted positive changes but recorded levels of sustained progress were perceived as being quite low.

52 Sky Sports Living for Sport, *Proven Results* http://livingforsport.skysports.com/whats-our-goal/proven-results, last accessed 17.08.2012.

Given that the intervention lasted only eight weeks this is not surprising, but is suggestive that for the biggest benefits from sport and recreation programmes in schoolchildren they should be fully integrated into the timetable rather than delivered in short bursts.

Chance to Shine was launched by the Cricket Foundation in 2005 to increase participation in cricket at state schools, 4,000 of which now run the programme. Although national in its focus, projects are delivered at a local level via County Cricket Boards across England and Wales, involving up to eight primary and secondary state schools and a local cricket club in each project. Structured coaching from professionals and a competition programme are offered to children, with programmes running for a minimum of five years. 2011 saw 347,390 pupils taking part in Chance to Shine, around half of whom were girls (46%), one in ten (12%) of whom were from BME backgrounds and 5% of whom had special educational needs. Over 66,326 hours of coaching were delivered across the year, with the majority of coaching (79%) taking place during curriculum time (2011, Chance to Shine). This programme is thought to be valuable to children because the game of cricket promotes leadership, teamwork and strategic awareness, teaches respect and how to cope with setbacks and is inclusive. In addition, cricket as a hook for engaging children has been taken one step further with the development o f a cricket-based online education resource aimed at improving literacy, numeracy and IT skills through concrete examples relating to cricket that interest and engage the children involved with the programme for effective learning. Disappointingly, this resource doesn't appear to be too widely used at present, with a survey of teachers in 2011 finding that one in four were unaware of it (Institute of Youth Sport, 2011).

For 2011 there have been two evaluations of the Chance to Shine programme: an operations report from the programme itself and an independent evaluation conducted by the Institute of Youth Sport. Both have been primarily qualitative in their focus when considering the impact on children and in local communities. Quantitative data exists only for such elements of the programme as number of sessions delivered, hours of coaching held and club links made. Whilst useful in understanding the delivery of the programme, this data doesn't help us to understand the overall impact on young people. Qualitative feedback from teachers about children's classroom behaviour and performance is however very positive.

THE GAME OF CRICKET PROMOTES LEADERSHIP, TEAMWORK AND STRATEGIC AWARENESS, TEACHES RESPECT AND HOW TO COPE WITH SETBACKS AND IS INCLUSIVE

The evidence suggests that after breaks or lunchtimes when children played cricket, they returned to the class in a calmer mood and there was less conflict in the classroom than when other sports had been played. Furthermore, children demonstrated increased confidence and motivation, which teachers believed to be the result of improvements to self-esteem from performing well in cricket competitions or coaching sessions. Children themselves also reported that their teamwork skills had increased as a result of playing cricket.

Some schools involved in Chance to Shine also stipulated that in order to participate in competition, children had to have a clean record of behaviour in lessons. This was seen by teachers to directly improve behaviour across the curriculum and attitudes towards school as children wanted to be able to participate. The primary benefit for teachers, however, was that skills and motivations learnt through an activity the children were engaged in could help their performance in other areas of school life. In particular, female participants reported that from engaging in Chance to Shine they had a stronger sense of identity and self-direction.

"*What we are trying to do is find something that children are good at and therefore raise their self-esteem whether that be in cricket or art and that gives them a more positive self-image and that then will hopefully transfer onto their other areas of learning*" (Primary head teacher, cited in Institute of Youth Sport, 2011, p.13). This perspective is supported by Cooper et al. (1999) and Marsh (1992), who propose that physical activity programmes with school links increase motivation and investment in schools and subsequently improve academic performance (both cited in Trudeau and Shephard, 2008). Similarly, Eitzen and Sage (2003) propose that the cultural values embodied within sport align winning with success and institutionalise conflict through competitions. This can translate into a good work ethic back in the classroom.

It is also possible that physical activity programmes linked to the schools can improve academic performance by reducing absenteeism, again as a result of either increased engagement with the school or the development of better relationships with teachers and peers, and also through contributing to better levels of fitness and overall health and therefore lower levels of illness. The Texas Youth Fitness Study covered more than 2.4 million students at schools across Texas and found that the children who were physically fit not only performed better academically but also had better attendance rates and lower instances of disciplinary referrals. During the school year 2007-2008, pupils in American grades three to 12 in 6,532 schools were assessed through six tests covering five areas of physical fitness: body composition, aerobic capacity, muscular strength, endurance and flexibility. Cardiovascular health as measured by a walking/running test was found to have a higher correlation to school success than body mass index, demonstrating the importance of not just maintaining a healthy weight but being physically active and fit too (Welk et al., 2010).

EMPLOYMENT: INTRODUCTION

Around 70% of the UK population (aged 16 to 64) are in paid work or employment; this means that unemployment[53] levels are amongst the highest they have been for more than 15 years, with 2.63 million people unemployed as of May 2012 and 1.59 million of these claiming Jobseeker's Allowance (Office for National Statistics, 2012). It is therefore not surprising that the total estimated cost of benefits for unemployed people in 2009-2010 was significant at £4.9 billion (Jin, Levell and Phillips, 2010).

1.02 million of the UK's unemployed are aged between 16 and 24, equating to an unemployment rate of 21.9% for young people (Rhodes, 2012). Statistics for those in this age bracket who are not in education, employment or training (NEET) also reveal that during the first quarter of 2012 one in ten (9.8%) 16 to 18 year olds fell into this category (Department for Education, 2012b). Gaining suitable education, qualifications and training increases the chance of employment; for example almost one in four (23%) 25-29 year olds without qualifications wanted paid work but didn't have it (ONS, 2011 cited on The Poverty Site[54]). Employment also improves life chances: for example being employed reduces the risk of offending by between a third and a half (Social Exclusion Unit, 2002). Unemployment is therefore both an indicator of social exclusion and also a driver, in that unemployment can lead to other aspects of social exclusion such as poverty, homelessness, social capital and poor physical and mental health. Conversely, these aspects of social exclusion can also be a barrier to employment (Bradshaw et al., 2004), thus creating a cycle of social exclusion that can be difficult to break. Given the complex and interrelated nature of the aspects of social exclusion, any interventions that can tackle multiple disadvantages should be well supported and promoted. Physical activity is one such example as, amongst other things, it has the potential to improve physical and mental health, build social capital and increase employment opportunities and prospects.

SOCIAL CAPITAL

One way in which leisure time physical activity may contribute to increased employment opportunities is via its positive influence on accruing social capital (for more information see the chapter on social cohesion). Networking is regarded as being a key component

53 Unemployment is used here as a term to capture people without a job who have been actively seeking one and are available to start working if a job is offered to them. It does not account, for example, for people in full time education or the long-term sick.

54 The Poverty Site, *Impact of Qualifications on Work*, http://www.poverty.org.uk/31/index.shtml, last accessed 20.08.2012.

of contemporary business: not only does it facilitate working relationships within a job, it also provides a means of matching up vacancies with potential candidates. Claims for the importance of networking in job hunting range from being responsible for filling 28% of vacancies to 99%, with the most frequently cited as being around the 60% mark. There is little robust research in the area given that those interested enough to survey on this topic tend to be involved in social networking or recruitment. An American recruitment agency analysed data from over 50,000 clients to find that networking was the number one means by which people secured jobs, with two in five (41%) places made through networking in 2010[55]. A 2011 poll of 402 LinkedIn users found that 34% got their last job through a personal contact who informed them about it[56], however the sample may be biased towards greater engagement with networking given that they were recruited through an online workplace networking site. The influence of networking on job placements, whilst likely to be lower than spuriously stated statistics suggest, does however still seem to be significant.

Out of work social interactions in places such as sports clubs provide one of the main opportunities for people with different employment backgrounds to interact socially – at work the interaction is defined by employment and at home people tend to live in areas of similar income and economic status. This potential for interaction is particularly true once someone becomes unemployed when interaction with those in a variety of employment positions is most beneficial for job seeking. However, the benefit has been evidenced to apply only in the short-term as employees are not willing to recommend people of insufficient skill for vacancies in case it reflects badly on them, and unemployed people lose links with employed people and suitability in their eyes over time (Bramoullé and Saint-Paul, 2004).

Based on the argument that participating in voluntary organisations allows for the formation of social capital, which can facilitate better employment prospects, Ruiter and De Graaf (2009) assessed the socioeconomic impact of involvement in voluntary associations in the Netherlands. Using data from the Family Survey of the Dutch Population 2000, the researchers found that members of voluntary organisations are more likely to start new jobs, have higher earnings and be employed in jobs with a higher status than non-members. Additionally they found that volunteering in general is beneficial when entering the labour market for the first time and that where members belong to associations with high status co-members, the likelihood of starting a new job is higher, and the new job will be of a higher status too. These findings indicate that social capital plays a significant part in employment prospects for sports club members who are actively involved with the club.

55 Forbes online, *Networking is Still the Best Way to Find a Job Survey Says*, http://www.forbes.com/sites/susanadams/2011/06/07/networking-is-still-the-best-way-to-find-a-job-survey-says/, last accessed 22.05.2012,

56 Career Horizons, *Career Poll: How Did You Get Your Last Job?* http://careerhorizons.wordpress.com/2011/09/22/career-poll-biggest-mistake-on-resumes/, last accessed 22.05.2012,

VOLUNTEERING AND EXTRACURRICULAR ACTIVITIES

As noted earlier in this review, more people volunteer in sport than any other activity, both at a club level and in supporting major sporting events, and this volunteering can be beneficial for employment prospects. Whilst there has been little research solely on the benefits of volunteering in sport on employability, there is evidence for the impact of volunteering more generally. Almost nine in ten (87%) employers believe that volunteering can have a positive effect on career progression, whilst 97% of volunteering organisations have experienced this happening. For example, employers identify communication and teamwork as the most important skills for employment (average importance scores of 8.8 and 8.6 out of ten respectively) and 88% of employers believe that both of these skills can be developed through volunteering (V, 2008).

Research on 546 employees from 16 companies in the UK has examined the business case for volunteering. With the support of their employers, the employees were all involved in volunteering for an educational initiative. The research concluded that there is strong evidence for volunteering to help with the development of business skills and competencies in employees. Two in three employees (66%) felt that volunteering had improved their communication skills, and almost the same amount reported that it had improved their ability to help others (65%), whilst more than half (54%) reported increased adaptability and around two in five felt their influencing/negotiating skills (45%) and their team working (43%) had improved as a result of volunteering (Corporate Citizenship, 2010). Furthermore, analysis of the National Citizen Service Pilots found that the proportion of young people who felt confident being the leader of a team increased by 16% (from 47% to 63%) amongst National Citizen Service Participants compared to a 3% increase in the control group (NatCen Social Research et al., 2012).

Three in five (61%) employers in 2012 state that they aren't satisfied with school/college leavers' self-management skills, almost half (46%) say they aren't satisfied with their problem solving skills and around a third (32%) of employers are not satisfied with school/college leavers' teamwork skills (CBI, 2012). Extracurricular activities such as volunteering or taking part in sport and recreation provide opportunities to improve these and other skills that are valued by employers, such as communication.

In particular team sports and outdoor adventure activities are perceived by employers to foster desirable skills and demonstrate outgoing personalities, and more unusual activities have the advantage of catching a prospective employer's attention and demonstrating a passion for life (Stuart et al., 2009). From a sample of 3,000 employers and employees across the UK, it was found that four out of five (80%) employers value volunteering on a CV[57]. In addition, for people with an intellectual disability, who are underrepresented in the paid work force and encounter many barriers to employment, volunteering can offer a meaningful alternative (Trembath et al. 2010). Volunteering can also benefit those with fewer qualifications by providing them with experience and training opportunities.

Using a cohort sample of graduates from 27 UK universities and colleges, Blasko, Brennan and Shah (2002) analysed data on 2,997 students to assess the employment prospects of students from socially disadvantaged groups. The research begins with an analysis of the factors that determine graduate employability regardless of student background. The findings support the hypothesis that involvement in extra-curricular activities can improve employability by helping graduates to gain a range of important skills, and that employers perceive participation in extracurricular activities positively. The employment success of graduates is measured by a range of factors including lack of unemployment, salary, level of occupation, skill and competency assessment and the possibility for promotion. The proportion of successful graduates was almost twice as high (22%) amongst those who spent more than ten hours a week on extracurricular activities when compared to those with no involvement (13%), and even those who spent between one and ten hours a week involved with extracurricular activities were slightly more successful than those with no involvement (16% and 13% respectively). Incidentally, participation in extracurricular activities was also associated with increased benefits for employment amongst graduates from socially disadvantaged groups, although members of this group were less likely to participate in such activities.

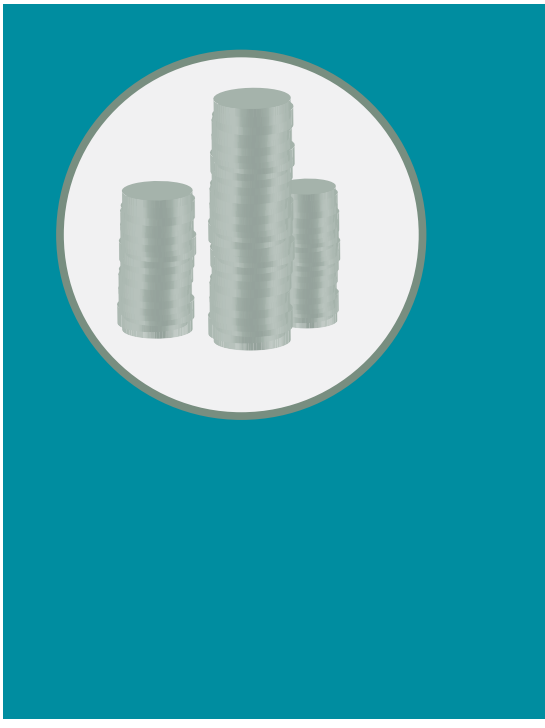
Small scale qualitative research with 40 young adults retrospectively assessed involvement in regular competitive sport on the formation of life skills. The researchers conclude that competitive sport provided an educational context for learning life skills but that interactions with parents, peers and coaches in this context were crucial for how they acquired life skills through sport. Of these, peer interactions were the most important (Holt et al., 2009).

57 TimeBank *Key Facts* available online http://timebank.org.uk/key-facts, last accessed 07.08.2012.

This would accord with Rooth's (2011) interesting findings relating to perceptions of leisure time physical activity by employers; when recruiting, the leisure time physical activities most valued by employers were sociable activities such as football and golf as opposed to more fitness orientated individualised activities such as swimming or running, suggesting that leisure time physical activities that indicate social skills are appealing to employers. Using data on 450,000 Swedish individuals about their physical fitness at age 18 and their adult earnings, assessed by control variables, Rooth found that those with a higher level of fitness had 4-5% higher earnings but that this falls to 2% after controlling for non-cognitive skills, suggesting that higher earnings are linked to higher fitness and higher soft skills. In addition to this analysis, Rooth sent more than 8,500 fictitious job applications to real job openings advertised in Sweden with randomly selected variations in types of leisure time physical activity undertaken. Similarly, Rooth found that general participation in leisure time physical activity didn't equate with a hiring premium as would be expected if participation was a sign of better health and employers were seeking healthy employees. Instead, occupations classed as physically demanding valued health related fitness focused activities whilst other occupations valued leisure activities for their social and soft skills, which appeared to equate to around an additional year's worth of work experience.

LIKELIHOOD OF EMPLOYMENT AND POTENTIAL TO EARN

By exploring levels of physical activity and rates of employment in 25 European countries, Kavetsos (2011) explores the probability of an individual being employed in relation to their participation and frequency in physical activity. The data suggests that there is a causal effect for physical activity on employment, and that this is especially the case for men. In a fascinating paper Lechner (2009) also explores the effect of individual participation in leisure time physical activity on individual labour market outcomes in the long run, this time in Germany. He considers three means by which positive effects may be produced: firstly through greater productivity as a result of improved health and wellbeing, secondly through the social capital and networks formed by group participation and thirdly through suggesting to employers that the individuals are healthy and motivated and thus will perform highly in their jobs. Lechner concludes that over a 16 year period regular active participation in sport and recreation (at least once a month versus less than once a month) increases earnings by around 1,200 Euros a year, which equates to a 5% to 10% increase in earnings – the equivalent of an additional year in education.



The research is based on data gathered from the German Socio-Economic Panel Study between 1984 and 2006 with 6,751 individuals aged between 18 and 45 at enrolment and considers both selection bias and confounding variables in the analysis in a sophisticated way.

Forthcoming research led by Cleveland State University, America has found that moderate exercise such as brisk walking, along with jogging, swimming or weight lifting three times a week could be related to a salary increase of between 6% and 9% in comparison to inactive counterparts. Salary increases were still evident for those exercising one to three times a month compared to inactive counterparts. As the research is currently unpublished the full methodology is not known, but the findings are based on two data sets with over 12,000 people assessed for levels of physical activity and their salaries. The researchers propose that higher energy levels, improved cognitive function and improved psychological function as a result of regular exercising are responsible for higher earnings (Kosteas et al., forthcoming).

As suggested by Lechner (2009), the higher earnings and better career progression of more physically active individuals could be because these individuals tend to be healthier and therefore more productive and more likely to be perceived by employers as motivated and hard working. As part of being healthy, regularly active people are far less likely to be overweight or obese – regular physical activity in accordance with the Government recommendation of thirty minutes five times a week can keep an individual within 3% of their initial body weight (Department of Health, 2011b; Jakicic, 2009; Wing, 1999) (see the chapter on physical health for the role of physical activity in obesity prevention and weight maintenance).

A 2004 study, carried out as part of a wider investigation into chronic diseases and work performance, sought to test associations between work performance and lifestyle-related modifiable health risks, such as physical inactivity, obesity and poor cardio respiratory fitness. A sample of 683 workers in four American cities was assessed for health risks and work performance. Pronk et al. (2004) found that moderate physical activity was related to improvements in the quality of work performed and overall job performance, whilst vigorous physical activity was only related to overall job performance. In addition, obese employees showed significantly less ability to get on with colleagues and had higher rates of absenteeism.

An association exists within the workforce between obesity and lower skills. Whether this association is real or perceived, evidence suggests that it is preventing obese people from securing well paid positions or promotions (see Puhl and Brownell, 2001, for a comprehensive review of obesity related prejudice and inequality in the workplace); Lundborg et al. (2010) term this the obesity penalty. Using data on 450,000 Swedish men enlisting for the military, Lundborg et al. found an 18% reduction in earnings amongst obese people, theorised by the researchers to be as a result of a negative association between obesity and skill level, with obesity seen to correlate with low cognitive and non-cognitive skills. More influential however was the relationship evidenced between obesity and poor physical fitness. Obesity is therefore a marker of skills and fitness and as such is used by employers to discriminate against obese members of the workforce – further evidence for this comes from the fact that obese people are more likely than people within the normal weight range to report discrimination in the workplace (Carr and Friedman, 2005).

High levels of physical fitness are perceived favourably by employers because they are associated with greater productivity, the ability to work longer hours and less sick leave. A few studies have begun to examine the short and long term impacts of obesity on absence from work, and there is a weak consensus emerging that obesity is a risk factor for short and long term absence from sickness. Harvey et al. (2010) conducted cross sectional and prospective analysis on London Underground staff, with a total sample size of 1,489. Participants were assessed for height, weight, physical and mental health and sick days taken for short term illness (defined as less than ten days) and long term illnesses. Obese individuals took an average of four extra sick days a year than their colleagues within the normal weight category. Workers with a healthy body mass index took an average of six sick days a year whilst obese workers took an average of nine and a half days and very obese workers an average of 11 days. Harvey et al. found that obesity related chronic medical conditions were responsible for increasing the risk for long term sickness absence but that this could not explain all the increase in short term sickness absence.

Not only is it thought that keeping fit and healthy influences an employer's decisions around hiring, promoting and level of pay, evidence from one small study also suggests that exercising during lunchtime at work increases productivity. A sample of 201 volunteers from three Bristol-based workplaces with onsite exercise facilities completed mood diary questionnaires and had their exercise habits recorded; they also completed work-performance grids at the end of each day and three focus groups were held with participants to explore performance related topics. The researchers reported 79% of the participants had improved mental and interpersonal performance on days where they exercised, 74% managed their workload better and 72% managed their time better. In addition, on days when they had exercised, 41% reported feeling more motivated to work, 27% more able to deal with stress calmly and 21% reported higher concentration on work. All indicators of performance were higher on exercise days regardless of the amount or intensity of exercise undertaken and inductive analysis of the focus groups revealed this to be linked to changes in mood with tolerance and resilience higher on exercise days (Coulson, McKenna and Field, 2008). This research is limited by its small, self-volunteered sample, the majority of whom (67%) were female, however the combination of a trial and a focus group makes it more robust than many other trials of this nature that rely on participants to self-report.

Evidence is suggestive that sport and recreation during the working day makes employees more productive and increases motivation; team activities have also been shown to boost staff morale and workplace activity programmes have been associated with increased job satisfaction, a reduction in staff turnover and reduced absenteeism. A thorough meta-analysis of physical activity interventions in the workplace looked at the results from over 38,000 participants across more than 100 studies, concluding that such interventions can improve both individual health and workplace outcomes. For example, the analysis found significantly positive effects for fitness (effect size of 0.57), job stress (effect size of 0.33) and work attendance (effect size of 0.19) when comparing those involved in interventions with the control participants (Conn et al., 2009). These findings support the Health, Work and Well-being Programme (2008), which states that physical activity programmes at work can also reduce absenteeism by up to 20% and on average physically active workers take 27% fewer sick days (cited in National Institute for Health and Clinical Excellence, 2008a), although this can be higher depending on the situation within each organisation before any intervention. For example, encouraging better physical and mental health amongst staff at Stockport Council led to a 44% reduction in sick days which equated to a saving of £1.58 million (Business in the Community, 2009).

Other studies have found that well run workplace interventions focusing on staff wellbeing can increase employee job satisfaction and reduce staff turnover by between 10% and 25% on average (PWC, 2008, cited in National Institute for Health and Clinical Excellence, 2008a). These findings demonstrate significant benefits to employers of physical activity, as well as those that we have established it has at an individual level.

Introducing an Active Workplace intervention for the 540 employees of the Ginsters factory in Cornwall not only reduced sickness, stress-related illness and accidents at work, but also led to a 14% reduction in health premiums, a 14% reduction in staff turnover and a drop in recruitment advertising costs from £55,000 to £15,000 over three years (Hudson, 2010). Working with Sport England and the local council to encourage active travel, create physical activity opportunities in the workplace and build links with local sports clubs, which allowed employees and their families to trial new activities at new clubs, the employees of Ginsters are far healthier and more positive about their jobs and the reputation of the factory has grown considerably. This initiative has offered a really broad range of activities to not just employees but their families too: everything from self-defence to scuba-diving. In addition, they have introduced healthy eating programmes and free fruit, aimed at creating a total shift in attitude around being active and healthy.

In the hospitality sector staff turnover amongst frontline hotel employees is thought to be around 60%. Based on their research findings, Magnini, Lee and Kim (2011) suggest that physical activity should be encouraged amongst employees as a means of increasing overall job satisfaction and strengthening commitment to the organisation. It is thought that the role of physical activity in contributing to overall general wellbeing and reducing levels of anxiety (see the chapter on physical activity and mental health for an overview of the evidence here) contributes to greater life satisfaction, which in turn is an indicator of wellbeing and can also translate into increased job satisfaction (Judge and Watanabe, 1993). It is also possible that increases in self-esteem from participating in physical activity can contribute to overall greater life satisfaction (Stubbe et al. 2006; Pressman et al. 2009). Magnini, Lee and Kim (2011) highlight that when overall wellbeing is increased and anxiety levels are reduced, our capacity for emotional intelligence is higher, and this is particularly beneficial in the hospitality industry in a general sense and also increases job satisfaction by increasing happiness and optimism.

210 hotel employees from nine hotels in South Korea were asked how often per week they exercised, with answer options ranging from less than one hour per week to more than seven hours a week. Measures of trust, emotional intelligence, overall job satisfaction and organisational commitment were also taken. Higher levels of physical activity were found to lead to higher levels of emotional intelligence among hotel workers.

HIGHER LEVELS OF PHYSICAL ACTIVITY WERE FOUND TO LEAD TO HIGHER LEVELS OF EMOTIONAL INTELLIGENCE AMONG HOTEL WORKERS

Amongst employed people, it is thought that 60% of their waking hours are spent at work (National Institute for Health and Clinical Excellence, 2008a), making it a prime setting for encouraging greater levels of physical activity. Recognising this, the National Institute for Health and Clinical Excellence (2008) has produced guidance and recommendations on encouraging physical activity in the workplace alongside tools for implementing the recommendations, stating that, *"the benefits are significant and far outweigh any initial costs"* (National Institute for Health and Clinical Excellence, 2008b, p.9); one such tool explores the business case for promoting physical activity in the workplace. This tool allows for employers to plug in the numbers of employees, their salary cost, sick days taken, recruitment costs and so on against the costs of any physical activity interventions to calculate the potential savings that could be conferred as a result. It is simple enough to use but provides an interesting example of how investing in physical activity opportunities for employees could significantly benefit employers in the long term.

CONCLUSION

The fitness and health benefits of regular leisure time physical activity appear to extend beyond the physical. The physiological processes that occur during exercise are related to increased capacity for learning, more energy and better concentration. As a result, keeping active can facilitate increased productivity. This occurs not only in the classroom and workplace, influencing educational attainment, employment prospects and earning potential, but is also a factor considered by many employers when recruiting. The overwhelming conclusion is that replacing academic time with increased time on physical activity in school leads to either improved or equal academic performance. Therefore, given the additional health benefits of increased activity, this approach is a positive one to be supported.

Relatively few studies have explored the impact of participating in sport and recreation at school on adult participation level, but those which have suggest a positive relationship, indicating that not only can being active at school help academic productivity, it may also set up good habits for life which will be beneficial for future physical and mental health, employment prospects and creating social capital. Although only a relatively small number of studies exist into the impact of regular physical activity and earnings, those that do are suggestive of higher earning potential for the most active. More research, and in particular more UK-focused research, would be welcomed. If early findings are indicative of a true pattern then sport and recreation can not only help people live longer, healthier lives, they can also help people earn more whilst they do so and save employers money – truly a win-win situation.