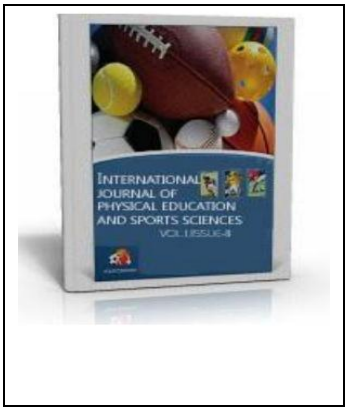
ISSN-2231-3745

The Impact of Physical Activity and Fitness on Academic Achievement and Cognitive Performance of Children



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ABSTRACT

The potential for physical activity and wellness to enhance intellectual capacity, learning and scholastic accomplishment in youngsters has gotten consideration by scientists and approach producers. This paper reports a deliberate way to deal with ID, investigation and survey of distributed reviews up to mid-2009. A three-stage seek technique was received to distinguish concentrates that utilized measures of physical movement or wellness to evaluate either level of relationship with or impact on a) scholastic accomplishment and b) psychological execution. An aggregate of 18 studies including one randomized control trial, six semi test and 11 correlational studies were incorporated for information extractives. No reviews meeting criteria that analyzed the connections between physical activity and psychological capacity were found. Feeble positive affiliations were found between both physical activity and wellness and scholarly accomplishment and wellness and components of intellectual capacity, yet this was not bolstered by mediation considers. There is deficient confirmation to reason that extra physical training time builds scholarly accomplishment; however there is no proof that it is adverse. The quality and profundity of the confirmation base is constrained. Additionally investigate with thoroughness past correlational reviews is fundamental.

Keywords: Physical Activity; Physical Fitness; Children

1. INTRODUCTION

The physical medical advantages of taking an interest in normal physical movement and keeping up physical wellness are generally settled (Department of Health, 2004, United States Department of Health and Human Services, 2008). It has been plainly exhibited that physical activity diminishes danger of creating cardiovascular sickness (CVD), stroke, a few growths, corpulence, sort 2 diabetes mellitus and is likewise successful in the treatment of a few of these maladies.

There has additionally been developing enthusiasm for the advantages of physical activity for emotional wellness and a solid confirmation base demonstrates that standard activity and enhanced wellness increments mental prosperity (Biddle, Fox and Boutcher, 2001, Biddle and Mutrie, 2008). Exercise can help individuals feel better about themselves and their lives, decrease nervousness and enhance temperament. Proof is likewise working to demonstrate that physical activity is related with considerably lessened dangers of emotional instabilities and conditions, for example, misery,

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intellectual hindrance and dementia (Fox and Mutrie, in press; Hamer and Chida, 2008). The advantages of physical movement in the treatment of dejection (National Institute of Clinical Excellence, 2004) and change in select parts of subjective capacity in more seasoned grown-ups are turning out to be progressively settled (Angevaren, Aufdemkampe, Verhaar, Aleman, and Vanhees, 2008). Besides, intense episodes of very much oversaw physical exercise may encourage certain parts of data handling in grown-ups (Tomporowski, 2003).

Some of these constructive outcomes on psychological well-being have additionally been appeared in youngsters and youths, in spite of the fact that the proof base is restricted. Few reviews have explored the preventive or treatment impacts of activity on emotional instability inside this populace, incompletely in light of the fact that rate is low. Notwithstanding, audits have demonstrated that activity or potentially wear inclusion can effectsly affect mental prosperity. For instance, practice has been appeared to enhance physical self-recognitions and to a lesser degree self-regard in kids (Fox, 2001) in spite of the fact that impacts are conflicting.

Notwithstanding the consequences for mental wellbeing, there has been significant enthusiasm for the potential effect of enhanced wellness and exercise on intellectual capacity and learning in youngsters. The thought that larger amounts of activity or wellness may improve considering, fixation and in this manner scholarly execution is alluring to teachers. Not exclusively would it be able to profit kids, it could enhance the school's additional incentive for scholastic accomplishment. For physical teachers and games organizers, it could legitimize more noteworthy arrangement of physical movement in the school educational modules. Without a doubt, since the mid-1990s schools have been embracing business projects, for example, Brain Gym (www.braingym.org.uk), a framework that uses engine coordination activities to improve learning, in spite of confirmation of its viability. Different plans, for example, 'Wake Up Shake Up' (www.foundation-stage.info) and "Energizers" (www.ncpe4me.com/energizers) are likewise rising in schools inside the UK and the US separately.

Four writing surveys have been distributed on the connections between physical activity and psychological capacity or scholarly execution since 2003. In a survey of 44 studies Sibley and Etnier (2003) inspected the proof for the impact of physical movement on cognizance in youngsters. 28 cross-sectional associational and 16 intercession contemplates, with kids between the ages of four and 18 years were incorporated. Eight unique classifications of psychological appraisal were recognized and affiliations or impacts of single sessions and standard support in different types of high-impact preparing, resistance preparing and physical training educational programs were outlined. A mean impact size of 0.32 for movement was accounted for. This audit was exceptionally comprehensive with a few reviews being unpublished, result measures were assorted and a few specimens were kids with learning challenges where connections may be very extraordinary.

The relationship between physical activity and school execution was explored by Taras (2005) in a paper detailing 14 thinks about, incorporating an implicit number with conceptual just, distributed in the vicinity of 1984 and 2004, including members in the vicinity of five and 18 years old. In an account summation of the discoveries, demonstrating feeble or no relationship between'sactivity level and scholastic execution, Taras presumes that the field requires additionally research to better comprehend the effect of movement levels upon understudy execution. Trudeau and Shephard (2008) introduced a current survey of studies connecting educational time physical activity and scholarly execution. Nine cross-sectional reviews and seven semi test contemplates evaluating scholastic execution by review point midpoints (GPAs) and determinants of GPA (focus, classroom conduct and so on), distributed in the vicinity of 1966 and 2007, were incorporated. The survey revealed non-huge patterns in studies and presumed that scholastic accomplishment is not influenced by constraining the time assigned to PE direction, school physical movement and games programs.

A story synopsis of the examination into the impacts of physical movement on cognizance in youth was displayed by Hillman, Erickson and Kramer (2008) as a short sub-area of a paper evaluating the

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more extensive impacts of physical activity on perception over all age bunches. The creators reasoned that, from the constrained measure of distributed research there was no sign that an expansion in educational programs time physical movement is related with a lessening in scholarly execution. A further account survey is offered by Tomporowski, Davis, Miller, and Naglieri (2008), of investigations of the impacts of physical exercise on cognizance and scholastic accomplishment. The conclusion came to by these creators is that activity might be an imperative strategy for improving parts of mental working that are key to subjective improvement. Highlighted in this paper is the fluctuation of the result of studies and inadequately chose result measures. The creators recommend this might be because of variables including scientists choosing populaces that don't speak to the overall public, for instance, kids with mental or physical inabilities.

Given the enthusiasm for the potential for physical movement in its different structures to upgrade psychological and school execution, we feel that a more efficient and thorough way to deal with surveying the writing is justified that gives a hearty and target synopsis of the condition of information on this essential point. This is required with a specific end goal to judge what is required to take the field advances. Right now, the finishes of existing surveys are ambiguous and it is unrealistic to figure out if this emerges from study or populace choice, consolidating investigations of various plan or that address distinctive research inquiries, or understanding of discoveries. There are a few review qualities that require clearer division including recognizing physical movement versus wellness impacts, additional versus inside educational programs activity, intellectual capacity versus scholarly accomplishment, and maybe here and now or intense versus long haul impacts.

2. REVIEW OF LITERATURE

This audit has endeavored to address some of these issues by adopting a painstakingly outlined strategy to detailing the current distributed writing (until February 2009). Ponders examining scholastic execution and intellectual capacity as result factors are surveyed independently, similar to those taking physical activity and physical wellness as introduction factors. Besides cross sectional reviews are independently surveyed from mediation ponders and more prominent accuracy in the meaning of factors is endeavored. Rundowns are limited to results that have accomplished the specialists' set levels of factual centrality. Results are talked about with regards to the potential for this territory of research and the sorts of research inquiries and plans that would be expected to take the field advances. Youth physical movement is a perplexing blend of practices that occur in differing social settings. Thought could be offered to classifications, for example, reprieve time play, dynamic travel, don and physical instruction (both inside and extra to the school educational programs), casual play and games and move clubs outside school. This audit considers settings and in addition methods of activity which may incorporate strolling, running, cycling, swimming, vivacious games, and move. Besides, thought is given to how each of these was measured as far as term, recurrence and level of power.

Rather than physical activity, physical wellness is an unpredictable arrangement of useful limits and abilities. In youngsters, these are incompletely controlled by hereditary variables and phase of natural development and also the measure of physical activity embraced. Regularly a battery of tests are utilized to evaluate parts, for example, cardiovascular wellness, strong quality and perseverance, once in a while body composition or level of bloatedness, adaptability, spryness, coordination, adjust and response time. This audit incorporates any part of physical wellness when it has been surveyed utilizing a state sanctioned test or measure to score subjects.

Scholastic accomplishment is the youngster's execution when surveyed by state sanctioned tests inside a school, or instructive setting. Regularly this is evaluated as accomplishment in particular subjects, for example, arithmetic or perusing aptitude, review point normal (in the US) or through standard national appraisal tests (SATs). This variable is subject to the capacity of the tyke, their

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home foundation and condition, and additionally the quality and amount of scholastic guideline that youngster gets.

Subjective execution alludes to the kid's execution when evaluated utilizing a perceived and approved trial of intellectual capacity. Tests survey parts of perception, for example, response time, consideration, working memory and jolt reactivity (all in all alluded to as official control). Psychological and scholastic execution are thought to interrelate as parts of discernment, for example, consideration and working memory are essential for scholarly achievement.

Regardless of proceeded with emotional increments in kids' medical problems, physical instruction projects are being sliced like never before to account for more center scholastic time. This pattern proceeds despite the fact that the present confirmation indicates physical training to be decidedly identified with expanded scholastic execution; when time is dispensed for quality physical instruction, there is no weakness to scholarly accomplishment (Smith and Lounsbery, 2009). Along these lines, it is important that physical instruction (PE) programs in schools keep on being broke down to further demonstrate the estimation of physical movement through physical training programs. Expanding time in physical movement could help address a genuine wellbeing sympathy toward kids, which is the expanding frequency of overweight and weight. As indicated by the Centers for Disease Control and Prevention, the quantity of overweight kids has dramatically multiplied since 1980, with 16% (more than nine million) of kids and high scholars matured 6-to 19-years overweight (Satcher, 2005).

Solid People 2010 (US Department of Health and Human Services Public Health Service, 2000) records physical movement as a main wellbeing pointer and objectives have been set up to enhance physical activity among grown-ups, youths, and youngsters. Moreover, Healthy People 2010 shows that being overweight or large is a noteworthy giver to a few preventable reasons for death. Unfavorable wellbeing outcomes from corpulence incorporate the danger of hyperlipidemia, hypertension, irregular glucose digestion, sort II diabetes, coronary illness, asthma, orthopedic issues, and a 80% likelihood of grown-up stoutness. Different outcomes for the fat kid incorporate psychosocial issues (social disgrace and segregation), and low self-regard.

The ascent in weight has been ascribed to stationary practices, diminish in every day physical exercises, and diminish in day by day physical instruction classes and poor nourishment. Inquire about has examined the levels of physical activity, the measure of physical instruction and the level of wellness in connection to heftiness. It is critical to separate physical activity, physical training, and physical wellness as there is frequently perplexity among these terms. In the first place, physical activity is characterized as any real development created by skeletal muscles that require vitality use. Physical training includes a formatively suitable educational programs directed by a qualified physical instruction proficient, that grows physically taught people who have the learning and abilities required for lifetime physical movement. At long last, physical wellness alludes to an arrangement of characteristics individuals have or accomplish, and are identified with their capacity to perform physical activity. There is wellbeing related physical wellness, (cardiovascular wellness, body structure, adaptability, solid perseverance, and strong quality) and ability related physical wellness (readiness, adjust, coordination, power, speed, and response time). The impacts of physical activity which falls under the classification of wellbeing related physical wellness is analyzed in this paper.

For youngsters, a noteworthy contributing issue to weight is that they are driving more inactive ways of life (Sibley and Etnier, 2003). For instance, youngsters have a tendency to invest more energy in stationary exercises, for example, PC utilize, electronic diversions, and sitting in front of the TV. With the expansion in stationary exercises, there is a relentless abatement in day by day physical activity. For example, the Shape of the Nation Report (2001) exhibited that there were more youngsters observing every day TV (around 40% for three hours day by day) than there were kids taking an interest in day by day physical movement (around 30% day by day). All the more as of late, as per the Shape of the Nation Report (2010), vivacious physical activity for no less than 20 minutes that

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expanded heart rate and made sweat, was seen in just a single third of kids matured 6-to 17-years old. Likewise, there has been a relentless decrease in the quantity of understudies that take an interest in day by day physical instruction classes. The School Health Policies and Programs Study (2000) showed just 8% of grade schools and 6.4% of center/middle schools, and 5.8% of senior secondary schools give every day PE amid the school year.

3. PHYSICAL FITNESS AND COGNITIVE PERFORMANCE

General physical movement is a calculate sound living. As per the Surgeon General's provide details regarding physical movement and wellbeing, the advantages of standard physical activity for youngsters and youthfulness include: assembling and keeping up solid bones, muscles and joints, diminishing sentiments of gloom and uneasiness, and advancement of mental prosperity. Likewise, physical movement controls weight, diminish fat, form fit muscle, and helps scholarly execution.

Scientists and instructors concur that development is fundamental to learning as the mind is initiated amid physical activity. In this way, by consolidating physical activity, physical training can have useful effects on both scholarly learning and physical movement examples of understudies. As indicated by a few analysts, (Etnier, Salazar, Landers, Petruzzello, Han and Nowell, 1997; Hillman, Castelli, and Buck, 2005; Hollmann and Struder, 1996; Plowman, 2008; Shephard, 1997; Trudeau and Shephard, 2010; Sibley and Etnier, 2003) when the cerebrum is initiated amid physical movement, existing mind cells are revived and new ones are empowered. In particular, there is an expansion in cerebral blood stream, improvement of excitement level, changing hormone discharges, and upgraded supplement consumption. The following segment 1.1.1 takes a gander at impacts of physical movement on the mind, and segment 1.1.2 looks at physical activity consequences for psychological working.

Physical movement impacts on the mind have been broadly investigated (Etnier, et al., 1997; Plowman, 2008; Trudeau and Shephard, 2010; Sibley and Etnier, 2003). Physical activity benefits for the mind have included: increment in cerebral blood stream (direct to high forces of activity have indicated huge builds), changes in neurotransmitters (intense episodes of activity cause changes), increments in norepinephrine and serotonin (after an intense episode of activity and ceaseless exercise impacts all the more long haul increments in neurotransmitters), and perpetual basic changes in the cerebrum. The increments in cerebral blood stream advantage psychological working because of the expanded supplement and oxygen supply to the mind. Moreover, the increments in norepinephrine found in people are critical because of the way that reviews on rats have indicated abnormal amounts of norepinephrine related with enhanced memory. For instance, Isaacs, Anderson, Alcantara, Black, and Greenough, (1992) directed a trial where rats were doled out to one of four conditions. The principal gathering was an engine expertise learning bunch that prepared for 30 days on a hindrance course that was intermittently expanded in trouble. The second gathering was additionally prepared for 30 days to walk quickly and after that run one hour every day. The third gathering was housed separately with a running wheel, and the movement was willful. The fourth gathering was an idle gathering with indistinguishable enclosures as alternate gatherings. Their outcomes found that both the engine aptitude learning bunch and the monotonous physical movement assemble had perpetual changes in the cerebrum, which showed that physical activity, and engine expertise learning fortified angiogenesis (a physiological procedure in the body that includes the development of fresh recruits vessels).

All the more as of late an audit directed by Trudeau and Shephard (2010) highlighted the relationship of physical movement to cerebrum wellbeing and scholastic execution of schoolchildren. The trial examines on physical activity and cognizance on rats and people concentrated on the hippocampus, which is identified with memory. The concentrate of these examinations was on long haul hippocampal potentiation (LTP). This is an essential procedure in the union of memory and is described by an expansion in synaptic adequacy. The LTP has all the earmarks of being encouraged by

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physical activity through the accompanying systems: enhanced synaptic transmission, expanded centralizations of neurotrophins, insurance against the antagonistic impacts of free radicals, and expanded neurogenesis (improvement of neurons). Like the Isaac et al. (1992) study, Trudeau and Shephard (2010) inspected a few trial considers indicating enhanced synaptic transmission subsequent to running, and quicker learning of labyrinth pathways for rats. Furthermore, a few grown-up creature contemplates have shown increments in mind inferred neurotrophic figure (BDNF) and other development calculates reactivity to physical movement.

4. PHYSICAL ACTIVITY EFFECTS ON COGNITIVE FUNCTIONING

A critical positive relationship has been seen in the exploration on the connection amongst cognizance and physical activity. For instance, Sibley and Etnier (2003) directed a meta-investigation of 44 studies that demonstrated a positive connection with a huge general impact size of 0.32 between physical movement and seven classifications of psychological execution (perceptual aptitudes, insight remainder, accomplishment, verbal tests, science tests, formative level and scholastic availability) among school-matured youngsters. Also, the survey showed that all plan sorts and distinctive sorts of physical movement created intellectual capacity benefits.

Analyzing kids with and without clinical issue, an audit by Tomporowski, (2003) exhibited positive intense exercise impacts on kids' conduct and subjective execution. Psychological execution was measured in a few courses relying upon the review. The assortment of measures utilized was: letter-cancelation speed, arithmetic calculation, Woodcock-Johnson Test, WISC-R: Digit Span coding, memory, contracted indication survey, self-incitement, consideration, stereotyped practices, classroom conduct, class disturbances, and hostility and hyperactivitiy.

All the more as of late Tomporowski, et al. (2008) checked on research concentrates that inspected physical activity consequences for youngsters' insight, discernment, and scholastic accomplishment. The reviews were assessed in light of the official capacity speculation. Official capacity includes booking, reactivity restraint, arranging, and working memory. In the reviews physical movement impacts on official capacity in grown-ups have encountered the most critical outcomes out of the four sorts of discernment's mental handling: official capacity, controlled preparing, visuospational preparing, and speeded handling. At the point when the official and non-official intellectual procedures in more established grown-ups were evaluated taking after a high-impact preparing and non-oxygen consuming conditioning program, there were post-preparing contrasts. The oxygen consuming preparing bunch performed tests that required official capacity more proficiently and quickly than the non-physical activity gather.

Grown-up research on the official capacity theory can be stretched out to foresee the physical activity related changes in youngsters' subjective capacity. The cross-sectional reviews (Tomporowski, et al., 2008) explored by the scientists demonstrated that the kids who were physically fit performed psychological errands all the more quickly and showed more noteworthy activation of mind assets than less fit kids.

For the trial thinks about inspected by Tomporowski, et al. (2008), scholarly accomplishment was the normal result measure with the most confirmation for unending physical movement effectsly affecting scholastic accomplishment. Because of variety in techniques with few randomized reviews, the general conclusion from these reviews was that the youngsters' scholastic advance was not ruined because of the time spent in physical training.

Generally speaking, the confirmation so far demonstrates picks up in youngsters' mental working from the physical movement mediations on assignments that include official capacities. There are numerous unanswered inquiries, for example, if the psychological advantages decay when the physical activity is ended, and if there is a relationship to the sort, span, or force of the projects.

ISSN-2231-3745

With the numerous physiological advantages of physical movement to the constructive outcomes on mental health and comprehension, it is obvious that physical activity upgrades learning. The following area addresses grade school physical activity mediations.

CONCLUSION

The present study found that kindergarten children who received the IPAC program increased their physical activity, and reached the academic performance level of the control group by the end of the school year in reading (despite scoring lower than the controls in the beginning), but not math. Thus over time the experimental group caught up to the controls in three out of the four Dibels academic scores compared to the controls, or improved the same as the controls in the Growth Scale Value of the G-MADE, who did not receive the IPAC program. With physical activity being a leading health indicator according to Healthy People 2010, the results of this study demonstrate the importance of providing a variety of daily physical activities for kindergarten students to have the opportunity to improve their physical health. This study did not address whether there was any negative impact, however IPAC was conducted before school and academic time was not reduced. This is important when considering curricular intervention to increase physical activity. A number of previous cross-sectional studies have also found that physical activity had a positive effect or had no negative effect on academic achievement. Evidence of the positive effect of physical activity was also found in the three longitudinal studies reviewed by Shephard (1997). Additionally, recent literature reviews address the importance of quantity and quality of physical activity, and have found that acute bouts and higher intensities of activities have a stronger association with improved academic performance. Positive effects on academic performance and cognition are observed in a variety of physical activities and design types. Therefore, with the available evidence suggesting positive effects or no effect from a variety of physical activity designs, intensities and types, further exploration of these relationships between physical activity and academic achievement are warranted.

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