

Psychosocial aspects of physical activity

The health benefits of regular physical activity have been studied and are well described in the literature (1). The psychosocial benefits of regular physical activity, which are considered to be as important as the health benefits, are less clear (2). The current data regarding the impact of physical activity on children's psychosocial health confirm an associative, rather than a causal link in many studies (3). Definitive research is also made difficult by the Hawthorne effect. The Hawthorne effect refers to subjects who change their behaviour as a result of being part of a study (4). Additionally, the type, duration or intensity of physical activity among the paediatric population that is necessary to achieve optimal, positive emotional and mental benefits, are poorly defined (2).

The intention of the present commentary is to scrutinize current thinking regarding the psychosocial aspects of regular physical activity. It will address the role of physical activity in:

- managing stress and anxiety in children and youth;
- reducing depression in children and youth;
- children and youth with attention deficit/hyperactivity disorder (ADHD), learning disorders and autism;
- developing self-esteem;
- intelligence and academic performance;
- reducing juvenile delinquency; and
- Character development.

STRESS AND ANXIETY MANAGEMENT

The incidence of stress among children and youth has been described (5). Stress has become an ever-increasing and relevant problem in children (6). The etiology, diagnosis and treatment of childhood stress are well addressed in the literature (7). However, the role of exercise in stress management, although intuitively seen as potentially positive, is less well defined for the paediatric population. Data available in the adult population, regarding the benefits of exercise in reducing stress, seem more definitive (5).

Exercise may serve as an effective tranquilizer. Studies in adults indicate that 30 min of aerobic exercise reduces muscle tension by as much as does a dose of 400 mg of meprobamate (8). The relaxation effects were determined by subjective self-reports, through electroencephalogram changes and in the reduction of peripheral deep tendon reflexes. The mechanism by which physical activity reduces muscle tension is felt to be via a central, corticospinal effect (8).

The tension reduction induced by exercise lasts for 4 to 6 h in adults. The level and intensity of exercise may be important. Some studies suggest that only vigorous, sustained exercise lead to tension reduction; other studies suggest that moderate exercise is beneficial only when it occurs over an extended period and on a regular basis. An equal reduction of psychosocial stress occurs with both aerobic and anaerobic activities (9). Case reports in adults have indicated that regular physical activity may be helpful in the treatment of panic attacks and phobias (10).

It was observed that 30 min of movement training for 10 weeks reduced anxiety in healthy four-year-olds (11). Psychological testing and teachers' reports were used to monitor participants' responses to activity. Physically fit college students were shown to handle stress better than unfit subjects (12). Similar results were found when girls aged 11 to 17 years were studied (13).

Competitive physical activity may lead to an increase in stress and anxiety; however, this increase is thought to be transient and mild, as long as the athlete is not pressured excessively

by parents, teachers or coaches. Individual sports such as gymnastics, ballet, ice skating and wrestling generate more stress than do team sports, but, overall, the stress response to competitive sports is not worse than that of band competitions and academic stress, for example (14).

Athletic competition may become destructive when the contest becomes linked to self-worth, personal integrity and the virtue of the players. Individuals who may be at an extra risk for developing stress as a result of athletic competition are those with low levels of self-esteem and low performance expectations (15).

DEPRESSION

Depression among Canadian children aged 12 to 17 years is common. The incidence, unfortunately, is on an upward trend (16).

The mechanism by which physical activity may reduce the effects of depression is speculative at best. Psychological function is influenced strongly by blood levels of neurotransmitters such as noradrenaline, serotonin and dopamine. Depression has been associated with a depletion of neurotransmitters such as serotonin. Physical exercise increases the levels of central nervous system neurotransmitters.

In human studies, circulating sympathetic amines increase two to six times over resting levels after 30 min of vigorous exercise. Increased production of endogenous brain opiates, known as endorphins, can produce a morphine-like effect. The effect of these endogenous opiates has been shown in some studies to be reversible by the administration of naloxone, a narcotic antagonist (17).

One attempt to explain how regular physical activity may reduce depression is the 'Time-Out' theory. According to this theory, relief of depression results from exercise distracting and diverting the subject's attention away from environmental stressors (1).

The self-significance theory, which is not well tested, suggests that when an individual participates in physical activity, that participation is characterized by society as 'good'; thus, exercise provides a sense of self-discipline, control and competence. It may also give the subject a sense of self-significance through the experience of reaching goals and overcoming obstacles (1).

Studies in older teenagers tend to support the benefits of physical activity in treating adolescent depression (18). Improvement in depression scores was also shown when aerobic exercise programs were used in college students (19).

ADHD AND LEARNING DISORDERS

A limited number of studies have addressed the effects of physical activity on specific abnormalities in cognitive and behavioural dysfunctions in children and youth.

A regular jogging program over 10 to 22 weeks has been shown to reduce the need for stimulant medication in children with ADHD (11). The theory behind this observation holds that increased motor activity resulting from physical exertion substitutes for the stimulant effects of medication. There is, however, uncertainty as to the duration of benefits derived from physical activity.

Research done on children with learning disabilities, although limited, shows that a program of regular aerobic exertion over an extended time of 20 weeks leads to an increase in physical fitness and an improvement in self-esteem. However, there was no observed difference in academic performance (20).

AUTISTIC STATES

When five-to six-year-old children with autism were engaged in aerobic activities for 5 to 8 min on a regular basis, they showed a reduction in self-stimulating behaviour compared with children in a control group playing quietly. Similar studies in children with autism also

showed a decrease in self-stimulatory behaviour following physical activity, but there was no improvement in social function (21).

SELF-ESTEEM

Although good self-esteem is important in all children, obese children are at particular risk for having poor self-esteem and being rejected by peers. Numerous studies have brought attention to the fact that it is difficult to specifically link increases in physical activity with improved self-esteem (22,23). Most studies suggest that exercise programs are related to improvements in the self-esteem scores of participants (24).

Speculation as to why increased physical activity may be associated with improved self-esteem includes the following:

- achieving goals;
- becoming more competent;
- achieving mastery;
- having increased social desirability;
- developing self-preservation strategies; and
- developing social reinforcement.

Previous meta-analysis studies done in elementary school-aged children support the concept that physical activity and a healthy self-concept are related (25). In some of these studies, the relationship was more prominent when aerobic activities were used (25).

INTELLIGENCE

No study has ever demonstrated the impairment of intellectual performances from increases in physical activity (26). However, the bulk of studies show that physical activity does not increase basic intelligence, but may improve academic performance (27). Studies of children with mental retardation that looked at the role of physical activity in improving intelligence showed that there was no gain in intelligence scores and no improvement in academic performances (28). However, an improved body image was observed in children with mental handicaps when they participated in regular physical activity (29).

JUVENILE DELINQUENCY

According to the majority of scientific studies, juvenile delinquency among athletic groups is less than that in the nonathletic population (30). There are some theories, proposed as an explanation. These theories include the following:

- the surplus energy theory (excess energy needs to be spent, and activity allows subjects to 'blow off steam') (1);
- the stimulus-seeking theory (the excitement and thrills resulting from physical activity satisfy the increased need for stimulation) (1); and
- the boredom theory (sport provides an alternative to occupy a time void, and by participating in physical activities, the child is too tired and too occupied to have energy left for delinquent behaviour) (1).

Positive family interactions as a result of exercise may also be a contributing factor in explaining the reduced incidence of delinquency among physically active children and youth (31).

CHARACTER DEVELOPMENT

Athletic competition does not appear to promote character development; instead, there are some studies that suggest that individuals with athletic experience have poorer attitudes toward fair play (32). Socially desirable behaviours such as friendliness, generosity and cooperation are inconsistent with physical activities that emphasize winning. However, physical activity may have the potential for personal growth in qualities including

persistence, deeper self-reliance, commitment and motivation, and may increase resourcefulness (33). This is probably truer for non competitive physical activities than team competition.

CONCLUSIONS

Future studies investigating the link between physical activity and mental health are needed for more definitive conclusions. Although some data suggest that there are benefits from physical activity, including reduced anxiety, depression and juvenile delinquency, and improved concentration, academic grades and self-esteem, further studies are required to draw more definite conclusions. Current data, for the most part, appear to be inadequate.

Meanwhile, preliminary data support a dictum advanced by the ancient Greeks: *Mens sana in corpore sano* –a healthy mind in a healthy body.

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