

Revisiting the importance of childhood activity

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Abstract

Formalised exercise programmes for children and adolescents are becoming increasingly important. There has been a drastic increase in documented childhood morbidity and mortality relating to poor nutrition and low activity levels in recent years. Regular physical activity decreases the risk of chronic disease and is also a fundamental component in the management of illnesses. Recommendations for the paediatric population remain insufficient and ill-defined. This article revisits the risks of physical inactivity in childhood and provides the latest recommendations for exercise prescription in the paediatric population. Inactive children have a higher risk of developing chronic diseases, such as obesity, type 2 diabetes, high blood cholesterol and hypertension. Other undesirable consequences include orthopaedic problems, cardiovascular disease and various psychological complications. Both aerobic and resistance training should be incorporated into paediatric exercise programmes. The recommended guidelines for childhood activity are 60 minutes of moderate-intensity exercise every day of the week. This article highlights the importance of formalised paediatric exercise programmes in disease prevention and health promotion. A healthy and happy adolescent population ultimately contributes to an adult population with a low risk of ill health.

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Introduction

There has been a drastic increase in documented childhood morbidity and mortality relating to poor nutrition, obesity and low activity levels in recent years. Formalised exercise programmes for children and adolescents are becoming increasingly important. In the past, children used to engage in spontaneous, unstructured, physical play time. These activities encouraged social interaction, stimulated creativity and developed motor skills. However, the primary goal was enjoyment.¹ Presently, various factors limit the amount of time children engage in critical play, drastically increasing the importance of proper paediatric exercise programmes.^{1,2} Causes of inactivity include an escalating use of cellphones, computers, television and video games, which all encourage a sedentary lifestyle. Urban lifestyle usually implies decreased access to playing space and equipment, with lack of supervision because both parents work.¹

A 2002 survey in England showed that 30.3% of boys and 30.7% of girls were overweight, while 16% of the boys and 15.5% of the girls were obese.³ Although exact figures are not available, the World Health Organization has reported that Africa is following the world trend, with growing rates of overweight and obesity. The number of overweight or

obese children in Africa in 2010 was more than double that in 1990.⁴ A recent review of the literature by the University of Pretoria indicated high levels of overweight and obesity in South African children and adolescents and identified inactivity as one of the major causes.⁵

The detrimental effects of suboptimal exercise during childhood extend beyond the mere aesthetics of being overweight or obese. They contribute directly to increased paediatric morbidity and mortality.³ Overweight children have a higher risk of developing chronic diseases, such as type 2 diabetes, high blood cholesterol and hypertension, at earlier ages. Other undesirable consequences include orthopaedic problems, cardiovascular disease and various psychological complications.¹⁻³

The converse is that regular physical activity decreases the risk of chronic disease and is also a fundamental component in the management of illness.² Structured exercise in childhood will significantly decrease the current morbidity and mortality rates observed in the paediatric population.³ It is recommended that in order to achieve the maximum health benefits of exercise, children should participate in 60 minutes of moderate-intensity physical activity on a daily basis.^{1,3}

Health benefits

The numerous physical and psychological benefits of exercise, summarised below, are extensively documented in the literature.³

Musculoskeletal development

One of the main benefits of exercise for children is enhancement of physical development. Regular physical activity boosts skeletal growth and promotes the development of the cardiorespiratory system.^{2,3} It also infers other advantages, such as improved hand-eye coordination, while optimising overall physical development and maturation.³

Reducing the risk of chronic disease

The incidence of coronary heart disease, obesity and numerous other chronic diseases can be significantly decreased by participating in regular moderate-intensity activity.³ It has been demonstrated that a combination of regular exercise and a healthy diet can delay the progression of impaired glucose tolerance, a subclinical condition, to type 2 diabetes, a clinical condition requiring medical treatment.⁶ Interestingly, certain orthopaedic conditions can also be prevented by structured exercise during puberty and the adolescent years. The risk of osteoporosis in later life can be reduced by weightbearing exercise, such as running, skipping and jumping.³

Study results indicate that physically active children are likely to be physically active as adults, and that obese children have a much greater chance of being obese as adults.³ On a positive note, this implies that apart from the physical and psychological advantages of exercise in childhood, proper and regular exercise can produce a healthier adult population in the long term.

Disease management

In cases where children already suffer from illness, suitable exercise can optimise their health and improve prognosis. In studies that investigated the effect of exercise on childhood hypertension and asthma, the results confirmed that regular sustained physical activity reduced blood pressure and improved quality of life in asthmatics.¹

Diabetes mellitus is another example of an illness in which exercise contributes to optimum management. The body does not produce enough insulin to promote the uptake of glucose by cells in patients with type 1 diabetes. They need to be injected with exogenous insulin, e.g. actraphane (Actrapid® and Humulin N®) in order to ensure glucose uptake and to stabilise blood glucose levels. Exercise plays a fundamental role in maintaining stable blood glucose levels via two mechanisms. Firstly, glucose is the primary

energy source in the metabolic processes required to sustain activity. It is steadily used up during exercise. Secondly, exercise increases the expression of glucose receptors in muscle and tissue cells. This causes an increased uptake of glucose by cells. Exercise helps to maintain stable blood glucose levels in both these ways, and in so doing the amount of exogenous insulin required by the patient is gradually reduced.⁷ The body produces insulin in patients with type 2 diabetes, but the cells are resistant to its action. The goal of treatment should be to minimise the risk of acute and chronic diabetes complications by encouraging weight loss, increasing exercise capacity, normalising blood glucose levels and controlling associated co-morbidities.⁶ Typically, these patients require the use of oral agents such as metformin (Glucophage®) to control their blood glucose levels.⁸

In summary, exercise improves sensitivity to insulin, increases glucose uptake and lowers blood glucose levels. As a direct consequence, patients benefit by being able to reduce the dose of required medication.^{1,6} A study by the American College of Sports Medicine showed that in high-risk diabetic populations, the risk of type 2 diabetes could be lowered by 58% using interventions which combined physical activity and modest weight loss.⁹

Psychological benefits

The psychological benefits of exercise are equally important to well-being. Exercise is known to improve self-confidence, and to lower anxiety, tension and depression.¹⁰ It can also aid in an increased sense of coherence and social integration.¹¹ Team sports have the added advantage of developing communication skills and improving social skills.^{3,6} Exactly how exercise causes these benefits is still controversial. Some theories include a sense of increased control, greater mindfulness or alterations in neurotransmitter levels.¹⁰ Generally, results indicate that regular physical activity has beneficial short- and long-term effects on psychological well-being.¹²

Practical guidelines for exercise

The recommended guidelines for childhood activity are 60 minutes of moderate-intensity exercise every day.^{1,3} Qualifying activities include active play, brisk walking, swimming, cycling and dancing.³ In addition, children and adolescents should be encouraged to participate in activities which enhance and maintain cardiovascular function, muscular strength, bone health and flexibility twice a week. Examples include climbing, skipping, jumping, gymnastics or aerobics.^{1,3} These activities need to be gradual, cumulative, moderate, enjoyable and varied.³ Any exercise programme must be carefully structured to avoid overtraining and overuse injury.¹ It is important to focus on

the enjoyment of the activities, with children in particular, rather than on ultimate success in a sport, or placing too much emphasis on body image or weight.

Both aerobic training and resistance training can achieve health benefits for children. Resistance training

develops muscle mass, muscle strength and muscular endurance. Although initially thought to stunt growth and contribute to musculoskeletal injury, resistance training is now recognised as an effective means with which to augment athletic performance if carefully supervised.¹

Resistance training has various beneficial effects as long as the child is emotionally mature enough to follow instructions and is capable of understanding the risks and benefits.^{1,13} Miller et al suggests that a resistance training programme should be used as part of a sport-specific training and conditioning programme because of the beneficial effects on muscle development and strength.¹³ Nettle et al provides various suggestions, summarised in Table I, for the development of a safe and effective paediatric resistance training programme.¹

Table I: Key factors to remember for a resistance training programme¹

- Individualise each training programme.
- Do not allow the participant to train too frequently, or to increase weights, sets or repetitions without supervision.
- Provide simple, clear and concise verbal instructions, as well as simple exercise demonstrations for every exercise.
- Encourage proper technique, form and posture.
- Inform parents continually of progress and performance.
- Keep training fun, but stress the seriousness of the activity.
- Participants should be able to describe and demonstrate each activity.
- Keep track of progress.
- Provide positive reinforcement.

Injury prevention during exercise

Finding the balance between exercise overloading and underloading is important. Just as too little exercise can increase the risk of chronic disease, too much can cause overuse injuries, as well as emotional and psychological complications.^{1,2}

There are two main types of sports injury: acute (traumatic) and chronic (overuse). An acute injury occurs as a result of trauma resulting from one specific incident, for example, ankle sprains or shoulder dislocation. By contrast, a chronic injury is caused by repeated microtrauma to cartilage, bone, tendons, ligaments and muscle.¹⁴

The first step in managing an injury is to make an accurate diagnosis and identify whether or not it is acute or chronic. The type of damage sustained from an acute injury will

determine the treatment, while it is of utmost importance to determine the correct biomechanical cause of an overuse injury, as symptomatic treatment alone will not resolve the condition. Medication can also be used to manage pain and inflammation. Commonly used drugs include nonsteroidal anti-inflammatory drugs, analgesics and corticosteroids.¹⁴ It is very important to determine the correct dose of these drugs in children and adolescents.

The way forward

This article highlights the importance of formalised paediatric exercise programmes in disease prevention and health promotion. A healthy and active adolescent population will ultimately contribute to an adult population with a low risk of ill health.³

It is clear that overweight and obesity contribute to paediatric morbidity and mortality, and that obesity is not solely due to overeating. Children are actually eating less, but becoming overweight because of incorrect food choices and drastic decreases in physical activity.^{1,3,4} The combination of healthier eating habits and correct exercise prescription is needed to overcome this nationwide problem.³

The combined effect of healthy children and adults will decrease the burden on the national health sector, while increasing longevity and productivity in the workplace, ultimately contributing to economic welfare in the long term. It is important for sports physicians to be mindful of the long- and short-term physical and psychological benefits of exercise, and to use this information to encourage an active lifestyle in both parents and children.

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