

Is There a Positive Relationship between Physical Fitness and Physical Activity in Children? - A Brief Review

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Abstract

Physical activity is regarded as an important component of a healthy lifestyle. It is a well-known notion that physical activity is strongly related with physical fitness in adults (Blair et al., 1989; Anderson & Haraldsdottir, 1995; Young & Steinhardt, 1993). The aim of this review is to investigate as whether this notion will exist for the Ellsiras rural children and children from other studies. Eight out of 11 found published studies which investigated the relationships between physical activity and physical fitness in children were included in the review. The included observational studies met the criteria used in the selection covering physical fitness and physical activity in children between the age from 5 to 14 years old. An overview of Ellsiras Longitudinal Study and other 7 eligible studies shared common findings of either few or low and moderate relationship between physical activity and physical fitness and especially with endurance performance does exist. The observed results therefore warrant further investigation on this relationship over a period of time from different cultural contexts.

Key Words: Physical Fitness, Physical Activity, Children, Comparative Review, Health, Chronic Diseases

Introduction

Physical fitness and physical activity of children are issues of current interest among public health and sport sciences professionals. Studies show that an early sign of chronic disease and risk factors for chronic disease like elevated cholesterol and hypertension which may be considered normal at the middle-age population can also be found in young children (*National Institutes of Health, 1996; US Department of Health and Human Services, 1996, World Health Organisation, 2002*). An alarming situation is that current generation of children and youth are often characterized as either physically unfit or physically inactive, or both (*Malina, 1997*). Therefore, the consequences of low aerobic fitness and low levels of physical activity found to be associated with chronic disease risk factors in children (*Davies et al., 1995; Deheeger et al., 1997; Kemper, 2004*).

Physical activity in the physiological terms refers to "...bodily movement produced by skeletal muscles and resulting in energy expenditure (*Bouchard et al., 1990*). Therefore, physical activity may be carried out in different forms or context such as free movement, play, formal exercise, dance, physical education, sport, work, and probably others. Physical fitness in children is classified into twofold context: motor and health-related fitness. The motor fitness includes components of skilled movements, i.e. agility, balance, coordination, power, speed, strength and muscular endurance that enable the individual to perform a great variety of physical activities. Health-related fitness is oriented towards health status and is operationalised in terms of cardiorespiratory function, abdominal and low back musculoskeletal function, and fatness (*Malina, 1997*). According to the findings by *Malina (1997)* is that in many developed countries, emphasis on the

fitness of children and youth has shifted from a primary motor focus to health-related focus over the past 15-20 years. The shift in emphasis to health-related for children and youth is based on either one or both of the following premises related largely to adult health concerns: (1) regular physical activity during childhood and youth may function to prevent or impede the development of several adult diseases which include physical inactivity in a complex, multi-factorial etiology: degenerative diseases of the heart and blood vessels, musculoskeletal disorders of the lower back, obesity and related complications; and (2) habits of regular physical activity during childhood and youth may directly and favorably influence physical activity habits in adulthoods and in turn have beneficial effect on the fitness and health status of adults (Malina, 1997).

It is been suggested that physical activity and physical fitness are strongly related (Livingstone, 1994). Comparative review studies on this relationship are limited, particularly in South Africa. The aim of this review is therefore, to investigate as whether this relationship will exist for the Ellisras rural children when compared with children from other studies. This review study will be presented by discussing the benefits that can be achieved by participating in physical activity and physical fitness, inclusion criteria and discussion of findings from literature on the relationship between physical fitness and physical activity in children, and recommendations.

Physical Activity and Physical Fitness Benefits to Health

Inactivity has been linked to the development of chronic diseases (Westernerp, 1999; Grund et al., 2001).

While physical activity is been considered as a modifiable factor for preventing and reducing mortality from many chronic diseases of lifestyle (National Institutes of Health, 1996; US Department of Health and Human Services, 1996; Bauman & Owen, 1999). In addition it is been suggested that people who are regularly active are more advantaged than the sedentary one's with regard to development of chronic diseases (Powell, 1997). Regular physical activity is linked to enhanced health and to reduced risk for all-cause mortality and the development of many chronic diseases (US Department of Health and Human Services, 1996). Furthermore, participation in physical activity provides people with substantial physical, social and mental health gains and well-being throughout the entire lifespan (Gallahue & Ozmun, 1995).

Physical fitness is the maintenance of basic body functions to get through day-to-day activities around the work place and the house. Cardiorespiratory endurance, or the body capacity to use oxygen efficiently, is often considered the most important health-related component of physical fitness (Malina, 1997). Research findings suggested that cardiorespiratory activity can reduce the risk or alleviate the symptoms of cardiovascular disease, obesity, hypertension, high blood cholesterol, and diabetes (Blair et al., 1989; Pate et al., 1995; National Institutes of Health, 1996; US Department of Health and Human Services, 1996; Williams, 2001).

Is There A Relationship Between Physical Fitness And Physical Activity In Ellisras Children And Children From Other Studies?

In answering the research question raised in this review a literature

search was performed with the aid of computer through Medline, PUBMED search performed on 18 April 2006, using physical fitness and physical activity as key words. Further, studies included were restricted to those studies which deal with children (i.e. covering the age range from 5 to 14 years) on the relationship between physical fitness and physical activity. The included studies were mostly on cross-sectional design. Eight out of 11 found published studies which were relevant and were included in the review (Table 1). The excluded studies were based on the associations between nutrition or growth, fatness and physical fitness and physical activity or vice versa, or children older than the one included in the selection criteria. Furthermore, some investigating the role of physical activity in obesity/overweight.

Table 1. An overview information of observational studies on physical fitness and physical activity in children

Country	Reference	Number. of subjects studied by gender	Age range (years)
<i>Ellisras (South Africa)</i>	<i>Monyeki et al. 2005</i>	212 (112 boys; 100 girls)	7-14
<i>Senegal</i>	<i>Benefice, 1993;</i>	40 (20 boys; 20 girls);	10 & 13;
	<i>Benefice, 1998</i>	140 (66 boys; 74 girls)	8.5-13.5
<i>Mozambique</i>	<i>Prista et al., 1997</i>	593 (277 boys; 316 girls)	8-14
<i>Taiwan</i>	<i>Haung and Malina, 2002</i>	282 (138 boys; 144 girls)	12-14
<i>Estonia</i>	<i>Oja & Jürimäe, 1998</i>	294 (161 boys; 133 girls)	6
<i>Kiel (Germany)</i>	<i>Grund et al. (2000)</i>	88 (49 boys; 39 girls)	5-11
<i>Bangor, North Wales</i>	<i>Rowlands et al., 1999</i>	34 (17 boys; 17 girls)	8-10

In contrary to what was postulated by *Livingstone (1994)* that it is obvious that activity and fitness are strongly related the reviewed studies showed few relationships (Table 1). **In South Africa**, the cross-sectional findings in 212 boys and girls aged 7-14 year old from the *Ellisras Longitudinal Study (Monyeki et al., 2000)* showed few significant relationships between physical activity and sit-ups, shuttle run and 1600m run in girls, but none in boys (*Monyeki et al., 2005*). Further, in **Senegal** *Benefice (1992; 1998)* reported low relationships between estimated activity and motor fitness variables. In addition *Benefice's* study showed gender differences in the relationship between cardiorespiratory fitness and activity in girls, but not in boys. Furthermore, similar results were also found in a study that was done in **Mozambique**, where it was reported that total physical activity was significantly associated with cardiorespiratory endurance run (*Prista et al., 1997*). In **Taiwane** youth 12-14 years of age, estimated energy expenditure in moderate-to-vigorous physical activity was significantly related to the one-mile run and sit-and-reach, but was not related to sit-ups and the sum of skinfolds. After controlling for age, sex, socio-economic status and area of resident, though not significant, were low, 0.12 to 0.19, and the amount of variance accounted for was <5% (*Haung and Malina, 2002*). **Estonian children**, few significant relationships between fitness and activity were observed after the correction for age, height and weight (*Oja & Jürimäe, 1998*). Such relationships were found between activity, plate tapping, flamingo balance, standing broad jump, bent arm hang, handgrip, endurance shuttle run for boys and girls separately.

In **Kiel (Germany)**, a study by Grund et al. (2000) which investigated the relationships between physical activity, physical fitness, muscle strength and nutritional state in 88 children 5- to 11-year-old revealed no association between energy expenditure and activity with aerobic fitness.

In **Bangor, North Wales**, Rowlands and colleagues (1999) in their study which investigated the relationship between habitual daily activity and levels of body fatness and aerobic fitness in 8- to 10-year-old children. In their study significant relationship between aerobic fitness (endurance run on a treadmill) and activity (Tritrac and pedometer) was found.

Implications and the Wayforward

The outcomes of this review study were in contrast with observed strong relationship found in adults' studies on the relationship between physical fitness and physical activity. This may however be a major concern for public health and human movement science professionals, and therefore appeal for further investigation in the relationship between physical fitness and physical activity over a period of time. Criticism made by Malina (1997) are that the physical education profession should start to shift emphasis on sport skills and do much on health-related physical fitness such as cardiorespiratory fitness, muscle and power strength. The stated criticism may seem to be relevant for the findings in this review. Moreover, many involved in public health or the health promotion field hold that cardiorespiratory endurance and fitness should be the objective of physical education at all grade levels, particularly in the context of the goals of the Healthy

People 2000 (U.S. Public Health Service, 1990).

Today, few studies have examined the relationship between activity and fitness particularly in developing countries like South Africa. Therefore, more studies from different cultural background including Ellisras Longitudinal Study with the emphasis on longitudinal design are needed to confirm or refute the discrepant findings regarding physical fitness and physical activity in children. In addition to activity questionnaire, there is also a need to employ some sophisticated methods of assessing physical activity in children in order to draw a clear conclusion on (1) the relationship between physical fitness and physical activity in children and (2) to unravel the causality of this relationship with randomized control trials with physical activity as the independent and physical fitness as the dependent variable.

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