



Relationship between depressive symptoms with physical activity and physical fitness among children



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KEYWORDS

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Abstract

This study examined the relationship between depressive symptoms with both physical activity (PA) and physical fitness among children. 530 Schoolboys underwent standard anthropometry, One-mile run/walk and hand grip strength tests. Lower PA was observed for the boys with high depressive symptoms (HDS). Time of One-mile run/walk test showed simultaneously increasing as depressive symptoms increasing. No significant difference was observed for grip strength among the boys with depressive symptoms. Overall, HDS were related to greater body fatness, lower PA, and worse performance of doing the one-mile run test (but not grip strength) compared with the boys with lower depressive symptoms.

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1. Introduction

Obesity and depression, conditions which have until recently been considered “adult” health problems; are now recognized as common conditions among youths (Ogden et al., 2006). Prevalence of major depressive disorder has been estimated to be 2% of children, and 4-8% of adolescents (Birmaher et al.,

2004). It has been reported that rate of psychological illness in children and adolescents are increasing (Collishaw, Maughan, Goodman, & Pickles, 2004). Furthermore, a lot of studies have reported significant relationship between psychological difficulties such as depression and obesity in youths (Eremis et al., 2004; Pyle et al., 2006; Shoup, Gattshall, Dandamudi, & Estabrooks, 2008).

Regular participation in physical activity (PA) not only benefits adolescents and children by strengthening muscles, increasing bone mass, sustaining oxygen uptake, and reducing risk of cardiovascular disease and other chronic diseases, but also helps to improve self-esteem, increase self-consciousness and reduce anxiety and stress (Janssen & LeBlanc, 2010; Li, 2012; McManus & Mellecker 2012; Scully, Kremer, Meade, Graham, & Dudgeon, 1988).

On the other hand, physical fitness can be thought of as an integrated measure of most, if not all, the body functions

Abbreviations: BMI, body mass index; WC, waist circumference; FM, fat mass; FFM, fat free mass; HDS, high-depressive symptoms; CRF, cardiorespiratory fitness; PA, physical activity; SES, socio-economic status; IOTF, International Obesity Task Force; PAQ-C, PA Questionnaire-Children; MANCOVA, multivariate analysis of covariance; ANOVA, analysis of variance

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(skeletal muscular, cardiorespiratory, hematocirculatory, psychoneurological and endocrine-metabolic) involved in the performance of daily PA and/or physical exercise (Janssen & LeBlanc, 2010; Scully, Kremer, Meade, Graham, & Dudgeon, 1988). Hence, when physical fitness is tested, the functional status of all these systems is actually being checked. This is the reason why physical fitness is nowadays considered one of the most important health markers, as well as a predictor of morbidity and mortality for cardiovascular disease and for all causes (Blair, Cheng, & Holder, 2001; Ortega, Ruiz, Castillo, & Sjostrom, 2008).

Although, a negative relationship has been shown between being physically active and psychological difficulties such as depression by several studies (Dishman et al., 2006; Feng et al., 2009; Jerstad, Boutelle, Ness, & Stice, 2010; Motl, Birnbaum, Kubik, & Dishman, 2004; Suija et al., 2013; Tomson, Pangrazi, Friedman, & Hutchison, 2003), and some recently studies among adults and older people have demonstrated relationship between high depressive symptoms (HDS) with worse performance of doing some physical fitness tests, such as aerobic fitness and static strength tests (Garrison, Addy, Jackson, McKeown, & Waller, 1992; Nabkasorn et al., 2006; Rantanen et al., 2000; Suija et al., 2013; Tomson et al., 2003; Van-Millingen, Lamers, de Hoop, Smit, & Penninx, 2011), however, there are little evidences about the relationship between psychological difficulties such as depressive symptoms with PA, physical fitness and weight status in children. Therefore, examining the relationship between depressive symptoms with some health related variables (as mentioned above) may be able to help to facilitate a better understanding about psychological difficulties such as depression in children. Therefore, the present study aimed to examine the relationship between depressive symptoms with some anthropometric variables, PA and physical fitness (aerobic fitness and muscle strength) among a sample of 8-11 year old aged children.

2. Methods

2.1. Subjects and design

In 2012-2013, this cross-sectional study was conducted in 568, 8-11 year old schoolboys in the center of Ardabil Province, North West of Iran. Ardabil is located in 70 km far from Caspian Sea, cold and semi-arid, with an area of 18,011 km², and 564,365 inhabitants. The selection of the participants was made on stratified random-sampling from 7-11 year old student population (N=21,253). At the first stage a systematic random-sampling procedure was conducted to select the schools (only boys' public elementary schools). Then five schools were selected in urban areas of the center of Ardabil Province. At the second stage, classes (total number=19) were selected at each grade using a simple random-sampling method. All boys in the selected classes were invited to participate in the study. The exclusion criteria were the known presence of chronic disease, musculoskeletal injury, and use of medication that alters physical fitness tests. The nature and purpose of the study were explained to parents before consent was obtained, and participation was on a voluntary basis. The measurements and the fitness tests that the children underwent were carried out at the time of physical education lessons. Because of dropping out 38 children during the study (withdrawal of the

Table 1 Characteristics of the study participants (n=530).

	Mean ± SD
Age (year)	9.65 ± 1.1
Height (cm)	135.2 ± 7.8
Weight (kg)	32.15 ± 8.8
BMI (kg/m ²)	17.4 ± 3.2
Fat mass (kg)	8.6 ± 6.6
WC (cm)	60.6 ± 9.45

BMI: body mass index; FM: fat mass; WC: waist circumference.

study, diseases, etc.), the last participants number decreased to 530 boys. General characteristics of the participants are shown in Table 1. The present study was approved by the Human Ethical Committee of the Ardabil department of Education, and the experiment was performed in accordance with the ethical standards of the committee and with the Helsinki Declaration. All the children volunteered for the present study and informed consents according to the rules of the department were acquired from all the participants in written and parents' signed form.

2.2. Anthropometric variables

Weight was measured in underwear and without shoes with an electronic scale (Type SECA 861) to the nearest 0.1 kg, and height was measured barefoot in the Frankfurt horizontal plane with a telescopic height measuring instrument (Type SECA 225) to the nearest 0.1 cm. Body mass index (BMI) was calculated as body weight in kilograms divided by the square of height in meters. Cut-off points for BMI defining, underweight, normal weight, overweight and obesity were identified by using the International Obesity Task Force (IOTF) BMI cut-off points (Cole, Bellizzi, Flegal, & Dietz, 2000; Cole, Flegal, Nicholls, & Jackson, 2005). Waist circumference (WC) was measured midway between the lowest rib and the superior border of the iliac crest with an inelastic measuring tape at the end of normal expiration to the nearest 0.1 cm.

Lange skinfold calipers were used to assess tricep (vertical fat fold taken midway between the olecranon process and acromion process on the posterior aspect of the arm) and calf (vertical skinfold taken on the medial aspect of the calf at the point of largest circumference) skinfold thickness (Roche, Heymsfield, & Lohman, 1996). All measurements were taken on the right side of the body. The average of three measures was calculated for each site and the following equations were used to predict fat mass (Roche et al., 1996):

$$\text{Males: \% fat} = 0.735 (\text{sum of average skinfolds}) + 1.0$$

$$\text{Fat mass (FM)} = \text{weight} \times \text{fat percentage} / 100$$

$$\text{Fat free mass (FFM)} = \text{weight} - \text{fat mass}$$

2.3. Depressive symptoms

Children's Depression Inventory (CDI), a reliable and well-validated twenty-seven item questionnaire with total scores

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