



Effects of exercise on physical fitness in children with intellectual disability

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ABSTRACT

This paper presents the results of the study which examined the effects of carefully designed physical exercise programs on the development of physical fitness in children with ID. The study sample consisted of 42 children with ID and 45 typically developing children. All the participants were assessed using Eurofit Test Battery. The results were analyzed in terms of participation in the exercise program and level of intellectual functioning. While ID children scored significantly lower on fitness tests when compared with typically developing children, the study revealed an association between degree of ID and physical fitness.

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1. Introduction

Children with intellectual disabilities (ID) exhibit numerous impairments in different domains of functioning. Alongside impairments in cognitive, social and adaptive behaviour, they also report lower levels of physical fitness at all stages of life (Pitetti & Boneh, 1995; Skowroński, Horvat, Nocera, Roswal, & Croce, 2009; Van De Vliet et al., 2006). Furthermore, numerous researchers have reported lower performance on standard fitness tests for the assessment of strength, endurance, flexibility and motor coordination, cardiovascular endurance in persons with ID (Chaiwanichsiri, Sanguanrungrasirikul, & Suwannakul, 2000; Fernhall & Pitetti, 2001; Graham & Reid, 2000; Guideti, Franciosi, Gallota, Emeranziani, & Baldari, 2010; Horvat, Pitetti, & Croce, 1997; MacDonncha, Watson, McSweeney, & O'Donovan, 1999; Skowroński et al., 2009). Lower scores in the domain of physical fitness are associated with limited mental ability and short attention span (Vuijk, Hartman, Scherder, & Visscher, 2010), limitations and impediment in motor development (Frey & Chow, 2006; Hartman, Houwen, Scherder, & Visscher, 2010; Vuijk et al., 2010; Westendorp, Houwen, Hartman, & Visscher, 2011), sedentary lifestyle (Bickum, 1995; Lotan, Isakov, Kessel, & Merrick, 2004; Pitetti & Boneh, 1995), and lack of motivation to try one's best during testing (Halle, Gabler-Halle, & Chung, 1999). Test scores are influenced by gender, age, and level of intellectual disability (Fernhall & Pitetti, 2001; Skowroński et al., 2009). In that respect, children with mild ID have lower scores on locomotor skills than children with borderline ID (Hartman et al., 2010) and athletes with lower ID obtain higher performance scores in motor coordination test (Guideti et al., 2010).

Little information is available on the provision of physical fitness and intervention programs among people with intellectual disabilities, particularly concerning children with ID. Authors Hayakawa and Kobayashi (2011) reported

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significant improvement in children with ID in the 50 m dash, mean 10 m walk time, 10 m obstacle course walk and a significant increase in the hip joint split angle. Earlier studies done on adults with ID reported beneficial effects of exercise as shown in statistical decreases in individual weight, especially among the mild disability level group, BMI score, and positive improvement in V-shape sit and reach test, sit-up tests. (Wu et al., 2010). Benefits of physical activity were observed in balance, strength, endurance and health self-perception (Carmeli, Zinger-Vaknin, Morad, & Merrick, 2005). Movement difficulties, impossible or impeded coordination of upper and lower limbs significantly reduce activities in children with ID, which is first observed in the family and school environment, and continues throughout adulthood. Reduced number of activities that would enable children to improve existing and develop new abilities may significantly affect their functioning in further everyday life, thereby putting them at risk of declining health associated with low physical fitness (Graham & Reid, 2000; Horvat & Croce, 1995; Piek, Dawson, Smith, & Gasson, 2008).

The aim of our research was to determine whether and to what extent application of different planned activities, i.e. specific exercise program, could affect the development of physical fitness in children with borderline and mild ID.

2. Methods

2.1. Participants

The sample population consisted of 87 young school-age children, i.e. from 6.5 to 12 years old (mean 8, 6 SD 1, 89). Of the total number of participants, 42 were children with ID, enrolled in special schools, while 45 were children recruited from the general population, attending regular schools. All children were from a similar cultural background.

Of the 42 participants with ID, 23 were classified as having mild ID (52%) and 19 as having borderline ID (48%). The sample did not include children with Down Syndrome. The following criteria were observed when creating the sample of children with ID: presence of intellectual disability as defined by the *American Psychiatric Association* (2000); children in the 6.5–12 age range; normal neurological and health status. The study excluded children with metabolic diseases, as well as musculo-skeletal, cardio and respiratory system diseases, in order to avoid potential influence of neurological and health factors on physical fitness test results. Accordingly, the sample did not include children with multiple disabilities. Furthermore, the sample did not include children who regularly participated in physical activities. The other group included typically developing children from local schools who were randomly selected and aligned according to gender and age with the group of children with ID. When creating this group the following criteria were observed absence of intellectual disability; children in the 6.5–12 age range; normal neurological and health status. The study excluded participants with metabolic diseases, as well as musculo-skeletal, cardio and respiratory system diseases, in order to avoid potential influence of neurological and health factors on physical fitness test scores. This group did not include children who participated in organized physical activities, either.

The first phase focused on creating the study groups with different treatment. Three treatment groups were formed. The first, experimental group (E) included 21 participants, 12 of whom were children with mild ID and 9 with borderline ID, all of whom participated in the fitness program. The second group, control group 1 (K1), included the same number of participants (21), 11 of whom were diagnosed with mild ID, 10 with borderline ID. This group did not participate in the fitness program, but was only involved in the initial and final testing. In order to achieve adequate control of numerous other factors which may affect the scores, groups E and K1 were evenly matched and pairs were formed, whereby each child from group E was matched with a child of identical gender, age and IQ from group K1. Consequently, the two groups were aligned by gender, age and abilities. Children without disabilities made up the third group, control group 2 (K2), consisting of 45 typically developing participants, who did not participate in the fitness program, either.

The research was reviewed and approved by the Research Committee. Written consent was obtained from children's parents or guardians, as well as from schools administrators, who were informed about the aim and course of this research.

2.2. Procedure

Following the selection and alignment of the sample population, initial assessment of physical fitness was performed. Final assessment was done after the completion of the 6-month experimental program. Physical fitness was assessed in a sports facility that meet all the required criteria (health and sanitary requirements, adequately dimensioned space, lighting, adequate flooring, sufficient equipment and accessories, measuring instruments). After careful consideration of the initial results and assessment of all parameters related to the abilities of children with ID, individual programs were designed for all children from the experimental group. The 6-month fitness program consisted of 3 weekly sessions, each lasting 45 min, with activities performed with each child individually. The fitness sessions took place both during and outside school hours. The fitness program included a detailed description of exercises, exercise aim (e.g. developing coordination), time and venue (e.g. gym, Monday 14–14.45), person responsible for leading the program (e.g. name of the leader). Most of the activities were performed in the indoor sports facility and outdoor grounds, with participation of senior year students of the Teachers' Training Faculty, class teachers, as well as sports teachers. The activities performed were exercises recommended for development of specific physical fitness.

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