



ELSEVIER

Contents lists available at ScienceDirect

Research in Developmental Disabilities



High risk for obesity in children with a subtype of developmental coordination disorder



Yi-Ching Zhu^a, John Cairney^b, Yao-Chuen Li^b, Wei-Ying Chen^c,
Fu-Chen Chen^d, Sheng K. Wu^{e,*}

^a Graduate Institute of Clinical Medical Science, China Medical University, Taichung City 404, Taiwan

^b CanChild Centre for Childhood Disability Research, Departments of Family Medicine, Psychiatry & Behavioural Neurosciences & Kinesiology, McMaster University, Hamilton, ON, Canada

^c School of Psychology, The University of Sydney, Sydney, NSW 2006, Australia

^d Department of Recreation Sport & Health Promotion, National Pingtung University of Science & Technology, Taiwan

^e Institute of Sport Performance, National Taiwan University of Physical Education & Sport, Taichung City 404, Taiwan

ARTICLE INFO

Article history:

Received 14 September 2013

Received in revised form 20 February 2014

Accepted 27 February 2014

Available online 27 March 2014

Keywords:

Obesity

Children

Developmental coordination disorder

Balance

Taiwan

ABSTRACT

The purpose of this study was to compare the prevalence of overweight and obesity in typically developing (TD) children, children with developmental coordination disorder (DCD) and balance problems (DCD-BP), and children with DCD without balance problems (DCD-NBP). Two thousand and fifty-seven children (1095 boys, 962 girls) ages 9–12 years were recruited from 18 elementary schools in Taiwan. The Movement Assessment Battery for Children was used to assess motor coordination ability. International cut-off points for body mass index were used to classify participants into the following groups: normal-weight, overweight or obese. Compared with TD children, children in the DCD-BP group were more than twice as likely to be obese (OR = 2.28; 95% CI = 1.41–3.68). DCD-BP children were also more likely to be obese compared to DCD-NBP children (OR = 1.79; 95% CI = 1.02–3.16). Boys in the DCD-BP group were more likely to be obese when compared to DCD-BP girls (OR = 3.12; 95% CI = 1.28–7.57). Similarly, DCD-NBP boys were more likely to be obese when compared to DCD-NBP girls (OR = 2.67; 95% CI = 1.21–5.89). Children with both DCD and BP were significantly more likely to be obese when compared to TD and DCD-NBP children. From an intervention perspective, the inclusion of regular physical activity, including activities that encourage development of both balance and energy expenditure, may be required to prevent obesity in this population.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

A diagnosis of developmental coordination disorder (DCD) is made when the level of performance of movement skills is substantially below that expected for a child's chronological age and measured intelligence (American Psychiatric Association, 2000). The specific manifestations of the disorder affect both gross and fine motor skills. Children with DCD experience difficulties performing a wide variety of motor tasks, which results in significant negative impacts to everyday

* Corresponding author. Tel.: +886 4 22213108x2203; fax: +886 4 22250756.

E-mail address: skwu@ntupes.edu.tw (S.K. Wu).

activities of daily living, such as feeding, dressing, writing, self-care, and play skills (Barnhart, Davenport, Epps, & Nordquist, 2003; Missiuna, Moll, King, King, & Law, 2007). Even with practice/training, children with DCD have difficulties learning new skills and are likely to avoid participating in activities in order to prevent experiencing frustration and failure. Children with DCD are often less physically active and tend to prefer more sedentary lifestyle pursuits (Cairney, Kwan, Hay, & Faught, 2012; Wu, Lin, Li, Tsai, & Cairney, 2010). As a result, it has been argued that children with DCD are at increased risk of obesity and poor physical fitness, which in turn may lead to negative health outcomes later in life (Li, Wu, Cairney, & Hsieh, 2011).

Currently, the precise causal connections between DCD and obesity are not yet known. Some studies report DCD as a risk factor for obesity, others stress the influence of weight on motor coordination/ability. For example, several studies have shown that children and adolescents with DCD were more likely to be overweight or obese compared to typically developing (TD) children, suggesting obesity may result from motor coordination difficulties (Cairney et al., 2010; Schott, Aloff, Hultsch, & Meermann, 2007). Schott et al. (2007) in the UK study reported that the percentage of overweight and obese children ages 10–12 years was significantly higher in the DCD group than in the TD group. Cairney et al. (2010) using a large longitudinal sample of Canadian children found that those with DCD were at persistently greater risk of overweight (odds ratio [OR] = 3.44) and obesity (OR = 4.00). At the same time, several studies have also shown that obesity may affect the motor proficiency of preschoolers and children. D'Hondt, Deforche, De Bourdeaudhuij, and Lenoir (2008) demonstrated that childhood overweight and obesity have a negative impact on fine motor skills performance when postural balance is simultaneously challenged. Some studies reported that overweight and obese children showed poorer locomotor skills, such as jumping, kicking and poor performance in the shuttle run and 30-m sprint when compared to their normal-weight peers (Graf et al., 2004; Okely, Booth, & Chey, 2004). Compared to balance ability, however, weight status in children may have less influence on object control and fine motor skills. Zhu, Li, and Wu (2010) reported that obesity was associated with poor performance on both static and dynamic balance tasks among boys and girls. Similarly, several studies also indicated that the higher risk for DCD in obese children in comparison to normal-weight peers was more pronounced in balance than in ball control and manual dexterity (D'Hondt et al., 2008; Wagner et al., 2011).

Previous studies have investigated the balance ability of overweight and obese children and reported that these children displayed lower locomotor and balance skill levels compared with peers with healthy weight (Roberts, Veneri, Decker, & Gannotti, 2012). McGraw, McClenaghan, Williams, Dickerson, and Ward (2000) also found that obese prepubertal boys had poorer postural stability during quiet stance, and showed significantly greater sway, energy, and variability in the gait cycle. They suggested that the instability observed in obese boys may be caused by excess body weight. In addition, D'Hondt et al. (2011) demonstrated higher variability in postural sway velocity in overweight children. The above findings suggested that overweight or obesity may impose constraints on children's balance and functional performance.

It is well known that DCD is a highly heterogeneous disorder, and children frequently present with co-occurring conditions in addition to their motor difficulties (Macnab, Miller, & Polatajko, 2001; Visser, 2003). Clearly, there are no typical motor deficit profiles of children with DCD. Children with DCD have been found to show several subtypes (Hoare, 1994; Zhu et al., 2010). The construct of "subtype" was proposed in order to understand the nature and characteristics of children with DCD in greater depth. There are two methods used to classify different subtypes of DCD in the extant literature. The first approach is descriptive: The researcher selects specific cutoff points on different sub-tests (e.g., tests of balance; tests of fine motor skills) used to assess DCD to classify children into different subgroups (Hoare, 1994; Macnab et al., 2001). For example, Geuze (2003) and Tsai, Wu and Huang (2008) created a subtype children with DCD and balance problems (DCD-BP) using the following criteria: Total Impairment Score (TIS) of the Movement Assessment Battery for Children test (MABC test) at or below 5th percentile; the Total Balance Score (TBS) of the MABC test at or below 5th percentile; and the static balance score >1 on the MABC test.

The second classification method for children with DCD is based on a statistical approach - cluster analysis. However, because the initial selection of variables to include in the cluster analysis is left to the discretion of the researchers involved, this inevitably leads to different subtype classifications (Hoare, 1994; Macnab et al., 2001; Wu, Lin, & Zhu, 2007; Zhu et al., 2010). In general, the results of this work have led to subtypes characterized by a generalized motor deficit or by difficulties in particular fundamental or functional abilities, such as balance ability, fine motor skills and ball control (Wright & Sugden, 1996; Wu et al., 2007; Zhu et al., 2010). Because the present study focuses specifically on the role of balance problems in relation to overweight and obesity in children with and without DCD, the descriptive approach was selected to classify DCD subtype groups.

A subtype of children with DCD-BP has been consistently identified in most subtyping studies (Hoare, 1994; Macnab et al., 2001; Wu et al., 2007; Zhu et al., 2010). Previous studies have shown that children with DCD-BP had a marked sway in the center of pressure, either during the two-leg stance or in more difficult conditions like standing on the non-preferred leg with eyes closed (Geuze, 2003; Tsai, Wu, & Huang, 2008). Although previous studies have reported that obesity may be associated with poor motor coordination ability, particularly in relation to balance ability, these studies have been somewhat limited by small samples; this in turn affects the ability to make statistical comparisons within and between subtype groups of children with DCD. Therefore, the purpose of the present study was to compare the prevalence of overweight and obesity among TD children, children with DCD and balance problems (DCD-BP), and children with DCD and no balance problems (DCD-NBP). We hypothesized that the prevalence of overweight and obesity would be higher in the DCD-BP subtype group. When compared to those in the DCD-NBP and TD groups. Because there is inconsistency in the results concerning the relationship between balance and obesity between boys and girls in the published literature (Cairney et al., 2010; Graf et al., 2004; Wagner et al., 2011), gender differences were also examined.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات