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## Understanding physical activity and motivations for children with Developmental Coordination Disorder: An investigation using the Theory of Planned Behavior



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### ABSTRACT

Developmental coordination disorder (DCD) is a neurodevelopmental condition, affecting approximately 5–6% of children. Previous research has consistently found children with DCD being less physically active compared to typically-developing (TD) children; however, the psychosocial factors associated with physical activity for children with DCD are poorly understood. The purpose of this study was to examine how theory-based physical activity cognitions impacts physical activity behaviors for children with and without DCD. Participants included a sample of boys ( $N = 61$ ,  $M_{\text{age}} = 13.25 \pm .46$ ) with DCD ( $n = 19$ ) and without DCD ( $n = 42$ ), drawn from a larger prospective cohort study. A questionnaire with psychosocial measures was first administered, and accelerometers were used to assess their physical activity behavior over the subsequent week. Findings indicate that DCD was significantly associated with lower physical activity ( $F(1,58) = 6.51, p < .05$ ), and poorer physical activity cognitions ( $F(4,56)$  Wilks Lambda = 2.78,  $p < .05$ ). Meditational analyses found attitudes ( $B = .23, p < .05$ ) and subjective norms ( $B = .31, p < .05$ ) partially mediating the relationship between DCD and physical activity. Overall, this study further confirms that the activity deficit that exists among boys with DCD, and that the relationship is partially mediated through some physical activity cognitions. Interventions should target the perceived approval of influential people, and the personal evaluations of physical activity for boys with motoric difficulties. These findings further emphasizes the discrepancy in physical activity that exist between boys with DCD and TD boys, and highlight the need to better understand the psychological factors related to physical activity for children with DCD.

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## 1. Introduction

Developmental coordination disorder (DCD) is a neurodevelopmental disorder affecting approximately 5–6% of school-aged children (APA, 2000; Kadesjo & Gillberg, 1999). Compared to typically-developing (TD) children, those with DCD have substantially poorer motor coordination abilities, which with activities of daily living including active play (APA, 2000). Emerging literature has found children with DCD to be less physically fit (Cairney, Hay, Faught, Flouris, & Klentrou, 2007; Faught, Hay, Cairney, & Flouris, 2005; Schott, Aloff, Hultsch, & Meermann, 2007), less physically active (Cairney, Kwan, Hay, &

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Faught, 2012; Wrotniak, Epstein, Dorn, Jones, & Kondilis, 2006), and at significantly greater risk for overweight and obesity (Cairney, Hay, Faught, & Hawes, 2005; Faught et al., 2005; Hay, Hawes, & Faught, 2004). Together, these conditions position children with DCD at higher risk for coronary vascular disease (Cairney et al., 2007; Cairney, Hay, Veldhuizen, & Faught, 2010; Faught et al., 2005), negative self-perceptions (Piek, Baynam, & Barrett, 2006; Skinner & Piek, 2001), and social and emotional problems from childhood through adolescence and beyond (Cantell, Smyth, & Ahonen, 1994).

Despite the accumulating evidence of physical inactivity among children with DCD, few studies have examined the psychosocial factors related to engagement in physical activity for this population. The extant evidence suggests that children with DCD have lower perceived athletic competence and tend to avoid participation in sports or active pursuits (Fitzpatrick & Watkinson, 2003; Piek et al., 2006); leading unfortunately, to a misperception of being unmotivated or lazy. Perhaps even more disheartening, DCD often goes undiagnosed and/or is not treated due to the belief that their impairment is simply a “playground disability” that they will out-grow, and is not serious enough to warrant intervention (Losse et al., 1991). The current study aims to better understand the influence of theory-based psychosocial factors on the relationship between DCD and physical activity behaviors. Specifically, we used Ajzen's (1991) theory of planned behavior (TPB) to examine whether the physical activity cognition variables of attitudes, subjective norms, perceived behavioral control, and intentions, mediate the relationship between DCD and physical activity.

The TPB is a popular theoretical framework in behavioral research to predict diverse health behaviors such as fruit and vegetable consumption or seatbelt use, and is widely used in predicting physical activity behavior (Hagger, Chatzisarantis, & Biddle, 2002). Briefly, the theory posits that an individual's intention – representing one's motivation and sense of a conscious decision to exert effort to perform the behavior – is directly influenced by three antecedent factors: attitudes, subjective norms, and perceived behavioral control (PBC). Attitude represents the positive or negative evaluation of the target behavior, with respect to our study physical activity. Subjective norm reflects the perceived social pressures to perform the behavior, and PBC represents the beliefs one has about the presence of factors that may enable or hinder performance of the behavior and the perceived degree of control he/she has over these factors. The theory suggests that people are more likely to intend to perform a behavior if they evaluate it positively, believe that other important people think they should perform it, and believe that they have control over their behaviors. Given that childhood may be a formative stage for the development of physical activity cognitions (Rhodes, Macdonald, & McKay, 2006), and that these factors are considered amenable to change (Hagger et al., 2002), this study will provide a basis for the development of theory-based interventions targeting children with DCD.

In addition to understanding the salient psychological factors related to physical activity among children with DCD, it is also important to acknowledge that many of the existing studies on children with DCD have used self-report measures of physical activity (Cantell et al., 1994; Losse et al., 1991; Piek et al., 2006; Skinner & Piek, 2001). Self-report measures often result in an overestimation of actual physical activity in children and adolescents (Welk, Corbin, & Dale, 2000), as a result of social desirability bias and/or the cognitive demands associated with retrospectively estimating intensity and duration of the behavior. Objective measures of physical activity such as motion sensor monitors provide a less biased estimate of physical activity, capturing short, random bursts of activity, stemming from participation in structured and unstructured activities (Armstrong & Welsman, 2006). Few studies have used sensor monitors such as accelerometers to estimate physical activity in children with DCD. One exception was a recent study by Green and colleagues (2011), examining differences in physical activity between children with probable DCD (pDCD) and TD children using accelerometry. Similar to previous research using self-reported measures of physical activity (Cairney et al., 2005a; Cairney, Hay, Veldhuizen, Missiuna, & Faught, 2009; Wrotniak et al., 2006), results from Green et al. found children with pDCD significantly less active than TD children, but that the effect of pDCD on moderate-to-vigorous physical activity was gender specific: for boys, having pDCD was associated with lower levels of physical activity. This gender differences was also evident in another recent physical activity study of children with DCD. Using accelerometers to assess physical activity, Spironello and colleagues (2011) found that the direct effect of DCD on physical activity was observed only for boys, not girls. Therefore, in an effort to examine the influence of physical activity cognition on the relationship between DCD and physical activity among children with DCD, the current study will examine how variables of the Theory of Planned Behavior relates to physical activity behaviors assessed by accelerometry, between boys with and without DCD.

## 2. Methods

### 2.1. Participants

The study is a cross-sectional investigation of a subset of children, who were participating already in a 6-year, prospective cohort study examining healthy growth and development of children, called Physical Health and Activity Study Team (PHAST; Cairney et al., 2009). A group of children ( $n = 126$ ) were selected from PHAST, and invited to participate in a longitudinal case-control study. This investigation is based on data collected in the fifth year of the longitudinal study. The cohort consists of 61 male participants who were selected from the PHAST study based on their motor proficiency scores; the details of which are described in a previous publication (Cairney et al., 2010). All children were enrolled in schools in southern Ontario, Canada and were in Grade 8 during the 2008/2009 school year (ages 13–14).

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