



# Motor abilities of adolescents with a disruptive behavior disorder: The role of comorbidity with ADHD



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## ARTICLE INFO

### Article history:

Received 6 November 2014

Received in revised form 29 December 2014

Accepted 19 January 2015

Available online 17 February 2015

### Keywords:

Motor abilities

Disruptive behavior disorder

ADHD

Adolescent

Bruininks–Oseretsky test of motor proficiency

## ABSTRACT

The aim of this study was to explore the incidence, type and severity of motor impairment in male adolescents with a disruptive behavior disorder (DBD) and evaluate the role of comorbid ADHD. The Bruininks–Oseretsky test of motor proficiency, Second Edition was administered to examine a detailed motor profile and to compare the motor abilities of individuals with DBD ( $n = 99$ ) to those of controls ( $n = 87$ ). Additional subgroup analyses were conducted within the clinical population and encompassed (1) analyzing differences in motor profiles between individuals diagnosed with oppositional defiant disorder (ODD) or conduct disorder (CD) and (2) comparing the motor profiles of individuals with or without comorbid ADHD. The results indicated that individuals with a DBD showed a mixed motor impairment profile. Even after controlling for IQ, the DBD group obtained significantly lower scores in comparison to controls. The ODD and CD subgroups showed a similar motor profile. Presence of comorbid ADHD did not produce major differences in the motor profile. As approximately 79% of the adolescents with a DBD suffered from motor impairment, motor ability needs to be adequately addressed in research as well as in clinical practice.

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## 1. Introduction

The diagnostic and statistical manual of mental disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) acknowledges a separate disorder for children who lack developmental, age-appropriate motor skills, namely Developmental Coordination Disorder (DCD). Although motor disorders, including DCD, can occur in isolation, they regularly seem to coexist with other pediatric mental health disorders. From a more subjective point of view, the motor behavior of children and adolescents with a psychiatric disorder is often described as clumsy, wooden and less fluent. Several studies have examined and confirmed these observations by using standardized motor assessment instruments. On average,

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children with a psychiatric disorder perform worse on standardized motor tests in comparison to typically developing peers (Emck, Bosscher, Beek, & Doreleijers, 2009; Emck, Bosscher, Van Wieringen, Doreleijers, & Beek, 2011; Simons, Verscheure, Vandenbussche, Adriaenssens, & Delbroek, 2013).

The presence of possible co-occurring motor problems is of great clinical importance. Accumulating evidence indicates that motor impairment during childhood predisposes for a range of psychosocial, emotional, academic and physical problems (Dewey, Kaplan, Crawford, & Wilson, 2002; Losse et al., 1991; Piek, Bradbury, Elsley, & Tate, 2008; Rivlis et al., 2011; Schoemaker & Kalverboer, 1994; Skinner & Piek, 2001). Furthermore, several links have been established between motor impairment and poor prognostic outcome (Hellgren, Gillberg, Bagenholm, & Gillberg, 1994; Lingam et al., 2012; Piek et al., 2007; Rasmussen & Gillberg, 2000; Sigurdsson, Van Os, & Fombonne, 2002).

The majority of the motor ability literature focuses on attention deficit hyperactivity disorder (ADHD) and Autism spectrum disorders (Fliers et al., 2008; Goulardins, Marques, Casella, Nascimento, & Oliveira, 2013; Harvey et al., 2007; Hilton et al., 2007; Kopp, Beckung, & Gillberg, 2010; Pan, Tsai, & Chu, 2009; Pan, 2014; Pitcher, Piek, & Hay, 2003; Staples & Reid, 2010; Verret, Gardiner, & Beliveau, 2010; Whyatt & Craig, 2012). Whereas considerable research attention has been paid to these disorders, the motor abilities of children and adolescents with a disruptive behavior disorder (DBD) remain largely unknown. To our knowledge, no studies have been published that directly investigate the prevalence of motor impairment in children with oppositional defiant disorder (ODD) and/or conduct disorder (CD). Only a handful of studies have examined topics related to this issue. Emck et al. (2011) assessed the gross motor skills of children with different psychiatric conditions, including a behavioral disorders group ( $n = 44$ ) comprised of children with ADHD, ODD and CD. This study showed that the scores of these children on the test of gross motor development, 2nd edition (TGMD-2) (Ulrich, 2000) significantly differed from the norm population, reflecting marked delays in motor development for about three years. Livesey, Keen, Rouse, and White (2006) examined the relationship between externalizing behavior in 5 and 6 year old children and motor performance, measured by the Movement Assessment Battery for Children (M-ABC) (Henderson & Sugden, 1992). Only one subtest, ball skills, predicted externalizing behavior, with better ball skills being associated with less externalizing behavior. Kroes et al. (2002) investigated whether qualitative aspects of motor performance in 5 and 6 year old children are related to a later diagnosis of ADHD or ODD/CD. The results indicated that the qualitative domain Ball Skills, from the Maastricht Motor test (Vles, Kroes, & Feron, 2004) was predictive of ODD/CD. But in contrast to the findings of Livesey et al. (2006), they found that better performance on ball skills indicated an increased risk of ODD/CD. Moreover, they concluded that motor problems in ADHD are primarily related to the diagnosis of ADHD and are not a characteristic of ODD/CD. A study by Kooistra, Crawford, Dewey, Cantell, and Kaplan (2005) explored to what extent ODD puts a child with ADHD at risk for motor impairment. Scores on the Bruininks–Oseretsky test of motor proficiency (BOTMP) (Bruininks, 1978) of children with ADHD, Reading Disorder (RD), ODD or various combinations of these, were compared to scores of typically developing controls. The results show that children in the ADHD + ODD group and the ADHD + RD + ODD group scored significantly lower on the Full Battery Composite of the BOTMP than controls. Moreover, a link between gross motor skills and ODD was established. Kadesjö and Gillberg (1999) found increased percentages of children meeting criteria for ODD, if DCD and ADHD were comorbid with one another. A latent class analysis, performed by Martin, Piek, Baynam, Levy, and Hay (2010), indicated that motor problems and ADHD were not found in the same class, unless other mental health disorders were present. In another study, conducted by Iversen, Knivsberg, Ellertsen, Nødland, and Larsen (2006), the co-occurrence of motor coordination difficulties in children with severe behavioral and emotional problems was examined. The study revealed that 62.1% of the children scored in the borderline or definite motor problem range, measured by the M-ABC. Of the children with behavioral or emotional problems 55% fulfilled the criteria of DCD in comparison to 3.4% of the children in the control group. From a reversed perspective, examining the extent of associated difficulties in children with DCD, studies indicate that these children show a greater degree of internalizing and externalizing problems (Dewey et al., 2002; Green, Baird, & Sugden, 2006).

In conclusion, research concerning motor abilities in children and adolescents with DBD is incomplete. Due to the scarcity of research, contradictory results, methodological insufficiencies and the absence of clearly defined clinical groups; no sound conclusions can be drawn from previous work. In order to address this paucity of research, the current study explores the incidence, severity and type of impairment in motor abilities in a group of male adolescents diagnosed with DBD.

Although comorbidity is a widely acknowledged phenomenon, it is still quite often neglected in research as well as in clinical practice (Visser, 2003). A solid link between DBD and ADHD exists, as 42–90% of the children with ADHD also meet the criteria for ODD or CD (Rommelse et al., 2009). Furthermore, ADHD is associated with proneness for DCD, with prevalence estimates up to 50% (Kadesjö & Gillberg, 2001; Piek, Pitcher, & Hay, 1999). While the main focus of this article lies on motor abilities of adolescents with DBD, the differences between adolescents with or without comorbid ADHD will be assessed and evaluated.

## 2. Method

### 2.1. Participants

A total of 196 male adolescents aged 12–18 years participated in the study. The clinical sample was recruited from the University Centre for Child and Adolescent Psychiatry in Antwerp (Belgium). Many health care providers from all over Flanders (Dutch speaking part of Belgium) make referrals to this clinic. All boys stayed at the residential unit for behavioral

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