



Differentiating children with Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Learning Disabilities and Autistic Spectrum Disorders by means of their motor behavior characteristics

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ABSTRACT

The study was designed to investigate the discriminant validity of the Motor Behavior Checklist (MBC) for distinguishing four groups of children independently classified with Attention-Deficit/Hyperactivity Disorder, (ADHD; $N = 22$), Conduct Disorder (CD; $N = 17$), Learning Disabilities (LD; $N = 24$) and Autistic Spectrum Disorders (ASD; $N = 20$). Physical education teachers used the MBC for children to rate their pupils based on their motor related behaviors. A multivariate analysis revealed significant differences among the groups on different problem scales. The results indicated that the MBC for children may be effective in discriminating children with similar disruptive behaviors (e.g., ADHD, CD) and autistic disorders, based on their motor behavior characteristics, but not children with Learning Disabilities (LD), when used by physical education teachers in school settings.

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1. Introduction

1.1. Motor behavior characteristics of children

Many children facing symptoms of attentional, emotional, behavioral or developmental problems are placed in public elementary schools without a first screening. These children are “at risk” for school failure, emotional difficulties and significant negative adult outcomes compared to their peers (Eisenberg, Fabes, Guthrie, & Reiser, 2000). Detection efforts are particularly critical during the early educational years, when students are most amenable to change in behavioral, social, and academic arenas and before students with emotional and behavioral disorders (EBD), Learning Disabilities (LD) and Autistic Spectrum Disorder (ASD), experience negative outcomes within and beyond the school setting (Landrum, Tankersley, & Kauffman, 2003; Lane, 2003; Volkmar, Lord, Bailey, Schultz, & Klin, 2004; Wagner, Kutash, Duchnowski, Epstein, & Sumi, 2005).

Among those children who attend school, educational professionals are in a unique position to facilitate adaptive and social behaviors (Waller, Waller, Schramm, & Bresson, 2006; Webster-Stratton, Reid, & Hammond, 2004). Several studies suggest that evidence for the presence of Externalizing and/or Internalizing symptoms can be obtained in multiple active situations, and a number of behavioral symptoms can be observed during physical education classes, team games and during standardised play procedures (Kashani, Allan, Beck, Bledsoe, & Reid, 1997; Mol Lous, Wit, De Bruyn, & Riksen-Walraven,

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2002). Educators who observe different aspects of children's behavior during their lessons are able to identify young children "at risk" for school adjustment problems related to attention, conduct, learning, and mood with a great deal of accuracy (Flanagan, Bierman, & Kam, 2003).

Physical education teachers have the knowledge and the skills to focus on the "warning signs" of abnormal motor related behaviors providing useful information about the development of school-aged children. However, there are only a few instruments that use the physical educators as main source of information about children's development and the majority of them focus on movement and motor coordination problems (Bruininks-Oseretsky Test of Motor Proficiency, Bruininks & Bruininks, 2005; Test of Gross Motor Development, Ulrich, 2000; Movement Assessment Battery for Children, Henderson & Sugden, 2007), or on specific disorders which are highly connected with performance in sports or with class management in school settings (State-Trait Anxiety Inventory for Children, Spielberger, 1973; Physical Education Classroom Instrument, Kulinna, Cothran, & Regualos, 2003). Based on children's motor behavior observed during physical education classes, a new instrument was developed for use by physical education teachers in this study in order to check for differences in motor related behavior characteristics among four clinical groups of children coming from special education settings.

Disruptive behavior disorders (DBDs), specifically Attention-Deficit Hyperactivity Disorder (ADHD) and Conduct Disorder (CD), are the most common reasons for referral children and adolescents to mental health clinics. Attention-Deficit Hyperactivity Disorder (ADHD) is characterized by inattention, lack of concentration, and learning difficulties in addition to some degree of hyperactivity and impulsivity (American Psychiatric Association, 2000; Corrigan, 2003). The disorder affects approximately five percent of school aged children (Johnson & Rosén, 2000) which experience difficulties in behaviors crucial to academic success, such as maintaining attention, modulating activity levels, inhibiting impulsive responses, and persisting with academic tasks (DuPaul & Stoner, 2003). Students with ADHD experience persistent and extreme distractibility (Hutchison, 2004), cannot screen out irrelevant stimuli in order to concentrate on tasks long enough to complete them, and does not sustain thought processes long enough to do school work (Bennett, Dworet, & Weber, 2008). The DSM-IV criteria for ADHD (American Psychiatric Association, 2000) include several items that are related to motor characteristics, including fidgeting, running about or excessive climbing (possibly linked to subjective feelings of restlessness), difficulties in playing, and acting as if 'driven by a motor'. During physical activities, children with ADHD exhibit age-inappropriate features of hyperactivity, excessive impulsivity, problems in lateralization, and are often left-handed (Reid & Norvilitis, 2000). In addition, general coordination difficulties and soft neurological signs are frequently reported (Denckla, 2003; Sadock & Sadock, 2003).

Although the diagnostic criteria presents clear distinctions between the core symptoms of ADHD and LD (American Psychiatric Association, 2000), researchers have described a strong link between ADHD and LD. Symptoms similarities between the disorders include problems with inattention and hyperactivity, low frustration tolerance, poor self esteem, low morale, deficits in social skills, impaired academic achievement, increased school dropout and poor vocational achievement (Epstein, Shaywitz, Shaywitz, & Woolston, 1991; Jensen et al., 2001). During physical activities, children with Learning Disabilities, display subtle motor difficulties, deficits in balance and spatial awareness (Miyaraha, 1994), deficits in selective attention and problem solving (Wolfe, 1996), hyperactivity, conceptual rigidity, inappropriate reactions emotional instability (Sherrill, 1998) and sometimes lack social skills and are unable to solve interpersonal problems (Bluehardt & Shephard, 1995).

Conduct Disorder (CD) is marked by a pervasive and persistent violation of rules or rights of others (American Psychiatric Association, 2000) and early-onset of conduct problems in childhood are a major risk factor for the development of delinquency, violence, antisocial behavior, impoverished social ties, and drug or substance abuse in later years (Bassarath, 2001; Patterson, DeGarmo, & Knutson, 2000). Research in psychomotor behavior in children with behavioral disorders suggested that tension, restlessness, psychomotor agitation, and disturbed development of body awareness are often present (Aendekerck & Verheij, 1997). At educational settings, children with conduct problems deviate from school and social principles, rules and regulations; display delinquent behavior, difficulties in social relationships, aggressiveness, combustible disobedience, anger, lack of empathy or concern for others, misperception of the intent of others in ambiguous social situations, lack of guilt or remorse, and low self-esteem (Dodge, 1993).

Educational research indicated that autism may not be an excessively rare disorder (Volkmar et al., 2004), but it could represent the extreme of a quantitative distribution of autistic traits that are present in the general population (e.g. Constantino & Todd, 2003; Spiker, Lotspeich, Dimiceli, Myers, & Risch, 2002). Problem behaviors observed with autism include physical aggression, self-injury, property destruction, stereotyped behaviors, and tantrums are highly disruptive to classroom, community, and home environments and without intervention, they are more likely to increase than improve (Horner, Carr, Strain, Todd, & Reed, 2002). During physical activities, children with ASD, indicate stereotyped and repetitive motor mannerisms, impairments of facial expression, postures, and gestures, and are often characterized as clumsy and as having problems in motor coordination (Berkeley, Zittel, Pitney, & Nichols, 2001; Piek & Dyck, 2004). Autistic traits are widely distributed in the general population, and there are many children unselected by the lack of appropriate screening instruments (Skuse, Mandy, & Scourfield, 2005). Recent surveys of the prevalence of autism in the community indicate not only an increase in the number of cases meeting conventional criteria, but a disproportionate increase in the number of milder cases that fail to reach full criteria (Chakrabarti & Fombonne, 2001; Yeargin-Allsopp et al., 2003).

Due to the effectiveness of early intervention on the outcome of individuals with ASD, there is a race to identify children with ASD at younger ages (Matson, Boisjoli, Hess, & Wilkins, 2010). For this reason, a top priority in the field of autism is the development of precise early diagnostic tools that are designed to assess symptoms of ASD in young children. The Baby and

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