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Systematic literature review

Behavioral comparisons in Autism Spectrum Disorder and Developmental Coordination Disorder: A systematic literature review



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ABSTRACT

Background: Autism Spectrum Disorder (ASD) and Developmental Coordination Disorder (DCD) are developmental disorders that, since the DSM-5, can be diagnosed as co-occurring conditions. While some recent studies suggest that ASD and DCD have similar traits, others show clear behavioral distinctions between the two conditions. By gathering all studies that included (1) an ASD group and a DCD group, (2) an ASD + DCD group and a DCD group, or (3) ASD, ASD + DCD, and DCD groups, we aimed to identify similarities and differences in behaviors between the two disorders.

Method: We used a systematic search of PubMed (1946 –), Scopus (1970 –), PsycINFO (via EBSCO, 1600 –), CINAHL (via EBSCO, 1937 –), SportDiscus (via EBSCO, 1985 –), and WorldCat (via FirstSearch) in addition to reference list and author name searching PubMed, Scopus, PsycINFO, CINAHL, SportDiscus, and WorldCat to identify original studies that met the following criteria: (1) an ASD group and a DCD group, (2) an ASD + DCD group and a DCD group, or (3) ASD, ASD + DCD, and DCD groups.

Results: From the 1598 articles screened, 11 were included in the qualitative analysis. The articles included reported more differences than similarities in individuals with ASD and DCD, with clear distinctions for working memory ability, gestural performance, grip selection, and cortical thickness. Only two studies reported similarities in face processing abilities and perceived competence, and the interventional studies showed group similarities in behavior improvement, such as intelligence and attention.

Conclusions: Based on the articles reviewed, we conclude that while DCD and ASD share some behavioral symptoms, the symptom profiles of each disorder are unique and separable. We recommend that the evaluation of potential DCD in individuals with ASD be performed systematically and thoroughly, so as to distinguish this co-occurring condition from sensorimotor symptoms associated with ASD.

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Autism Spectrum Disorder (ASD) and Developmental Coordination Disorder (DCD) are developmental disorders with distinct definitions and diagnostic criteria. ASD is currently diagnosed based on symptoms in two core domains: difficulty with social interaction/communication, and restricted interests and repetitive behaviors. DCD, on the other hand, is characterized by significant difficulty performing motor skills at an age-appropriate level. Individuals with DCD experience substantial impact of these difficulties on everyday tasks as well as in social relationships (Leonard & Hill, 2014). Due to recent changes in the *Diagnostic and Static Manual for Mental Disorders–Fifth Edition* (DSM-5) in 2013, these two conditions can be diagnosed as co-occurring in certain individuals (e.g., children with ASD with significant difficulties in motor skills can also be diagnosed with DCD). However, questions remain on behavioral similarities and differences in profiles of individuals that have ASD, individuals that have DCD, and individuals diagnosed with both conditions, in motor behavior as well as in other domains. Therefore, this review aimed to investigate similarities and differences of behaviors in children diagnosed with DCD, ASD, or both at the same time. This examination has important clinical implications, given the increasing attention paid to sensorimotor features of ASD (e.g., Donnellan, Hill, & Leary, 2013; Fournier et al., 2010; Whyatt & Craig, 2013). It is crucial to determine which behavioral and motor challenges are part of the core symptom profile of ASD, and whether they are fundamentally different in a sub-set of individuals with ASD and co-occurring DCD (hereafter abbreviated as ASD + DCD).

DCD is characterized by difficulties in performing accurate and fast gross- and fine-motor skills, including problems with coordination and balance. The movements of children with DCD frequently lead to performance difficulties in activities of daily living and physical games that typically-developing (TD) children perform easily. Many researchers use the terms “dyspraxia” and DCD interchangeably. However, some have argued that dyspraxia is a condition specifically impacting the ability to plan unfamiliar motor tasks (Bundy, Lane, & Murray, 2002), or to perform skilled gestures (Dziuk et al., 2007). For the purpose of this discussion, we consider these two conditions similar in their clinical characteristics, as indicated by the European Academy of Childhood Disability (EACD) guidelines (Blank, Smits-Engelsman, Polatajko, & Wilson, 2012).

DCD has been described as a “hidden problem” (Gibbs, Appleton, & Appleton, 2007), with an estimated prevalence as high as 10% in school-aged children. In general, estimates of 2% to 7% are more likely (APA, 2013), implying that most school classes have at least one affected child. The diagnostic process involves assessing motor skills, evaluating whether these skills affect daily living, determining whether there was an early onset of motor delays, and ensuring that the disturbance was not due to a general medical and/or neurological condition. Prior to the changes in the DSM-5, the diagnostic criteria for DCD included ruling out the presence of a co-occurring Pervasive Developmental Disorder (PDD): a category that, at the time, included Autistic Disorder (AD), Asperger’s Syndrome (AS), Rett’s Syndrome, and PDD-Not Otherwise Specified (PDD-NOS). The most recent revision of the DSM eliminated this rule, making it possible for an individual to be diagnosed with co-occurring ASD + DCD.

In DSM-5, a single diagnostic code—Autism Spectrum Disorder (ASD)—replaces the earlier diagnoses of AD, AS, and PDD-NOS. ASD is a broad term used for a clinical population characterized by complex and often heterogeneous patterns of biological and behavioral symptoms, with shared features in the domains of communication and social interaction, and restricted interests and repetitive behaviors (APA, 2013). ASD affects a lower proportion of children than DCD, with prevalence estimates at 1 in 68 children (Christensen et al., 2016). In addition to the behaviors described above, motor impairments are a common symptom of ASD, and have been observed from the earliest descriptions of the disorder (Kanner, 1943). Ozonoff and colleagues (2008) and others have suggested that motor disturbances appear to be among the first manifestations of developmental abnormalities in ASD, and could serve as biomarkers of this condition in the first years of life before other core symptoms (i.e., social communication, restricted interests) can be reliably measured. Fournier et al. (2010) concluded after a systematic literature review and meta-analysis that motor coordination deficits are pervasive across the range of ASD-related diagnoses, and can be considered a cardinal feature of ASD. In general, several researchers suggest that when compared to typically-developing (TD) individuals, individuals with ASD also have significant motor praxis and coordination impairments, although they may not carry a formal diagnosis of dyspraxia or DCD (Downey & Rapport, 2012; Dziuk et al., 2007).

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