



Contents lists available at ScienceDirect

Research in Developmental Disabilities

journal homepage: www.elsevier.com/locate/redevdis

Joint attention in Down syndrome: A meta-analysis

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ARTICLE INFO

Number of completed reviews is 2

Keywords:

Down syndrome
Joint attention
Meta-analysis
Behavioral phenotype
Language development
Social development
Autism spectrum disorder

ABSTRACT

Background: Some studies have indicated that joint attention may be a relative strength in Down syndrome (DS), but other studies have not.

Aim: To conduct a meta-analysis of joint attention in DS to more conclusively determine if this is a relative strength or weakness when compared to children with typical development (TD), developmental disabilities (DD), and autism spectrum disorder (ASD).

Methods and procedures: Journal articles published before September 13, 2016, were identified by using the search terms “Down syndrome” and “joint attention” or “coordinating attention”. Identified studies were reviewed and coded for inclusion criteria, descriptive information, and outcome variables.

Outcomes and results: Eleven studies (553 participants) met inclusion criteria. Children with DS showed similar joint attention as TD children and higher joint attention than children with DD and ASD. Meta-regression revealed a significant association between age and joint attention effect sizes in the DS vs. TD contrast.

Conclusions and implications: Joint attention appears to not be a weakness for children with DS, but may be commensurate with developmental level. Joint attention may be a relative strength in comparison to other skills associated with the DS behavioral phenotype. Early interventions for children with DS may benefit from leveraging joint attention skills.

What this paper adds?

Down syndrome (DS) is the most common neurogenetic disorder associated with intellectual disability. Joint attention—a dynamic skill that involves coordinating attention between another person and an object—supports both language and social development. Some previous research has indicated that joint attention may be a relative strength in DS; other studies have not. Reasons for these mixed findings could include the measure of joint attention, participant ages, and type of comparison groups. If joint attention is not a relative strength, it should be targeted in early intervention. If it is a relative strength, it can be leveraged to improve language and social development. The present study contributes to the literature by conducting a meta-analysis— which statistically combines previous studies and provides a higher level of evidence than individual studies in evidence-based practice—of joint attention in DS to more conclusively determine if it is a relative strength or weakness contrasted to children with typical development (TD), developmental disabilities (DD), and autism spectrum disorder (ASD). Results indicate that children with DS showed similar

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<https://doi.org/10.1016/j.ridd.2018.03.013>

Received 15 August 2017; Received in revised form 27 March 2018; Accepted 29 March 2018
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joint attention abilities when compared to TD children and better joint attention than children with DD and ASD. This suggests that joint attention is not a weakness for children with DS. Joint attention in DS may be commensurate with developmental level and may be a relative strength in comparison to other skills associated with the DS behavioral phenotype.

1. Introduction

Down syndrome (DS) is the most common and recognizable neurogenetic disorder with an incidence rate of 1 in 691 live births in the United States (Parker et al., 2010). DS is caused by an overexpression of genes on chromosome 21, which leads to mild to moderate intellectual disability (Canfield et al., 2006). In addition to the presence of intellectual disability, children with DS have a unique behavioral phenotype that is characterized by relative strengths in social functioning (e.g., social relatedness, social competence, etc.), nonverbal communication, and receptive language coupled with relative weaknesses in expressive language and shifting attention (see Fidler, Most, & Philofsky, 2009; Grieco, Pulsifer, Seligsohn, Skotko, & Schwartz, 2015). This unique combination of abilities has led researchers to examine the development of joint attention—a predictor of both social skills and language development—in children with DS. Thus, joint attention abilities in DS may have a cascading effect on both social and language development similar to the pattern that has been noted in typical development (Hahn, 2016). The purpose of the present study was to conduct a meta-analysis of previous research on joint attention in DS to more conclusively elucidate if this skill is a strength or weakness relative to both typically developing peers and peers with other developmental disabilities.

1.1. Joint attention

Joint attention is a dynamic, two-fold skill that involves coordinating attention between a social partner and an object or event of interest coupled with the awareness by both individuals that their attentional focus is shared (Baldwin, 1995; Bakeman & Adamson, 1984). Joint attention is accomplished by using eye gaze, gestures, and vocalizations (Bakeman & Adamson, 1984). Joint attention emerges around 6 months in typically developing children and continues to develop well into the second year of life when it is then used with ease (Adamson & Chance, 1998).

Joint attention is often defined by the attentional focus of each social partner as either *initiating* or *responding*. Initiating joint attention refers to directing a social partner's attention to an object or event of interest, whereas responding to joint attention refers to following attention-directing behaviors of a social partner to an object or event of interest (Mundy et al., 2007). For example, an infant pointing in the direction of a dog while looking at her caregiver and back to the dog is initiating joint attention. In response, the caregiver may follow the child's point and gaze and then look back at the child saying, "Dog. You see a dog! Do you like the dog?". The caregiver is responding to joint attention. Initiating and responding to joint attention can also be combined to describe an individual's *overall joint attention* abilities (Mundy et al., 2003). Because joint attention occurs during a set period of time (e.g., minutes, seconds) the term *coordinated joint engagement* has been used to describe the period in which a child is actively engaged with a social partner around an object or event of interest (Adamson & Chance, 1998; Adamson, Bakeman, & Deckner, 2004; Bakeman & Adamson, 1984).

1.1.1. Importance of joint attention

Joint attention supports both language and social development (Baldwin, 1995; Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Trevarthen & Aitken, 2001). Prior to the development of spoken language, joint attention can be used to communicate with social partners (Bates et al., 1979) and supports language acquisition, such as word learning (Bruner, 1975; Harris, Kasari, & Sigman, 1996; Loveland & Landry, 1986; Tomasello & Farrar, 1986; Tomasello & Kruger, 1992). Returning to our example of the infant and the dog, when the infant points to the dog, the caregiver's response of, "Dog. You see a dog!" helps to tie a word to its referent (i.e., labeling), which fosters new word learning and vocabulary development (Morales et al., 2000; Mundy et al., 2007). Without joint attention, infants may miss critical opportunities for word learning, which in turn could negatively influence their vocabulary development (Bruner, 1975; Tomasello & Todd, 1983).

Further, the social interactions that are facilitated by joint attention help infants learn about the emotions, desires, and intentions of their social partners (Meltzoff & Moore, 1998; Trevarthen & Aitken, 2001). These skills are important for fostering social development and lead to the development of theory of mind—the understanding that people are intentional beings that have their own thoughts and minds (Meltzoff & Moore, 1998; Tager-Flusberg, 2005; Trevarthen & Aitken, 2001). This, in turn, supports the development of social skills that allow humans to think, reason, and interact with the social world (Meltzoff, 2007; Tager-Flusberg, Skwerer, & Joseph, 2006). Thus, considering that joint attention is needed for both social and language development, it is often used as either a target or support in early intervention (Luyster, Seery, Talbott, & Tager-Flusberg, 2011). As such, joint attention is especially important to understand in populations, such as DS, that struggle with social cognition and language.

1.2. Joint Attention in Down Syndrome

Research on joint attention abilities in DS has reported mixed findings. Mental-age appropriate levels, or better, of initiating joint attention (Fidler, Philofsky, Hepburn, & Rogers, 2005; Mundy, Kasari, Sigman, & Ruskin, 1995) and overall joint attention (Hahn, Fidler, Hepburn, & Rogers, 2013; Kasari, Mundy, Yirmiya, & Sigman, 1990; Kasari, Freeman, Mundy, & Sigman, 1995) have been reported in children with DS when compared to mental-age matched typically developing peers and peers with other developmental disabilities. However, other studies have reported some difficulties in overall joint attention, especially prior to 26 months relative to

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