Guided Participation and Parental Tutoring in Preschool Children with Autism: A Pilot Study of Relationship Development Intervention (RDI)

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Abstract

The guided participation relationship between parents and children, whereby parents sensitively support the child's emerging abilities, is central to child development. However, difficulties with intersubjective engagement characteristic of autism can make supportive interactions between parents and children more challenging. In this study, we compared dyads of parents and children with autism (n = 16) and dyads of parents and children with other developmental disabilities (n = 14) on two coding schemes, the Dyadic Coding Scales (DCS: Humber & Moss, 2005) and a Parent Scaffolding coding scheme (adapted from Meins, 1997a). Consistent with expectations, the ASD group showed more difficulties in parent-child engagement on the DCS. Although autistic children were more likely to resist parental input on the Parent Scaffolding task, their parents were equally as sensitive as those in the developmental disabilities group. Child factors on the Parent Scaffolding coding scheme were associated with DCS scores. Half (n = 8) of the children with autism received an academic schoolyear-long modified version of Relationship Development Intervention (Gutstein, 2009) delivered in a preschool setting, and all children with autism (n = 16) were re-assessed at the end of the preschool year. The dyads who had received RDI showed improvements in parent-child engagement on the DCS both compared to baseline and compared to the group who did not receive the intervention. No changes in Parent Scaffolding were found. The results are discussed in relation to intervention priorities for children with autism.

Keywords: parent-child interaction, autism, intersubjectivity, intervention, relationship-development intervention.

Author Biographies

Fionnuala Larkin, DPsychSc is a clinical psychologist with an interest in developmental psychology and psychopathology, and in particular, bidirectional processes between parent and child that shape development. She is a Clinical Coordinator in the Department of Psychology at University of Limerick and a Research Fellow in the Department of Psychology at University of York. She specializes in assessment and intervention for developmental disorders in children and adults and conducts research on mind-mindedness, parent-child relationships and interaction, maternal/infant mental health and autism.

Lynne Hollaway, M.S. OTR/L is a Clinical Instructor I at the University of Central Arkansas Occupational Therapy Department. She has seventeen years' experience working with children with ASD and their families within an outpatient and preschool setting. At the time of the study, she was a certified RDI consultant and Director of Pediatrics Plus Developmental Preschool where the study was conducted. Her primary roles were administering the RDA-RV assessments, collaborating on intervention implementation, and coordinating the project with her co-authors.

Mary Garlington, M.A., BCBA, M.S., OTR/L is an experienced occupational therapist and Board Certified Behavior Analyst (BCBA) who specializes in the treatment of children with autism spectrum disorder (ASD). She has provided school-based, community-based, and home-based services to children with ASD for the past thirteen years. She currently serves as ASD Clinical Expert for Pediatrics Plus where she provides clinical oversight for all ABA therapy services and consultation services for occupational, physical, and speech-language therapists at Pediatrics Plus. At the time of the study Mary was an RDI consultant

and provided the direct RDI intervention to the children and their parents. She also administered RDA-RV assessments.

Jessica Hobson, Ph.D. is Clinical Director of the Family Guidance and Therapy Center, Petaluma. She is a licensed clinical psychologist and Lecturer in the Psychology Department at Sonoma State University. She is a certified RDI consultant. Her clinical specialties include assessment, diagnosis, consultation, and therapy for autism spectrum disorders (ASDs). Areas of clinical and research expertise include parent-child interaction, joint attention, social communication, sensory processing, emotion regulation, neurodiversity, and twice-exceptionality. She uses mindfulness and relationship-based approaches to intervention. She has published academic papers on diverse topics in ASD including comorbid psychiatric symptoms, sensory processing differences, social anxiety, and neurocognitive profiles.

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In this paper, we use both person-first (i.e., person with autism) and identity-first (i.e., autistic person) language interchangeably for purposes of variety in the writing and to be respectful to both forms of linguistic preference.

Introduction

In his sociocultural theory, Vygotsky (1978) proposed that higher psychological functions of an individual child's developing mind are the outcome of experiences in social interaction with caregivers. Recent developments in neuroscience, developmental psychology, and developmental psychopathology have made abundantly clear that quality of parent-child connection shapes the formation of neural connections in the developing brains of young children. Specifically, the capacity of parents to attend to their children's subjective experiences and attune to their mental lives lays the foundation for secure attachment, self-awareness, self-regulation, and growth throughout the lifespan.

Meins (1997a) coined the term 'mind-mindedness' to refer to the caregiver's propensity to relate to the mind (rather than the actions or physical attributes) of the young child, a propensity which relates to both secure attachment and the young child's developing understanding of other minds (Meins, Fernyhough, Fradley, & Tuckey, 2001; Kirk et al, 2015; Laranjo, Bernier, Meins, & Carlson, 2014). Siegel (2010) described 'mindsight,' the capacity to be aware of and empathize with the subjective experiences of self and others, as a critical way in which parents nurture their young children's developing minds. According to his model, attuned communication leads to dyadic regulation, which lays the foundation for self-regulation to develop. A similar process – "mentalization" (or parental reflective functioning) – has also been linked to attachment security and emotion regulation (Fonagy et al., 1991). Indeed, parental reflective functioning has been associated with quality of parent-child relationships as well as child emotion regulation (Heron-Delaney et al., 2006). These convergent approaches support and enrich our understanding of the need for children to experience joining and connecting with caregivers in the context of emotionally attuned intersubjective communication and collaboration for their ongoing social and emotional development.

Parents and their children often participate in these forms of shared experience during guided participation activities (Rogoff, 1990). Guided participation refers to a collaborative process in which a more experienced person or guide helps another less experienced person or apprentice to become competent in practices that are socially and personally meaningful practices of everyday life in a culture. In guided participation, parents scaffold children's performance during culturally normative instructional activity to promote feelings of competence and autonomy (Rogoff, Ellis, & Gardner, 1984). Ideally, parents provide such support within their children's Zone of Proximal Development (Vygotsky, 1978). However, not all parents are equally effective as guides. For example, mothers of securely attached preschool children are more effective tutors than those of insecurely attached children, in that they provide more positive feedback, are less likely to intervene physically, provide help when asked, and pitch their help at an appropriate level for their child's needs (Meins, 1997b).

The quality of guided participation engagements may also be related to child characteristics which contribute to the interactive process. Feedback and responsiveness from their children help parents provide appropriate levels of scaffolding, encourage motivation, and support transfer of responsibility. In this respect, not all children are equally proficient apprentices, and their strengths or difficulties may also affect the quality of guided participation (Sameroff, 2009). The characteristic intersubjective difficulties of children on the autism spectrum may create obstacles for emotionally attuned communication and collaboration during parent-child guided participation (Slade, 2009).

Beginning early in development, biologically based challenges with intersubjective and interpersonal engagement are evident in and likely pivotal for the development of autism spectrum disorder (Charman et al., 1997; Hobson 1993, 2004; Mundy, Sullivan, & Mastergeorge, 2009; Volkmar et al., 2005). Infant siblings of children with autism who

themselves later go on to receive a diagnosis of autism often exhibit social disengagement by the end of the first year (Ozonoff et al., 2010). For example, at 11 months of age, high-risk infants later diagnosed with autism were less socially engaged during free play with their parents (Campbell et al., 2015) and 10-month-old infants at elevated risk of autism were less likely to make clear social initiations towards their parents (Pijl et al., 2021). Not only this, diminished social engagement in infants at genetic risk for autism spectrum disorder may elicit a more directive style of interaction from their parents (Wan et al., 2012). Over time, lower quality of interaction between infants at risk for developing autism and their caregivers predicts a subsequent diagnosis of autism (Wan et al., 2013). Thus, early risk factors for the emerging diagnosis of autism may exert their influence through diminished child-caregiver connection during guided participation (Green et al., 2015).

In three of our own empirical studies, severity of autism has been associated with challenges in the guided participation relationship, as measured by the Dyadic Coding Scales (DCS; Humber & Moss, 2005). The DCS were originally developed to assess the smoothness and fluidity of the goal-corrected partnership and to pick up such features as escalating conflict, controlling behavior, rigidity, and task-oriented focus in parent-child dyads characterized by insecure forms of attachment (Humber & Moss, 2005). The DCS include ratings of social coordination, communication, appropriate role assumption, emotional expression, responsivity/sensitivity, tension/relaxation, mood, and enjoyment. In this sense, the DCS is a measure of the quality of the Guided Participation Relationship.

In our first empirical study, Beurkens et al. (2013) demonstrated how greater severity of a child's autism, as measured by the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2: Lord et al., 2012) calibrated severity scores, was related to lower quality of parent-child relatedness, as assessed by the DCS. Larkin et al. (2015) replicated this finding with school-age verbally able children on the autism spectrum vis-à-vis a matched

comparison group, using the Relationship Development Assessment – Research Version (RDA-RV). In a third study, Hobson et al. (2016) not only replicated inverse correlations between ADOS-2 calibrated severity scores and quality of guided participation on the DCS, but also demonstrated potential for improvement in both DCS and ADOS-2 calibrated severity scores among children with autism and their parents participating in Relationship Development Intervention (RDI) over time.

In recent decades, approaches to autism treatment are increasingly focused on enriching the social environment and supporting parents as facilitators of their children's development (Dawson et al., 2010; Gutstein, 2009; Green et al., 2010; Green, 2013; Kasari, Freeman & Paparella, 2006; Mahoney & Perales, 2003; 2005; Rogers et al., 2006; Wieder & Greenspan, 2003). Unlike traditional behavioral forms of intervention, RDI focuses on providing a "growth environment" for autistic children through modifications to qualities of social relatedness with caregivers. RDI provides parents with real-life coaching and parent training, using mindful guiding engagements as a mechanism to foster development of motivation, communication, emotional regulation, episodic memory, attention-shifting, self-awareness, appraisal, executive functioning, flexible thinking and creative problem solving. The primary aim of a comprehensive RDI program is to provide intersubjective child-caregiver experiences in the context of guided participation in order to promote the development of self-regulation, problem-solving, coping with uncertainty, resilience, and growth mindset (Green, 2013; Gutstein, 2009). Thus, participation in RDI should be expected to enhance qualities of child-caregiver relatedness during guided participation activities.

The aim of the present study was to compare matched groups of young children with and without ASD, attending a developmental preschool, on both the Dyadic Coding Scales (DCS) and coding of parental scaffolding on a teaching task (Meins, 1997b). We predicted that, as in our previous studies, the DCS would reveal difficulties in the Guided Participation

Relationship for children on the autism spectrum and their parents. We also predicted that a parental teaching task would reveal parents of children with autism to be sensitive guides despite their children's difficulties in the apprentice role. Our third aim was to establish whether there was change on the DCS and parental scaffolding in a subset of the dyads with autism spectrum disorder receiving a modified (preschool-based) version of Relationship Development Intervention when compared with a matched group in a separate classroom who did not receive RDI. All children and families received parent- and school-based interventions as usual during the school year, with exceptions detailed below.

Children in the RDI classroom were provided with direct intervention from an RDI consultant twice weekly. The RDI consultant met twice weekly with the treatment team consisting of teachers, speech and language therapist, and occupational therapist for feedback on guiding engagements with the students. Parents participated in monthly individual meetings with the RDI consultant, and they were provided with feedback on individualized homework assignments based on RDI goals. Parents attended a group educational meeting monthly with other parents of children in the same class, led by the RDI consultant. Group parent trainings covered the following topics in this order: 1) What is Autism? 2) What is engagement? 3) Strategic Pacing 4) Authentic Decision Making 5) Limit Setting vs. Control 6) Communication 7) Communication Expanded 8) Family Readiness 9) Guiding State of Mind and 10) Guiding Assessment.

Children in the non-RDI classroom did not receive intervention from an RDI consultant. They received similar levels of intervention through treatment as usual in their classroom. Their teachers, speech and language therapists, and occupational therapists met twice weekly, with the exception that there was no RDI consultant in attendance. Parents attended individual monthly meetings with their children's therapists and classroom teachers to discuss progress and concerns related to their children's treatment plans. Parents of

children in the non-RDI classroom attended parent trainings on other topics. Non-RDI parent trainings included: What is ABA; What is Rethink, & Why Use Rethink; How to Navigate MrsRiley.com; Sound in Motion; Strategies to Improve Processing; Screen Time for children with ASD; and an End of Year wrap up.

Method

Participants

The present study included 30 children, between the ages of three and six years, and their parents. There were 14 children (8 girls) who were diagnosed with developmental disabilities (DD) but did not meet criteria for autism spectrum disorder. Children in the DD group had speech and language delays, cerebral palsy, Down syndrome, seizures, and spina bifida. The DD group had a mean chronological age of 4 years; 8 months (SD = 10 months). There were 16 children (7 girls) attending the same preschool program who had a previous clinical diagnosis of autism spectrum disorder (ASD). The ASD group had a mean chronological age of 4 years; 1 month (SD = 5 months).

Children in the ASD group were administered Module 1 (n = 12) or Module 2 (n = 4) of the Autism Diagnostic Observation Schedule, 2nd edition (ADOS-2: Lord et al., 2012) to confirm clinical diagnoses. The ADOS-2 is considered the gold standard instrument for identifying clinical features of autism spectrum disorder. It provides a standardized assessment of communication, social interaction, behavior, sensory stereotypies, and play or imaginative use of materials. Algorithms for the ADOS-2 allow for alignment between the various modules used with participants of differing ages and functioning levels (Gotham et al., 2008). A calibrated severity score, called the autism severity metric, is calculated to identify severity of clinical features independent of participant demographics. This metric, ranging from 1 to 10, allows for standardized comparison of total scores across modules.

Calibrated severity scores in the present sample ranged from 6 – 10, all consistent with a diagnosis of autism.

All children were assessed by preschool-based speech and language pathologists at the beginning of the school year. A language age-equivalent was provided to the research team for each participant. The DD group had a mean language age-equivalent score of 2 years; 2 months (SD = 8 months) and the ASD group had a mean language age-equivalent score of 2 years; 5 months (SD = 5 months).

Intervention Groups

The children with autism were in two separate classes (each class $n = 8$) in the same preschool. For purposes of the research, one of the classes added RDI to the interventions provided. The classroom receiving RDI had baseline language scores ranging from 10 – 47 months ($M = 25.75$ months). The non-RDI classroom had baseline language scores ranging from 4 – 41 months ($M = 25.75$ months). Each group had two ADOS-2 Module 2 and six ADOS-2 Module 1 administrations. The mean ADOS-2 calibrated severity score was 8.88 in the non-RDI classroom and 8.38 in the RDI classroom. Thus, the children were very similar at baseline in their language levels and autism severity.

RDI was delivered within the classroom, and via individual and group parent sessions provided on site throughout the school year. Children in the non-RDI classroom received equal levels of in-classroom support focused on general behavioral principles. Parents in the non-RDI classroom attended trainings on other topics, as detailed in the Introduction.

Measures

Relationship Development Assessment – Research Version (RDA-RV)

Parent-child dyads were administered the RDA-RV. The assessment included a series of eight 5-minute tasks, administered in the same order for every dyad. These included: music-making, shared story reading, a fishing game, a construction teaching task, ball play,

discovery box, pretend play, and joint block building. These tasks provided presses for joint engagement and social interaction. The only instructions given to parents were to use materials together with their children, and to set limits as they would at home. For one construction teaching task, parents were asked to, “Teach your child to use the blocks to copy this picture.” Apart from entering the room to remove and replace materials, and provide standard instructions, the tester stayed out of the room while the dyads engaged with each set of materials. The RDA-RV was administered at the beginning of the school year for all 30 dyads, and again at the end of the school year for the 16 dyads whose children had ASD.

Video Recording

The assessments were video recorded for coding by two separate research teams. All 46 video recordings were assigned random numbers (ranging from 1 – 46) and distributed to two separate coding teams, overseen by Author 1 (FL) in the UK for ratings of Parent Scaffolding and Author 4 (JH) in the US for ratings on the Dyadic Coding Scales. The first and fourth authors remained blind to diagnostic, treatment group, and time status until after all ratings were complete and entered into the database. After coding was complete, the second author of the study provided the lead authors with diagnostic status, time, and treatment variables for the 46 videos in order to allow the authors to conduct statistical analyses.

Coding Schemes

Dyadic Coding Scales. The Dyadic Coding Scales (Humber & Moss, 2005) consist of nine scales, each scored from 1 – 7. Coordination refers to the smoothness of transitions. Communication refers to the quality of information exchange. Partner Roles refers to appropriate parental and child roles. Emotional Expression refers to the quality and balance, including appropriateness and intensity, of emotional displays. Responsiveness / Sensitivity refers to mutual sensitivity to the needs of the other. Tension / Relaxation refers to whether or

not the dyad appears anxious or presents with a relaxed and open manner. Mood refers to the general mood, positive or negative, of the dyad. Enjoyment refers to the level of warmth or pleasure. An overall score is used to provide a summary of the general quality of the interaction within the dyad. Each of nine scales on the DCS were scored on from 1 – 7, with higher scores indicating better quality interaction.

For example, Coordination is broadly defined as the flow of interaction – smoothness of transitions – toward explicit or implicit mutually understood goals and involves the organizing and construction of a mutually productive experience. A low score (e.g., 2) would indicate little or unproductive interaction, little flexibility, lack of smoothness, separate and unrelated activities, and/or intense friction. A medium score (e.g., 4) would indicate sometimes unclear or imbalanced interaction, little flexibility, lack of smoothness, separate and unrelated activities, and/or intense friction. A high score (e.g., 6) would suggest interaction proceeds smoothly toward mutually defined goals, most differences are resolved, there is synchrony and harmony, and balance of who initiates and responds.

The total score (possible range 9 – 63) was used for subsequent analyses. A research assistant blind to the diagnostic composition of the sample, and all study variables, rated all of the videos on the Dyadic Coding Scales. A second research assistant, also naïve to study details, rated 20% of the videos. Inter-rater reliability for the total DCS score was excellent (ICC = .94).

INSERT TABLE 1 AROUND HERE

Parent Scaffolding. One episode of the RDA-RV involved the parent teaching their child how to build a DUPLO® boat. In this Parent Scaffolding task, parents were specifically asked to teach their children how to construct a boat that matched the model in a picture. These episodes were transcribed, and using the transcript and video, were coded for parental

tutoring strategies, following Meins (1997b). Each line of the transcript containing relevant content was counted as an intervention, and coded for the *Type* of intervention, and the *Level* of intervention (See Table 1). Children's success at completing that aspect of the task was coded (e.g., locating the correct block, or placing it in the correct location). Parents' ability to modify the level of support they provided in response to the child's competence at the task (e.g., increasing support if the child struggled) was termed Parent Sensitivity. Parent Sensitivity was judged in the following ways: where children succeeded at one stage of the task, the parent's next intervention should be at the same level, or a lower level, indicating that they were reducing the intensity of their support in response to the child's capability. Where children failed at that stage of the task, the parent's next intervention should be at a higher level than the previous one, but no more than two levels above it.

Child's sensitivity to parental input was also coded (See Table 1). Level 1 described instances where children either resisted or ignored their parent's input, which could be through verbal (e.g., shouting 'stop' or 'no') or non-verbal means (e.g., turning away). Level 2 was applied to instances where children acknowledged their parent's input, without taking it on board (e.g., watching or listening to their parent, but then carrying on without incorporating their idea). Level 3 was applied to instances where the child accommodated the parent's input or intervention (e.g., parent suggests: *'I think that piece goes there'*, and child picks it up and places it, or attempts to place it, in that location).

One research assistant blind to study hypotheses and groups coded all videos, and a second coded 20%, with very good inter-rater reliability (child response: κ=.70; parent sensitivity: weighted κ=.61). Child response to parent (number of 'ignore/fail to adjust' or 'accommodate'); Parent Sensitivity (proportion of sensitive interventions by parent) and the proportion of Parent Negative Feedback were used in analyses.

Results

INSERT TABLES 2 AND 3 AROUND HERE

Dyadic Coding Scales

Table 2 displays the descriptive statistics for the ASD and DD groups at baseline on each measure. As predicted, dyads comprised of children in the ASD-group and their parents received significantly lower scores on the Dyadic Coding Scales (M = 37.94, SD = 11.37) than dyads comprised of children in the DD-group and their parents (M = 51.86, SD = 9.04), $t(28) = 3.67$, $p = .001$. Secondly, as predicted, dyads whose children were in the RDI classroom showed a significant improvement in DCS scores between the beginning (M = 37.63, SD = 10.58) and end (M = 47.50, SD = 6.39) of the academic school year, $t(7) = -4.47$, $p = .003$ (See Table 3). Use of dependent t-tests was supported as, among the RDI group, DCS scores at baseline and outcome were highly correlated, $r(8) = .84$, $p = .009$. It is important to note that those dyads whose children were in the non-RDI classroom did not show a change in DCS scores between the beginning (M = 38.25, SD = 12.84) and end (M = 37.88, SD = 14.01) of the academic school year, $t(7) = .144$, $p = .889$. Use of dependent t-tests was supported as, among the non-RDI group, DCS scores at baseline and outcome were highly correlated, $r(8) = .86$, $p = .007$.

It is important to note that the RDI and non-RDI groups had very similar DCS scores at baseline (RDI M = 37.63, non-RDI M = 38.25), but very different scores from each other at outcome (RDI M = 47.50, non-RDI M = 37.88). Therefore, participation in the RDI classroom had a significant effect on change in DCS scores $F(1,14) = 9.04$, $p = .009$.

Insert Figure 1 Here

Parent Scaffolding

There were no differences between the ASD and DD groups in how long the Parent Scaffolding task lasted, $t(28) = -.66$, $p = .515$, nor in how many interventions the parents provided to the child, $t(28) = -.37$, $p = .718$. Assumptions for parametric testing were met for all variables except for *child resists parent input*. However, as ANOVA is robust to deviations from normality, parametric testing was conducted.

Analyses were conducted to investigate whether there were differences between the ASD group (n = 16, pre-intervention) and the DD group (n = 14) on how parents and children engaged during the Lego task.

The ASD and DD samples were compared on the parent scaffolding coding scheme using MANOVA, with four dependent variables of *child resists parent*, *child accommodates parent*, *parent sensitivity*, and *parent use of negative feedback*, and the fixed factor of child diagnosis. Using Pillai's Trace, there was a significant effect of diagnosis on the parent scaffolding coding scheme, $V = .36$, $F(4, 25) = 3.58$, $p < .05$, partial $\eta^2 = .36$. Follow-up ANOVA analyses showed that the group differences were driven by the child response: children with autism were more likely to resist parent input than the DD group, $F(1, 28) = 6.72$, $p < .05$, partial $\eta^2 = .19$; and were less likely to accommodate parental input, $F(1, 28) = 13.79$, $p = .001$, partial $\eta^2 = .33$. On the other hand, consistent with our prediction, parents in both groups were as likely to demonstrate sensitivity in their provision of feedback, $F(1, 28) = 2.31$, $p = .140$, partial $\eta^2 = .08$, and parents were equally likely to use negative feedback in both groups, $F(1, 28) = 2.58$, $p = .119$, partial $\eta^2 = .08$.

Changes on the Parent Scaffolding measure between the baseline and outcome follow up were analysed based on children in the ASD group who received the RDI intervention (n=8) and those who did not (n=8). As depicted in Table 3, there were no significant changes over time in the RDI or non-RDI groups on parent tutoring. (p-value range .21 – .90)

Relations between DCS and Parent Scaffolding

Using data from the autistic children and parent dyads at baseline (n = 16), we analysed the relations between the DCS and Parent Scaffolding coding scheme, to investigate how the overall quality of parent-child engagement related to the provision of scaffolding by parents. At baseline, the Parent Scaffolding variables of *child resists parent r(16) = -.29*, *parent sensitivity r(16) = .09*, and *parent use of negative feedback r(16) = -.39* were not associated with parent-child DCS scores (all p-values *ns*). However, there was a trend towards higher rates of *child accommodates parent* being associated with higher scores on the DCS, *r(16) = .48, p = .060.*

At outcome, the trend persisted with higher rates of *child accommodates parent* continuing to be associated with higher scores on the DCS, *r(16) = .46, p = .076.* In addition, at outcome, there was a significant inverse correlation between *child resists parent* and scores on the DCS, *r(16) = -.672*, *p = .004.* The more a child resisted support from their parent, the lower the scores for the dyad. At outcome, parent scaffolding variables were not associated with outcome DCS scores, *parent sensitivity r(16) = -.27*, and *parent use of negative feedback r(16) = -.36*, p-values *ns*.

Discussion

This study is the first to investigate the Guided Participation Relationship (GPR) in preschool age autistic children, in relation to a matched comparison group, using validated measures of parent-child interaction and parental tutoring. As expected, compared to children with other developmental disabilities, autistic children and their parents exhibited difficulties in the GPR as coded by the DCS. This result contributes to a growing set of research on the DCS as a valid and reliable measure of the GPR in ASD. In addition, the autistic children were specifically more resistant and less accommodating to parental tutoring during a teaching task. Critically, parents themselves did not show differences in sensitivity or use of

negative feedback in the guide role during the teaching task. A subset of the autistic children who received a modified version of RDI (Gutstein, 2009), delivered in their preschool over the course of a school year, showed significant improvements in the parent-child GPR between baseline and outcome. These changes were not seen in a matched group of children who did not receive RDI. No changes on the parent scaffolding task were found.

An important finding from this study is that parents of children with autism were not less sensitive as guides towards their children. They demonstrated similar levels of sensitivity to parents in the comparison group, by incorporating their child's success on the task to guide the teaching input they provided. They did not provide more negative feedback than the comparison group either. This finding accords with previous research demonstrating that parental sensitivity is not compromised in parents of children with autism (e.g., Baker, Messinger, Lyons, & Grantz, 2010; Brigham, Yoder, Jarzynka, & Tapp, 2010; Kasari, Sigman, Mundy, & Yirmiya, 1988). Instead, the present study suggests that parents of autistic children are available for the kind of attunement required to be effective guides. However, it takes two to tango and there were challenges in the GPR.

Although parents are equally available to their autistic children, it appears that the children may have difficulty experiencing the parental attunement provided in ways that foster collaborative participation in guiding engagements. In the present study, children with autism showed a stronger tendency to resist or ignore parental input, demonstrating their difficulties in adopting the role of apprentice. This result emphasizes the limitations that autism places on the guided participation relationship, and the challenges that it poses for the day-to-day guiding that parents typically provide, which is integral to children's cognitive and social development (Collins et al., 2000; Laursen & Bukowski, 1997; Maccoby, 1992; Sameroff, 2009). It also makes the intact sensitivity in the parents of children with autism all the more remarkable, given the high levels of resistance the parents encountered from their

children when attempting to engage them. In the present study, the child variables on the parent scaffolding coding scheme correlated with global quality of relatedness as coded by the DCS at baseline and outcome.

One reason why DCS ratings may have been sensitive to change in the dyads receiving RDI is that they apply to qualities of child–adult interaction most closely aligned with attunement. For example, low scores on the communication item might be given for a limited communication involving withdrawal and awkward silences, whereas high scores are given for clear, direct and meaningful words and gestures, comfortable silences, and a balance in who does the talking and listening. A low rating on the DCS would correspond to variables such as disinterest, inaccessibility, lack of pleasure, and the presence of discord and conflict, whereas a high score would be given when there is mutual responsiveness, enjoyment, and harmonious and agreeable interactions with genuine interpersonal interest. Previous studies of our own have consistently demonstrated how the DCS is sensitive to differences between dyads with and without an autistic child, and to change over time in dyads participating in RDI (Larkin et al., 2015; Hobson et al., 2016). This is the first study to demonstrate improvement on the DCS among dyads participating in RDI, in relation to a matched comparison group.

Contrary to predictions, there was no change in the parent scaffolding task between baseline and outcome for children with autism receiving RDI. This potentially reflects the brevity of the task, which at 5 minutes duration may not have been sufficient to identify any changes in the guided participation relationship. Alternatively, it may be that the early stages of RDI intervention focused on broader aspects of parent-child interaction which led to improvements in connection and attunement overall, as better reflected by the DCS. In keeping with this interpretation, the RDI themes and topics covered in the modified form of intervention were closely aligned with mind-mindedness, mindsight, and reflective

functioning. Parents were helped to understand the nature of the breakdown in the GPR, and become inviting social partners, despite their children's limitations. Indeed, the RDI approach, with an explicit initial aim on the part of the consultant to help parents regulate and reflect in order to provide their children with experiences of connection, is grounded in developmental neuroscience and a recent paradigm shift in the science of parenting (Perry & Dobson, 2013; Porges, 2017; Siegel & Bryson, 2011). The RDI approach seeks to address obstacles to growth by providing a facilitating environment which fosters mastery motivation and curiosity. Just as Carl Rogers emphasised the facilitative aspects of warmth and acceptance in a therapeutic environment, parents may facilitate their children's development through prioritizing emotional safety and connection (Rogers, 1951).

The present results highlight the potential for emotionally attuned intersubjective communication and collaboration to develop in parent-child dyads despite the challenges autism may place on the GPR. From the viewpoint of intervention, we know that child development can be facilitated when parents alter specific interactive behaviors (Hoagwood et al., 2001). In the field of autism, interventions are beginning to take seriously the areas of social-communicative difficulty that are core features of autism and include parents in the treatment process. Many studies have also shown that providing training to parents yields improvements in their children: in joint attention (Aldred et al., 2004; Jones et al., 2006; Schertz & Odom, 2007), communication (Symon, 2005; Vismara, Colombi, & Rogers, 2009), shared engagement and problem solving (Wieder & Greenspan, 2003), and improved emotional co-regulation (Gulsrud et al., 2010). A program aimed at increasing parental responsiveness to children with autism had a positive impact on the children's social-emotional development (Mahoney & Perales, 2003). Green et al. (2010) found improvements in parent-child synchrony and shared attention, and an increase in children's attentional bids to parents, following a parent-delivered communication intervention. The children's

improvements on the ADOS following intervention were found to be mediated by changes in parent synchrony and increases in children's attentional bids, suggesting that the improvements in parent-child interaction were responsible for broader improvements in the child's presentation of autistic symptoms (Pickles et al., 2015).

Findings such as these stress the importance of understanding social reciprocity as a two-way street, and clinical work with both children and those with whom they interact (Gernsbacher, 2006). Interventions for children with autism which focus upon parent–child interaction and target communication may have important implications for the children's development (Aldred et al., 2004; Green et al., 2010; Kasari et al., 2008; Wetherby & Woods, 2006). In the RDI approach, the focus of intervention for autistic children is on the pacing, structuring, and sensitive adjustment of everyday guiding activities. The aim is to create a context for deeper interpersonal engagement, coordination, and communication (Gutstein, 2009; Gutstein et al., 2007; Hobson & Hobson, 2011). Particularly in initial stages of RDI, there is a focus on the parent, to understand and support their affective experience of parenting, and aspects of their cognitions and attributions about the child. Slade (2009) writes about the unique challenges of raising children who may have limitations in their ability to display and understand mental states. RDI focuses on reducing parental stress and reactivity in response to challenging behaviors or interactions with children, and to foster curiosity and openness to children's mental states. Improvements on the DCS in the current study may have arisen from parents having developed new understandings of their children, leading to more accepting, enjoyable interactions.

This focus on parental factors is supported by recent intervention studies. Training mothers in mindfulness is an approach that has led to significant reduction in maladaptive behavior of their children with autism (Singh et al., 2006). Mothers involved in that study reported an increase in overall parenting satisfaction, increased satisfaction with their

parenting skills, and an increase in mindfulness with their children. Similarly, outside of the ASD field, Zeegers et al., (2019) found that parents who completed a mindfulness-based intervention: 'Mindful with your Baby/Toddler', showed improvements in mind-mindedness and accepting behavior during interaction, as well as reporting reductions in stress. Consequently, their infants/toddlers showed improvements in responsiveness during interaction, as parents displayed a less reactive style of interaction.

Recent interventions have also begun to explicitly target maternal mind-mindedness, delivered by a variety of means such as video feedback (Colonnessi et al, 2012; Schacht et al., 2017), parent groups (Zeegers et al., 2019) and through smartphone apps (Larkin, Oostenbroek, Lee, Hayward, & Meins, 2019). While mind-mindedness is not generally found to be lower overall in parents of children with autism, attributions towards children can be more negative than in children without autism, which is in turn associated with parenting stress (Kirk & Sharma, 2017; Larkin et al., 2020). Parents of children with autism can also be less likely to attribute positive behavior to stable, internal characteristics of the child (Bussanich, Hartley, & Bolt, 2017). Enabling parents to tune into their children's mental states in developmentally appropriate ways may reduce parenting stress and frustration and support parents' mental health.

This emphasis on parents' ability to accurately tune into children's minds, or 'parental mentalization', is increasingly part and parcel of intervention programmes for typically developing children and those with developmental disorders (Camoirano, 2017; Delahooke, 2019; Siegel & Bryson, 2011). Parenting programmes that encourage parents to tune in to the reasons behind their child's behavior before responding have been found to reduce parenting stress (e.g., Parents Plus, see Carr et al., 2017). In a recent study, Enav et al. (2019) delivered a mentalization-based group treatment to parents of autistic children, finding improvements in reflective functioning, parental self-efficacy and parent report of child emotional and

behavioral symptoms. There is a need for further studies with children with autism that support parents' ability to self-regulate, to accurately mentalize and thus to respond to the child with compassion and understanding.

In summary, recent developments in affective neuroscience demonstrate the central importance of emotional attunement and shared experience in development (Porges & Furman, 2011; Siegel, 2001). Emotional connection and attunement are just as vital for autistic children but can be more difficult for them to experience given the limitations imposed by the condition (Slade, 2009), with profound implications for their subsequent development.

Further large-scale studies to evaluate RDI are warranted. Such studies should include measures of adherence and fidelity, as well as randomization and an appropriate sample size to evaluate effectiveness. Nevertheless, the RDI approach is grounded in and informed by decades of credible research evidence. In the present study, we build on the growing evidence that interventions focused on creating a context for children on the autism spectrum to thrive and experience warmth, joy, and connection with their caregivers, despite their challenges, can lead to meaningful change.

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Table 1.

Parental Scaffolding Coding Scheme (Adapted from Meins, 1997)

Type	*Example*
Question	"*Where does the red go?"*
Positive feedback	"*Very good"*
Negative feedback	"*Not that one"*
Parent physically intervenes when child requests	*Child asks parent to put a piece in place and they comply*
Parent physically intervenes without request	*Parent puts hand over child's hand and places the piece.*
Other suggestion	"*This is easier, do this"*
Level	
1: Orienting suggestions, focusing strategies, general rules and comments	"*You have to turn this around"*
2: Suggestions about specific pieces, locations, actions, but not combination of all three.	*"You need a red one"*
3. Solutions: suggestions combining specific pieces, locations and/or actions.	*"That piece fits in there".*
4. Physical help	Parent holding one square while child attaches another
5. Demonstration	Parent independently performs the action.
Child Response	
1. Ignores or rejects: child ignores or resists parent help	Child says: *"Stop"* and continues with own action.

2. Acknowledges: child acknowledges parent input but does not incorporate	Child says: *"Hmmm"* but continues without suggestion.
3. Accommodates: child accommodates parent input	Child says, *"Oh yeah"* and moves piece to that place

Table 2.

DCS and Parent Scaffolding Scores for the groups (ASD, DD) at Time 1

	ASD	DD
	n = 16	n = 14
	M (SD)	M (SD)
DCS Total Score	37.94 (11.37)	51.86 (9.04)
Child Resists	.23 (.18)	.08 (.14)
Child Accommodates	.27 (.22)	.53 (.15)
Parent Sensitivity	.48 (.16)	.55 (.12)
Parent Negative	.03 (.03)	.05 (.03)

Table 3.

Scores at Baseline and Outcome for ASD groups.

	RDI M (SD)		NON-RDI M (SD)	
	Baseline	Outcome	Baseline	Outcome
DCS Total score	37.63 (10.58)	47.50 (6.39)	38.25 (12.84)	37.88 (14.01)
Child Resists	.19 (.19)	.20 (.17)	.26 (.17)	.21 (.22)
Child Accommodates	.29 (.23)	.36 (.24)	.25 (.20)	.33 (.23)
Parent Sensitivity	.30 (.09)	.38 (.13)	.33 (.10)	.34 (.15)
Parent Negative	.03 (.01)	.03 (.04)	.04 (.05)	.02 (.04)

Figure 1.

Dyadic Coding Scale Scores by Time and Group