

Using Parents as Implementers in a Sibling-Mediated Intervention to Improve Joint Attention in
Children with ASD

Lauren Brooke Perlmutter

A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

University of Washington

2026

Reading Committee:

Kristen Missall, Chair

Carol Davis

Scott Spaulding

Monica Oxford

Program Authorized to Offer Degree:

College of Education

©Copyright 2026

Lauren Brooke Perlmutter

University of Washington

Abstract

Using Parents as Implementers in a Sibling-Mediated Intervention to Improve Joint Attention in
Children with ASD

Lauren Brooke Perlmutter

Chair of the Supervisory Committee:

Kristen Missall

College of Education

Joint attention is a foundational skill for social and language development in children with autism spectrum disorder (ASD). Peer-mediated interventions, such as *Stay, Play, Talk*, have been adapted to sibling-mediated interventions as neurodiverse preschool and elementary children spend substantial time in the home setting. By training neurotypical siblings and implementing the intervention in the home setting, sibling-mediated interventions aim to increase the generalization of joint attention skills, promote naturalistic social interactions, and foster meaningful relationships within the family environment. While prior studies have used researchers to train siblings rather than indigenous implementers, such as parents, the current study utilized parents as implementers to train neurotypical siblings in the *Stay, Play, Talk* intervention. A nonconcurrent multiple baseline design across 5 sibling dyads was used. The

current study examined (1) the effectiveness of the intervention on joint attention displayed by children with ASD using visual analysis, (2) the fidelity of parent-led training, (3) the fidelity of sibling implementation following parent training, and (4) parents' perceptions of the intervention's alignment with family goals, cultural values, and practicality. Parent training was delivered virtually to enhance accessibility, responding to the growing need for remote intervention following the COVID-19 pandemic. Results indicated that all children with autism increased in joint attention throughout intervention, parents effectively trained the neurotypical siblings to implement the intervention, and all neurotypical siblings used the various strategies of the intervention. All parents reported that the intervention aligned with their family goals and cultural values, highlighting the importance of involving families in intervention. Findings contributed to the literature on sibling-mediated interventions and informed practices for sustainable, family-based support for children with ASD. Implications for clinical and school-based practice and future research are addressed.

Keywords: Autism spectrum disorder; sibling-mediated intervention; indigenous implementers; Stay, Play, Talk; social validity; procedural fidelity; joint attention.

Table of Contents

Acknowledgements	10
Chapter 1: Introduction	11
Joint Attention	11
Peer-Mediated Intervention	12
Stay, Play, Talk	13
Shift to Family Centered Practices	14
Virtual Intervention Delivery	14
Intervention Goal Alignment	15
Contextual Fit and Social Validity	16
Sibling-Mediated Interventions	17
Importance of Indigenous Implementers	18
Procedural Fidelity Data with Indigenous Implementers.....	19
Present Study	20
Chapter 2: Literature Review.....	23
Peer-Mediated Interventions as a Foundation	23
Overview of Peer-Meditated Interventions.....	24
Evidence Supporting Peer-Mediated Interventions for Joint Attention	26
From Peer to Sibling-Mediated Interventions	30
Sibling-Mediated Interventions	32
Evidence Base for Sibling-Mediated Interventions.....	34
Stay, Play, Talk Intervention.....	41
Role of Indigenous Implementers in Interventions.....	45

Parents as Implementers.....	45
Procedural Fidelity and Social Validity with Indigenous Implementers.....	47
Feasibility with Indigenous Implementers	53
Purpose of the Current Study.....	56
Chapter 3: Method.....	58
Recruitment.....	58
Participants.....	60
Dyad 1: Leah and Emma.....	60
Dyad 2: Caleb and Ryan.....	61
Dyad 3: Henry and Gabe.....	61
Dyad 4: Jordan and Ilana and Dyad 5: Clara and Ilana.....	62
Setting and Materials.....	63
Response Definitions.....	65
Measurement Procedures.....	66
Data Collection.....	66
Interobserver Agreement.....	68
Procedural Fidelity.....	70
SPT (Researcher).....	71
SPT (Parent).....	71
SPT (Sibling).....	72
Research Design.....	72
Visual Analysis.....	74
Research Procedures.....	76

Semi-Structured Interview.....	76
Parent Training.....	76
Baseline.....	77
Intervention.....	78
Social Validity.....	79
Chapter 4: Results.....	80
Research Question 1.....	80
Summative Visual Analysis	80
Dyad 1.....	80
Dyad 2.....	80
Dyad 3.....	81
Dyad 4.....	81
Dyad 5.....	81
Research Question 2	81
Research Question 3.....	82
Research Question 4.....	83
Chapter 5: Discussion.....	85
Overview of Study Findings.....	85
Research Question 1.....	86
Research Question 2.....	87
Research Question 3.....	89
Research Question 4.....	92
Implications for Clinical and School-Based Practice.....	95

Clinical Practice.....	95
School-Based Practice.....	96
Limitations.....	97
Recruitment.....	98
Weekly Implementation.....	99
Resources.....	100
Future Research.....	101
Conclusion.....	103
References.....	105
Table 1.....	124
Table 2.....	125
Table 3.....	126
Table 4.....	127
Table 5.....	130
Table 6.....	131
Table 7.....	133
Table 8.....	134
Table 9.....	135
Table 10.....	136
Table 11.....	137
Figure 1.....	138
Figure 2.....	140
Appendix A.....	142

Appendix B.....	144
Appendix C.....	145
Appendix D.....	165
Appendix E.....	167
Appendix F.....	172

Acknowledgements

I have been fortunate to be supported by a community of professors, colleagues, friends, and family members who have provided support and guidance throughout my graduate career. First and foremost, thank you to the families who participated in my dissertation and placed their trust in me and my research. Your dedication to implementing the intervention demonstrates one of the many ways you support your children, and I feel grateful to have had the chance to interact with each of you and your families.

Thank you to my committee members, Dr. Carol Davis, Dr. Scott Spaulding, and Dr. Monica Oxford for your invaluable feedback and expertise throughout each of my graduate milestones. I am grateful for the opportunity to learn from each of you during this process. To my wonderful advisor, Dr. Kristen Missall, thank you for your unwavering support, time, and energy over the past six years. You recognized my potential as a researcher and challenged me in ways that have allowed me to grow immensely. To the soon-to-be Dr. Emalise Mitchell and Dr. Katrina Kerrigan, I would not be where I am today without you. We have supported each other through every set back, celebrated each accomplishment together, and grown both personally and professionally along the way. I am so proud of us.

I am deeply grateful to my support systems, near and far, for helping me reach this milestone. To those who made Seattle feel like home, my New Orleans community who first saw this dream come to life, and my childhood friends who constantly check in on me – thank you. I am extremely grateful to my grandparents, sister, dad, and mom for believing in me every step of the way and supporting this dream of mine. And to Jacob, thank you for entering my life during year one of graduate school and being my constant source of support, encouragement and home-cooked meals, making even the long days feel both manageable and meaningful.

Chapter 1: Introduction

One in 36 8-year-old children are reported to have an autism diagnosis, which is the greatest prevalence reported in the United States to date (Maenner et al., 2023). With the rise in autism diagnoses, there has been an increase in the diversity of how autism is presented and the varying needs of individuals with autism. Although the needs of individuals vary, the diagnostic criteria of autism spectrum disorder (ASD) includes persistent deficits in social communication (American Psychiatric Association, 2022).

Deficits in social communication have been marked by difficulty with language skills (e.g., gestures and requests), social engagement, imitation, and play (Gena, 2007; Pacia et al., 2022). Social communication deficits have also been linked to difficulty forming friendships and increased depressive symptoms (Rai et al., 2018). Research has shown that interventions targeting social communication skills not only improve these skills, but have collateral benefits in other areas including decreasing problem behavior and increasing emotion regulation skills (Ledbetter-Cho et al., 2017). Therefore, the need to target social communication skills through intervention for children with ASD is necessary.

Joint Attention

One crucial social communication skill is joint attention because it is one of the earliest emerging social behaviors in typical social development (Hansen et al., 2019; Krier & Lambros, 2021; Maich et al., 2018). Joint attention is defined as a social communication skill in which two people use gestures or eye gaze to share attention concerning an object or event (Tsao & Odom, 2006). Joint attention is a significant predictor of language outcomes, which aid in social communication, and has been correlated with autism severity and social skills such as social initiation, imitation, and expressive language (Jones et al., 2006; Woods & Wetherby, 2003). As

such, joint attention is an important social communication skill that can be targeted through intervention as it is an observable behavior and can be taught through observation, imitation, and modeling (Bandura, 1977).

Joint attention throughout preschool and elementary school is associated with positive outcomes over time including academic achievement and improved mental health (Jones et al., 2015). Additionally, young children who are exposed to more positive peer interactions have been shown to have decreased rates of problem behavior throughout elementary school (Spivak & Farran, 2016). The inverse relationship between positive peer interactions and problem behaviors suggests the importance of including peers in intervention to increase social communication skills, including joint attention.

Peer-Mediated Intervention

Peer-mediated interventions have been shown to be an effective way to teach joint attention skills for preschool and elementary aged children with ASD (Banda et al., 2010; Barber et al., 2016; Chang & Locke, 2016). The Division for Early Childhood (DEC) of the Council for Exceptional Children recommends peer-mediated interventions to help improve engagement for children with autism from preschool to elementary school (DEC, 2014).

In peer-mediated interventions, dyads can be formed between neurotypical peers and neurodiverse children. Neurodiverse children typically include individuals with ASD or with developmental delays who would benefit from an intervention targeting social communication (Reichow & Song, 2024). The neurotypical peer receives training on how to foster an environment where the neurodiverse child has opportunities to increase social initiations and responses (Barber et al., 2016). Within this model, the peer is the intervention agent, and the

researcher, teacher, or school staff typically assumes the role of the trainer and teaches the peer how to implement the intervention (Chang & Locke, 2016).

Peer-mediated interventions are beneficial for children with ASD because peers can model desired social behaviors, peers are easily accessible in the school setting to assume the role of the intervention agent, and the child with ASD can practice their social skills with the peer throughout the school day (Chan et al., 2009). Peer-mediated interventions typically occur in preschool or elementary-school classrooms because the classroom is a natural environment for interaction between children with autism and neurotypical peers. Additionally, peer training is also feasible as training typically takes place during the school day (Zagona & Mastergeorge, 2018).

Stay, Play, Talk

Stay, Play, Talk (English et al., 1997) is a peer-mediated intervention that includes observation, imitation, and modeling and allows for joint attention to be recorded. *Stay, Play, Talk* was created to simplify the play-based demands placed on the neurotypical peer by teaching them three direct tasks: stay near the neurodiverse child, play with the child, and talk about the child's play (English et al., 1997; Goldstein, 2007). *Stay, Play, Talk* also reduces the need for frequent prompting by the teacher which requires less resources for implementation (e.g., time). In a systematic review and meta-analysis of *Stay, Play, Talk*, intervention studies were implemented in inclusive or general education classrooms ($n = 6$), homes ($n = 3$), or clinics ($n = 1$). Training sessions were facilitated by the researcher ($n = 8$) or by the researcher and teacher ($n = 2$; Ledford & Pustejovsky, 2023). Within the 10 reviewed *Stay, Play, Talk* studies, the three studies that occurred in the home were the only studies that included the family.

Stay, Play, Talk was used in the home setting and adapted as a sibling-mediated intervention in three studies (Kim, 2010; Tsao, 2019; Tsao & Odom, 2006). In each of the studies, the siblings were trained in the *Stay, Play, Talk* intervention by the researcher and all sessions took place in each of the dyad's homes (Kim, 2010; Tsao, 2019; Tsao & Odom, 2006). Following the *Stay, Play, Talk* intervention, the neurodiverse sibling's ($n = 4$) joint attention increased (Tsao & Odom, 2006), the neurodiverse sibling ($n = 3$) increased the number of social interaction gestures made towards their sibling (Kim, 2010), and there was an observed change in the social behaviors of the neurodiverse sibling ($n = 2$; Tsao, 2019). Each study showed how *Stay, Play, Talk* can be adapted from a peer-mediated intervention to a sibling-mediated intervention to support social communication in the home and use siblings as intervention agents. Utilizing siblings as intervention agents can serve as a foundation for broader family involvement, highlighting the critical role of family engagement in increasing intervention outcomes.

Shift to Family Centered Practices

Family engagement positively impacts child outcomes across various domains and is important for successful interventions for young children with ASD (Haine-Schlagel et al., 2020; Rojas-Torres et al., 2020). When the family is included in intervention, researchers are able to collaborate with the family to ensure intervention goals are aligned with the family's values, ensure contextual fit, and take into account social validity. Ways to incorporate the family in intervention are through sibling-mediated interventions and the participation of indigenous implementers, or individuals who occur naturally in the intervention context (i.e., parents).

Virtual Intervention Delivery

Including families with neurodiverse children in intervention is a cost effective and equitable way to meet the child and family's needs (Shalev et al., 2020). For example, families who live in rural areas tend to face barriers in accessing intervention (Wetherbery et al., 2018). In a review of children with autism receiving Medicaid, results found that families living in rural areas lacked greater access to evidence-based care compared to families living in urban areas (Mandell et al., 2010). This suggests the need to include families in intervention across all geographic areas.

Virtual intervention delivery can be used to implement evidence-based interventions to families in rural areas. Studies have shown positive outcomes associated with delivering parent training, virtually, including increased social skills for children with autism and decreased family stress level (Boisvert et al., 2010; Knutsen et al., 2016). However, research using virtual intervention delivery for family-mediated interventions is limited, especially following the COVID-19 pandemic where there was a large shift to delivering mental health services virtually (Ingersoll et al., 2016; Pacia et al., 2022). When delivering intervention training virtually, strong research methodology is recommended to ensure rigor (Ingersoll et al., 2016; Vismara et al., 2018).

Intervention Goal Alignment

Because social skill needs vary significantly across young learners, intervention goals must be established through a comprehensive decision-making process between the family and the researcher. When interventions include the family, the decision-making process can be personalized, comprehensive, and tailored to each child's unique needs (Syriopoulou-Delli & Gkiolnta, 2024). Also researchers must be culturally responsive and be able to "think, feel, and act in ways that acknowledge, respect, and build on ethnic, sociocultural, and linguistic

diversity” (Lynch & Hanson, 2004, p. 43). This includes researchers understanding their own worldview and being aware and sensitive of the worldview of others (Jones, 2014). Culturally responsive researchers recognize the complexity of culture, implement interventions that incorporate individual differences, and ask questions in a clinical interview that allow them to gain a greater understanding about each family and child (Jones, 2014). In turn, this allows for collaboration in defining intervention goals for the child that are culturally relevant for them and their family.

When creating intervention goals related to joint attention, it is important to consider who is defining the goals. The Autistic Self Advocacy Network explored ethical implications of autism therapies and services as well as perspectives on similar therapies from the broader disability community (Autistic Self Advocacy Network, 2022). They explained the ethical importance of ensuring that social skill goals are not masking autistic traits but rather empowering autistic individuals to self-advocate and providing them with tools to make social decisions (Autistic Self Advocacy Network, 2022). By promoting family collaboration in interventions, the family is positioned as the expert on their child and can guide intervention decision making.

Contextual Fit and Social Validity

Families' understanding about their child's needs can help to inform team members and ensure that interventions are contextually relevant and aligned with family dynamics and culture. Contextual fit posits that the match between an intervention and local context impacts the quality of intervention and whether the intervention is able to produce the desired outcomes for the child and their family (Crone et al., 2015; Horner et al., 2014). Researchers must consider if the outcome of the intervention is highly valued and if there is a need for intervention according to

those receiving support (i.e., children and families; Horner et al., 2014). Each child and family's needs are unique, and involving families in the intervention allows researchers to collaborate directly with them to identify and address those specific needs (Horbanczuk, 2024; McLaughlin et al., 2012).

Researchers are also able to collect social validity data (Wolf, 1978), the social acceptability of procedures and the social importance of intervention outcomes, throughout intervention with families (Carter, 2010). Researchers have noted the importance of including direct consumers (i.e., individuals directly involved in the interventions) and indirect consumers (i.e., individuals who are strongly affected by the effects of interventions) in deciding intervention goals to ensure that intervention outcomes have social validity (Ledford et al., 2016). In a review of single case research design (SCRD) studies ($n = 28$) regarding behavior interventions for young children, less than half of the studies ($n = 13$) involved consumers in determining the intervention goals and procedures and only four studies addressed goals with the consumers before intervention implementation (Park & Blair, 2019). These findings underscore the importance of involving the family in creating intervention goals, prior to intervention, to ensure they are relevant, acceptable, and effective for the child with ASD.

Sibling-Mediated Interventions

One way to involve families throughout an intervention is to include a neurotypical sibling in an intervention for the neurodiverse sibling. Research has begun to explore using evidence-based peer-mediated interventions to inform sibling-mediated interventions because neurodiverse preschool and elementary children spend substantial time in the home setting (Bene & Lapine, 2020). Similar to a peer-mediated intervention, in a sibling-mediated intervention, dyads are formed between a neurotypical sibling and neurodiverse sibling. The neurotypical

sibling serves as the intervention agent and receives training on how to create opportunities for their sibling to develop targeted skills, such as play (Walton & Ingersoll, 2012).

A meta-analysis of sibling-mediated interventions ($n = 16$) revealed that sibling-mediated interventions can improve social communication skills, including joint attention, and facilitate the maintenance and generalization of the targeted skills (Bene & Lapine, 2020). Studies were conducted in participants' homes ($n = 10$), schools ($n = 3$), university settings ($n = 2$), and a preschool ($n = 1$) and neurotypical siblings were most often trained by the researcher ($n = 14$). Results of the meta-analysis emphasized the importance of interventions including the sibling and warrants future research that examines the effectiveness of using indigenous implementers to train the siblings to support long-term maintenance and generalization of skills.

Importance of Indigenous Implementers

Indigenous implementers are individuals who are involved in the intervention and occur naturally in the context of the intervention, but are not the primary researcher (i.e., parents). Including indigenous implementers in applied settings provides many benefits to the implementer (i.e., parent) and the child. Research has shown that when parents learn skills to support their neurodiverse child's behaviors, they report a decrease in stress, improvement in family cohesion, and an increase in their sense of competence (Heitzman-Powell et al., 2014).

Additionally, including indigenous implementers in intervention helps to increase the generalizability of skills across naturally occurring contexts (Conrad et al., 2021; Maich et al., 2018). During and after an intervention, such as a peer-mediated intervention in the school setting, the responsibility often shifts to the family to ensure that their child's learned skills are generalized across settings. Children with ASD have shown challenges with applying skills learned in intervention settings to everyday settings (Vismara & Rogers, 2010). Therefore,

involving families throughout an intervention can help to increase the generalizability of skills (Pacia et al., 2022).

In a meta-analysis of parent-mediated interventions for young children with autism, it was reported that the majority of parent training occurred within the family's home to promote the generalization and maintenance of skills (Nevill et al., 2016). Additionally, a systematic review of parent-mediated interventions for children with autism highlighted that such interventions are valuable because they allow parents to take the role of the therapist and "bring treatment into a home and community setting, enabling the transfer of skills to real-life settings" (Conrad et al., 2021, p. 2). The parent-mediated interventions that Conrad et al. (2021) highlighted emphasized the importance of parent involvement in interventions to increase generalization and suggested a need for future research on how indigenous implementers can effectively administer interventions.

Procedural Fidelity Data with Indigenous Implementers

When utilizing indigenous implementers in applied environments (e.g., school and home), data must be collected to ensure that the intervention is implemented as intended (Ledford & Gast, 2014). This can be done by collecting procedural fidelity data, which is defined as "the extent to which the procedures of all conditions (baseline and intervention) are implemented as planned and described" (Wolery, 2013, p. 41). Procedural fidelity data can provide insight into whether or not indigenous implementers implement procedures correctly (Wolery, 2013).

Challenges that may occur with indigenous implementers include incorrectly following the steps due to a lack of training, skill variability (i.e., familiarity with evidence-based interventions), or misinterpretation of instructions. There may also be environmental challenges,

such as the intervention occurring in a location with distractions. Therefore, when collecting procedural fidelity data, it is important to continuously collect and monitor the degree to which the intervention is being implemented according to the researcher's protocol.

In a systematic analysis examining trends in reporting procedural fidelity in SCRD, researchers found an increasing trend in the percentage of SCRD studies that reported procedural fidelity data measurement (Ledford & Wolery, 2013). It is recommended that researchers not only name and report procedural fidelity findings, but also clearly specify the behavioral variables measured. While more than half of the studies reported the specific behavioral variables they measured (58%), less than half the studies reported data by behavior (43%; Ledford & Wolery, 2013). Reporting data by behavior is important because it helps readers understand which components of an intervention may require additional support, thus aiding in the design of more rigorous interventions (Ledford & Wolery, 2013). Including procedural fidelity allows indigenous implementers to deliver the intervention rigorously, ensuring data-based decisions can be made from their findings.

Present Study

Research has highlighted the importance of improving joint attention skills for children with ASD as joint attention serves as a building block for developmental milestones including social initiation, imitation, and expressive language (Jones et al., 2006). One method to increase joint attention has been through peer-mediated interventions which have informed sibling-mediated interventions. *Stay, Play, Talk* (English et al., 1997) was originally designed as a peer-mediated intervention, but three studies have explored how this intervention could be modified to utilize siblings as the intervention agent in the home setting to increase generalizability (Kim, 2010; Tsao, 2019; Tsao & Odom, 2006). In the studies, the siblings were trained by the

researcher. Therefore, there is a gap in the literature that questioned if indigenous implementers could train siblings to implement the *Stay, Play, Talk* intervention with fidelity. A meta-analysis of *Stay, Play, Talk* interventions emphasized the need for further research on whether indigenous implementers can effectively administer the intervention (Ledford & Pustejovsky, 2023) and noted that few studies report fidelity of implementation (Chan et al., 2009).

To address these gaps, the current study utilized parents as indigenous implementers to train neurotypical siblings in the *Stay, Play, Talk* intervention. The study measured and reported the procedural fidelity of parent and sibling implementation, as well as the level of joint attention demonstrated by preschool and elementary children with ASD throughout the intervention. Parent training was delivered virtually to increase accessibility and participation (in addition to one in-person training session). This approach addressed the limited research on virtual intervention delivery for family-mediated interventions, an area of growing importance following the COVID-19 pandemic (Pacia et al., 2022).

Centering the needs of the family and their child, social validity data was collected to assess the extent to which the intervention aligned with the family's goals for their child's social development, fit within their cultural values, and was practical to implement in their daily lives. A review of SCRD studies ($n = 28$) revealed that only four studies engaged families in setting intervention goals prior to intervention (Park & Blair, 2019). As such, the current study actively involved families in the goal-setting process, ensuring that the intervention was aligned with the family's goals, values, and needs. Therefore, the research question are as follows:

1. Does the *Stay, Play, Talk* intervention, when implemented by siblings, increase the percentage of joint attention displayed by preschool and elementary-aged children with autism?

2. To what extent do parents train the neurotypical sibling to implement *Stay, Play, Talk* with fidelity?
3. To what extent do neurotypical siblings implement *Stay, Play, Talk*, following parent training, with fidelity?
4. To what extent do parents report that the *Stay, Play, Talk* intervention aligns with their family's goals for their child's social development, fits within their cultural values, and is practical to implement in their daily lives?

Chapter 2: Literature Review

Given the prevalence of ASD, it is critical to address social communication skills, such as joint attention, in children with ASD to foster developmental milestones including social initiation, imitation, and expressive language (Jones et al., 2006). Peer-mediated interventions, like *Stay, Play, Talk* (English et al., 1997), have been adapted for use in sibling-mediated interventions to assess joint attention, specifically, but questions remain regarding whether indigenous implementers, like parents, can deliver interventions with fidelity to their children. To address these gaps, the current study investigated a sibling-mediated intervention delivered virtually utilizing parents as implementers, examined procedural fidelity for parent and sibling implementation, assessed joint attention outcomes, and determined the social validity of the intervention in aligning with family goals and values. To expand understanding of peer- and sibling-mediated interventions as well as the role of indigenous implementers in intervention, a literature review was conducted.

Peer-Mediated Interventions as a Foundation

Due to the breadth of literature around peer-mediated interventions, this literature review focused on the intersection of the intervention setting, the intervention trainer, and the collection of procedural fidelity and social validity data. Information on these four areas was gathered, as each component is relevant to the current study and informed the intervention design. Reviewing the relevant peer-mediated intervention literature is essential for understanding the foundation of sibling-mediated interventions. A search of the literature was conducted using Education Source, PsycInfo, and ERIC. All studies reviewed included preschool or elementary-aged participants (3-10 years old), utilized a SCRD, included an element of procedural fidelity and/or social validity, and were from 1983 to present (see Table 1).

Overview of Peer-Mediated Interventions

The search terms used included “peer-mediated intervention,” “autism spectrum disorder,” “autism,” “social communication,” and “single case design.” The initial search yielded 26 studies. Peer-reviewed papers and dissertations were included. If one of the dyads in the study did not meet the age requirements (3-10 years old), the study was excluded from the review. Additionally, if procedural fidelity and/or social validity was not included, the study was excluded from the review. Therefore, the researcher reviewed the 26 studies and included only those with preschool or elementary-aged participants that measured procedural fidelity and/or social validity ($n = 6$ studies). This literature review began by exploring the settings in which peer-mediated interventions targeting social communication had been implemented, as well as identifying the individuals who served as intervention implementers. Examining the components of setting and implementer provided insights that informed the selection of the intervention setting and implementer for the current study.

McFadden et al. (2014) investigated the effects of a peer-mediated intervention on the social communication behaviors of young children with ASD and their neurotypical peers in a school recess setting. The recess setting was chosen because prior studies had demonstrated that interventions during recess led to increased cooperation, communication, and play skills for children with ASD (Harper et al., 2008; Lang et al., 2011). However, a peer-mediated intervention had yet to be utilized for intervention delivery .

The researchers recruited school personnel, including four paraprofessionals, to implement the intervention based on their familiarity with the four participants and their peers. The implementers were trained by the researcher through modeling during recess across three sessions, with procedural fidelity data informing subsequent training. The intervention resulted

in increased social communication across all dyads. McFadden et al.'s (2014) research informed the current study by emphasizing the importance of implementing interventions in unstructured settings and involving implementers who are familiar with the dyads.

Katz and Girolametto (2013) investigated the effects of a peer-mediated intervention on the social interactions of children with ASD ($n = 3$) in a structured, early childhood daycare setting. The researchers aimed to determine whether the children with ASD increased the frequency and length of their social interactions following the intervention and whether the intervention was feasible within the daycare context. The daycare educators were trained on the intervention across two sessions. Following training, the daycare educators co-implemented the intervention with the primary researcher across five social skills training sessions with the neurotypical peers. Treatment fidelity was assessed during the training sessions by the early childhood educators and primary researcher and was reported to have 100% fidelity.

After the intervention, educators completed a questionnaire assessing the feasibility of implementing the intervention in a daycare setting. Results showed that educators felt confident in teaching peers the intervention and believed they could continue implementing it throughout the daily curriculum. Katz and Girolametto's (2013) research informed the current study by emphasizing the feasibility of integrating intervention strategies into everyday routines, which aligns with the goal of enabling parents to incorporate sibling-mediated intervention into their family routines.

Banda et al. (2010) examined the effects of a peer-mediated intervention for children with ASD ($n = 2$) during center time activities in a kindergarten classroom. The neurotypical peers were trained by the researcher in the kindergarten classroom to "preserve the natural environment of a general education setting" (Banda et al., 2010, p. 622). During the training

sessions, the researcher taught peers to initiate interactions with the children with ASD through modeling, prompting, and reinforcement. Social initiations (e.g., asking for help, offering help, and asking for a material) and responses (e.g., responding to requests for help, materials, and/or a turn) increased for both dyads throughout the intervention, reflecting the effectiveness of peer-mediated interventions in increasing social communication in elementary school classrooms.

Banda et al.'s (2010) study differed from McFadden et al.'s (2014) study as it occurred during structured class time and training was conducted by the researcher who had no prior relationship with the dyads. In contrast, McFadden et al. (2014) implemented the intervention during unstructured class time and training was conducted by the paraeducators who had a relationship with the dyads. Katz and Girolmaetto's (2013) peer-mediated intervention occurred during structured time with both familiar (teachers) and unfamiliar (researcher) individuals. Taken together, these studies described peer-mediated interventions in structured and unstructured settings with familiar and unfamiliar implementers, offering valuable insights into how setting and implementer characteristics can influence interventions targeting social communication. These findings informed the present study's decision to use parents as indigenous implementers and siblings as the interventionist within a naturalistic home setting.

Evidence Supporting Peer-Mediated Interventions for Joint Attention

The previous studies highlighted how peer-mediated interventions can increase social communication skills for children with ASD. This literature review then focused on peer-mediated studies specifically targeting joint attention, as it is one of the earliest emerging social behaviors in typical social development (Hansen et al., 2019; Krier & Lambros, 2021; Maich et al., 2018). Given that the present study involves preschool and early elementary-aged children, joint attention was selected as the social communication skill to target. Using the same search as

above, the studies that specifically targeted joint attention, were a SCRD, included participants between the ages of 3 and 10 years, and included social validity and/or procedural fidelity were further reviewed ($n = 3$ studies).

Krier and Lambros (2020) expanded the literature on peer-mediated interventions by examining the effectiveness of cross-age peer-mediators in increasing joint attention skills for preschool students with ASD – an age group aligned with the current study. The researchers trained third-grade peers who were nominated by their teachers. The selected peers were reported to have strong social skills, were compliant in adult-directed activities, and were willing to help others. The research team trained the peers in a quiet classroom using pivotal response training and intervention occurred in a preschool classroom. After the peer intervention sessions, the researcher completed a 7-item checklist, created by the primary author, to assess treatment fidelity. Although it is important to collect treatment fidelity, Ledford and Gast (2014) suggested that treatment fidelity assessment are more rigorous when conducted by someone other than the researcher themselves.

Krier and Lambros (2020) included both direct and indirect consumers to assess social validity - a practice important for ensuring that intervention outcomes are meaningful and important to those in the study (Ledford et al., 2016). Before the intervention, social validity data were collected from the parents of the students with ASD to ensure that the parents felt that it would be beneficial for their child with ASD to expand their play skills. Following the intervention, the researchers gathered data from the parents of the peers to assess whether they felt the intervention was a valuable use of their child's time and asked the peers if they enjoyed working with the preschoolers. Social validity data were also collected from the teachers to evaluate whether they felt the intervention was effective.

Krier and Lambros' (2020) reported increases in the percent of joint attention for all three participants determining that peer-mediated interventions are effective for cross-age dyads, thus informing the current study's age inclusion requirements. While treatment fidelity was not collected with rigor as suggested by Ledford et al. (2016), high fidelity was reported. Additionally, social validity findings from the direct and indirect consumers indicated that the intervention was perceived as beneficial. Krier and Lambros' (2020) research informed the current study by emphasizing the value of expanding social validity data collection to parents and the neurotypical child, as well as demonstrating potential for joint attention to increase in dyads of different ages.

Hansen et al. (2019) examined the procedural fidelity of training neurotypical peers and its impact on the joint attention of preschool children in an inclusive classroom environment. Peer training was conducted by the primary researcher in a hallway or nearby office space, while baseline and intervention sessions occurred in the classroom during center time or free play. Notable is that Hansen et al.'s (2019) study collected both procedural fidelity and treatment fidelity as previous peer-mediated interventions had not done so. Procedural fidelity data were collected for all baseline and intervention sessions using a 9-item checklist developed by the primary researcher and assessed by an independent observer. The procedural fidelity data collection ensured that the interventionist refrained from using teaching procedures during baseline, provided appropriate prompts during intervention, and used the social narrative during peer training. Procedural fidelity ranged from 88-100%, demonstrating that the researcher implemented the intervention with high fidelity.

Peer interventionist treatment fidelity was assessed using a 5-item checklist designed to ensure that peer participants correctly implemented the steps (e.g., remaining in the play area)

during baseline and intervention sessions. Peer interventionist treatment fidelity ranged from 50-100%, with an overall average of 79%. Variability in peer intervention fidelity was attributed to the difficulty of capturing the peer throughout the entirety of the play scenarios. Hansen et al. (2019) highlighted this methodological limitation and recommended that future research employ simplified fidelity checklists. These findings informed the current study's approach to collecting and measuring treatment fidelity.

Hansen et al. (2019) also collected social validity data from the dyads' teachers following the intervention. Teachers rated the acceptability and feasibility of the intervention goals, procedures, and outcomes. On a 5-point Likert scale (1 = least acceptable, 5 = most acceptable), the average teacher rating was 4.22, indicating high acceptability. However, Hansen et al. (2019) emphasized the importance of including additional stakeholders, such as the parents of the neurotypical and neurodiverse peers, as well as the students themselves, in future social validity assessments. This gap in stakeholder inclusion informed the current study's social validity procedures. Hansen et al. (2019) observed increases in joint attention for all dyads, highlighting that peer-mediated interventions can effectively increase joint attention skills in young children with ASD and further supported the current study's focus on targeting joint attention.

Hansen et al. (2023) expanded their previous study (Hansen et al., 2019) by examining whether children with ASD increased their bids to peers following intervention – a component of joint attention not previously assessed in inclusive preschool classrooms. The study recruited three preschool-aged children with ASD and three neurotypical children with teacher-reported age-appropriate joint attention skills. All dyads attended the same preschool, which served approximately 30% of students with disabilities in inclusive classrooms.

The primary researcher trained the neurotypical peers in the classroom at a learning station away from other students. Training occurred immediately prior to the peer-mediated intervention and included reading a social narrative about facilitating joint attention, asking comprehension questions, and role-playing various play scenarios. During baseline, the interventionist prompted the dyads to stay together. During the intervention phase, the interventionist additionally prompted the neurotypical peer to initiate joint attention if no initiation occurred within the first 3 minutes of play. These procedures informed the current study's intervention design regarding effective ways to prompt joint attention with young children. Hansen et al. (2023) also collected procedural fidelity data for 80% of sessions and reported high intervention fidelity.

The results demonstrated a functional relation between peer training and increased joint attention by the children with ASD, suggesting that joint attention can improve for children with ASD in naturalistic settings. Hansen et al. (2023) highlighted the limited research targeting joint attention in natural environments with natural social partners and recommended future studies to extend this work. The current study built on this recommendation by targeting joint attention with natural social partners (siblings) in preschool and elementary-aged dyads. Additionally, Hansen et al. (2023) noted a limitation was that the primary researcher was the implementer of the intervention, which may have acted as a discriminative stimulus for joint attention behavior. They recommended that future research use a pyramidal model where the researchers train teachers to train peers, which may lead to greater maintenance of the intervention. This recommendation informed the current study's use of a pyramidal model where the researcher trained indigenous implementers to train siblings.

From Peer to Sibling-Mediated Interventions

Peer-mediated interventions have been established as an evidence-based practice for increasing the social skills of children with ASD school settings. The school environment provides a naturalistic context to facilitate social communication skills, encourage reciprocity during activities, and ensure consistent interactions with familiar peers (Chang & Locke, 2016). In the reviewed literature (see Table 1), all peer-mediated interventions occurred in the classroom setting with variations in structured versus unstructured activities. Across these studies, either the researcher ($n = 4$) or the teacher ($n = 2$) served as the peer trainer, and all interventions demonstrated increases in social communication ($n = 3$) or joint attention skills ($n = 3$). These findings emphasize the success of peer-mediated interventions and the feasibility of utilizing peers as intervention agents in the classroom.

However, a challenge with peer-mediated interventions is the difficulty for the children with ASD to transfer their learned skills to environments outside the classroom setting. In the peer-mediated studies reviewed, four studies cited limitations with generalization. Additionally, because peer-mediated interventions primarily occur in the school setting, they limit the extent to which families are engaged in the intervention process. In the reviewed peer-mediated literature, only Krier and Lambros (2020) included the family in the intervention through the collection of social validity data.

Because research has shown that family engagement positively impacts child outcomes, it is integral to include the family in intervention and consider approaches that leverage family involvement (Haine-Schlagel et al., 2020; Rojas-Torres et al., 2020). Sibling-mediated interventions, an extension of peer-mediation strategies, utilize siblings as intervention agents for neurodiverse preschool and early elementary-aged children. Conducted in the home environment, sibling-mediated interventions build on the principles of peer-mediated

interventions and have been shown to improve the social communication skills of children with ASD (Celiberti & Harris, 1993; Oppenheim-Leaf et al., 2012; Walton & Ingersoll, 2012). The following research on sibling-mediated interventions informed the design of the current study by identifying gaps in the existing literature and highlighting best practices when including siblings in the intervention.

Sibling-Mediated Interventions

A sibling-mediated intervention involves the neurotypical sibling serving as the intervention agent and receiving training on how to support their neurodiverse sibling in increasing various targeted skills (Walton & Ingersoll, 2012). These skills may include play skills (Celiberti & Harris, 1993), academic skills (Schriebman et al., 1983), or adaptive skills (Swenson-Pierce et al., 1987). Sibling-mediated interventions are a logical extension of peer-mediated interventions, as they provide naturalistic opportunities for interaction in the home environment. Additionally, siblings share an emotional connection and their consistent presence in each other's lives offers opportunities for modeling and practicing skills in meaningful, real-life contexts. Similarly, the familial bond may enhance motivation and engagement in the intervention process (Ferraioli & Harris, 2011).

Initial studies exploring the effectiveness of using siblings as intervention agents found positive increases in academic and adaptive skills. Schreibman et al. (1983) was one of the early researchers to apply behavior modification with siblings. This study investigated whether neurotypical siblings could use principles of behavior modification to teach their siblings with ASD various learning tasks. Schreibman et al. (1983) measured the neurotypical siblings' correct use of behavior modification procedures and whether the siblings with ASD responded correctly using a multiple baseline design. Results showed that the neurotypical siblings were able to

correctly implement behavior modification strategies following training, as each dyad's graph displayed an increasing trend line and an increase in level between baseline and intervention. Additionally, all three siblings with ASD demonstrated increases in correct responses to learning tasks after intervention training.

One motivation for Schreibman et al.'s (1983) study was addressing parental concerns about sibling interactions in families with children who have ASD. To evaluate this, social validity data were collected by asking parents for examples of comments the neurotypical siblings made about their siblings before and after intervention. Following the intervention, parents reported a positive shift in the neurotypical siblings' attitudes toward their siblings. Schreibman et al.'s (1983) research was foundational in demonstrating that behavior modification can be applied effectively in sibling-mediated interventions. It also highlighted the importance of involving family members as primary agents of treatment delivery for neurodiverse children (Schreibman et al., 1983).

Building on Schreibman et al.'s (1983) study, Swenson-Pierce et al. (1987) expanded the focus of sibling-mediated interventions to include adaptive skills rather than solely academic skills. Neurotypical siblings were trained to use prompting and social praise to help their sibling with ASD perform a predetermined adaptive skill selected by their parents. Examples of adaptive skills included tooth brushing, clearing dishes, and preparing a simple snack. Training methods for the neurotypical siblings included role-playing sessions and in vivo instruction provided by the primary researcher.

The percentage of steps correctly followed by the neurotypical sibling was recorded for all baseline and intervention sessions, along with the percentage of steps performed independently by the sibling with ASD. Results demonstrated significant improvements across

all dyads, with the neurotypical siblings correctly implementing intervention techniques and the neurodiverse siblings increasing their task independence. For one dyad, where improvements were less pronounced (17% increase), an additional analysis was conducted using a point system to better understand the child's level of independence. While assigning point values was subjective, this additional step provided a more in-depth understanding of this dyad's average percentage of independence.

Swenson-Pierce et al. (1987) also collected social validity data from the neurotypical siblings and parents. Findings indicated that two of the three neurotypical siblings had applied the intervention skills in other contexts, and two of the three parents indicated that they felt like the intervention was beneficial for their children. Swenson-Pierce et al.'s (1987) study was pivotal in demonstrating the feasibility of targeting adaptive skills through sibling-mediated interventions, thereby expanding the scope of these interventions beyond academic domains.

The foundational work of Schreibman et al. (1983) and Swenson-Pierce et al. (1987) established that sibling-mediated interventions can effectively target academic and adaptive skills, laying the groundwork for researchers to explore additional domains for sibling-mediated interventions. Additionally, their research supported the importance of including family members in interventions and provided social validity results demonstrating that sibling-mediated interventions can positively impact sibling relationships and family dynamics. These findings underscore the value of leveraging familial bonds and the home environment to foster growth in neurodiverse children.

Evidence Base for Sibling-Mediated Interventions

Since Schreibman et al. (1983) and Swenson-Pierce et al.'s (1987) initial findings, sibling-mediated interventions have been implemented with siblings of various ages, targeting a

wide range of skill domains and using diverse intervention approaches. This literature review highlights studies central to the current research, aiming to inform the intervention design and address gaps in the existing literature. As such, the sibling dyads in the reviewed research were of preschool to elementary age, the studies targeted social communication skills and the studies were conducted in home settings (see Table 2). Most of the studies reviewed included elements of procedural fidelity and social validity.

Celiberti and Harris (1993) expanded the literature on sibling-mediated interventions by investigating whether neurotypical siblings could improve play behaviors and social skills in their siblings with ASD. Their study was grounded in the premise that play skills are an appropriate focus for sibling-mediated interventions because siblings play together naturally in the home environment, are natural intervention agents for fostering play behavior (Powell et al., 1983), and can learn modeling and prompting strategies (James & Egel, 1986).

Using a multiple baseline SCRD, Celiberti and Harris (1993) trained the neurotypical siblings to: (a) deliver play-related commands, (b) use social praise as a consequence for appropriate responses, and (c) respond effectively when their sibling did not comply with a request. Training and intervention sessions were conducted in the playroom of the participants' home and training was implemented by the primary researcher. Data was collected on the neurotypical sibling's ability to implement each skill (a-c). Results indicated that while the acquisition rates varied for each sibling, all neurotypical siblings successfully learned the three-step sequence. Additionally, these skills generalized to other settings and were maintained for up to 16 weeks post-training. The siblings with ASD also demonstrated increases in play behaviors across intervention phases. These findings informed the current study's intervention design

which incorporated a three-step learning sequence to teach neurotypical siblings ways to engage their siblings with ASD in play.

Celiberti and Harris (1993) collected social validity data from undergraduate students, who rated recorded baseline and intervention sessions on a 5-point scale based on sibling behaviors and the appropriateness of play. Results indicated that after sibling training, neurotypical siblings appeared more confident and engaged when playing with their sibling. Similarly, the social validity ratings indicated siblings with ASD also appeared more engaged with their neurotypical sibling following training, demonstrating the effectiveness of neurotypical siblings as intervention agents in sibling-mediated interventions.

Anecdotal information was also collected for neurotypical siblings and their parents. The researchers reported that following the intervention, siblings played together in a wide range of settings, neurotypical siblings felt more comfortable around their neurodiverse sibling, and all parents observed improved sibling relationships. The social validity and anecdotal reports from Celiberti and Harris' (1993) research reinforce the current study's goal of increasing play behaviors between siblings.

Ferraioli and Harris (2011) expanded the literature on sibling-mediated interventions by investigating how siblings could deliver interventions specifically targeting joint attention. Their interest in joint attention stemmed from evidence showing that gains in joint attention are linked to improvements in social initiation, imitation, and expressive language (Jones et al., 2006; Whalen et al., 2006). Additionally, Ferraioli and Harris (2011) aimed to explore how siblings could be trained in a natural environment, such as the home. Their research was reviewed due to its alignment with the intervention goals of the current study.

Using a multiple probe SCRD, the primary researcher taught the siblings ($n = 4$) to respond to joint attention and to initiate joint attention across 6 weeks. Training methods included modeling and role-playing, with siblings required to implement the intervention components correctly in a role-play with the researcher before beginning play sessions with their neurodiverse sibling. All siblings were able to progress through this component of the training. Siblings were also taught strategies to promote positive play interactions, such as gaining their sibling's attention and using interactive toys that encouraged joint attention. Procedural fidelity was assessed for 20% of the intervention sessions to evaluate how closely the siblings adhered to the intervention protocols. Three of the four siblings implemented the intervention with high fidelity (91.5%, 80%, 84%).

During the intervention phase, joint attention was recorded for the siblings with ASD. Three of the four dyads demonstrated significant increases in the spontaneous initiation of joint attention from baseline to intervention (0.5% to 11.3%; 0.9% to 3.8%; 0% to 5%). Additionally, all four dyads showed improvements in joint attention when the sibling tapped or pointed to an object. These findings support the effectiveness of siblings as intervention agents for targeting joint attention – a core focus of the current study. Furthermore, all parents reported improvements in the quality of their children's interactions and overall family dynamics. These outcomes highlight the value of designing interventions that align with the family's values and needs, an approach integral to the current study.

Walton and Ingersoll (2012) expanded the literature on sibling-mediated interventions by training neurotypical siblings in reciprocal imitation and examining its impact on the joint attention skills of their sibling with ASD. Reciprocal imitation training has been shown to increase imitation and joint attention in young children with ASD and generalize across various

settings when delivered by therapists and parents (Ingersoll, 2010; Ingersoll & Gergans, 2007; Ingersoll et al., 2007). Building on this evidence, Walton and Ingersoll (2012) explored how reciprocal imitation training could be adapted for sibling-mediated intervention.

The primary researcher trained the neurotypical siblings ($n = 6$) in reciprocal imitation training during two 15 to 30-minute treatment sessions per week for 10 weeks. Training involved role-playing, a poster with a description of the skill, and in vivo practice. A sticker chart was implemented to encourage the use of intervention strategies. Data on the neurotypical siblings' procedural fidelity was collected throughout all sessions and varied for each dyad. All siblings were able to use contingent imitation, four of the six dyads were able to learn linguistic mapping, and four of the six dyads increased their use of modeling during treatment. The variation in fidelity highlights the importance of ensuring that intervention steps are straight-forward. Additionally, 3 of the neurotypical siblings generalized the learned skills to others settings. However, Walton and Ingersoll (2012) noted that parent involvement could further support skill maintenance, a gap in the research that informed the current study. Lastly, following intervention, three of the four children with ASD demonstrated increased rates of joint engagement compared to baseline, demonstrating the effectiveness of sibling-mediated interventions in promoting joint attention.

Oppenheim-Leaf et al. (2012) extended the literature on sibling-mediated interventions by investigating if the neurotypical siblings ($n = 3$) could implement a prompting and reinforcing procedure with fidelity and whether the social skills of the sibling with ASD would increase following the intervention. The neurotypical siblings were taught to make requests, provide physical or verbal prompts, and praise their sibling's appropriate behaviors. This training sequence included didactic teaching, modeling, role-plays, and priming. Procedural fidelity was

measured across 45% of sessions and ranged from 80-100%, indicating that the procedures were implemented with high fidelity. Compared to Walton and Ingersoll's (2012) findings on procedural fidelity, Oppenheim-Leaf et al.'s (2012) study highlights that simplifying the intervention steps for neurotypical siblings can improve procedural fidelity.

Following the training sessions, Oppenheim-Leaf et al. (2012) measured the frequency of targeted social behaviors displayed by the siblings with ASD, including playing with others, sharing, and choosing an activity. Following intervention, the siblings with ASD had more opportunities to engage in social behavior and did so more frequently. When prompted by their neurotypical sibling, the sibling with ASD engaged in social behavior for 33%, 62%, and 47% of probes. Additionally, they independently engaged in the targeted social behaviors during 42%, 28%, and 52% of probes. These percentages demonstrated significant increases from baseline reflecting that social skills can increase following a prompting and reinforcing procedure. Parents reported high satisfaction with the intervention and observed strengthened sibling relationships throughout the process. Oppenheim-Leaf et al.'s (2012) findings informed the current study by demonstrating that neurotypical siblings can effectively learn behavioral instructional strategies to promote social behaviors in their siblings with ASD.

Bilgili-Karabacak et al. (2023) conducted a quantitative systematic review of sibling-mediated interventions for young children with ASD to investigate effective practices for training siblings. The review included studies that were conducted in the home ($n = 13$) or clinic setting ($n = 4$), measured social communication as an outcome variable, and involved participants between the ages of 3 and 15 years. Since the current study focused on the home setting with preschool and elementary-aged children, the researcher analyzed studies conducted in the home setting with participants aged 4 and 12 years ($n = 10$). Across these 10 studies, the

siblings received training as intervention agents from the primary researchers. Bilgili-Karabacak et al. (2023) noted that consideration should be given to “training parents as facilitators...since it may significantly impact the long-term support and care for children with autism and improve family well-being” (p. 13). This highlights a gap in sibling-mediated intervention research that the current study aimed to address by incorporating parents as facilitators of the intervention.

Additionally, only two studies collected social validity data from the neurotypical siblings, aligning with the broader lack of social validity data in special education research (Ferguson et al. 2019). As such, Bilgili-Karabacak et al. (2023) recommended that future research explore methods for integrating social validity measures for neurotypical siblings, as their motivation to continue using learned skills is influenced by their perception of the intervention. In response, the current study collected social validity data from neurotypical siblings to assess their perceptions of the intervention.

The 10 studies reviewed employed a range of interventions to train neurotypical siblings. In three studies, siblings were taught specific strategies to mediate focused intervention techniques through modeling, prompting, and reinforcing (Celiberti & Harris, 1993; Ferraioli & Harris, 2012; Oppenheim-Leaf et al., 2012). Four studies utilized naturalistic teaching approaches based on applied behavior analysis, including pivotal response training and reciprocal imitation training (Ozen, 2015; Sullivan, 1999; Walton & Ingersoll, 2012; Watkins et al., 2021). The remaining three studies adapted treatment packages from the peer-mediated intervention literature (Kim, 2010; Tsao & Odom, 2006; Tsao, 2019). After analyzing the effects on social communication for each type of intervention, Bilgili-Karabacak et al. (2023) reported that that the studies with the greatest effect sizes used adapted peer-mediated interventions. These studies demonstrated clear identification of “what the active ingredients of sibling

coaching were and how coaching was conducted” (p. 13). Based on this finding, Bilgili-Karabacak et al. (2023) recommended using adapted peer-mediated interventions for sibling-mediated interventions. This finding informed the current study, as the neurotypical siblings were trained using an adapted peer-mediated intervention.

Stay, Play, Talk Intervention

The adapted peer-mediated intervention used in sibling-mediated intervention research is *Stay, Play, Talk*. Odom and Strain (1984) conducted a review on peer-mediated interventions and identified three types of peer-mediated treatments that are used most commonly: proximity, prompt/reinforce, and peer initiation. English et al. (1997) combined these three elements to create an intervention where peers were taught to first maintain proximity with the target child, and then say the target child’s name, gain their attention, and talk about the activity. English et al. (1997) told peer models to “stay with your friend, play with your friend, and talk with your friend” (p. 231). This intervention became known as *Stay, Play, Talk*. Four neurotypical students were taught these skills and data was collected during play sessions with the neurodiverse child regarding four communicative acts: requests for attention, comments, responses, and other assertives. English et al. (1997) found immediate improvements in the frequency of communicative acts demonstrated by the neurodiverse children, providing evidence of an effective and simple intervention. Subsequent research on peer-mediated interventions used *Stay, Play, Talk* and reported positive outcomes for improving social interactions during free play activities in the classroom (Goldstein et al., 1997; Laushey & Hefflin, 2000).

Tsao and Odom (2006) sought to adapt *Stay, Play, Talk* for use in a sibling-mediated intervention. They used a multiple baseline SCRD across four sibling dyads to measure the effectiveness of the intervention on the sibling with ASD’s joint attention and social behavior.

Tsao and Odom (2006) expanded sibling-mediated intervention research by being the first to use *Stay, Play, Talk* with siblings as interventionist agents and to assess joint attention. Most prior peer- and sibling-mediated interventions focused on social interaction; however, Tsao and Odom (2006) specifically assessed joint attention, recognizing its importance and supporting the idea that “early intervention should focus directly on [joint attention] as an outcome variable” (p. 107; Jones & Carr, 2004; Whalen & Schreibman, 2003).

During training, the researchers reviewed the previous skill, introduced the new skill, read a story illustrating the use of the skill, and modeled using the skill. The neurotypical siblings were then encouraged to use the learned skill in the following play session. All four children with autism increased their frequency of joint attention with their siblings during play sessions. Specifically, joint attention increased for three of the four children during the intervention phases. Additionally, treatment fidelity was assessed by the parents to ensure that the researcher implemented the training correctly. Using a 5-item checklist, the parents reported that the researcher followed all steps of the intervention with fidelity. Tsao and Odom’s (2006) research informed the current study by demonstrating that joint attention can increase in children with ASD following the *Stay, Play, Talk* intervention.

Kim (2010) investigated whether *Stay, Play, Talk* would be effective in improving the social interaction skills of preschool-aged children with disabilities, using siblings as the interventionist in the home setting. A multiple baseline SCRD across participants was used with three dyads. Kim (2010) found that the neurotypical siblings were able to master the learning components of the intervention and consistently use the skills taught throughout the intervention. Comparing social behaviors of the neurodiverse children from baseline to intervention, an increase in social behaviors was observed, demonstrating that *Stay, Play, Talk* is effective for

increasing social behaviors (23% increase for dyad one, 27.05% for dyad two, 37.39% for dyad three).

Treatment fidelity was collected to verify that the researcher implemented the intervention correctly during training. Using an 8-item checklist, the parents reported that the researcher followed all steps of the intervention with fidelity. Kim (2010) also collected social validity data from both the parents and the neurotypical siblings. Overall, the parents reported that the intervention was appropriate and beneficial for their children and family, and they felt that with some additional training they could teach the skills and strategies to their children. This informed the present study, which uses *Stay, Play, Talk* with parents as facilitators. Additionally, Kim (2010) found that the three neurotypical siblings reported that they found the skills helpful in playing with their sibling and expressed a willingness to use the skills in the future. By including neurotypical siblings in the social validity data collection, Kim's (2010) research informed the current study by emphasizing the importance of including siblings' perspective on the intervention's effectiveness and their continued use of the skills.

Tsao (2019) used components of *Stay, Play, Talk* to examine the effectiveness of the intervention on social interaction for neurodiverse siblings as well as the outcomes for their neurotypical siblings ($n = 3$ dyads). Interestingly, Tsao (2019) recruited dyads who all identified as male, as females commonly serve as the intervention agents in the reviewed literature. Sibling training and implementation consisted of five lessons where the researcher taught the neurotypical siblings to stay in close proximity to their sibling as well as strategies for facilitating play and talking to their sibling. The first two lessons focused on *Stay, Play, Talk*, and the remaining three lessons focused on more specific strategies for involving their neurodiverse brothers in play.

Tsao (2019) found a moderate change in the social interactions of the neurodiverse siblings and increased social skill strategies used by neurotypical siblings. Additionally, the researcher collected social validity data from special education teachers who reviewed videotaped sibling play and rated the quality of the sibling's social interactions. Social validity findings indicated that professionals who were naive to the study's purpose found that the quality of social interactions between the siblings increased throughout baseline, intervention, and maintenance. The social validity findings are indicative that the quality of play between the sibling dyads increases following intervention. Tsao (2019) indicated that future research should gather input from the neurotypical sibling regarding their perspective on the quality of their sibling relationship following intervention. Therefore, this informed the current study with inclusion of social validity data from the neurotypical sibling.

Tsao and Odom (2006), Kim (2020), and Tsao (2019) solidified the effectiveness of *Stay, Play, Talk* for improving joint attention (Tsao & Odom, 2006) and social interaction skills (Kim, 2020; Tsao, 2019) for neurodiverse children. Advantages around sibling-mediated interventions include the feasibility of the home setting and generalizability of the skills in a natural setting. Based on the findings from Bilgili-Karabacak et al. (2023), it is recommended that researchers adapt peer-mediated interventions for use in sibling-mediated interventions. *Stay, Play, Talk* is the only peer-mediated intervention that has been adapted to a sibling-mediated intervention in the home setting for preschool- and early elementary-aged children targeting social communication skills. However, Bilgili-Karabacak et al. (2023) and Kim (2010) noted a gap in the literature around the inclusion of parents in the intervention. Therefore, the current study extended the literature on sibling-mediated interventions by training parents as indigenous implementers to facilitate *Stay, Play, Talk*.

Role of Indigenous Implementers in Interventions

As discussed in chapter 1, indigenous implementers are individuals who occur naturally in the intervention context. One way to include indigenous implementers in interventions is through parent-mediated interventions. Parent-mediated interventions position parents as the primary implementers, allowing for more naturalistic intervention approaches. However, it is essential to consider procedural fidelity, social validity, and feasibility when evaluating the role of indigenous implementers in interventions.

Parents as Implementers

The DEC (2014) recommends early behavioral interventions for children with ASD that empower parents to effectively support their children's behaviors. Involving parents in the delivery of interventions has several benefits: it enhances the likelihood of improved generalization of skills across settings (Pacia et al., 2020), it aligns with a more naturalistic approach to intervention (Jones & Feely, 2009), and parents report feeling more capable in addressing their children's behavior and a reduction of stress (Abbeduto et al., 2004; Eisenhower et al., 2005; Jurek et al., 2023). Additionally, parent-led interventions allow for better alignment with family goals, improved cultural fit, and increased practicality (Jurek et al., 2023) as parents can incorporate strategies learned from the intervention into their daily routines in a way that feels natural and relevant to their family dynamics.

In a systematic review of family-mediated social communication interventions for young children with ASD, Pacia et al. (2020) analyzed 50 family-mediated interventions. Within the 50 identified family-mediated interventions, 33 studies assessed a component of generalization. The researchers noted that a strength of family-mediated interventions was that parents are uniquely positioned to promote generalization as they occur in natural, everyday environments. For

example, many interventions were conducted in the home, which facilitated the transfer of learned skills to other contexts. Pacia et al. (2020) emphasized that parent involvement in intervention provides a strong foundation for generalization by leveraging familiar, meaningful contexts and natural reinforcement.

In a parent-mediated joint attention intervention for preschoolers with ASD, Jones and Feely (2009) examined the effectiveness of using parents as implementers in a naturalistic home setting. Parents were trained in behavioral intervention procedures, including discrete trial instruction and pivotal response training strategies. During training, researchers modeled joint attention techniques, and parents practiced implementing the intervention with the researcher. The researcher gave the parent corrective feedback, as necessary, before proceeding to the intervention phase. During the intervention, data were collected on the frequency of the child's responses to their parent's joint attention directives and the number of times the child initiated joint attention. Results indicated that parents implemented the intervention with high fidelity, ranging from 80% to 97%. Additionally, all children showed increases in joint attention responses and initiations from baseline to intervention, although the number of sessions required varied for each dyad. Jones and Feely (2009) attributed these differences to the diverse presentations of ASD amongst the children. Jones and Feely's (2009) research highlights the potential for parent-mediated joint attention interventions to be effective in natural settings and provides important insights for the current study, which assessed joint attention in the home.

Jurek et al. (2023) noted that while the effectiveness of parent-mediated interventions for children with ASD is documented, the qualitative experience of parents involved in parent-mediated interventions is limited. Therefore, Jurek et al. (2023) reviewed 23 studies that implemented parent-mediated interventions and synthesized information regarding if parents felt

a need for support during intervention. Parents reported that “including the child’s sibling...would help them feel supported and make it easier to implement the intervention” (p. 662). This finding informed the current study, which included the sibling in intervention as well as the parent.

Additionally, Jurek et al. (2023) noted that several studies emphasized the empowerment the parent felt during and following the intervention. Parents reported feeling a sense of advocacy and used this knowledge to better advocate for their children through shared decision-making and collaboration with their children’s school team, for instance (Carr & Lord, 2016; de Korte et al., 2022). Parents also reported feeling an increase in their confidence regarding their parenting skills, improved emotional well-being, and decreased parental stress (Manohar et al., 2020; Palmer et al., 2020; Stahmer et al., 2017). Additionally, the atmosphere of the home was reported to feel more relaxed following intervention leading to greater family cohesion.

Notable was that Jurek et al. (2023) found that many parents expressed the need for regular contact with the researcher when implementing the intervention. During the intervention, parents reported that they had questions about the intervention procedures. This highlights the importance of providing ongoing support to indigenous implementers to ensure high fidelity of intervention delivery and emphasized that the current study ensure that procedural fidelity data was collected and that the researcher remained in contact with the family during intervention.

Procedural Fidelity and Social Validity with Indigenous Implementers

As addressed in Jurek et al.’s (2023) study, procedural fidelity is necessary to ensure that the intervention is implemented as intended. This is especially important when using indigenous implementers for the intervention so that researchers can ensure that the findings and “resulting synthesis are on solid foundations” (Wolery, 2013, p. 41). The following literature was reviewed

to understand various strategies and challenges of measuring procedural fidelity with parents to inform the current study. Because there is a wide variety of parent-mediated interventions that measure procedural fidelity, studies that used SCRD to measure joint attention, reported procedural fidelity, and were conducted in the home setting were analyzed.

Jones and Feely (2009) examined whether parents implemented a joint attention intervention for preschoolers with ASD with high fidelity by analyzing the number of times the parent correctly and incorrectly presented the intervention component (e.g., discriminative stimuli, prompt, consequence) to their child. They did this using videotaped recordings of sessions. The researchers used direct counts of behavior to total the number of correct and incorrect presentations of the intervention component. Ledford and Wolery (2013) noted that using direct counts of behavior is recommended when collecting procedural fidelity to measure the behaviors with precision. Procedural fidelity data ranged from 86-97% for correct presentation of the discriminative stimuli, 80-100% for the correct use of prompting procedures, and 77-96% for the delivery of appropriate consequences reflecting that the intervention was implemented with high fidelity. However, Jones and Feely (2009) did not include the frequency at which they collected procedural fidelity data or detail about who collected the data. Noting each of these components is important as it is recommended to collect procedural fidelity data across at least 20-33% of sessions for each condition and each participant using a rater other than the researcher (Ledford & Gast, 2018). Jones and Feely's (2009) research informed the current study as it demonstrated using direct counts of behavior to collect procedural fidelity data, and the gaps in detail informed the current study by ensuring the process was clearly outlined.

Hansen et al. (2018) implemented a multiple-baseline SCRD across three dyads with preschool children and their parents. They trained the parents on how to facilitate joint attention

across 3 to 6 training sessions. A 14-item fidelity task analysis was used to score parent procedural fidelity. The results were graphed as the percentage of steps independently performed. During baseline, mean procedural fidelity was 18.8% (range = 10-40%) correct steps. Following parent training, the mean procedural fidelity during the intervention was 87% (range = 80-90%). Results revealed that following training, parents were able to implement the intervention with high fidelity. However, the researchers did not include the 14-item fidelity task analysis used to assess fidelity. As Ledford and Wolery (2013) have emphasized, including detailed description of specific behaviors is essential for providing greater insight into how procedural fidelity is measured and what behaviors were measured. Because this information was not included, there is some uncertainty regarding the precise steps that contributed to the observed fidelity outcomes. Building on Hansen et al.'s (2018) findings, the current study addressed this gap by incorporating a clear and detailed measure of procedural fidelity. Doing so will inform future interventions utilizing indigenous implementers.

Schertz and Odom (2007) evaluated joint attention outcomes following a parent-mediated intervention and assessed procedural fidelity. The parents were taught four strategies to facilitate joint attention: focusing on faces, turn-taking, responding to joint attention, and initiating joint attention. They were then asked to video record the play sessions and describe their child's performance during each session using brief daily notes. Once a week, the researcher met with the parent and reviewed the brief daily notes to assess procedural fidelity. Procedural fidelity was assessed by indications that the parents demonstrated an understanding and adherence to the strategy that they were facilitating. The researchers calculated the percentage of notes that demonstrated full, partial, and no fidelity. Two of the three parents demonstrated full fidelity for 70-85% of sessions and one of the parents demonstrated partial or no fidelity for 92% of the

sessions. While procedural fidelity data was collected, information was not included that detailed what was considered full, partial, or no fidelity. Therefore, it is unclear what data were collected and limits the “confidence readers can have that important variables were measured precisely across conditions” (Ledford & Wolery, 2013, p. 188). This finding highlights the importance of including detailed information regarding procedural fidelity measurements.

Taken together, these studies informed the current study by detailing challenges and strategies for measuring procedural fidelity. Schertz and Odom’s (2007) study gave further insight into the challenge of collecting procedural fidelity through a self-report measure as the daily notes lacked clarity into the behaviors measured. On the contrary, Jones and Feely (2009) detailed how they used direct counts of behavior to measure procedural fidelity which was helpful when understanding what behaviors were assessed. Schertz and Odom (2007) also noted the importance of taking into account the co-occurrence of familial disabilities and broader family stressors when using parents as implementers. Therefore, interventions must be tailored to meet the family’s needs and unique family dynamics.

One way to ensure interventions meet the family’s needs is to assess social validity. Wolf (1978) emphasized the importance of designing, implementing, and evaluating interventions that assess three dimensions of social validity: socially important goals, socially acceptable procedures, and socially important outcomes. Involving families in the decision-making process can ensure social validity (Strain et al., 2012). When families are included in the decision-making process, interventions can be tailored to meet their family’s values and goals. Park and Blair (2019) conducted a systematic literature review where they analyzed various social validity procedures that single case researchers used in their studies. They found that in interventions with natural change agents, such as parents, assessing social validity at the beginning of the

study is beneficial because it allows the natural change agents “to work with others to make adjustments to the intervention goals and procedures so that they are more meaningful and feasible” (p. 166).

Assessing social validity at the beginning of the study is seen in Bailey and Blair’s (2015) family-mediated intervention for children with ASD. The researchers collected three types of social validity: a self-rating by family members, a rating by naive observers, and a semi-structured interview with the families. Additionally, the researchers met with the family prior to the intervention to set goals. Social validity results found that all three dyads rated the intervention as having high levels of social validity (4.8, 4.9, and 4.4 points out of a 5-point Likert scale). Specifically, the parents reported that the intervention was easy to follow and that they found all steps of the intervention beneficial. Naive observers also reported that the children’s behaviors were more acceptable during intervention (4.5) compared to baseline (1.6), reflecting the social significance of the behaviors taught. Bailey and Blair’s (2015) intervention demonstrated that families appreciated “being an active team member” (p. 232). However, Bailey and Blair (2015) noted that more in-depth interviews are needed in SCRD to continue to identify family viewpoints. As such, their research informed the current study to include an interview with the family prior to beginning the intervention, in addition to collecting social validity data, to better understand the family’s goals.

In a quantitative systematic review of sibling-mediated interventions for young children with ASD, Bilgili-Karabacak et al. (2023) found that 16 of the 19 identified studies collected social validity data. However, only one study focused on social validity as it related to intervention goals, emphasizing the gap in sibling-mediated research for including families in defining intervention goals. Bilgili-Karabacak et al. (2023) noted that having more information

from parents and siblings “would allow individualization and create flexibility” (p. 14).

Additionally, Bilgili-Karabacak et al.’s (2023) social validity findings confirm previous research that has emphasized that social validity is an understudied area within special education research (Ferguson et al., 2019; Lu et al., 2021).

Specifically, Lu et al. (2021) reviewed sibling-mediated research that focused on better understanding how social validity is assessed with indigenous implementers. Studies included in Lu et al.’s (2021) analysis were from a peer-reviewed journal where siblings with ASD and their neurotypical siblings were involved in the intervention. The neurotypical sibling was the intervention agent and participants were between the ages of 3 and 9 years. Eleven of the 16 included studies conducted various social validity assessments. Lu et al. (2021) found that the 11 studies included a measure to determine if participants were satisfied with the intervention, and of those 11 studies, only two studies assessed specific intervention goals to determine if they were socially valid and meaningful to the family (Chu & Pan, 2012; Ozen, 2015).

Chu and Pan (2012) collected information from parents and siblings through brief interviews as well as through two open-ended questions and 13 Likert scale items. They found that all siblings and parents felt that the intervention had socially important goals, it was feasible to implement, and they reported feeling a sense of social growth in their siblings with ASD. Ozen (2015) collected data regarding the intervention goals from parents through three close-ended and four open-ended questions. All parents felt that the intervention goals were appropriate for their children and noted that they saw a transfer of the learned skills to various settings following intervention. By including a social validity measure that assesses parent’s alignment with the intervention goals, interventions are able to be implemented that better fit family values and contexts.

Schwartz and Kelly (2021) highlighted the importance of promoting social validity in interventions for individuals with ASD by ensuring the interventions align with each family's goals, values, and culture. They emphasized that researchers must actively listen to families, as families are the ones who determine what is socially important to them. This can be achieved through semi-structured interviews with the family conducted before, during, and after the intervention. Additionally, it is recommended that researchers practice intellectual and cultural humility by recognizing that families come from diverse backgrounds and hold unique perspectives. What is socially important to one family may not align with another family's priorities. By acknowledging the various aspects of identity (e.g., culture, race, religion, and gender) and collaborating with families, researchers can design interventions that reflect a family's goals and values. Schwartz and Kelly's (2021) work informed the current study by emphasizing the importance of tailoring interventions to meet family values, asking the family about their goals, and ensuring that the operational definition of the target behaviors are tailored to the family's culture per parent report.

Feasibility with Indigenous Implementers

Due to the rising prevalence of ASD, there is a gap between children in need of services and the availability of service providers, emphasizing the importance of families having access to evidence-based interventions (Zhang & Cummings, 2020). Virtual interventions, delivered via online platforms, can increase feasibility by reaching families in remote areas, reducing costs, and addressing the growing demand for accessible services (Ura et al., 2021). While the COVID-19 pandemic accelerated the shift to virtual modalities, prior to 2020 researchers were beginning to explore the feasibility of interventions delivered virtually with indigenous implementers (Pickard et al., 2016).

Pickard et al. (2016) implemented a virtual parent-mediated intervention for children with ASD to better understand the feasibility of interventions delivered virtually. The parent-mediated intervention was designed to target their child's social communication skills. Following intervention, the parents evaluated the virtual delivery model through a quantitative survey examining intervention acceptability, perceived child social communication gains, burden of the intervention on the family, and frequency of program use on a 7-point Likert scale (Pickard et al., 2016). Parents endorsed all areas favorably with mean scores ranging from 5.85 to 6.83 points. The parents were randomly assigned to a self-directed or therapist-directed group. In the self-directed group, parents progressed through a series of online modules to learn the intervention whereas in the therapist-directed group, the therapist led the parents through the training, virtually. Notable was that parents in the self-directed group reported needing additional guidance from a therapist. This finding informed the current study by emphasizing the need for therapist-directed interventions when delivering the intervention virtually. It is also important to note that procedural fidelity was not assessed in Pickard et al.'s (2016) study, and it is unclear if the intervention components were implemented as planned. Parents reported positive social communication gains as well as feeling a sense of parent empowerment suggesting that parent-mediated interventions can be delivered virtually and remain feasible, acceptable, and beneficial for families (Pickard et al., 2016).

Due to the COVID-19 pandemic and increased home-based interventions, Pan et al. (2023) evaluated the outcomes of parent-mediated interventions for children with ASD delivered virtually. Studies were included if the child with ASD was younger than 12 years old, if the intervention was delivered through virtual models involving online instruction, and if parent consultation and discussions with the interventionist occurred during implementation. Of the 17

studies identified, 8 studies included a measure of parent satisfaction as well as the feasibility of using virtual interventions. Pan et al. (2023) found that most parents reported above-average satisfaction with the intervention and high acceptance of the virtual intervention format. For instance, Li et al. (2022) taught a naturalistic teaching approach to parents across an 8-week intervention program designed to increase children's social, communication, imitation, and play skills. High parent participation and engagement was observed throughout the intervention and parenting stress was reported to decrease, reflecting the collateral benefits in other areas following a virtual parent-mediated intervention. Similarly, Corona et al. (2021) trained indigenous implementers, virtually, to implement evidence-based strategies "that could be feasibly implemented within daily routines and activities" (p. 3). Corona et al. (2021) found that 86% of the parents reported feeling satisfied with the intervention and appreciated the convenience of being able to meet with the researcher virtually. Results from Corona et al.'s (2021) study provided support for the feasibility of delivering behavioral interventions virtually with indigenous implementers.

In De Nocker and Toolan's (2023) systematic review of interventions that were delivered virtually for children with ASD, they noted that the majority of studies focused on broad communication skills. They emphasized the importance of future research expanding the scope of virtual interventions to target more specific skills, like joint attention (De Nocker & Toolan, 2023). Additionally, they noted the importance of ensuring that participants are recruited equitably and that efforts to do so are reported in the research. One suggestion is to recruit from public schools. As such, De Nocker and Toolan's (2023) review informed the current study which measured joint attention in children with ASD and recruited participants from public schools.

Purpose of the Current Study

The current study leveraged promising practices in virtual implementation, adapted *Stay, Play, Talk* as a sibling-mediated intervention, and included parents as indigenous implementers in a SCRD to maximize accessibility, practicality, and alignment with family goals and values. This study built upon the strengths and limitations in existing literature regarding peer- and sibling-mediated interventions and joint attention, emphasizing the importance of ensuring procedural fidelity and social validity when using indigenous implementers. Additionally, it addressed the need for family-centered, evidence-based interventions that are feasible for everyday use in home environments.

While the benefits of virtual implementation with indigenous implementers are well-documented (e.g., access to families in remote areas, cost- and time-effectiveness; Corona et al., 2021; De Nocker & Toolan, 2023; Li et al., 2022; Pan et al., 2023; Pickard et al., 2016; Ura et al., 2021), there is limited research on the outcomes of sibling-mediated interventions that are delivered virtually. This gap may be due to the challenges of training siblings who are often too young to independently implement interventions without parental support. To address this limitation, the current study taught parents how to implement a sibling-mediated intervention virtually and guided them in training the neurotypical sibling to deliver the intervention. Virtual delivery of the sibling-mediated intervention was a practical response to the growing need for interventions for children with ASD, the increase in virtual intervention services following the COVID-19 pandemic, and a way to ensure greater accessibility (Pacia et al., 2022). To address the recurring issue of limited procedural fidelity data in virtual intervention research (Pickard et al., 2016), sessions were video recorded and analyzed by trained graduate students to ensure the intervention was implemented as intended.

The literature on peer-mediated interventions has informed the development of sibling-mediated interventions as an effective way to target joint attention in children with ASD (Hansen et al., 2023; Hansen et al., 2019; Krier & Lambros, 2020). A systematic review recommended adapting peer-mediated interventions for use in sibling-mediated interventions (Bilgili-Karabacak et al., 2023). Since *Stay, Play, Talk* is the only peer-mediated intervention adapted in the home setting for preschool- and elementary-aged children that has shown improvements in joint attention (Kim, 2010; Tsao, 2019; Tsao & Odom, 2006), the present study used the *Stay, Play, Talk* intervention. Previous meta-analyses highlighted the need for further research to determine the effectiveness of indigenous implementers in delivering the intervention (Ledford & Pustejovsky, 2023) and pointed out that reporting on procedural fidelity remains scarce in the literature (Chan et al., 2009). As such, the current study utilized parents as indigenous implementers to train neurotypical siblings in the *Stay, Play, Talk* intervention and collected procedural fidelity data.

By including parents in the intervention, the researcher centered the needs of the family and collected social validity data related to the family's goals, values, and culture. Informed by Schwartz and Kelly's (2021) research, the current study respected the diverse aspects of identity (e.g., culture, race, religion, and gender) and collaborated with the families to ensure the intervention was tailored to their values and contexts. Despite the recognized importance of social validity (Bilgili-Karabacak et al., 2023; Park & Blair, 2019), sibling-mediated interventions rarely include families in defining intervention goals. The current study addressed that gap by involving families in goal-setting, ensuring the intervention was flexible, individualized, and aligned with the family's priorities for their child's social development.

Chapter 3: Method

Recruitment

Participants were recruited from a summer day camp program for children with ASD and/or ADHD, an autism center listserv, and a special education classroom in a public school in the Pacific Northwest. The program director for the summer camp and the human resources coordinator for the listserv sent out a flyer via email about the study. The flyer was approved by the university's Institutional Review Board and included the researcher's phone number and email address. The school psychologist for the special education classroom was asked to place printed flyers in the student's backpack for families to receive. After contacting the researcher, the parents participated in a semi-structured interview to assess fit, ensured that they met the specified inclusion criteria, and determined if they were willing to engage in the intervention which involved 3 sessions per week for up to 8 weeks, with each session lasting 15-25 minutes (see Appendix A).

The researcher met with four families who satisfied the inclusion criteria during the semi-structured interview. Following the initial parent training session with each family, the dyads began the baseline sessions. Two of the families encountered challenges with the neurodiverse child allowing them to video record the sessions. In response, the researcher offered several individualized suggestions including using smaller, less conspicuous cameras in the play area. The researcher offered to cover the cost of the camera using available funding and noted that the cameras were returnable if they did not work. The researcher also suggested observing sessions via live FaceTime to allow observation without capturing or storing video. Additionally, the researcher offered to attend play sessions in person. However, due to the neurodiverse child's

continued hesitation as well as recent health complications experienced by the parent in each dyad, both families decided to discontinue their participation in the study.

While the Dyad 1 and 2 began baseline, the researcher continued to recruit additional dyads. The researcher identified a third dyad who met the criteria and began baseline sessions when Dyad 1 and Dyad 2 entered the intervention phase. To recruit the final dyad, the researcher contacted an inclusive education school that serves children with and without disabilities, and the Assistant Principal posted the IRB approved flyer to the school's social media platforms. The researcher received over 250 email responses from interested families. However, the content of the emails was identical, suggesting inauthenticity. To determine the legitimacy of the emails, the researcher sent the 250 respondents a Google Form containing the inclusion criteria and available times for a semi-structured interview. Eight individuals completed the form, but only one followed through with the interview. During the interview, the family did not meet the age requirements of the study.

The researcher then asked a program director from the summer camp for children with ADHD and/or ASD to send out an email with the IRB-approved flyer. As a result, a family expressed interest in participating. During the semi-structured interview with this family, the mother was interested in having her neurodiverse twins and neurotypical younger child participate in the study as two separate dyads (Dyad 4 and Dyad 5). To address potential threats to internal validity, the researcher informed the parent that this would be acceptable under specific conditions: the twins could not be in the same room during the play sessions, the order of the sessions would need to vary (i.e., Dyad 4 play sessions should not always go before Dyad 5), and both dyads would need to begin the intervention phase at the same time. Beginning the intervention at the same time was intended to prevent the neurotypical sibling's exposure to the

intervention from influencing baseline data. The parent agreed to these terms and Dyad 4 and 5 were recruited.

Participants

The participants in this study included five sibling dyads (i.e., 5 children with ASD and their neurotypical sibling) and their parent. Children were included in the study if they were diagnosed with ASD by their physician or psychologist. Participating children with ASD and neurotypical siblings were between 5 and 10 years of age when the play sessions began. Each parent reported that the neurotypical sibling had typical cognitive and social development and that their child with ASD had a social-communication need. All families lived in one urban area of one Pacific Northwest state. Demographic information including ages, race/ethnicity, and languages spoken was gathered through a semi-structured parent interview (see Table 3).

Dyad 1: Leah and Emma

The first sibling dyad included Leah (she/her) and her sister, Emma (she/her). Leah was 10 years 11 months old at the time of intervention and was diagnosed with autism at age 7. Leah's mother reported that she is very bright and enjoys playing with animals. She is currently enrolled in a private school for children with ASD because the traditional classroom environment at her public school was difficult for Leah due to the structure of the school day and number of students in the classroom. Leah's mother noted that Leah has difficulty compromising and being flexible during play as she will become dysregulated when the play scenario does not align with her expectations.

Emma was 8 years 10 months old at the time of intervention. Her mother reported that Emma can navigate complex social dynamics with her sister. She hoped that this intervention would allow Emma to learn skills that make playtime more enjoyable with her sister as Emma

often gets frustrated with how Leah plays. Leah and Emma's mother reported that her daughters engage in imaginary play and enjoy working on puzzles together. The primary language spoken at home was English.

Dyad 2: Caleb and Ryan

The second sibling dyad included Caleb (he/him) and his brother, Ryan (he/him). Caleb was 6 years 5 months old at the time of intervention and was diagnosed with autism three months before beginning intervention (age 6 years 2 months). Caleb's mother reported that he enjoys playing with trains, likes Minecraft, and has a positive demeanor. His greatest challenges are interacting with others and staying engaged in play with same-aged peers and his brother. He is enrolled in public school and is in a general education class. He has an Individualized Education Program and receives specially designed social/emotional instruction.

Ryan was 10 years 2 months old at the time of intervention, and his mother reported that he communicates well with same-aged peers and enjoys playing with his friends. His mother hoped that this intervention would help her children play together, cooperatively. She noted that as Ryan is getting older, he is having greater difficulty playing with Caleb and that Caleb is experiencing challenges attending to the play. The primary language spoke at home was Mandarin which was spoken about 90% of the time.

Dyad 3: Henry and Gabe

The third sibling dyad was Henry (he/him) and his brother, Gabe (he/him). Henry was 5 years 10 months old at the time of intervention and was diagnosed with autism when he was two years old. Henry receives specially designed instruction in math, reading, writing, and social/emotional skills, per his Individualized Education Program. These services have been in place since preschool, during which he attended an early childhood special education preschool

for two years. Henry's mother reported that he enjoys jumping on trampolines, playing with toy cars, and kicking the soccer ball. He is reported to have difficulty sharing his toys, playing with same-aged peers in the classroom, and initiating play with peers and his siblings. Henry's mother reported that when he does not want to do something he will become dysregulated to communicate his needs. His mother noted that he becomes upset when playing most of the time.

Gabe was 10 years 8 months old at the time of intervention, and his mother reported that he is a loving brother who wants to help Henry learn how to play. He spends half of the week at his mother's house with Henry and the other half of the week with his father. She reported that Gabe and Henry enjoy playing near each other but are not typically engaged in the same activity. Because Henry is reported to have difficulty sharing toys and engaging in the same activity as Gabe, Henry's mother hoped that this intervention would teach Henry plays skills and give Gabe ideas about how to play with him. She also wanted to learn skills to help her children play together and was eager for the parent component of the intervention.

Dyad 4: Jordan and Ilana and Dyad 5: Clara and Ilana

Dyad 4, Jordan (they/them), and Dyad 5, Clara (she/her), are presented together as they are twins who both have ASD and participated in the intervention with their neurotypical sibling, Ilana. Jordan and Clara were 10 years 11 months old at the time of intervention and were both diagnosed with autism when they were 9 years old.

Jordan's mother reported that they are very bright. When Jordan was in kindergarten, they were in a class that focused on creating a foundation for social skills as they had difficulty with transitions and severe separation anxiety from their mother. During the intervention, they attended public school and participated in the NEST program. The NEST program allowed Jordan to be in a general education classroom while receiving social emotional support as

needed. For example, Jordan had access to a paraeducator during transitions and use of a quiet classroom when he needed to regulate. Jordan is receiving specially designed instruction in social/emotional per their Individualized Education Program. Jordan's mother reported that they have difficulty taking turns during play and can be rigid about the rules of the game, becoming upset when they are not followed.

Clara's mother reported that Clara enjoys running and wants to connect with others, however, she has a difficult time doing so. Clara's mother noted that she has academic and cognitive challenges and receives special designed instruction in math, reading, writing, and social/emotional per her Individualized Education Program. Clara experienced school refusal following COVID-19 and her mother noted that she had increased challenges regulating her mood during this time. Clara is now attending school regularly and is in the general education classroom about 80% of the time. Clara's mother reported that she has difficulty with turn taking and sharing during play and allowing others to direct the play.

Ilana was 8 years 9 months old at the time of intervention, and her mother reported that she enjoys interacting with her peers, takes turns, and shares easily with same-aged peers. She is also "exceptionally bright" and eager to help her siblings further develop their play skills. Ilana's mother reported that Ilana can get frustrated during play with her siblings and that there can be combativeness, at times, amongst her children. She hoped that the intervention would help to make family time more enjoyable and encourage cooperative play amongst her children.

Setting and Materials

The study consisted of three phases: parent training, baseline, and intervention. Parent training consisted of two sessions: the first session was conducted in person at the parent's home and the second session was conducted via Zoom. During the second session, parents were asked

to participate from a distraction-free location in their home (e.g., a quiet room without interruptions, scheduled at a time when they were not an active caretaker). Baseline and intervention sessions took place in an area where play occurred naturally in the family's home (e.g., playroom or family room) and play materials were selected based on sibling preference to ensure a naturalistic play environment (Ferraioli & Harris, 2011; Walton & Ingersoll, 2012). To ensure consistency across dyads, participants selected play materials from a broad, standardized list, such as pretend play toys, sensory toys, visual and auditory stimulus toys, games, and arts and crafts (see Appendix B).

Dyad 1 and Dyad 2 primarily engaged in pretend play and all sessions occurred in the family room. Dyad 1 played with Hatchimals (toy figurines) during the play sessions. They created a town for the Hatchimals to live in and expanded the town each play session. Dyad 2 engaged in play with Legos, cars, and action figures. Dyad 3 often played with visual and auditory stimulus toys and play occurred in the family room or the neurotypical sibling's bedroom. Examples of the toys that Dyad 3 played with included a kitchen set, a firetruck and police car that lit up, and a boxing arena that made noise. Dyad 4 and Dyad 5 typically engaged in pretend play and their sessions took place in the family room, the kitchen table, or their bedrooms. Dyad 4 and Dyad 5 would engage in crafts, play with Legos, or play with cars.

Parents were provided a binder with the training manual and three illustrations of children staying, playing, and talking to each other. The illustrations were shown to the dyads during the training and intervention sessions (a *Stay* visual, a *Play* visual, and a *Talk* visual). The training manual was created by the researcher and modified from Tsao and Odom's (2006) sibling-mediated intervention that was created from the evidence-based, peer-mediated intervention, *Stay, Play, Talk* (English et al., 1997; see Procedures section and Appendix C). The

parent was also given a tripod to use during the baseline and intervention sessions, and they used their own device to video-record the sessions. If a parent did not have a device that could record video, the researcher planned to provide a video camera. However, all parents had an iPhone to record the play sessions.

Response Definitions

Joint attention was defined as actively seeking engagement with another child or individual (initiating joint attention) or reacting to another person's bid for attention (responding to joint attention). Initiating joint attention included pointing, tapping, or handing an object to get attention, visually referencing the sibling (e.g., looking at the sibling; Ferraioli & Harris, 2011), and sharing materials (e.g., handing an item to the sibling or sharing the same object). Using words (e.g., "come here") or sounds (e.g., laughing) directed toward the sibling were considered verbal cues that constituted joint attention. Responding to an initiation of joint attention included following another person's gaze, pointing toward a shared object, or manipulating the same object (e.g., assembling Legos). Verbally or nonverbally acknowledging the bid (e.g., making eye contact, nodding, smiling, or responding with words) and physically responding to the actions (e.g., taking an offered item or moving closer to the person in response to an invitation to play) were also considered a response to joint attention.

Non-examples of joint attention included behaviors that did not involve shared focus on the same object or activity. For example, joint attention was not considered to have occurred if the siblings played next to each other with different toys without interacting (e.g., the neurodiverse child playing with Legos while the neurotypical sibling played with a puzzle), or if the child responded to the sibling's bid in a way that did not indicate shared interest (e.g., by ignoring them or walking away). Additionally, if the neurodiverse child took an object from their

sibling without any attempt to share or coordinate attention, this was not considered joint attention.

Asking about the family's cultural practices and values was important to ensure that the intervention was contextually relevant and aligned with family dynamics and culture (Crone et al., 2015; Horner et al., 2014). Therefore, parents were provided with the definition of joint attention prior to baseline during the semi-structured interview and asked to share examples and non-examples of how this behavior occurred within their family. For example, some families described examples of joint attention behaviors, such as sharing materials or valuing collaborative actions, while others provided non-examples, such as instances of parallel play where children did not engage with each other. These examples were not used to modify the definition of joint attention but rather to help the researcher and data coders understand how the behavior may manifest in each dyad and to confirm that increasing joint attention was a valued outcome for the families. This approach ensured a shared understanding of the target behavior and alignment between the intervention and their family's values.

Measurement Procedures

Data Collection

Baseline and intervention sessions occurred three times per week, and all sessions were recorded using a tripod and video-recording device (e.g., iPhone). Dyads remained in each phase until the data demonstrated stability in level and a consistent pattern of responding. When the researcher observed that the parent was having difficulty maintaining the three-sessions-per-week schedule, reminders and supports were provided (e.g., weekly check-ins and visual schedules). Dyads 1 and 3 resumed consistent participation following reminders. Dyads 4 and 5 required additional support due to scheduling constraints (e.g., family relocation, lice outbreak,

and personal family circumstances). Despite these challenges, Dyads 4 and 5 completed sufficient sessions to establish stability in level and a consistent pattern of responding. Dyad 2 did not have difficulty meeting this requirement. The number and timing of sessions for each dyad are reflected in the graphs (see Figure 1).

Sessions consisted of 15-minute play sessions where joint attention was measured for the sibling with ASD for 10 minutes. During the first 3-minutes and last 2-minutes data were not collected. Because it was expected that joint attention would increase at the beginning of the play session when the siblings were choosing what to play and at the end of the play when they were cleaning up, data collection began at minute 4 and ended at minute 13. By collecting data during the middle of the play session (minutes 4-13), the data collectors were more likely to observe natural interactions between the siblings (Bennetts et al., 2021; Rusby et al., 2015). Joint attention was measured during 10-minute partial interval coding sessions, with 5-second observation intervals followed by 5-second recording periods, for a total of 60, 10-second intervals for each play session.

Partial interval recording was selected because neurodiverse children typically display joint attention in brief, discrete episodes (Adamson et al., 2021; Cilia et al., 2020; Yurkovic-Harding et al., 2022). Since joint attention is likely to not persist across an entire interval, whole interval recording would be less sensitive to their occurrence, and momentary time sampling could miss these brief instances of joint attention altogether. Partial interval recording therefore allowed data collectors to capture the occurrence of these short behaviors within small intervals, providing an appropriate estimate of the frequency of joint attention (Ledford & Gast, 2018).

Following each session, the parent uploaded the recording to a shared Google drive that the researcher and family could access. The primary trained data collector accessed the video and

immediately coded for joint attention to allow for visual analysis. For 40% of sessions, a secondary trained data collector coded for joint attention so that interobserver agreement could be calculated (see Interobserver Agreement section). During the first in-person training session, the researcher identified and recommended the most suitable location in the home for setting up the tripod to ensure that the dyad would be captured effectively during the play session. The angle of the recording was integral so that the data collectors could record joint attention. Several locations in the dyad's home were trialed with the parent and researcher to ensure that the most suitable play setting was chosen for recording. The researcher gave feedback, when needed, to the dyad's parents if the camera angle needed to be changed. For example, Dyad 3 was prompted to turn the camera horizontal instead of vertical to capture more within the frame. Play sessions would have been discontinued if the children were not captured in the frame, however, this did not occur.

The data collection sheet included the joint attention definition and the examples and non-examples of joint attention that the family discussed with the researcher (see Table 4). The primary data collector indicated whether joint attention occurred or did not occur within each interval for every session. The percentage of intervals in which joint attention occurred was determined by adding the number of intervals joint attention occurred, dividing by the total number of intervals, (i.e., 60), and multiplying by 100 after each session. There were two sessions that were discontinued due to safety concerns. Therefore, data for Dyad 4 (Baseline Session 8) included 51 intervals, and data for Dyad 5 (Intervention Session 1) included 45 intervals.

Interobserver Agreement (IOA)

Prior to data collection, the researcher taught the primary and secondary data collectors the definition of joint attention and provided a practice video for coding joint attention during play sessions. Training continued until both data collectors achieved 100% accuracy in identifying joint attention behaviors. The data collectors watched three videos and correctly identified 84%, 93%, and 100% of the joint attention instances, respectively.

To keep the data collectors naïve to the study hypotheses, the researcher did not share the research study questions with the data collectors. The researcher told the data collectors that this information would be shared following data collection and that the data collector's primary responsibility was to record whether or not joint attention was displayed throughout the play sessions.

During baseline and intervention, the primary and secondary data collectors reviewed the play sessions, coded for joint attention, and uploaded completed data collection forms to a shared Google drive. IOA was calculated following 35% of sessions using occurrence agreement (Ledford & Gast, 2018). Occurrence agreement was chosen because it was likely that joint attention would be low. IOA was calculated by dividing the number of intervals in which both data collectors recorded joint attention by the number of intervals in which both agreed on the occurrence plus those in which they disagreed (i.e., total number of intervals) and then multiplying by 100 (see Table 4). An acceptable level of IOA was set at 80% or higher (McHugh, 2012). If the IOA had dropped below 80%, the researcher planned to re-train the data collectors on how to accurately code for joint attention using additional videos of children playing. However, this did not occur and retraining was not necessary.

Mean IOA percentages for each dyad are presented in Table 5. During the baseline phase, IOA ranged from 89% to 94% and in the intervention phase, IOA ranged from 83% to 88%. The

decrease in IOA during the intervention phase may be attributed to the increased frequency of joint attention behaviors which introduced more opportunities for disagreement between the data collectors. However, these results indicated strong reliability across both phases of the study as all IOA values remained above the 80% threshold.

Procedural Fidelity

Because multiple levels of fidelity were collected in this study, the Cascading Logic Model was used (Ledford & Gast, 2024). The Cascading Logic Model illustrates the various levels of implementation required when multiple stakeholders have a role in the implementation of the intervention (Ledford & Gast, 2024). In this study, the stakeholders included the researcher, the parent, and the neurotypical sibling; therefore, fidelity data was collected at each level of the cascade.

First, implementation fidelity was collected about the *researcher's behavior* when training the parents. Implementation fidelity is the extent to which the *researcher* completed the training as planned (Ledford & Gast, 2024). Next, procedural fidelity measured the *parent's behavior* during the training, baseline, and play sessions to ensure that the parent was not prompting during baseline, the training was implemented as intended, and appropriate prompting was used during the play sessions. Lastly, measurement of the *neurotypical sibling's behavior* was collected to understand if the sibling was implementing the intervention as intended following the training they received from their parent (known as procedural fidelity).

All sessions were recorded via the parent's video-recording device to ensure that procedural fidelity data could be coded. Fidelity data for parent training, baseline, and intervention sessions was reported and collected for 50% of sessions as best practice is collecting

procedural fidelity data across at least 20-33% of sessions for each condition and each participant (Ledford & Gast, 2018).

Stay, Play, Talk (SPT; Researcher). The primary data collector coded for implementation fidelity, the extent to which the researcher trained implementers (i.e., parents) as planned, during both of the parent training sessions (Ledford & Gast, 2018; see Appendix D). Implementation data was recorded using a 12-item checklist. The total number of correct steps was divided by 12 and multiplied by 100 to calculate the percentage of steps implemented correctly. The researcher followed 100% of the steps across all training sessions for all dyads.

The primary data collector was trained to collect implementation fidelity data by watching a mock video of the parent training and completing the checklist (see Appendix D). The researcher reviewed each step on the checklist with the primary data collector to ensure that they understood each question. During the mock video, the primary data collector correctly identified 100% of the 12-steps outlined in the implementation fidelity checklist.

SPT (Parent). Procedural fidelity data was collected by the researcher to confirm that (a) the parent was not prompting the child during the baseline phase, (b) the parent trained the neurotypical sibling as intended in the *Stay, Play, Talk* intervention, and (c) that appropriate prompting was used during the intervention play sessions.

During the baseline phase, the researcher collected procedural fidelity data on whether the neurotypical sibling received any instructions or prompts from the parent beyond reminders to stay in the play area. If the siblings left the play area, data was collected on if the parent paused the session recording, brought the children back, and resumed the play session.

Procedural fidelity data was also recorded to understand the extent to which the parent trained the neurotypical sibling as intended in the *Stay, Play, Talk* intervention. The researcher

assessed if the parent provided a definition of the skill being taught, gave clear examples of the skills, showed the visual of the skill, and reviewed various scenarios of the skill. Training sessions during the intervention were analyzed prior to the next session.

During the intervention play sessions, procedural fidelity data was collected regarding if prompting occurred by the parent if the neurotypical sibling did not make an initiation within the first minute, if the parent brought the children back to the play area if they left for more than 1 minute, and ensured that prompting was occurring after every two minutes that the neurotypical sibling was not using a skill taught. Additionally, data were collected about whether the *Stay*, *Play*, *Talk* materials were present. If not, feedback was provided to the parent.

SPT (Sibling). During the baseline and intervention play sessions, the researcher collected procedural fidelity data regarding the percentage of intervals in which the neurotypical sibling engaged in a component of the *Stay*, *Play*, *Talk* intervention. A momentary time sampling system with 5-second intervals was used because *Stay* (S), *Play* (P), or *Talk* (T) behaviors were brief, discrete, and intermittent. For instance, each behavior occurred for a short period, was clearly distinguishable from the others, and often did not occur continuously throughout the play session, making momentary time sampling an appropriate method to estimate their occurrence. Additionally, a momentary time sampling system allowed the researcher to record which behavior was present at the end of each interval, providing a reliable estimate of how consistently the neurotypical sibling implemented each intervention component.

The researcher recorded whether *Stay* (S), *Play* (P), or *Talk* (T) occurred at the end of each 5-second interval by marking (+) if the behavior occurred or (-) if it did not occur. If the behavior did occur, the researcher specified which component of the intervention was used at the end of the interval (S, P, and/or T). The definitions, examples, and non-examples of the

intervention components are outlined in Table 6. Identifying the frequency of S, P, or T allowed the researcher to analyze which components of the intervention were used most often and how each may have contributed to changes in the neurodiverse sibling's joint attention. Interobserver agreement was collected by the primary data collector for 30% of the sessions.

By collecting procedural fidelity data on the neurotypical sibling's use of the intervention during the play sessions, the researcher understood if the neurotypical sibling implemented the intervention with fidelity. According to the Cascading Logic Model (Ledford & Gast, 2024), measuring the neurotypical sibling's fidelity is essential, as their level of adherence to the intervention is likely to influence its overall effectiveness.

Research Design

This study used a single case research design (SCRD) to determine the effects of parents as indigenous implementers in a sibling-mediated intervention, *Stay, Play, Talk* (English et al., 1997). A non-concurrent multiple baseline design (NCMBD) across dyads was used to evaluate the effects of the sibling intervention on joint attention while controlling for threats to internal validity. One of the reasons that a non-concurrent multiple baseline design was selected is because it was the goal that joint attention would become a learned skill for each participant. This goal made other designs, such as an alternating treatment design, less appropriate, as behaviors that are learned cannot be unlearned or alternated across conditions.

Specifically, a NCMBD was chosen as this type of design is useful when evaluating interventions within applied contexts, such as the home setting, and offer several advantages within special education research including logistical considerations, feasibility, and practicality (Slocum et al., 2022; Smith, 2022). In a systematic review of special education intervention studies that used a NCMBD ($n = 406$), 77% reported that using a NCMBD was due to logistical,

feasible, or practical considerations related to applied settings; 17% stated that this design was chosen for ethical reasons such as not wanting to delay treatment; and 20% noted a NCMBD was chosen due to difficulty recruiting participants (Morin et al., 2024). As such, this study used a NCMBD anticipating recruitment challenges and difficulty scheduling families, and to ensure that treatment was not delayed.

This study was also designed with consideration of the debate surrounding how effectively NCMBDs control for threats to internal validity including maturation, testing and session experience, and coincidental events (Ledford, 2022; Slocum et al., 2022; Smith, 2022). However, by controlling for threats to internal validity, this study aimed to maintain rigor. To control for maturation, baseline phases had a different number of sessions to ensure that changes in behavior were not solely attributed to the natural passage of time. To control for testing and session experience, baseline phases had a different number of sessions to control for any practice effects or increased familiarity with the testing environment (Slocum et al., 2022). Varying the number of baseline sessions across dyads minimized the likelihood the results would be impacted by repeated exposure to testing. Baseline lengths were expected to vary amongst participants/dyads.

Lastly, the NCMBD required the researcher to identify the start of each participant's baseline and intervention phase varied based on specific dates to control for coincidental events (Slocum et al., 2022). This reduced the likelihood that external events occurring at the same time impacted all participants, allowing for a clearer isolation of effects. The specific dates for baseline and intervention sessions are noted on the x-axis of the dyad's graphs.

Visual Analysis

The researcher used within condition analysis to guide formative decisions as well as summative visual analysis at the conclusion of the study. Formative visual analysis was used to graph the percent of joint attention displayed and procedural fidelity data following each baseline and intervention session. The researcher graphed and plotted each data point. The researcher then analyzed the percent of joint attention displayed to decide if the dyad should remain in their present phase or change phases. The researcher set the change criterion for this study at a minimum of three data points at a stable level. In a systematic review of special education intervention studies using a NCMBD, most studies included a minimum of one to three data points in baseline and a maximum of 6 to 10 data points during baseline (Morin et al., 2024). Participants remained in baseline and intervention until there was a pattern of responding, stability in data (at least 3 data points), and a clear trend in the data. In terms of procedural fidelity, data were analyzed prior to the next session to determine if parents needed coaching on procedural fidelity (e.g., ensure that *Stay*, *Play*, *Talk* visuals are displayed during the play sessions).

Summative visual analysis was used at the conclusion of the study to determine if there was a functional relationship between joint attention and the *Stay*, *Play*, *Talk* intervention. In hopes of having three demonstrations of an effect, five dyads were recruited for this study. To determine if a functional relationship was demonstrated, the researcher used visual analysis to focus on the extent to which within-condition data patterns were stable and the extent to which the between-condition shifts in data patterns were detected and if they co-occurred with each change in condition (Ledford & Gast, 2014). Dependent upon the data characteristics, the researcher would be able comment on at least one of the following: trend, level, variability,

stability, immediacy of change, and/or overlapping data to determine if there was a functional relation.

Research Procedures

Semi-Structured Interview

Contextual fit about the intervention was gathered through a semi-structured parent interview where information about diagnosis, cognitive and social development of their neurodiverse and neurotypical child, and social-communication goals was collected. Data from the semi-structured interview were used to ensure that there was a need for intervention according to the family receiving the support (Horbanczuk, 2024). The researcher also highlighted the length and expectations of participating in the study and the need for video recording (see Appendix A).

Once the parent was informed about the study, the requirements, and goals, written parent consent was collected as well as assent from the neurotypical child and neurodiverse child. The consent form included details describing the study, what they would be asked to do, what their children would be asked to do, the risks of the study, and the potential benefits of the study. Since the parent was the implementer of the intervention, the parent explained the study and gained assent from both of their children. Assent could be given verbally or nonverbally by the children (Breux & Smith, 2023). However, the researcher asked the parent to document how assent was gathered. The children were told the goals of the study, what they would learn, and they were reminded that they could stop participating at any time or withdraw assent.

Parent Training

After parent consent was obtained, two parent training sessions occurred for the researcher to train the parent in *Stay, Play, Talk*. The first parent training session occurred, in

person, to establish rapport between the researcher and the family and set up the tripod for video recording. The second parent training session occurred via Zoom, was recorded, and lasted approximately 30 minutes. Using Bandura's (1977) Social Learning Theory, the idea that individuals learn from one another through observation, imitation and modeling, the researcher taught *Stay, Play, Talk* to the parent in the same way that the parent would then teach *Stay, Play, Talk* the child. However, sibling training would occur across three sessions, even though parent training occurred across two sessions in an effort to be mindful of the parent's time. At the conclusion of the second training session, the researcher asked the parent to explain *Stay, Play, Talk*. If the parent could not explain the three components of the intervention, the researcher provided additional training to the parent. However, additional training did not occur as all the parents explained the intervention components to the researcher following training.

In the first session, the parent learned how to teach *Stay* and *Play* to the child. In the second session, the parent learned how to teach *Talk* to the child and reviewed all three skills. Throughout both sessions, the parent was given an opportunity to ask questions and gain clarification when needed. Both sessions included the researcher providing a clear definition of the skill, giving examples of the skills, showing a visual of the skill, and discussing various scenarios about how the skill could be used.

Baseline

During baseline, each dyad was engaged in a 15-minute play session where the target child was observed, and joint attention behaviors were recorded for minutes 4-13. The neurotypical sibling did not receive specific instructions or prompts. They were told by their parent that it was a time for them to play together, but that it was necessary for them to stay in the play area specified. The parent was informed of the importance of keeping their children in

view of the camera, and if the children left the play area for more than 1 minute throughout more than two sessions, the researcher planned to provide the parent with additional strategies to help keep the children within view. This was to ensure that the researchers could review the session to code for joint attention. If the siblings did not return after 2 consecutive minutes, the session would be discontinued and not scored. However, no sessions needed to be discontinued.

Intervention

For the first three intervention sessions, the neurotypical sibling received a 10-minute lesson from their parent learning *Stay, Play, or Talk*. These sessions were focused on how to facilitate social interactions and play behaviors for their sibling with ASD. Parents had a printed copy of the training manual created by the researcher with printed *Stay, Play, Talk* visuals. The neurotypical siblings were trained on how to *stay* in physical proximity of their sibling when playing (training session one). They were then taught different ways to gain their sibling's attention when they *play*. Examples included sharing their toys, saying their name, or taking turns with a desired toy (training session two). Next, the parent taught the neurotypical sibling how to *talk* with their sibling during play and ask questions (training session three). The following training sessions began with a review of *Stay, Play, Talk* that was approximately 5-7 minutes.

During each training session, the parent reviewed the previously learned skill, clearly introduced and defined the new skill, gave examples of the new skill, showed a visual illustrating the new skill, and then provided various scenarios using the learned skill. This sequence took approximately 7 minutes. The remaining time was used for the neurotypical sibling to ask questions. Examples of skills that neurotypical siblings would learn included requesting to share, organizing/facilitating play, and compromising.

Play sessions occurred with the dyad immediately after the training for 15 minutes. During the play session, the neurotypical sibling was encouraged to use their new skills and the parent prompted the neurotypical sibling if they did not make an initiation within the first minute. After two minutes of no initiation, the parent prompted the neurotypical sibling again. Prompting occurred regardless of if the child left the play area. The parent was told to continue to prompt the neurotypical sibling every two minutes that a skill was not used until the conclusion of play session.

Social Validity

To assess if the intervention aligned with the family's goals for their child's development, fit within their cultural values, and was practical to implement in their daily lives, a social validity survey was administered to parents and the neurotypical sibling following the last intervention session (see Appendix F). The parent's survey consisted of 9 questions and the neurotypical child's survey consisted of 4 questions. Both surveys were rated on a 5-point Likert scale. The social validity questionnaire provided insight into understanding if the family found the intervention and goals socially acceptable and meaningful (Ledford et al., 2016; Strain et al., 2012). Additionally, the researcher met with each parent following the intervention to discuss the intervention, including what went well and any challenges.

Chapter 4: Results

Research Question 1

The mean percentage of joint attention that each neurodiverse sibling displayed in the baseline and intervention phases are displayed in Table 7. All five children with autism increased their frequency of joint attention with their siblings during the play sessions as depicted in Figure 1. Following the *Stay, Play, Talk* intervention, all dyads increased the average percentage of joint attention displayed by 6%, 14%, 29%, 15%, and 11%, respectively.

Summative Visual Analysis

To determine if there was a functional relationship between joint attention and the *Stay, Play, Talk* intervention, summative visual analysis was used to comment on at least one of the following: trend, level, variability, stability, immediacy of change, and/or overlapping data (Figure 1).

Dyad 1. Although joint attention data remained at a high level in baseline (range = 85-90%) and intervention (range = 93-97%), there was an increase in level between the phases. Additionally, an immediacy of change from baseline to intervention (88% to 95%) was observed and there was no overlap in data between phases depicting a functional relation. There was low variability in the data between baseline and intervention, reflecting stability in the percentage of joint attention.

Dyad 2. Joint attention data showed greater variability in baseline (range = 60-84%) than in intervention (range = 84-95%) but there was a predictable pattern of responding and stability within each phase. There was a steep accelerating trend during baseline and a gradual accelerating trend during intervention. Additionally, there were moderate levels of joint attention displayed in baseline (range = 60-84%) and high levels of joint attention displayed in

intervention (range = 84-95%). An immediacy of change from baseline to intervention was observed (77% to 93%) with minimal overlapping data (percentage of non-overlapping data = 85.71%), thus reflecting a functional relation.

Dyad 3. Joint attention data remained at moderate levels during baseline (range = 45-50%) and increased to higher levels during intervention (range = 66-82%). There was a steep accelerating trend in the data during intervention and an immediacy of change from baseline to intervention was observed (48% to 66%). Additionally, there was no overlapping data between phases reflecting a functional relation.

Dyad 4. Joint attention data showed greater variability in baseline (range = 48-72%) than in intervention (range = 68-84%), but there was a predictable pattern of responding prior to each phase change. There was a gradual accelerating trend in baseline compared to intervention where there was a steep accelerating trend. Additionally, there was an immediacy of change from baseline to intervention (68% to 72%) and there was minimal overlapping data (percentage of non-overlapping data = 71.43%) thus reflecting a functional relation.

Dyad 5. Although joint attention data remained at a high level in baseline (range = 71-78%) and intervention (range = 75-90%), there was an increase in level between the phases. Additionally, there was low variability in the data during baseline reflecting stability in the percentage of joint attention. During intervention there was a steep accelerating trend in the data and minimal overlapping data (percentage of non-overlapping data = 80%), depicting a functional relation.

Research Question 2

To understand the extent to which parents trained the neurotypical sibling to implement *Stay, Play, Talk* with fidelity, procedural fidelity data were collected by the researcher in

baseline and intervention using a checklist (Appendix E). The intervention protocol was divided into fidelity during training and fidelity during play. The total number of correct steps followed were divided by the total number of correct and incorrect steps followed and multiplied by 100 to obtain a percentage. The average percentages were calculated for baseline and intervention for each dyad (see Table 8). Average procedural fidelity percentages remained at or above 95% for baseline sessions (range = 95-100%) and at or above 93% for intervention sessions (range = 93-100%), showing that all parents implemented the intervention effectively in baseline and intervention.

Within baseline, procedural fidelity scores were between 95% and 100% for all dyads. Four of the five parents refrained from giving their neurotypical child any instruction or prompts and three of the five parents brought their children back to the play session if they left the play area for more than one minute. The remaining two dyads stayed in the play area for the entirety of the baseline session; however, both of these dyads had a play session discontinued because the siblings had an argument and difficulty regulating their emotions.

Throughout intervention, all parents followed the training protocol of reviewing the previously learned skill, giving a clear definition of the new skill, showing the visuals, and reviewing the scenarios. One of the five dyads followed the play session protocol with 100% fidelity (Dyad 1). Procedural infidelities during the play session were around having the *Stay*, *Play*, *Talk* visuals present during the play session (Dyad 2) and prompting after every two minutes that the neurotypical sibling did not use a skill (Dyad 3, 4 and 5).

Research Question 3

Understanding the extent to which neurotypical siblings implemented *Stay*, *Play*, *Talk*, with fidelity following parent training allowed conclusions to be drawn about the sibling's

fidelity to the intervention. Although there was some variability between dyads, all neurotypical siblings learned and applied the strategies more consistently after receiving the training from their parents (see Table 9). Figure 2 depicts the neurotypical sibling's use of stay, play, or talk in each session.

The “*Stay*” component was implemented at relatively high levels across all dyads in baseline with percentages ranging from 66.75% to 95.80%. Following training, “*Stay*” remained consistently high, with percentages ranging from 83.43% to 99.14%. Dyad 2 showed the greatest increase in “*Stay*” from baseline to intervention increasing 16.68 percentage points (66.75% to 83.43%).

The “*Play*” and “*Talk*” components demonstrated significant change across dyads following parent training. For Dyad 1, 2, 4, and 5, “*Play*” increased between 19.21% and 29.57% and “*Talk*” increased between 22.60% and 34.45%. Dyad 3 demonstrated the greatest increase in both “*Play*” and “*Talk*” following parent training. The neurotypical sibling for Dyad 3 increased his use of “*Play*” and “*Talk*” 54.34% and 46.66%, respectively.

Research Question 4

Social validity data were collected to understand the extent to which parents reported that the *Stay, Play, Talk* intervention aligned with their family's goals for their child's social development, fit within their cultural values, and was practical to implement in their daily lives. Additional social validity data were also collected from the neurotypical sibling. Using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), the average social validity rating for the parent and neurotypical sibling is reported by dyad in Table 10. Ratings closest to 5.00 indicate greatest satisfaction with the intervention.

The parents “strongly agreed” (n = 4) or “agreed” (n = 1) that the *Stay, Play, Talk* intervention was beneficial to their neurodiverse child’s social development. All of the dyads “strongly agreed” that the activities and strategies used in *Stay, Play, Talk* aligned with their family’s cultural values and indicated that the intervention goals matched the developmental goals they had for their neurodiverse child. Families “strongly agreed” (n = 2) or “agreed” (n = 3) that the strategies taught in *Stay, Play, Talk* were easy to implement in their daily routines. In terms of parent training and implementation, all dyads “strongly agreed” (n = 3) or “agreed” (n = 2) that they felt like they effectively learned how to implement the intervention after the training sessions from the researcher and that their neurotypical child was able to effectively learn the intervention. In terms of parent perception on how their children enjoyed the intervention, they “agreed” or “strongly agreed” that both children enjoyed the intervention.

To understand how the neurotypical siblings felt about the intervention, the researcher sent the parent a 4-question survey for their neurotypical child to complete following the intervention. One dyad “strongly agreed” with the statement that they liked having their parent teach them *Stay, Play, Talk* and the other neurotypical siblings felt “neutral” about their parent teaching them the intervention. The neurotypical siblings “strongly agreed” (n = 2) or “agreed” (n = 3) that they enjoyed the play sessions with their siblings and most felt that their sibling enjoyed the play sessions as well. Notable was that one dyad indicated that they “disagreed” with the statement that they felt like their sibling enjoyed the intervention. Dyads indicated they felt “neutral” (n = 2), “agreed” (n = 2), or “strongly agreed” (n = 1) to continue using the *Stay, Play, Talk* skills with their sibling. The neurotypical sibling who “strongly agreed” that they would continue using the *Stay, Play, Talk* skills with their sibling was the dyad with the greatest response to the intervention (Dyad 3).

Chapter 5: Discussion

The purpose of the current study was to understand if researchers could effectively train parents to implement a sibling-mediated intervention and if the intervention, in turn, increased the percentage of joint attention displayed in children with autism during play sessions with their neurotypical sibling. Additionally, this study examined if the neurotypical sibling implemented the intervention effectively following parent training. By understanding the needs of each family, the researcher worked to ensure that the intervention aligned with the family's values. This research aimed to address the gap in the literature by examining the use of parents, as indigenous implementers, to deliver the *Stay, Play, Talk* intervention, collect information on the cascading levels of procedural fidelity for the intervention, and deliver parent training virtually to enhance accessibility, responding to the growing need for remote intervention following the COVID-19 pandemic. Specifically, this study addressed the following research questions:

5. Does the *Stay, Play, Talk* intervention, when implemented by siblings, increase the percentage of joint attention displayed by preschool and elementary-aged children with autism?
6. To what extent do parents train the neurotypical sibling to implement *Stay, Play, Talk* with fidelity?
7. To what extent do neurotypical siblings implement *Stay, Play, Talk*, following parent training, with fidelity?
8. To what extent do parents report that the *Stay, Play, Talk* intervention aligns with their family's goals for their child's social development, fits within their cultural values, and is practical to implement in their daily lives?

Overview of Study Findings

Research Question 1

The results of this study provide strong support for the effectiveness of *Stay, Play, Talk* as a sibling-mediated intervention to increase joint attention for children with autism. All five dyads showed an increase in the percentage of joint attention displayed by the children with autism from baseline to intervention. These results add to the growing research base of sibling-mediated interventions increasing the neurodiverse sibling's social skills (Celiberti & Harris, 1993; Ferraioli & Harris, 2011; Oppenheim-Leaf et al., 2012; Walton & Ingersoll, 2012) and specifically support the use of *Stay, Play, Talk* as a sibling-mediated intervention (Kim, 2010; Tsao, 2019; Tsao & Odom, 2006;).

Summative visual analysis indicated evidence of a functional relation for all of the dyads based on immediacy of change, increased level, and minimal to no overlapping data. Dyad 3 showed the greatest increase in average percentage of joint attention displayed between baseline and intervention (29%) followed by Dyad 4 (15%) and Dyad 2 (14%). Interestingly, Dyad 3 and Dyad 2 included the youngest neurodiverse participants in the study – 5 years, 10 months and 6 years, 5 months. Although all dyads in the current study showed an increase in the average percent of joint attention displayed between baseline and intervention, results indicated that *Stay, Play, Talk* may be more effective for younger children with ASD. However, the current study did not have participants with ASD in the study who were between 7 and 9 years. In a meta-analysis of *Stay, Play, Talk* interventions implemented in the school ($n = 6$), home ($n = 3$), or clinic ($n = 1$), the children with autism ranged from 3 years old to 8 years old supporting the conclusion that *Stay, Play, Talk* may be more effective for children who are up to 8 years old (Ledford & Pustejovsky, 2023).

Results also indicated that *Stay, Play, Talk* may be most beneficial for neurodiverse children who begin with lower levels of joint attention as they demonstrated the greatest gains across phases. For example, the joint attention of Dyad 3 increased by 29 percent, Dyad 4 increased by 15 percent, and Dyad 2 increased by 14 percent. Their average percentage of joint attention displayed in baseline was 47%, 62%, and 75%, respectively. This finding implies that *Stay, Play, Talk* may be more effective for neurodiverse children who demonstrate less joint attention initially, while future research may explore what adaptations can be made for neurodiverse children who demonstrate high levels of joint attention in the first baseline sessions.

Research Question 2

All parents trained the neurotypical sibling to implement *Stay, Play, Talk* with high fidelity during both baseline (range = 95-100%) and intervention (range = 91-100%) phases. This finding addresses a gap in the literature regarding the use of indigenous implementers in sibling-mediated interventions (Ledford & Pustejovsky, 2023). These results contribute to a growing body of research supporting the inclusion of indigenous implementers, such as parents, in interventions for children with ASD (Conrad et al., 2021; Nevill et al., 2016; Pacia et al., 2022), and extend prior research by explicitly reporting the cascading levels of fidelity, a variable that is often not documented (Hansen et al., 2023; Ledford & Gast, 2024).

During the baseline session on 4/11, the neurotypical child in Dyad 2 was prompted twice, contrary to baseline protocol. The researcher reminded the mother of Dyad 2 to refrain from any prompting during baseline, and the mother adhered to this guideline in all subsequent baseline sessions. Notable was that when the mother prompted her neurotypical child, the percentage of joint attention displayed increased. The researcher ensured that a sufficient number of baseline sessions followed the procedural infidelity on 4/11 for stability.

Additionally, both Dyad 2 and Dyad 3 left the play area for more than one minute, once, during their baseline sessions. Dyad 2 was distracted by the family cat, while Dyad 3 left to retrieve a snack. Dyad 4 and Dyad 5 each had a session discontinued due to an argument during the play session that led the parent to intervene for safety. Distractibility, hunger, and arguments occurring during the play sessions reflected the naturalistic of conditions of home-based play interactions.

Following the play sessions with Dyad 4 and Dyad 5 that were discontinued due to safety concerns, the researcher collaborated with the parent to discuss possible solutions. Recommendations included reminding the neurotypical sibling to engage in emotional regulation and mindfulness strategies that she used typically in the home when she was frustrated and reminding her that she could request a break or end a play session. The parent found these recommendations to be helpful and there were not any other instances of the parent intervening during the play sessions for safety.

Throughout the intervention, all parents followed the training protocol with high fidelity, supporting the feasibility of using *Stay, Play, Talk* as a parent implemented sibling-mediated intervention. Parents reported that the strategies were straightforward and easy to use, which is a commonly cited strength of *Stay, Play, Talk* (Ledford & Pustejovsky, 2023). While the researcher ensured that all key training components were delivered as outlined in the Procedural Fidelity Checklist (see Appendix E), parents were encouraged to adapt the example scenarios for each play scenario to align with their children's interests. For instance, instead of using the scripted example of playing with toy trucks during the Play training, Dyad 1 substituted trucks with Hatchimals - a preferred and shared interest between the siblings. This flexibility maintained the integrity of the intervention while supporting the importance of contextual fit in

interventions, a critical factor in the effectiveness of interventions in natural settings (Crone et al., 2015; Horner et al., 2014).

The variability in procedural fidelity observed across Dyads 2-5 during the play sessions highlighted the importance of providing ongoing support and coaching when parents serve as interventionists. These findings are consistent with prior research that emphasizes the need for procedural fidelity data to be collected with indigenous implementers to ensure that the intervention is implemented as intended (Ledford & Gast, 2014; Ledford & Pustejovsky, 2023; Ledford & Wolery, 2013). The increase in procedural fidelity following researcher support for Dyads 2-5 suggests that re-teaching can help address challenges with parent implementation. Dyad 2 was reminded to have the *Stay, Play, Talk* visuals present during the play session and the parent of Dyad 3, Dyad 4, and Dyad 5 were reminded to continue prompting after every two minutes that the neurotypical sibling did not use a skill. Despite these occurrences, all dyads demonstrated high percentages of procedural fidelity, overall, supporting the use of indigenous implementers in sibling-mediated interventions.

Research Question 3

The neurotypical sibling's fidelity of the intervention is a key factor to examine as their consistency in using the intervention strategies can strongly influence effectiveness. Because three behaviors are taught during this intervention (staying, playing, and talking), it was important to collect procedural fidelity data to understand which specific behavior(s) changed from baseline to intervention and how these behaviors may have contributed to the positive outcomes (Ledford & Pustejovsky, 2023). The results showed that although all dyads demonstrated relatively high levels of "*Stay*" prior to the intervention, the frequency of "*Stay*" increased across all dyads following intervention and was present during more than 80% of

intervals. This finding demonstrates that neurotypical siblings increased their use of “*Stay*” when explicitly taught the intervention.

Notably, Dyad 2 revealed the greatest improvement in “*Stay*” following intervention indicating that teaching “*Stay*” and consistently reviewing this strategy in the intervention sessions was helpful for the neurotypical sibling. Additionally, the neurodiverse sibling’s percentage of joint attention increased immediately following the “*Stay*” lesson indicating that the “*Stay*” behavior may have directly contributed to this positive outcome. Dyad 2’s mother reported that she felt like her neurotypical child already knew to stay near his brother during play, but explicitly teaching and prompting this behavior through the intervention was very beneficial.

The “*Play*” component revealed positive increases across all dyads during intervention suggesting that the parent-led training was effective at teaching the neurotypical siblings to engage in various play strategies with their sibling. As indicated in the Results section, four of the five dyads showed significant increases between 19.21 and 29.57 percentage points and Dyad 3 showed an increase of 54.34 percentage points. These findings indicated that following the “*Play*” training session, the neurotypical siblings effectively implemented and used their taught skills. Dyad 4 and Dyad 5 used their “*Stay*” and “*Play*” skills in combination throughout most of the intervention sessions. However, Dyad 1, 2, and 3 tended to use “*Stay*” more than “*Play*.” Compared to baseline, the neurotypical sibling’s use of “*Play*” significantly increased for all dyads.

The greatest increase was with the “*Talk*” strategy. This may be because “*Talk*” is a more advanced skill compared to “*Stay*” and “*Play*,” and was a newer skill for many of the dyads. Given that the neurotypical siblings were between the ages of 8 and 10 years old, it is possible

that “*Stay*” and “*Play*” behaviors had already been fostered through natural play interactions with peers at school and at home (Krier & Lambros, 2020). Several parents highlighted the value of explicitly teaching “*Talk*.” For example, Dyad 1’s parent noted that her child began asking more open-ended questions during play, while the parent of Dyad 4 and 5 observed that her child learned to ask her neurodiverse siblings what they wanted to play and let them take the lead. She also reported that her neurotypical child began using the “*Talk*” skill with same-aged peers outside the home and less conflict was reported at school. These findings suggest that teaching “*Talk*” may increase sibling interactions at home and support broader social skill development for the neurotypical sibling. Future research should examine how gains in the “*Talk*” strategy, specifically, generalize across home and school settings, and whether explicit training in more advanced conversational skills lead to greater improvements in the sibling relationship.

Overall, all siblings were able to implement the *Stay, Play, Talk* intervention with fidelity. As Ledford and Pustejovsky (2023) noted, existing research has not clearly reported neurotypical sibling procedural fidelity data which makes it difficult to determine which behaviors contribute most to positive outcomes. By collecting sibling procedural fidelity data, the researcher was able to identify that the following behaviors contributed most to positive outcomes: Dyad 1 - Talk, Dyad 2 - Talk, Dyad 3 - Play (although “Talk” greatly improved as well), Dyad 4 - Play, Dyad 5 - Talk (see Table 11). This finding expands current sibling-mediated *Stay, Play, Talk* research as it was the first study that examined sibling procedural fidelity data in the home setting.

Research Question 4

Understanding the extent to which the *Stay, Play, Talk* intervention aligned with each family’s goals for their child’s social development, fit within their cultural values, and was

practical to implement in daily life contributed to the literature on contextual fit in sibling-mediated interventions, and specifically, the *Stay, Play, Talk* intervention (Crone et al., 2015; Horbanczuk, 2024; Horner et al., 2014). Social validity results indicated that all parents rated the intervention positively (average rating = 4.56) and the neurotypical siblings reported neutral to positive perceptions (average rating = 3.95).

All parents reported that the intervention aligned with their family's developmental goals and cultural values, reinforcing the importance of including the families in the goal setting process (Syriopoulou-Delli & Gkiolnta, 2024). The current study also contributed to the limited research on collaborating with both direct and indirect consumers, such as siblings and parents, when determining intervention goals and outcomes (Ledford et al., 2016; Park & Blair, 2019). To ensure contextual fit, the researcher met with each family before starting the intervention to discuss the family's cultural practices and values and to confirm that increasing joint attention was a socially meaningful and culturally appropriate goal. All families affirmed that the intervention fit within their cultural values, reinforcing the importance of asking about cultural practices rather than assuming them (Crone et al., 2015; Horner et al., 2014). The current study included siblings from four different ethnic backgrounds, underscoring the need for communicating and collaborating with each family to learn about their values.

All parents "strongly agreed" or "agreed" that the intervention was practical to implement in their daily lives which is integral when using parents as implementers. Involving families throughout an intervention can help to increase the generalizability of skills, however, it is necessary for the intervention to feel practical for this to happen (Pacia et al., 2022). The parents of Dyad 2 and Dyad 3 shared that play sessions became routine-like and were implemented before or after dinner. In contrast, the parents of Dyad 4 and Dyad 5 initially found it challenging

for her children to choose play activities, making sessions harder to initiate. However, she shared that this improved with time. The parent of Dyad 3 highlighted the usefulness of the visual graphics, sharing that the *Stay, Play, Talk* visuals were practical and now “in all our play areas reminding our children to stay, play, and talk.” Practicality is essential when working toward the generalization of skills and involving families in interventions can increase the likelihood that new behaviors are sustained over time (Pacia et al., 2022).

The inclusion of social validity data from the neurotypical siblings is a novel contribution from this study, as such data are rarely collected in special education research despite their central role in sibling-mediated interventions (Ferguson et al., 2019). Analyzing the sibling’s responses offered valuable insight into their perception of the intervention which may influence their motivation to continue using the intervention strategies (Bilgili-Karabacak et al., 2023). Overall, the siblings reported neutral to positive attitudes toward continuing to use the intervention skills with their sibling. However, greater understanding about the sibling’s experience could have been gained by collecting anecdotal feedback from the siblings or incorporating open-ended responses to the social validity measure.

Following the completion of the social validity questionnaire, the researcher met with each parent to discuss their experience with the intervention. Common themes included an increased sense of empowerment, appreciation for having a structured opportunity to teach their neurotypical child play skills, and the value of involving the entire family system in intervention. The parent of Dyad 1 shared that her greatest takeaway was “the conversations that it allowed [me] to have with Emma... [we] were talking about things that [we] have never fully talked about before.” The parent of Dyad 1 was referring to conversations about Emma’s sister having ASD and what this meant for Emma. Similarly, the parent of Dyad 2 shared that she “wanted the

chance to teach Ryan play skills and, before this opportunity, it was harder to talk about these strategies.” The parent of Dyad 4 and Dyad 5 expressed seeing “such a turnaround in all of Ilana’s interactions with her siblings and friends” reflecting that the intervention was useful for her neurotypical child as well.

Parents also reported feeling empowered, contributing to the growing literature on the benefits of using indigenous implementers, such as parents, in intervention. These benefits include increased confidence, reduced stress, and greater advocacy for their children (Jurek et al., 2023). For example, the parent of Dyad 1 shared that she would typically intervene quickly during sibling disagreements, but *Stay, Play, Talk* gave her confidence to step back and she reflected, “They can work things out on their own.” The parent of Dyad 4 and Dyad 5 said that she was surprised by how well her children played together and observed a decrease in conflict over time.

Finally, parents emphasized the importance of including the family system in the intervention process. The parents of Dyad 2 and 3 noted that they had not previously been involved in interventions with their child, highlighting the accessibility of virtual, home-based interventions like *Stay, Play, Talk*, that include parent participation and training (Boisvert et al., 2010; Knutsen et al., 2016; Shalev et al., 2020). The parent of Dyad 4 and 5 expressed that the intervention fostered opportunities for her children to help one another learn play skills. She described the experiences as a “bi-directional learning model,” emphasizing that both siblings could support each other’s growth. This understanding reflects principles of Social Learning Theory, which posits that individuals learn through observing and interacting with others (Bandura, 1977), reinforcing the reciprocal nature of sibling-mediated interventions.

Implications for Clinical and School-Based Practice

The findings from the current study suggest important implications for individuals supporting young children with autism and their siblings who are between the ages of 5 and 10 in clinical and school settings. Previous research has shown that peer- and sibling-mediated interventions can increase the social communication (Banda et al., 2009; Katz & Girolametto, 2013; McFadden et al., 2014; Oppenheim-Leaf et al., 2012) and joint attention (Ferraioli & Harris, 2011; Hansen et al., 2019; Hansen et al., 2023; Krier & Lambros, 2020; Walton & Ingersoll, 2012) that children with autism display. However, most peer- and sibling-mediated interventions are delivered in school or clinic settings (Zagona & Mastergeorge, 2018) and are implemented primarily by researchers (Ledford & Pustejovsky, 2023). The current study expanded this research by demonstrating that parents can successfully implement a sibling-mediated intervention in the home setting, highlighting the potential for more naturalistic, family-centered approaches to be integrated into clinical and school-based practice.

Clinical Practice

Findings from the current study emphasized the empowerment that many parents felt following the sibling-mediated intervention. As such, clinicians working with children with autism should consider including the family system in treatment. This could include involving parents in the goal setting process for therapy, creating opportunities for sibling participation in sessions, and ensuring that skills taught in the clinical setting can be practiced at home to promote generalization (Bene & Lapine, 2020; Syriopoulou-Delli & Gkiolnta, 2024). The current study also revealed that parents were able to effectively serve as implementers, suggesting that clinicians can provide structured training, resources, and ongoing support to equip parents with the skills needed to facilitate interventions at home. For example, clinicians can model the *Stay, Play, Talk* strategies during sessions, coach parents through role-play, and provide visual

supports or a step-by-step guide for use at home with the sibling. Doing so may empower parents and create a bridge between clinical and naturalistic environments.

Research has begun to explore the use of family therapy in the context of autism, and although this area is still emerging, promising findings include greater family communication, adaptability, and cohesion (Hsiang et al., 2024). The outcomes of the current study emphasize the value of family-centered approaches and the importance of ensuring the intervention is socially valid. Results from the current study revealed that all parents reported that the intervention aligned with their family's cultural values, supporting its social validity. Schwartz and Kelly (2021) emphasized the importance of promoting social validity in interventions for children with autism and the current study reinforces this finding. Clinicians, such as behavior analysts, can promote social validity by directly asking clients and their families what outcomes are important to them, ensuring that intervention strategies align with the family's cultural values and routines, and provide ongoing feedback to parents and siblings - practices that were incorporated into the current study.

School-Based Practice

The *Stay, Play, Talk* intervention was originally developed as a peer-mediated intervention implemented in classroom settings (English et al., 1997). However, findings from the current study highlighted important implications for school-based professionals, particularly regarding the need to actively engage families in the intervention process. One family shared that this was their first time being involved in an intervention for their child, despite the child having an Individualized Education Program (IEP). This underscores the opportunity for school professionals to involve parents as active partners in intervention planning and implementation. Integrating families into the intervention process may increase the generalization of skills across

settings and foster a collaborative team approach that supports the child's goals (McIntyre & Garbacz, 2014). For example, a school-based professional might implement the *Stay, Play, Talk* intervention in the classroom, while the parents reinforce the same language and visuals at home, creating consistency between settings.

Although mandates require family participation in IEP meetings and prohibit pre-determining IEP goals without parental input (U.S. Department of Education, 1997), this study emphasized the need for additional efforts to ensure meaningful parent involvement throughout the intervention process. These findings align with the National Association of School Psychology (NASP) Practice Model (2020). Specifically, it aligns with the Family, School, and Community Collaboration domain which promotes communication between educators, school psychologists, and families in decision-making. Results from the current study suggest that including parents in intervention benefits the entire family system, reinforcing the value of collaboration at the school-level.

Limitations

There are several limitations to the current study that should be considered when interpreting the results. Methodological constraints, such as the frequency of the intervention sessions, logistical challenges related to participant recruitment and retention, and resource constraints that required the researcher to code portions of the data, may have impacted study's design and implementation. These factors highlighted the complexities of conducting family-centered research in naturalistic home settings and suggest ideas for future research.

Recruitment

One of the major limitations of the current study was difficulty recruiting families to participate in the intervention. Participants for the study were recruited ultimately through a

summer day camp for children ASD and/or ADHD, an autism center listserv, and a special education classroom in a public school. However, recruitment prior to securing these families was challenging. The researcher contacted a diverse range of sources, including Applied Behavior Analysis (ABA) therapy clinics, school psychologists, medical centers, community-based organizations, Parent Teacher Associations, and early childhood special education programs across the Pacific Northwest. Several factors likely contributed to these recruitment difficulties, including that the study required families to have both a neurotypical and neurodiverse sibling within a specific age range, a formal autism diagnosis for the neurodiverse child was required, and play sessions had to be recorded.

A formal autism diagnosis was part of the inclusion criteria to ensure diagnostic consistency across participants; however, many families face long waitlists to be evaluated for autism, particularly in publicly funded systems even when they know their children is neurodiverse (Smith-Young et al., 2020). Since this study required an autism diagnosis, some families with neurodiverse children were not eligible. This limitation may have been mitigated by allowing parent report and a standardized autism screening tool such as the Autism Diagnostic Interview - Revised (Rutter et al., 2003) or the Autism Spectrum Rating Scale (Goldstein & Naglieri, 2009) rather than formal diagnostic documentation.

Additionally, the requirement for video recording was a barrier for two families who initially passed the semi-structured interview. In both cases, the neurodiverse sibling refused to be recorded. Because video data were needed to measure joint attention and assess procedural fidelity for the parent and neurotypical sibling, this proved to be a limitation in the study design. Although the researcher offered to conduct in-person play sessions at the family's home three

times a week, one family declined expressing that the arrangement would not be a good fit for their lifestyle, and the other family lived over two hours away from the researcher.

These limitations highlight the challenges of conducting research in naturalistic settings, such as the home, where environmental variables and logistical challenges are more difficult to control than in structured environments like schools or clinics. One way that this may have been mitigated was for the researcher to build rapport with the neurodiverse sibling prior to introducing the recording. However, the study design intentionally limited researcher interactions with the children, as the intervention was implemented by the parents.

Weekly Implementation

Although parents were asked to implement the intervention three times per week and were informed that this was an expectation prior to the start of the study, several life events impacted the consistency of session implementation. For example, there was a one-week gap between play sessions for Dyad 1 due to out of town travel for their school's spring break. Although the parent was encouraged to continue recording the play sessions during the week, this did not occur as the family was traveling and had limited service to upload videos. Upon returning, the researcher contacted the parent to confirm that sessions would resume three times a week and she complied.

For Dyad 4 and 5, who were from the same family, sessions were implemented inconsistently – typically closer to twice per week for Dyad 4 and once per week for Dyad 5. The researcher maintained regular communication with the parent, reinforcing the importance of regular implementation and the goal of three play sessions per week. After the first two reminders, the mother implemented additional sessions. To further support implementation, the researcher provided a visual schedule to encourage three play sessions a week. During the

intervention, this family moved to a new home, resulting in a 12-day (Dyad 4) and 14-day (Dyad 5) gap between play sessions. Once settled, the family resumed play sessions, and the data reached stability after three subsequent sessions.

Inconsistent weekly implementation and gaps between sessions may have introduced threats to internal validity including history effects and maturation. Events outside the intervention, such as moving, may have influenced the behavior of Dyad 4 and Dyad 5, making it unclear whether changes were due to the intervention or external events. Additionally, maturation may have impacted the results of the intervention and allowed for developmental progress to occur naturally, making it difficult to isolate the effect of the *Stay, Play, Talk* intervention. These confounding factors should be considered when interpreting the results of the study.

Resources

Although the researcher had a primary and secondary data collector, the researcher was unable to provide monetary compensation for their work. Given that the videos took a minimum of 10-minutes to code, the researcher prioritized having the data collectors code joint attention, treatment integrity, and procedural fidelity for the neurotypical sibling. As a result, the researcher coded the procedural fidelity for the parent during the play sessions. Having the researcher code some of the data may have threatened the rigor of the study as it is best practice to have individuals other than the researcher code the data (Ledford & Gast, 2018). However, four of the five variables were coded by individuals other than the researcher, which supports the overall rigor of the study's data collection (Kazdin, 2020).

Additionally, because the data coders were graduate students, their availability was limited to the academic calendar. Because Dyad 4 and Dyad 5 moved after the academic

calendar, the researcher coded the final three play sessions for these dyads. Although this may be viewed as a resource limitation, it was necessary to ensure complete data collection.

Future Research

The current study is among the first to use parents as implementers in a sibling-mediated intervention, collect information on the cascading levels of procedural fidelity for the intervention, and deliver parent training virtually to enhance accessibility. In addition to future research addressing the limitations of the present study, additional research is recommended to clarify and expand upon the findings related to the method, sibling-mediated intervention research, and specifically, *Stay, Play, Talk* research.

First, future research should consider a maintenance phase for about three months following the last data point in the intervention phase. Adding a maintenance phase would allow researchers to examine if the sibling-mediated intervention continued to be effective and implemented amongst families in the home setting. It would also allow researchers to see if the neurodiverse child's joint attention changed over time.

Additionally, the current study collected social validity data from neurotypical siblings using a questionnaire. Future research should consider supplementing this with a semi-structured interview to gain greater insight into the siblings' perspectives about the intervention. Interviews would allow children to elaborate on their questionnaire ratings, share their personal experiences with the various intervention components, and provide feedback to inform future sibling-mediated research. Given that siblings' motivation and engagement can be influenced by how they perceive the intervention (Bilgili-Karabacak et al., 2023), it is crucial to understand their experiences. Similarly, it is recommended that social validity data be collected from the neurodiverse siblings to understand their experience of the intervention (Park & Blair, 2019).

Future research should also explore the effectiveness of *Stay, Play, Talk* in families with multiple *neurotypical* siblings and a neurodiverse sibling. The current study examined the effectiveness of *Stay, Play, Talk* in a family with one neurotypical sibling and two *neurodiverse* siblings (Dyad 4 and 5), and the intervention was found to be effective. However, because siblings often play together, training all neurotypical siblings may make the intervention more effective and consistent across each sibling. The parent of Dyad 3 noted that her neurotypical daughter, who was not directly involved in the intervention, observed the intervention sessions occurring in the home. Involving more than one sibling as an interventionist may create additional opportunities for social interaction for the neurodiverse sibling, supporting the generalization of skills across different play partners within the family.

Many parents noted difficulty in addressing the sibling conflict that arose during the play sessions (e.g., difficulties sharing) and knowing how to respond to their children. In addition to teaching *Stay, Play, Talk*, future research could explore parent-led training for the neurotypical sibling on ways to handle conflicts during play. Similar to how *Stay, Play, Talk* teaches three strategies, a parent could teach their child specific strategies to resolve disagreements that are developmentally appropriate and applicable to children between the ages of 5 and 10. This may include strategies such as taking turns, sharing, and deep breathing to keep their body calm. Providing neurotypical siblings with these tools may help reduce frustration and make play sessions more enjoyable, thus creating additional opportunities for the neurodiverse child to display joint attention.

Conclusion

This purpose of this study was four-fold: to evaluate whether the percentage of joint attention displayed by children with ASD (ages 5 to 10) increased following the *Stay, Play, Talk*

intervention; to explore whether parents could effectively train neurotypical siblings (ages 8 to 10), with fidelity, to implement the intervention; to examine the fidelity of sibling implementation; and to understand parents' perceptions of the intervention's alignment with their family goals and cultural values.

The current study demonstrated that all children with autism increased in joint attention throughout intervention, supporting the existing literature on peer- and sibling-mediated interventions that revealed joint attention increases through intervention (Ferraioli & Harris, 2011; Hansen et al., 2019; Hansen et al., 2023; Krier & Lambros, 2020; Tsao & Odom, 2006; Walton & Ingersoll, 2012). Novel to the field of sibling-mediated interventions was the finding that all parents effectively trained the neurotypical siblings to implement the intervention and that all neurotypical siblings used the various strategies of the intervention. This expands the literature by demonstrating the effectiveness of using indigenous implementers in sibling-mediated interventions (Ledford & Pustejovsky, 2023) and clearly documents the cascading levels of fidelity – a critical aspect that is often overlooked in research with various levels of implementation (Chan et al., 2009; Ledford & Gast, 2014; Ledford & Gast, 2024; Ledford & Wolery, 2013). Last, all parents reported that the intervention aligned with their family goals and cultural values, highlighting the importance of involving families in goal setting and ensuring contextual fit (Crone et al., 2015; Syriopoulou-Delli & Gkiolnta, 2024). These social validity findings contribute to the growing literature that emphasizes how parent involvement in intervention can enhance practicality and the likelihood of maintaining intervention gains (Jurek et al., 2023; Pacia et al., 2022).

These findings underscore the potential of sibling-mediated interventions implemented by parents to improve joint attention in children with ASD and to empower families to foster

meaningful sibling dynamics. As one parent reflected, “If there’s a sibling with autism, there’s a family with autism,” highlighting the importance of interventions that support the entire family system. Overall, the present study reinforces the value of involving families as active partners in intervention design and delivery, contributing to impactful outcomes for children and their siblings. Future research is needed to examine the long-term maintenance of joint attention gains, incorporate multiple siblings into the intervention, and further explore the perspectives of both the neurotypical and neurodiverse sibling following intervention.

References

- Abbeduto, L., Seltzer, M. M., Shattuck, P., Krauss, M. W., Orsmond, G., & Murphy, M. M. (2004). Psychological well-being and coping in mothers of youths with autism, down syndrome, or fragile X syndrome. *American Journal on Mental Retardation*, 109(3), 237–254. [https://doi.org/10.1352/0895-8017\(2004\)109<237:PWACIM>2.0.CO;2](https://doi.org/10.1352/0895-8017(2004)109<237:PWACIM>2.0.CO;2)
- Adamson, L. B., Bakeman, R., Suma, K., & Robins, D. L. (2020). Autism adversely affects auditory joint engagement during parent-toddler interactions. *Autism Research*, 14(2), 301–314. <https://doi.org/10.1002/aur.2355>
- Autistic Self-Advocacy Network. *For whose benefit? Evidence, ethics, and effectiveness of autism interventions*. 2022. <https://autisticadvocacy.org/policy/briefs/intervention-ethics/>
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev). <https://doi.org/10.1176/appi.books.9780890425787>
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1(1), 91–97. <https://doi.org/10.1901/jaba.1968.1-91>
- Bailey, K. M., & Blair, K.-S. C. (2015). Feasibility and potential efficacy of the family-centered prevent-teach-reinforce model with families of children with developmental disorders. *Research in Developmental Disabilities*, 47, 218–233. <https://doi.org/10.1016/j.ridd.2015.09.019>
- Banda, D., Hart, S., & Liu-Gitz, L. (2010). Impact of training peers and children with autism on social skills during center time activities in inclusive classrooms. *Research in Autism Spectrum Disorders*, 4(4), 619–625. <https://doi.org/10.1016/j.rasd.2009.12.005>
- Bandura, A. (1977). *Social learning theory*. Prentice Hall.

- Barber, A. B., Saffo, R. W., Gilpin, A. T., Craft, L. D., & Goldstein, H. (2016). Peers as clinicians: Examining the impact of stay play talk on social communication in young preschoolers with autism. *Journal of Communication Disorders*, 59, 1–15.
<https://doi.org/10.1016/j.jcomdis.2015.06.009>
- Bene, K., & Lapina, A. (2020). A meta-analysis of sibling-mediated intervention for brothers and sisters who have autism spectrum disorder. *Review Journal of Autism and Developmental Disorders*, 8(2), 186–194. <https://doi.org/10.1007/s40489-020-00212-z>
- Bennetts, S. K., Love, J., Westrupp, E. M., Hackworth, N. J., Mensah, F. K., Nicholson, J. M., & Levickis, P. (2021). Protocol for the adaptation of a direct observational measure of parent-child interaction for use with 7-8-year-old children. *Frontiers in Psychology*, 11, Article 619336. <https://doi.org/10.3389/fpsyg.2020.619336>
- Bilgili-Karabacak, I., Dueñas, A. D., Settanni, E., & Bauer, K. (2023). A quantitative systematic review of sibling-mediated interventions for young children with autism: Effects on sibling outcomes. *Review Journal of Autism and Developmental Disorders*.
<https://doi.org/10.1007/s40489-023-00362-w>
- Boisvert, M., Lang, R., Andrianopoulos, M., & Boscardin, M. L. (2010). Telepractice in the assessment and treatment of individuals with autism spectrum disorders: A systematic review. *Developmental Neurorehabilitation*, 13(6), 423–432.
<https://doi.org/10.3109/17518423.2010.499889>
- Breaux, C. A., & Smith, K. (2023). Assent in applied behaviour analysis and positive behaviour support: Ethical considerations and practical recommendations. *International Journal of Developmental Disabilities*, 69(1), 111–121.
<https://doi.org/10.1080/20473869.2022.2144969>

- Carr, T., & Lord, C. (2016). A pilot study promoting participation of families with limited resources in early autism intervention. *Research in Autism Spectrum Disorders*, 25, 87–96. <https://doi.org/10.1016/j.rasd.2016.02.003>
- Carter, S. L. (2010). Background of social validity. In S. L. Carter (Ed.), *The social validity manual* (pp. 1–20). Academic Press. <https://doi.org/10.1016/B978-0-12-374897-3.00001-5>
- Celiberti, D. A., & Harris, S. L. (1993). Behavioral intervention for siblings of children with autism: A focus on skills to enhance play. *Behavior Therapy*, 24(4), 573–599. [https://doi.org/10.1016/S0005-7894\(05\)80319-3](https://doi.org/10.1016/S0005-7894(05)80319-3)
- Chan, J. M., Lang, R., Rispoli, M., O'Reilly, M., Sigafoos, J., & Cole, H. (2009). Use of peer-mediated interventions in the treatment of autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 3(4), 876–889. <https://doi.org/10.1016/j.rasd.2009.04.003>
- Chang, Y.-C., & Locke, J. (2016). A systematic review of peer-mediated interventions for children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 27, 1–10. <https://doi.org/10.1016/j.rasd.2016.03.010>
- Chu, C.-H., & Pan, C.-Y. (2012). The effect of peer- and sibling-assisted aquatic program on interaction behaviors and aquatic skills of children with autism spectrum disorders and their peers/siblings. *Research in Autism Spectrum Disorders*, 6(3), 1211–1223. <https://doi.org/10.1016/j.rasd.2012.02.003>
- Cilia, F., Touchet, C., Vandromme, L., & Driant, B. L. (2020). Initiation and response of joint attention bids in autism spectrum disorder children depend on the visibility of the

- target. *Autism & Developmental Language Impairments*, 5, 1–11.
<https://doi.org/10.1177/2396941520950979>
- Conrad, C. E., Rimestad, M. L., Rohde, J. F., Petersen, B. H., Korfitsen, C. B., Tarp, S., Cantio, C., Lauritsen, M. B., & Händel, M. N. (2021). Parent-mediated interventions for children and adolescents with autism spectrum disorders: A systematic review and meta-analysis. *Frontiers in Psychiatry*, 12, 1-15. <https://doi.org/10.3389/fpsy.2021.773604>
- Corona, L. L., Stainbrook, J. A., Simcoe, K., Wagner, L., Fowler, B., Weitlauf, A. S., Juárez, A. P., & Warren, Z. (2021). Utilization of telemedicine to support caregivers of young children with ASD and their Part C service providers: A comparison of intervention outcomes across three models of service delivery. *Journal of Neurodevelopmental Disorders*, 13(1), 1-13. <https://doi.org/10.1186/s11689-021-09387-w>
- Crone, D. A., Hawken, L. S., & Horner, R. H. (2015). *Building positive behavior support systems in schools: Functional behavioral assessment*. Guilford.
- De Korte, M. W. P., Kaijadoo, S. P. T., Buitelaar, J. K., Staal, W. G., & Van Dongen-Boomsma, M. (2022). Pivotal response treatment- Parent group training for young children with autism spectrum disorder: A qualitative study on perspectives of parents. *Journal of Autism and Developmental Disorders*, 52(12), 5414–5427.
<https://doi.org/10.1007/s10803-021-05397-8>
- De Nocker, Y. L., & Toolan, C. K. (2023). Using telehealth to provide interventions for children with ASD: A systematic review. *Review Journal of Autism and Developmental Disorders*, 10(1), 82–112. <https://doi.org/10.1007/s40489-021-00278-3>
- Division for Early Childhood. (2014). *DEC recommended practices in early intervention/early childhood special education*. <https://www.dec-sped.org/dec-recommended-practices>

- Eisenhower, A. S., Baker, B. L., & Blacher, J. (2005). Preschool children with intellectual disability: Syndrome specificity, behaviour problems, and maternal well-being. *Journal of Intellectual Disability Research*, 49(9), 657–671. <https://doi.org/10.1111/j.1365-2788.2005.00699.x>
- English, K., Goldstein, H., Shafer, K., & Kaczmarek, L. (1997). Promoting interactions among preschoolers with and without disabilities: Effects of a buddy skills training program. *Exceptional Children*, 63(2), 229–243. <https://doi.org/10.1177/001440299706300206>
- Ferguson, J. L., Cihon, J. H., Leaf, J. B., Van Meter, S. M., McEachin, J., & Leaf, R. (2019). Assessment of social validity trends in the journal of applied behavior analysis. *European Journal of Behavior Analysis*, 20(1), 146–157. <https://doi.org/10.1080/15021149.2018.1534771>
- Ferraioli, S. J., & Harris, S. L. (2011). Teaching joint attention to children with autism through a sibling-mediated behavioral intervention. *Behavioral Interventions*, 26(4), 261–281. <https://doi.org/10.1002/bin.336>
- Gena, A. (2007). The effects of prompting and social reinforcement on establishing social interactions with peers during the inclusion of four children with autism in preschool. *International Journal of Psychology*, 41(6), 541–554. <https://doi.org/10.1080/00207590500492658>
- Goldstein, H., English, K., Shafer, K., & Kaczmarek, L. (1997). Interaction among preschoolers with and without disabilities. *Journal of Speech, Language, and Hearing Research*, 40(1), 33–48. <https://doi.org/10.1044/jslhr.4001.33>
- Goldstein, H., Schneider, N., & Thiemann, K. (2007). Peer-mediated social communication

intervention: When clinical expertise informs treatment development and evaluation.

Topics in Language Disorders, 27(2), 182–199.

<https://doi.org/10.1097/01.TLD.0000269932.26504.a8>

Goldstein, S., & Naglieri, J. (2009). *Autism spectrum rating scales*. Multi-Health Systems.

Haine-Schlagel, R., Rieth, S., Dickson, K. S., Brookman-Frazee, L., & Stahmer, A. (2020).

Adapting parent engagement strategies for an evidence-based parent-mediated intervention for young children at risk for autism spectrum disorder. *Journal of Community Psychology*, 48(4), 1215–1237. <https://doi.org/10.1002/jcop.22347>

Hansen, S. G., Mowbray, M., Raulston, T., Carnett, A., & Tullis, C. (2023). Effects of a peer-mediated joint attention intervention in an inclusive preschool setting. *Focus on Autism and Other Developmental Disabilities*, 38(2), 71–79.

<https://doi.org/10.1177/10883576221108111>

Hansen, S. G., Raulston, T. J., Machalicek, W., & Frantz, R. (2018). Caregiver-mediated joint attention intervention. *Behavioral Interventions*, 33(2), 205–211.

<https://doi.org/10.1002/bin.1523>

Hansen, S. G., Raulston, T. J., Machalicek, W., Frantz, R., Drew, C., Erturk, B., & Squires, J. (2019). Peer mediated joint attention intervention in the preschool classroom. *The*

Journal of Special Education, 53(2), 96–107. <https://doi.org/10.1177/0022466918807464>

Harper, C. B., Symon, J. B. G., & Frea, W. D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders*, 38(5), 815–826. <https://doi.org/10.1007/s10803-007-0449-2>

Heitzman-Powell, L. S., Buzhardt, J., Rusinko, L. C., & Miller, T. M. (2014). Formative

evaluation of an ABA outreach training program for parents of children with autism in remote areas. *Focus on Autism and Other Developmental Disabilities*, 29(1), 23–38.

<https://doi.org/10.1177/1088357613504992>

Horbanczuk, S. (2024). *Contextual fit in ABA practice: Utilizing a contextual fit tool to achieve social validity* (Publication No. 31328985) [Doctoral dissertation, University of Washington]. ProQuest Dissertations and Theses Global.

Horner, R., Blitz, C., & Ross, S. (2014). *The importance of contextual fit when implementing evidence-based programs* [Issue Brief]. U.S. Department of Health and Human Services, Office of Human Services Policy.

https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//44416/ib_Contextual.pdf

Ingersoll, B. (2010). Pilot randomized controlled trial of reciprocal imitation training for teaching elicited and spontaneous imitation to children with autism. *Journal of Autism and Developmental Disorders*, 40(9), 1154–1160. <https://doi.org/10.1007/s10803-010-0966-2>

Ingersoll, B., & Gergans, S. (2007). The effect of a parent-implemented imitation intervention on spontaneous imitation skills in young children with autism. *Research in Developmental Disabilities*, 28(2), 163–175. <https://doi.org/10.1016/j.ridd.2006.02.004>

Ingersoll, B., Lewis, E., & Kroman, E. (2007). Teaching the imitation and spontaneous use of descriptive gestures in young children with autism using a naturalistic behavioral intervention. *Journal of Autism and Developmental Disorders*, 37(8), 1446–1456. <https://doi.org/10.1007/s10803-006-0221-z>

Ingersoll, B., Wainer, A. L., Berger, N. I., Pickard, K. E., & Bonter, N. (2016). Comparison of a

- self-directed and therapist-assisted telehealth parent-mediated intervention for children with ASD: A pilot RCT. *Journal of Autism and Developmental Disorders*, 46(7), 2275–2284. <https://doi.org/10.1007/s10803-016-2755-z>
- James, S. D., & Egel, A. L. (1986). A direct prompting strategy for increasing reciprocal interactions between handicapped and nonhandicapped siblings. *Journal of Applied Behavior Analysis*, 19(2), 173–186.
- Jones, E. A., & Carr, E. G. (2004). Joint attention in children with autism: Theory and intervention. *Focus on Autism and Other Developmental Disabilities*, 19(1), 13–26. <https://doi.org/10.1177/10883576040190010301>
- Jones, E. A., Carr, E. G., & Feeley, K. M. (2006). Multiple effects of joint attention intervention for children with autism. *Behavior Modification*, 30(6), 782–834. <https://doi.org/10.1177/0145445506289392>
- Jones, E. A., & Feeley, K. M. (2009). Parent implemented joint attention intervention for preschoolers with autism. *The Journal of Speech and Language Pathology – Applied Behavior Analysis*, 4(1), 74–89. <https://doi.org/10.1037/h0100251>
- Jones, J. (2014). Best practices in providing culturally responsive interventions. In A. Thomas & P. Harrison (Eds.), *Best Practices in School Psychology* (6th ed., pp. 49-60). National Association of School Psychologists.
- Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, 105(11), 2283–2290. <https://doi.org/10.2105/AJPH.2015.302630>
- Jurek, L., Leadbitter, K., Falissard, B., Colin, C., Touzet, S., & Geoffray, M.-M. (2023). Parental

experience of parent-mediated intervention for children with ASD: A systematic review and qualitative evidence synthesis. *Autism*, 27(3), 647–666.

<https://doi.org/10.1177/13623613221112204>

Katz, E., & Girolametto, L. (2013). Peer-mediated intervention for preschoolers with ASD implemented in early childhood education settings. *Topics in Early Childhood Special Education*, 33(3), 133–143. <https://doi.org/10.1177/0271121413484972>

Kazdin, A. E. (2020). Single-case experimental designs: Characteristics, changes, and challenges. *Journal of the Experimental Analysis of Behavior*, 115(1), 56–85.

<https://doi.org/10.1002/jcab.638>

Kim, T. (2010). *Sibling-implemented intervention for improving social interaction skills of young children who have difficulties with socialization* [Unpublished dissertation]. University of Kansas.

Knutsen, J., Wolfe, A., Burke, B. L., Hepburn, S., Lindgren, S., & Coury, D. (2016). A systematic review of telemedicine in autism spectrum disorders. *Review Journal of Autism and Developmental Disorders*, 3(4), 330–344. <https://doi.org/10.1007/s40489-016-0086-9>

Krier, J., & Lambros, K. M. (2021). Increasing joint attention and social play through peer-mediated intervention: A single case design. *Psychology in the Schools*, 58(3), 494–514. <https://doi.org/10.1002/pits.22460>

Lang, R., Kuriakose, S., Lyons, G., Mulloy, A., Boutot, A., Britt, C., Caruthers, S., Ortega, L., O'Reilly, M., & Lancioni, G. (2011). Use of school recess time in the education and treatment of children with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 5(4), 1296–1305. <https://doi.org/10.1016/j.rasd.2011.02.012>

- Laushey, K. M., & Heflin, L. J. (2000). Enhancing social skills of kindergarten children with autism through the training of multiple peers as tutors. *Journal of Autism and Developmental Disorders*, 30(3), 183–193. <https://doi.org/10.1023/A:1005558101038>
- Ledbetter-Cho, K., Lang, R., Watkins, L., O'Reilly, M., & Zamora, C. (2017). Systematic review of collateral effects of focused interventions for children with autism spectrum disorder. *Autism & Developmental Language Impairments*, 2, 1–22. <https://doi.org/10.1177/2396941517737536>
- Ledford, J. R., (2022). Concurrence on nonconcurrence in multiple-baseline designs: A commentary on Slocum et al. (2022). *Perspectives on Behavior Science*, 45(3), 661–666. <https://doi.org/10.1007/s40614-022-00342-1>
- Ledford, J. R., & Gast, D. L. (2014). Measuring procedural fidelity in behavioural research. *Neuropsychological Rehabilitation*, 24(3–4), 332–348. <https://doi.org/10.1080/09602011.2013.861352>
- Ledford, J. R., & Gast, D. L. (Eds.). (2018). *Single case research methodology: Applications in special education and behavioral sciences* (3rd ed.). Routledge.
- Ledford, J. R., Hall, E., Conder, E., & Lane, J. D. (2016). Research for young children with autism spectrum disorders: Evidence of social and ecological validity. *Topics in Early Childhood Special Education*, 35(4), 223–233. <https://doi.org/10.1177/0271121415585956>
- Ledford, J. R., & Pustejovsky, J. E. (2023). Systematic review and meta-analysis of stay-play-talk interventions for improving social behaviors of young children. *Journal of Positive Behavior Interventions*, 25(1), 65–77. <https://doi.org/10.1177/1098300720983521>
- Ledford, J. R., & Wolery, M. (2013). Procedural fidelity: An analysis of measurement and

reporting practices. *Journal of Early Intervention*, 35(2), 173–193.

<https://doi.org/10.1177/105381511351590>

Li, F., Wu, D., Ren, F., Shen, L., & Xue, M. (2022). Effectiveness of online-delivered project impact for children with ASD and their parents: A pilot study during the COVID-19 pandemic. *Frontiers in Psychiatry*, 13, Article 806149.

<https://doi.org/10.3389/fpsy.2022.806149>

Lu, Y., Douglas, S. N., Bagawan, A., & Hauck, J. L. (2021). Using neurotypical siblings as intervention agents to guide individuals with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 89(1), Article 101868.

<https://doi.org/10.1016/j.rasd.2021.101868>

Lynch, E. W., & Hanson, M. J. (2004). *Developing cross-cultural competence: A guide for working with children and their families*. (3rd ed.). Brookes.

Maenner, M. J. (2023). Prevalence and characteristics of autism spectrum disorder among children aged 8 years—Autism and developmental disabilities monitoring network, 11 sites, United States, 2020. *Surveillance Summaries*, 72(2), 1–14.

<http://dx.doi.org/10.15585/mmwr.ss7202a1>

Maich, K., Hall, C. L., Van Rhijn, T. M., & Squires, K. (2018). Investigating stay, play, & talk: A peer-mediated social skills intervention for young children with autism spectrum disorder and other social challenges. *Exceptionality Education International*, 28(2).

<https://doi.org/10.5206/eei.v28i2.7766>

Mandell, D. S., Morales, K. H., Xie, M., Lawer, L. J., Stahmer, A. C., & Marcus, S. C. (2010). Age of diagnosis among Medicaid-enrolled children with autism. *Psychiatric Services*, 61(8), 822–829. <https://doi.org/10.1176/ps.2010.61.8.822>

- Manohar, H., Kandasamy, P., Chandrasekaran, V., & Rajkumar, R. P. (2020). Can RCTs capture it all?—Need for qualitative studies on parent-mediated interventions for children with autism spectrum disorder. *Asian Journal of Psychiatry*, 48(1), Article 101915.
<https://doi.org/10.1016/j.ajp.2019.101915>
- Mason, R., Kamps, D., Turcotte, A., Cox, S., Feldmiller, S., & Miller, T. (2014). Peer mediation to increase communication and interaction at recess for students with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 8(3), 334-344.
<https://doi.org/10.1016/j.rasd.2013.12.014>
- McFadden, B., Kamps, D., & Heitzman-Powell, L. (2014). Social communication effects of peer-mediated recess intervention for children with autism. *Research in Autism Spectrum Disorders*, 8(12), 1699–1712. <https://doi.org/10.1016/j.rasd.2014.08.015>
- McHugh M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, 22(3), 276–282. <https://doi.org/10.11613/BM.2012.31>
- McLaughlin, T. W., Denney, M. K., Snyder, P. A., & Welsh, J. L. (2012). Behavior support interventions implemented by families of young children: Examination of contextual fit. *Journal of Positive Behavior Interventions*, 14(2), 87–97.
<https://doi.org/10.1177/1098300711411305>
- Morin, K. L., Lindström, E. R., Kratochwill, T. R., Levin, J. R., Blasko, A., Weir, A., Nielsen-Pheiffer, C. M., Kelly, S., Janunts, D., & Hong, E. R. (2023). Nonconcurrent multiple-baseline and multiple-probe designs in special education: A systematic review of current practice and Future Directions. *Exceptional Children*, 90(2), 126-147.
<https://doi.org/10.1177/00144029231165506>
- Nevill, R. E., Lecavalier, L., & Stratis, E. A. (2016). Meta-analysis of parent-mediated

- interventions for young children with autism spectrum disorder. *Autism*, 22(2), 84–98.
<https://doi.org/10.1177/1362361316677838>
- Odom, S. L., & Strain, P. S. (1984). Peer-mediated approaches to promoting children's social interaction: A review. *American Journal of Orthopsychiatry*, 54(4), 544–557.
<https://doi.org/10.1111/j.1939-0025.1984.tb01525.x>
- Oppenheim-Leaf, M. L., Leaf, J. B., Dozier, C., Sheldon, J. B., & Sherman, J. A. (2012). Teaching typically developing children to promote social play with their siblings with autism. *Research in Autism Spectrum Disorders*, 6(2), 777–791.
<https://doi.org/10.1016/j.rasd.2011.10.010>
- Ozen, A. (2015). Effectiveness of siblings-delivered iPad game activities in teaching social interaction skills to children with autism spectrum disorders. *Educational Sciences: Theory & Practice*, 15(5), 1287–1303. <https://doi.org/10.12738/estp.2015.5.2830>
- Pacia, C., Holloway, J., Gunning, C., & Lee, H. (2022). A systematic review of family-mediated social communication interventions for young children with autism. *Review Journal of Autism and Developmental Disorders*, 9(2), 208–234. <https://doi.org/10.1007/s40489-021-00249-8>
- Palmer, M., San José Cáceres, A., Tarver, J., Howlin, P., Slonims, V., Pellicano, E., & Charman, T. (2020). Feasibility study of the national autistic society EarlyBird parent support programme. *Autism*, 24(1), 147–159. <https://doi.org/10.1177/1362361319851422>
- Pan, C.-Y., Kuo, T.-Y., & Kuo, F.-L. (2023). Meta-analysis of effectiveness of parent-mediated telehealth interventions in children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 107, Article 102209. <https://doi.org/10.1016/j.rasd.2023.102209>
- Park, E.-Y., & Blair, K.-S. C. (2019). Social validity assessment in behavior interventions for

- young children: A systematic review. *Topics in Early Childhood Special Education*, 39(3), 156–169. <https://doi.org/10.1177/0271121419860195>
- Pickard, K. E., Wainer, A. L., Bailey, K. M., & Ingersoll, B. R. (2016). A mixed-method evaluation of the feasibility and acceptability of a telehealth-based parent-mediated intervention for children with autism spectrum disorder. *Autism*, 20(7), 845–855. <https://doi.org/10.1177/1362361315614496>
- Powell, T. H., Salzberg, C. L., & Rule, S. (1983). Teaching mentally retarded children to play with their siblings using parents as trainers. *Education and Treatment of Children*, 6(3), 343–362.
- Rai, D., Culpin, I., Heuvelman, H., Magnusson, C. M., Carpenter, P., Jones, H. J., Emond, A. M., Zammit, S., Golding, J., & Pearson, R. M. (2018). Association of autistic traits with depression from childhood to age 18 years. *JAMA Psychiatry*, 75(8), 835–843. <https://doi.org/10.1001/jamapsychiatry.2018.1323>
- Reichow, B., & Song, J. (2024). Overview of reviews of peer-mediated interventions for young children with disabilities. *Topics in Early Childhood Special Education*, 1–15. <https://doi.org/10.1177/02711214241281383>
- Rojas-Torres, L. P., Alonso-Esteban, Y., & Alcántud-Marín, F. (2020). Early intervention with parents of children with autism spectrum disorders: A review of programs. *Children*, 7(12), 294–322. <https://doi.org/10.3390/children7120294>
- Rusby, J. C., Metzler, C. W., Sanders, M. R., & Crowley, R. (2015). Emulating real-life situations with a play task to observe parenting skills and child behaviors. *Journal of Family Psychology*, 29(2), 201–210. <https://doi.org/10.1037/fam0000056>
- Rutter, M., LeCouteur, A., & Lord, C. (2003). *Autism diagnostic interview—revised*. Western

Psychological Services.

- Schertz, H. H., & Odom, S. L. (2007). Promoting joint attention in toddlers with autism: A parent-mediated developmental model. *Journal of Autism and Developmental Disorders*, 37(8), 1562–1575. <https://doi.org/10.1007/s10803-006-0290-z>
- Schreibman, L., O'Neill, R. E., & Koegel, R. L. (1983). Behavioral training for siblings of autistic children. *Journal of Applied Behavior Analysis*, 16(2), 129–138. <https://doi.org/10.1901/jaba.1983.16-129>
- Schwartz, I. S., & Kelly, E. M. (2021). Quality of life for people with disabilities: Why applied behavior analysts should consider this a primary dependent variable. *Research and Practice for Persons with Severe Disabilities*, 46(3), 159–172. <https://doi.org/10.1177/15407969211033629>
- Shalev, R. A., Lavine, C., & Di Martino, A. (2020). A systematic review of the role of parent characteristics in parent-mediated interventions for children with autism spectrum disorder. *Journal of Developmental and Physical Disabilities*, 32(1), 1–21. <https://doi.org/10.1007/s10882-018-9641-x>
- Slocum, T. A., Pinkelman, S. E., Joslyn, P. R., & Nichols, B. (2022). Threats to internal validity in multiple-baseline design variations. *Perspectives on Behavior Science*, 45(3), 619–638. <https://doi.org/10.1007/s40614-022-00326-1>
- Smith, S. W., Kronfli, F. R., & Vollmer, T. R. (2022). Commentary on Slocum et al. (2022): Additional considerations for evaluating experimental control. *Perspectives on Behavior Science*, 45(3), 667–679. <https://doi.org/10.1007/s40614-022-00346-x>

- Smith-Young, J., Chafe, R., & Audas, R. (2020). “Managing the wait”: Parents’ experiences in accessing diagnostic and treatment services for children and adolescents diagnosed with autism spectrum disorder. *Health Services Insights*, 13(1), 1–10.
<https://doi.org/10.1177/1178632920902141>
- Spivak, A. L., & Farran, D. C. (2016). Predicting first graders’ social competence from their preschool classroom interpersonal context. *Early Education and Development*, 27(6), 735–750. <https://doi.org/10.1080/10409289.2016.1138825>
- Stahmer, A. C., Brookman-Frazee, L., Rieth, S. R., Stoner, J. T., Feder, J. D., Searcy, K., & Wang, T. (2017). Parent perceptions of an adapted evidence-based practice for toddlers with autism in a community setting. *Autism*, 21(2), 217–230.
<https://doi.org/10.1177/1362361316637580>
- Strain, P. S., Barton, E. E., & Dunlap, G. (2012). Lessons learned about the utility of social validity. *Education & Treatment of Children*, 35(2), 183–200.
<https://doi.org/10.1353/etc.2012.0007>
- Sullivan, C. L. (1999). *The effects of sibling-implemented training on social behaviors of autistic children* (Publication No. 304536392) [Doctoral dissertation, Western Michigan University]. ProQuest Dissertations and Theses Global.
- Swenson-Pierce, A., Kohl, F. L., & Egel, A. L. (1987). Siblings as home trainers: A strategy for teaching domestic skills to children. *Journal of the Association for Persons with Severe Handicaps*, 12(1), 53–60. <https://doi.org/10.1177/154079698701200108>
- Syriopoulou-Delli, C., & Gkiolnta, E. (2024). Standardization of meanings in autistic

- communication: Possibilities & limitations. In G. Bennett & E. Goodall (Eds.), *The Palgrave Encyclopedia of Disability*. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-40858-8_169-1
- Tsao, L.-L. (2019). Brothers as playmates for their siblings with developmental disabilities: A multiple-baseline design study. *Child & Youth Care Forum*, 49(3), 409–430. <https://doi.org/10.1007/s10566-019-09534-4>
- Tsao, L.-L., & Odom, S. L. (2006). Sibling-mediated social interaction intervention for young children with autism. *Topics in Early Childhood Special Education*, 26(2), 106–123. <https://doi.org/10.1177/02711214060260020101>
- Ura, S. K., Liao, C.-Y., Ganz, J. B., Stein, K., & Clark, S. (2021). Parent-coaching telehealth intervention for youth with autism spectrum disorder: A pilot program. *Child & Family Behavior Therapy*, 43(2), 86–102. <https://doi.org/10.1080/07317107.2021.1894719>
- Vismara, L. A., McCormick, C. E. B., Wagner, A. L., Monlux, K., Nadhan, A., & Young, G. S. (2018). Telehealth parent training in the early start denver model: Results from a randomized controlled study. *Focus on Autism and Other Developmental Disabilities*, 33(2), 67–79. <https://doi.org/10.1177/1088357616651064>
- Vismara, L. A., & Rogers, S. J. (2010). Behavioral treatments in autism spectrum disorder: What do we know? *Annual Review of Clinical Psychology*, 6(1), 447–468. <https://doi.org/10.1146/annurev.clinpsy.121208.131151>
- Walton, K. M., & Ingersoll, B. R. (2012). Evaluation of a sibling-mediated imitation intervention for young children with autism. *Journal of Positive Behavior Interventions*, 14(4), 241–253. <https://doi.org/10.1177/1098300712437044>
- Watkins, L., Tomeny, T., O'Reilly, M., Sillis, K. H., & Zamora, C. (2021). A naturalistic

- behavioral intervention to increase interaction between siblings with and without autism. *Behavior Modification*, 45(6), 863–886. <https://doi.org/10.1177/0145445520920813>
- Wetherby, A. M., Woods, J., Guthrie, W., & Delehanty, A. (2018). Changing developmental trajectories of toddlers with autism spectrum disorder: Strategies for bridging research to community practice. *Journal of Speech, Language, and Hearing Research*, 61(11), 2615–2628. https://doi.org/10.1044/2018_JSLHR-L-RSAUT-18-0028
- Whalen, C., & Schreibman, L. (2003). Joint attention training for children with autism using behavior modification procedures. *Journal of Child Psychology and Psychiatry*, 44(3), 456–468. <https://doi.org/10.1111/1469-7610.00135>
- Whalen, C., Schreibman, L., & Ingersoll, B. (2006). The collateral effects of joint attention training on social initiations, positive affect, imitation, and spontaneous speech for young children with autism. *Journal of Autism and Developmental Disorders*, 36(5), 655–664. <https://doi.org/10.1007/s10803-006-0108-z>
- Wolery, M. (2013). A commentary: Single-case design technical document of the what works clearinghouse. *Remedial and Special Education*, 34(1), 39–43. <https://doi.org/10.1177/0741932512468038>
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis*, 11(2), 203–214. <https://doi.org/10.1901/jaba.1978.11-203>
- Woods, J. J., & Wetherby, A. M. (2003). Early identification of and intervention for infants and toddlers who are at risk for autism spectrum disorder. *Language, Speech, and Hearing Services in Schools*, 34(3), 180–193. [https://doi.org/10.1044/0161-1461\(2003/015\)](https://doi.org/10.1044/0161-1461(2003/015))
- Yoder, P. J., Ledford, J. R., Harbison, A. L., & Tapp, J. T. (2018). Partial-interval estimation of

- count: Uncorrected and poisson-corrected error levels. *Journal of Early Intervention*, 40(1), 39-51. <https://doi.org/10.1177/1053815117748407>
- Yurkovic-Harding, J., Lisandrelli, G., Shaffer, R. C., Dominick, K. C., Pedapati, E. V., Erickson, C. A., Yu, C., & Kennedy, D. P. (2022). Children with ASD establish joint attention during free-flowing toy play without face looks. *Current Biology*, 32(12), 2739-2746. <https://doi.org/10.1016/j.cub.2022.04.044>
- Zagona, A. L., & Mastergeorge, A. M. (2018). An empirical review of peer-mediated interventions: Implications for young children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 33(3), 131–141. <https://doi.org/10.1177/1088357616671295>
- Zhang, Y. X., & Cummings, J. R. (2020). Supply of certified applied behavior analysts in the United States: Implications for service delivery for children with autism. *Psychiatric Services*, 71(4), 385–388. <https://doi.org/10.1176/appi.ps.201900058>

Table 1*Peer-Mediated Intervention Studies*

Study	Setting	Trainer	Target Behavior	Procedural Fidelity	Social Validity
McFadden et al., 2014	Recess	School personnel	Social communication	Intervention	Teachers
Katz & Girolametto, 2013	Early childhood classroom	School personnel	Social communication	Training	Teachers and undergraduate students
Banda et al., 2009	Kindergarten classroom	Research team	Social communication	Training	N/A
Krier & Lambros, 2020	Preschool classroom	Research team	Joint attention	Intervention	Parents, peers, and teachers
Hansen et al., 2019	Preschool classroom	Research team	Joint attention	Intervention and training	Teachers
Hansen et al., 2023	Preschool classroom	Research team	Joint attention	Intervention and training	N/A

Table 2*Sibling-Mediated Intervention Studies*

Study	Setting	Trainer	Target Behavior	Procedural Fidelity	Social Validity
Celiberti & Harris, 1993	Playroom	Research team	Play skills	N/A	Undergraduate students
Ferraioli & Harris, 2011	Playroom or bedroom	Research team	Joint attention	Intervention	Parents and sibling
Walton & Ingersoll, 2012	Family room	Primary researcher	Joint attention and imitation	Intervention	Undergraduate students, parents, siblings
Oppenheim-Leaf et al. 2012	Playroom	Primary researcher	Social skills	Intervention	Parents
Tsao & Odom, 2006*	Family room	Primary researcher	Joint attention	Training	Graduate students
Kim, 2010*	Playroom	Primary researcher	Social interaction	Training	Parents, siblings, students
Tsao, 2019*	Home	Primary researcher	Social interaction	N/A	Teachers not in the study

* = *Stay, Play, Talk* intervention

Table 3*Dyad Demographics*

Dyad+	Age	Race/Ethnicity	Primary Language
Dyad 1		White	English
Leah*	10 yrs, 11 mos		
Emma	8 yrs, 10 mos		
Dyad 2		Chinese	Mandarin
Caleb*	6 yrs, 5 mos		
Ryan	10 yrs, 2 mos		
Dyad 3		Hispanic	Spanish
Henry*	5 yrs, 10 mos		
Gabe	10 yrs, 8 mos		
Dyad 4		Native American	English
Jordan*	10 yrs, 11 mos		
Ilana	8 yrs, 9 mos		
Dyad 5		Native American	English
Clara*	10 yrs, 11 mos		
Ilana	8 yrs, 9 mos		

*Neurodiverse sibling

+ names changed

Table 4*Data Collection Sheet for Joint Attention***Interval Recording****Data Collector Initials:** _____ **Date:** _____ **Dyad Number:** _____**Circle One:** **Baseline** **Intervention**

Joint Attention Definition: Joint attention will be defined as the neurodiverse child actively seeking engagement with their sibling (initiating joint attention) or reacting to their sibling's bid for attention (responding to joint attention). Initiating joint attention includes pointing, tapping, or handing their sibling an object, visually referencing the sibling (e.g., looking at the sibling) and sharing materials (e.g., handing an item to the sibling or using the same object). Using words (e.g., "come here") or sounds (e.g., laughing) directed towards the sibling are considered verbal cues from the neurodiverse sibling that constitutes joint attention. Responding to joint attention includes behaviors such as the neurodiverse child following their sibling's gaze, pointing towards an object, or manipulating the same object (e.g., assembling Legos). Verbally or nonverbally acknowledging the sibling's bid (e.g., making eye contact, nodding, smiling, or responding with words) and physically responding to the sibling's actions (e.g., taking an offered item or moving closer to the sibling in response to an invitation to play) are also considered joint attention.

Family Examples and Non-Examples:

Interval	JA Occured (X or ✓)	Cumulative Time		Interval	JA Occured (X or ✓)	Cumulative Time
1		4"		31		9"
2		4' 10"		32		9' 10"
3		4' 20"		33		9' 20"
4		4' 30"		34		9' 30"
5		4' 40"		35		9' 40"
6		4' 50"		36		9' 50"
7		5"		37		10"
8		5' 10"		38		10' 10"
9		5' 20"		39		10' 20"

10		5' 30"		40		10' 30"
11		5' 40"		41		10' 40"
12		5' 50"		42		10' 50"
13		6"		43		11"
14		6' 10"		44		11' 10"
15		6' 20"		45		11' 20"
16		6' 30"		46		11' 30"
17		6' 40"		47		11' 40"
18		6' 50"		48		11' 50"
19		7"		49		12"
20		7' 10"		50		12' 10"
21		7' 20"		51		12' 20"
22		7' 30"		52		12' 30"
23		7' 40"		53		12' 40"
24		7' 50"		54		12' 50"
25		8"		55		13"
26		8' 10"		56		13' 10"
27		8' 20"		57		13' 20"
28		8' 30"		58		13' 30"
29		8' 40"		59		13' 40"
30		8' 50"		60		13' 50"

To be completed by researcher:

Joint Attention Score	
(a) # of Intervals Joint	

Attention Occurred:	
$(a)/60 \times 100 =$	

To be completed for IOA by researcher:

IOA Score	
(a) # of agreements for occurrence trials	
(b) # of disagreements for occurrence trials:	
$(a/a+b) \times 100:$	

Table 5*Mean Percentage for Interobserver Agreement*

Phase	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5
Baseline	92%	94%	91%	90%	89%
Intervention	87%	88%	85%	83%	86%

Table 6*Data Collection Sheet for Sibling Fidelity***Momentary Time Sampling****Date:****Dyad Number:**

Directions: Place a + if the neurotypical sibling is demonstrating a component of the *Stay, Play, Talk* intervention at the end of the 5-second interval and place a – if the sibling is not demonstrating a component of the intervention. If +, note whether the sibling is engaging in Stay (S), Play (P), or Talk (T).

Response	Definition	Example	Non-Example
Stay	The NT sibling remains in the same area as their sibling or within 5 feet.	The NT sibling sits next to their sibling or stays within 5 feet in a shared play area.	The NT sibling moves to a different play area or walks away, staying more than 5 feet apart.
Play	The NT sibling actively engages in a shared activity with their sibling.	The NT sibling takes turns, shares toys, builds a puzzle together, draws together, or engages in a board game with their sibling.	The NT sibling plays independently with their own toys, or the siblings engage in separate activities (unless they are working on the same play scheme).
Talk	NT sibling communicates with their sibling using words or gestures to share ideas, request, or respond.	The NT sibling greets their sibling, asks questions, makes requests, comments, or responds to their sibling's questions or requests.	The NT sibling does not talk to their sibling, ignores questions or requests, or exhibits verbal aggression.

Cum Time	+ or -	Comment (S, T, or P)	Cum Time	+ or -	Comment (S, T, or P)	Cum Time	+ or -	Comment (S, T, or P)
4:00			7:25			10:45		
4:05			7:30			10:50		
4:10			7:35			10:55		
4:15			7:40			11:00		
4:20			7:45			11:05		
4:25			7:50			11:10		

4:30			7:55			11:15		
4:35			8:00			11:20		
4:40			8:05			11:25		
4:45			8:10			11:30		
4:50			8:15			11:35		
4:55			8:20			11:40		
5:00			8:25			11:45		
5:05			8:30			11:50		
5:10			8:35			11:55		
5:15			8:40			12:00		
5:20			8:45			12:05		
5:25			8:50			12:10		
5:30			8:55			12:15		
5:35			8:55			12:20		
5:40			9:00			12:25		
5:45			9:05			12:30		
5:50			9:10			12:35		
5:55			9:15			12:40		
6:00			9:20			12:45		
6:05			9:25			12:50		
6:10			9:30			12:55		
6:15			9:35			13:00		
6:20			9:40			13:05		
6:25			9:45			13:10		
6:30			9:50			13:15		
6:35			9:55			13:20		
6:40			10:00			13:25		
6:45			10:05			13:30		
6:50			10:10			13:35		
6:55			10:15			13:40		
7:00			10:20			13:45		
7:05			10:25			13:50		
7:10			10:30			13:55		
7:15			10:35			14:00		
7:20			10:40					

Number of +s: _____ out of _____ intervals = _____ % of intervals

Number of S: ____/Total +s Number of P: ____/Total +s Number of T: ____/Total +s

Table 7*Mean Percentage of Observed Joint Attention*

Phase	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5
Baseline	88%	76%	47%	62%	74%
Intervention	94%	90%	76%	77%	85%

Table 8*Mean Percentage of Procedural Fidelity*

Phase	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5
Baseline	100%	95%	96%	96%	96%
Intervention	100%	93%	91%	94%	94%

Table 9*Mean Percentage of Intervals Using Stay, Play, or Talk*

Phase	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5
Baseline					
<i>Stay</i>	86.14%	66.75%	86.50%	94.88%	95.80%
<i>Play</i>	53.57%	55.50%	31.33%	66.00%	75.00%
<i>Talk</i>	19.43%	26.13%	8.67%	30.75%	32.80%
Intervention					
<i>Stay</i>	94.12%	83.43%	97.17%	99.14%	97.00%
<i>Play</i>	75.38%	74.71%	85.67%	95.57%	94.60%
<i>Talk</i>	53.88%	52.43%	55.33%	57.29%	55.40%

Table 10*Average Social Validity Rating*

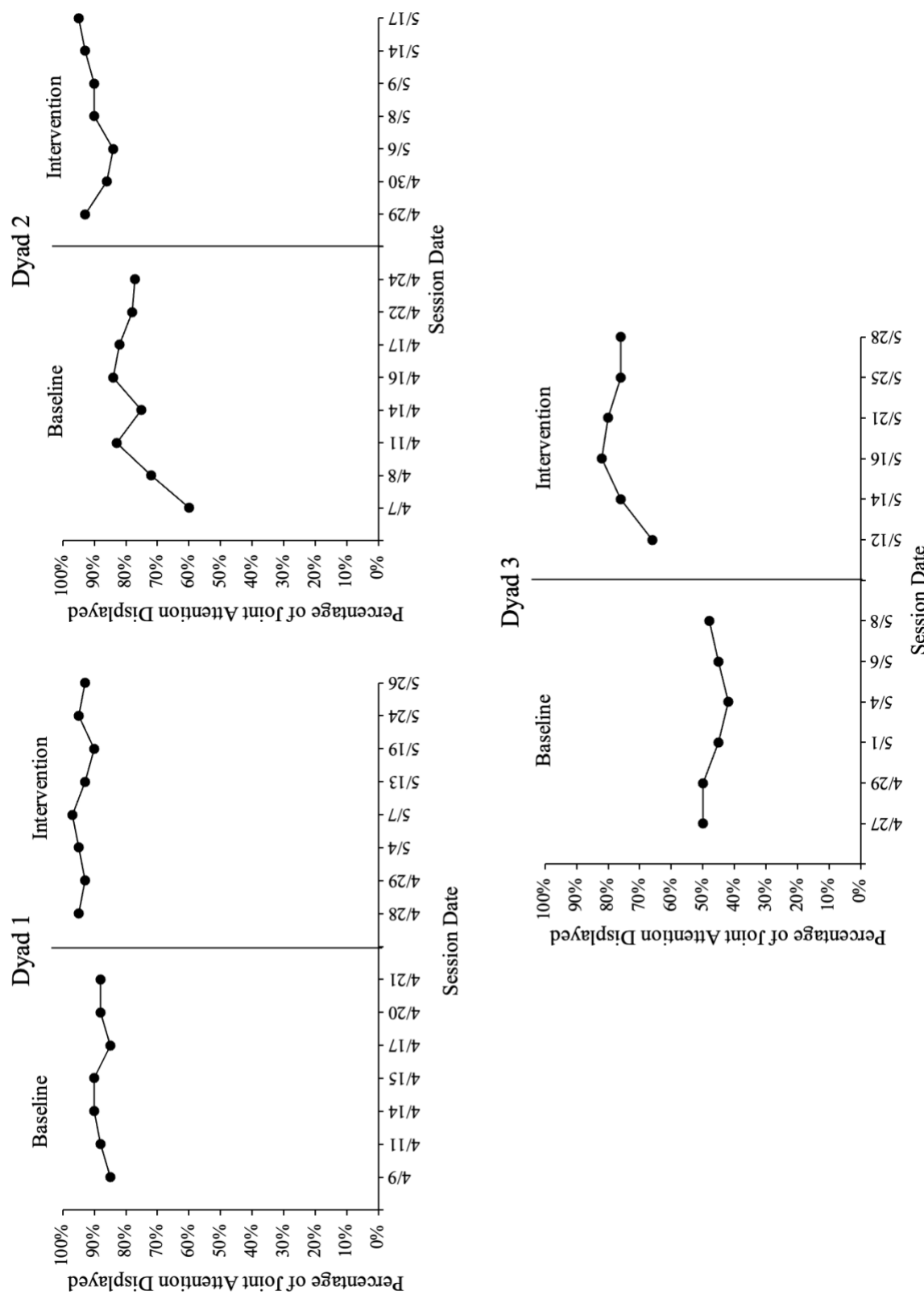
Dyad	Average Parent Rating	Average Neurotypical Sibling Rating
Dyad 1	4.22	3.75
Dyad 2	4.67	3.00
Dyad 3	5.00	5.00
Dyad 4	4.44	4.00
Dyad 5	4.44	4.00

Table 11*Changes in Neurotypical Sibling Use of Stay, Play, and Talk from Baseline to Intervention*

Dyad	Change in <i>Stay</i>	Change in <i>Play</i>	Change in <i>Talk</i>
1	+7.98%	+21.81%	+34.45%
2	+16.68%	+19.21%	+26.30%
3	+10.67%	+54.34%	+46.66%
4	+4.26%	+29.57%	+26.54%
5	+1.20%	+19.60%	+22.60%

Note. Greatest change in *Stay*, *Play*, or *Talk* for each dyad is indicated in bold.

Figure 1
Joint Attention as a Function of Sibling-Mediated Attention



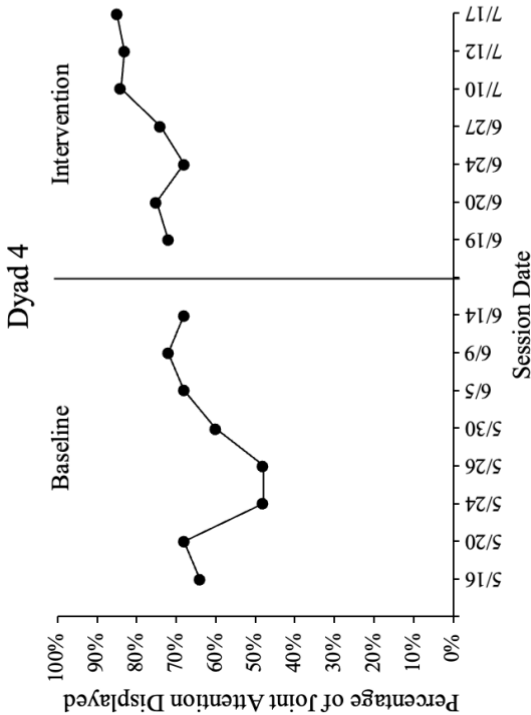
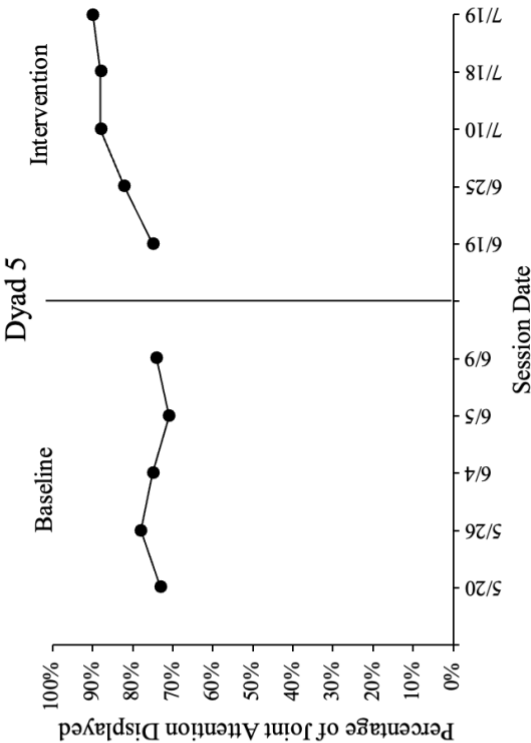
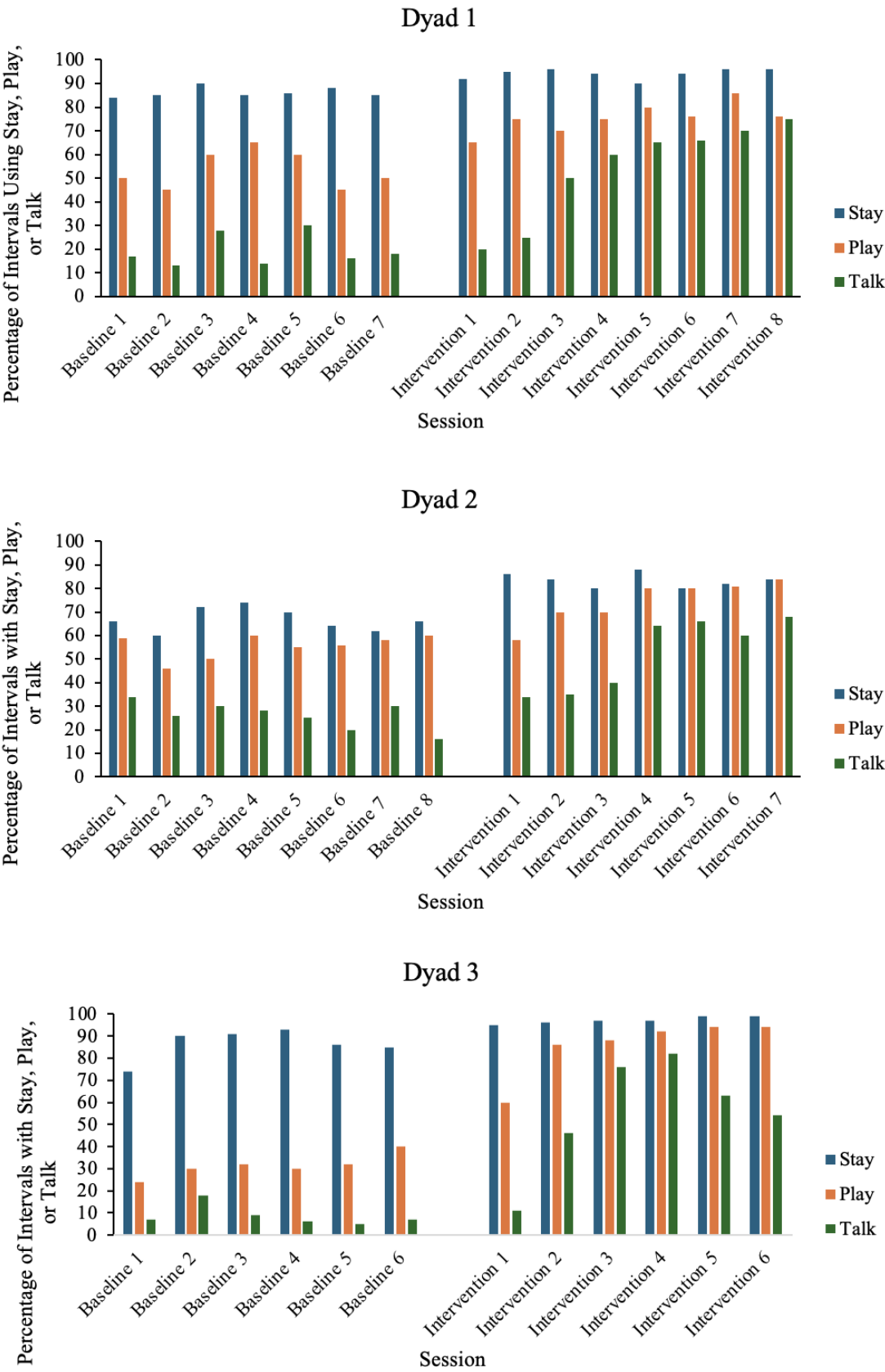
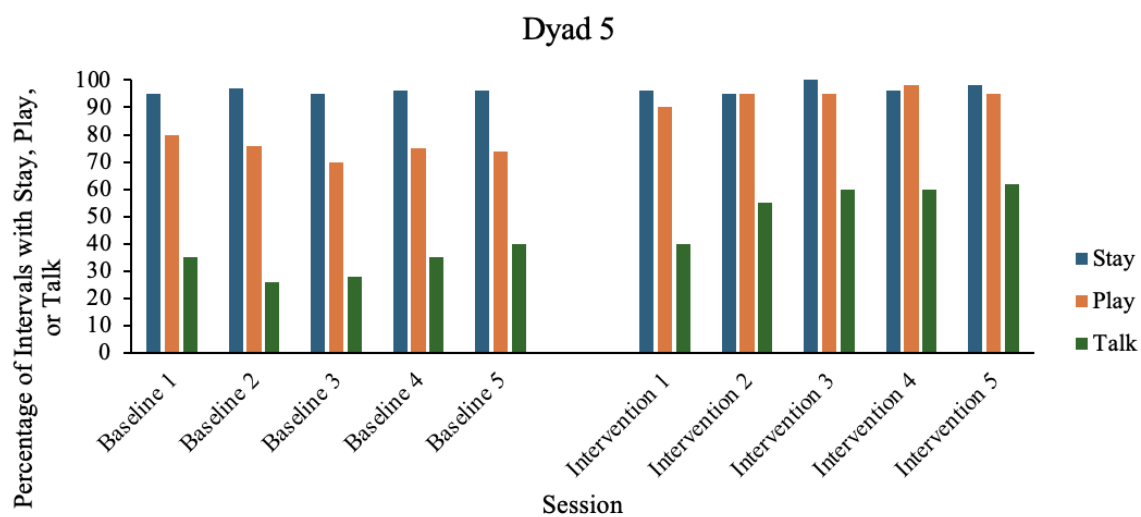
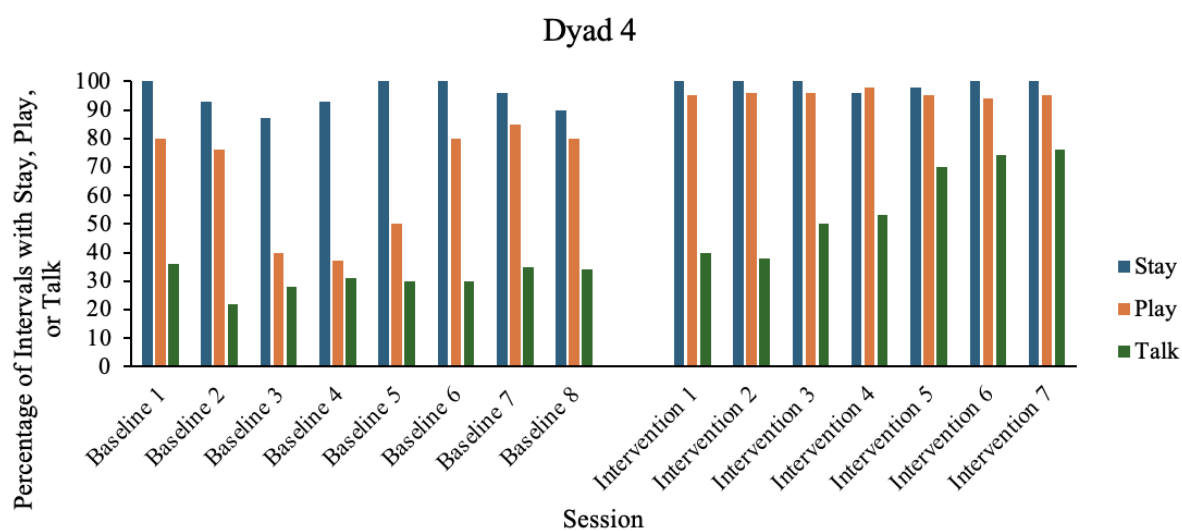


Figure 2

Neurotypical Sibling Use of Stay, Play, or Talk





Appendix A

To ensure that contextual fit regarding the intervention, the parent will be asked the questions below through a semi-structured interview.

Part 1: Diagnosis and Developmental Information

1. How old is your neurodiverse child and neurotypical child?
2. When did the psychologist or physician diagnose your child with ASD?
3. Describe your neurodiverse child's cognitive and social development. What are some strengths and challenges?
4. Do you have any concerns regarding your neurotypical child's cognitive and social development?

Part 2: Social Communication Goals

1. One of the aims of this intervention is to increase your neurodiverse child's joint attention. Joint attention is defined as the dyad engaging with the same object, with the neurodiverse child showing awareness of the sibling's involvement. Awareness of the sibling's involvement includes actively coordinating actions (e.g., both children manipulating different parts of the same toy), sharing materials (e.g., handing an item to the sibling), or visually referencing the sibling (e.g., looking at the sibling). Behaviors that do not involve shared focus on the same object or activity will not meet the criteria for joint attention (e.g., parallel play). Do these goals align with your family values?
2. What are examples and non-examples of joint attention in your family? For example, some families may describe examples of joint attention behaviors, such as sharing materials or valuing collaborative actions, while others may provide non-examples, such as instances of parallel play where children do not engage with each other.

Part 3: Expectations of the Study

1. The intervention will require regular parent participation. Do you anticipate any challenges in this? Is there anything I should be aware of (family travel, etc.)?
2. The intervention will consist of up to 24 sessions spread across 4-8 weeks, occurring 3 times per week for 15 to 25-minute durations. Is that okay with you?
3. I will need to record our training sessions via video recorder as well as have the play sessions recorded. Is that okay with you?

Intervention DetailsStep 1: Semi-Structured Interview with Parent (Zoom)Step 2: Parent Training: 2 sessions

Session 1: Stay & Play, ~30 minutes (in person)

Session 2: Talk & Review, ~30 minutes (via Zoom)

Step 3: Baseline: ~4-8 play sessions recorded via video recorder and sent to researcher immediately

Session 3-11: 15-minute session where siblings play together without any interruptions

**Step 1 & 2 can occur at the same time or in switched orders*

Step 4: Intervention: ~3-10 play sessions via Zoom or recorded and sent to researcher immediately

Session 12: Parent teaches Stay to neurotypical sibling followed by 15-minute play session

Session 13: Parent teaches Stay & Play followed by a 15-minute play session

Session 14: Parent teaches Stay, Play, Talk followed by a 15-minute play session

Session ~15-20: Parent reviews followed by a 15-minute play session

Social validity data collected following the last intervention session

Appendix B

Play Materials for Dyads

To ensure consistency across dyads, play materials for baseline and intervention sessions must meet at least one of the following criteria:

- Pretend play toys (e.g., play food set, tea set, dollhouse, action figures, doctor kits, role-playing sets, toy cars)
- Sensory toys (e.g., sensory balls, squishy toys, sand or water play sets)
- Visual and auditory stimulus toys (e.g., musical instruments)
- Games and interactive toys (e.g., turn-taking games, card games)
- Shared movement toys (e.g., parachutes, small trampoline)
- Arts and craft supplies (e.g., color books, stickers, playdough)
- Cause-and-effect toys (e.g., pop-up toys, toys that light up when manipulated)
- Interactive books (e.g., life-the-flap books)
- Building toys (e.g., blocks, LEGO sets, stacking cups)

Appendix C

Training Manual

Overview of the Sibling-Mediated Intervention Program

Introduction

This manual is modified from Stay-Play-Talk.

Purpose

1. Teach siblings some social skills/strategies
2. Encourage siblings to apply strategies to socially interact/play with children with ASD
3. Improve social relations between siblings

Design

Step 1: Semi-Structured Interview w/ Researcher & Parent

- Interview with the researcher and parent via Zoom
- Gain consent from parent
- Parent gains assent from neurotypical and neurodiverse siblings

Step 2: Parent Training:

- Session 1: Stay & Play (in person)
 - ~30 minutes
 - Collect treatment fidelity data
- Session 2: Talk & Review (via Zoom)
 - ~30 minutes
 - Collect treatment fidelity data

Step 3: Baseline: ~3-8 play sessions recorded and sent to researcher immediately

- Session 3-11: Play Session
 - 10-minute session
 - Siblings play together without any interruptions
 - Primary observer and secondary observer code for JA
 - Procedural fidelity data collected
 - Remain in baseline until there is stability in data

– Between all dyads there will be a different number of sessions and days to control for threats to internal validity.

– *Step 1 & 2 can occur at the same time or in reversed orders depending on family availability*

Step 4: Intervention: ~3-10 play sessions recorded and sent to researcher immediately

- Session 12
 - Parent teaches Stay to neurotypical sibling
 - 10 minute play session
 - Primary observer and secondary observer code for JA
 - Procedural fidelity data collected
- Session 13

- Parent reviews Stay & teaches Play to neurotypical sibling
 - 10 minute play session
 - Primary observer and secondary observer code for JA
 - Procedural fidelity data collected
- Session 14
 - Parent reviews Stay and Play and teaches Talk to neurotypical sibling
 - 10 minute play session
 - Primary observer and secondary observer code for JA
 - Procedural fidelity data collected
- Session 15-19:
 - Parent reviews Stay, Play, Talk
 - 10 minute play session
 - Primary observer and secondary observer code for JA
 - Procedural fidelity data collected
 - Remain in intervention until there is stability in data
 - Administer social validity questionnaire to parent and neurotypical sibling at the last session via email

If any questions arise, please contact Lauren at lperl14@uw.edu or 818.517.8107. Thank you for your participation!

Step 1: Semi-Structured Interview w/ Researcher & Parent**Part 1: Diagnosis and Developmental Information**

1. How old is your neurodiverse child and neurotypical child?
2. When did the psychologist or physician diagnose your child with ASD?
3. Describe your neurodiverse child's cognitive and social development. What are some strengths and challenges?
4. Do you have any concerns regarding your neurotypical child's cognitive and social development?

Part 2: Social Communication Goals

1. One of the aims of this intervention is to increase your neurodiverse child's joint attention. Joint attention is defined as the dyad engaging with the same object, with the neurodiverse child showing awareness of the sibling's involvement. Awareness of the sibling's involvement includes actively coordinating actions (e.g., both children manipulating different parts of the same toy), sharing materials (e.g., handing an item to the sibling), or visually referencing the sibling (e.g., looking at the sibling). Behaviors that do not involve shared focus on the same object or activity will not meet the criteria for joint attention (e.g., parallel play). Do these goals align with your family values?
2. What are examples and non-examples of joint attention in your family? For example, some families may describe examples of joint attention behaviors, such as sharing materials or valuing collaborative actions, while others may provide non-examples, such as instances of parallel play where children do not engage with each other.

Part 3: Expectations of the Study

4. The intervention will require regular parent participation. Do you anticipate any challenges in this? Is there anything I should be aware of (family travel, etc.)?
5. The intervention will consist of up to 24 sessions spread across 4-8 weeks, occurring 3 times per week for 15 to 25-minute durations. Is that okay with you?
6. I will need to record our training sessions via video recorder as well as have the play sessions recorded. Is that okay with you?

Part 4: Gather Written Consent and Explain Assent

1. Next, I want to get your consent to participate if you find the intervention a fit with your family's goals and values. Do you have any questions about the study?
2. I am going to send you an email with the consent form for you and assent forms for your children. If you could please send these back to me within 24 hours that would be great.

To gain assent from your children, I have included details of the study and what they will be asked to do. Can you please read this to your child and ask if they agree to participate? They are allowed to withdraw from the study at any time. If they agree, can you please document how they assented - verbally or nonverbally? I will include this in the sheets as well. Do you have any questions?

Step 2: Parent Training

2 sessions with only the parent (Session 1: In person, Session 2: Zoom)

Both sessions will be recorded and coded for treatment fidelity immediately after training.

Session 1: Stay & Play

Lauren: Thank you so much for agreeing to participate. Again, I am Lauren, a 5th-year School Psychology PhD student at the University of Washington. I enjoyed getting to know more about you and your children during our initial conversation.

First, I will gather your consent and ask for assent from your children.

Gather consent and assent

Today we will start the training sessions. The purpose of the training session is for you to feel competent in your abilities to lead the Stay, Play, Talk intervention to your neurotypical child. The agenda for today will be for you to learn Stay and Play. I will also ask if you have any questions throughout the session, but feel free to jump in at any time. Does that sound good?

**Share a copy of the training script, so that the parent can follow along.*

Lauren: I am going to teach you the intervention in the same way that you will teach your child the intervention. By doing so, I will model what this should look like. Pretend that you are your neurotypical child, and I will role play as you, the interventionist. We will start with the lesson for Stay.

—

Stay Training

Lauren: Today I am going to talk about being a good play partner with your brother/sister. The first step to being a good play partner is to stay with your brother/sister. To do this, you have to see where your brother/sister is and stay with your brother/sister. So, the first thing is to see where your sibling is and stay with your sibling.

Show visual of Stay

Lauren: What is the first thing you do when you are a play partner? (Wait for response or prompt)

Lauren: **Respond and validate that child is paying attention and listening attentively.**

Example: “Yes, stay is right! I love that you are listening and wanting to learn more about how to play together.” “I appreciate that you are listening to me.” “I am so proud of you for learning this.”

Lauren: When you stay with your brother/sister, that means you go to where your sibling is

playing and move with them.

Scenario 1: Suppose you see your brother/sister playing with blocks, and you are in the kitchen. What should you do? (Wait for response - go and play with him/her)

Be sure to offer validation

Lauren: That's right, wherever your brother/sister goes, that's where you should go. Stay with them when they move around to different toys.

Scenario 2: Okay, let's imagine another situation. Suppose your brother/sister is playing with some toy cars on the floor in the living room, and you're sitting on the couch. What should you do? (Wait for response - go and play with him/her)

Lauren: Awesome work! I love how you are always thinking about staying with your sibling. Do you have any questions?

Feel free to do more example scenarios, if needed. These additional examples can also be based on what you see in your home.

—

Lauren: Okay, so that was the sequence for the Stay training session. The training typically follows the same sequence: clear definition of the skill, visual of the skill, 2 scenarios, questions. Do you have any questions?

—

Play Training

Lauren: I am excited to teach you our next skill today. Do you remember what our first skill was? *Wait for response*. That's right, stay! Stay means you join your sibling where they are playing and move with them. The next step to being a good play partner is to **play** with your brother/sister. Playing with your sibling means that you share your toys and take turns with each other.

Show visual of Play

Lauren: What do you do after you stay with your sibling? (Wait for response or prompt of play) That's right play!

Offer validation "Thank you for listening!" "I really appreciate how you are engaged."

Scenario 1: Imagine your brother or sister is playing with a puzzle, and you want to play with it too. What could you do to play together? (Wait for response — take turns with puzzle pieces, help put pieces in, show them how to complete the puzzle)

Lauren: Exactly! You could ask to take turns adding pieces to the puzzle, or you could work together by finding pieces that fit. When you share and take turns, it helps make playtime more enjoyable for both of you.

Here you can also add something that is specific to your children.

For example, “I know that you want to play with your brother more and it can feel frustrating when he doesn’t want to play with you. By being a leader and playing with your brother by sharing and taking turns, play time is likely going to be more enjoyable.”

Scenario 2: Now, suppose you’re playing with a toy truck, and your brother or sister wants to join in. What could you do to make sure you’re playing together? (Wait for response — sharing the truck, letting them play with another toy truck, or creating a pretend game with the trucks.)

Lauren: Great idea! You could let them have a turn with the truck, or you could both drive trucks and pretend you’re working together to build something. Playing together means finding ways to make sure you’re both involved and having fun!

—

Lauren: Do you have any questions regarding Stay or Play? Nice work today! I appreciate your willingness to participate. I am looking forward to our next session.

Session 2: Talk & Review

Lauren: It is good to see you! Thank you for joining for your final training session. As a reminder, the purpose of the training sessions are for you to feel competent in your abilities to lead the Stay, Play, Talk intervention to your neurotypical child. The agenda for today will be to learn Talk and then we will review all 3 skills. There will also be time for you to ask questions. As always, feel free to jump in any time! Does that sound good?

**Share a copy of the training script, so that the parent can follow along.*

—

Talk Training

Lauren: Last time, we talked about being a good play partner. We talked about two steps. Do you remember what the two steps are?

You’re right; stay with your brother/sister and play with your brother/sister.

Offer validation

Lauren: Now, there's one more step to being a good play partner and that is to talk with your brother/sister. Talking is really important because it helps your brother or sister understand what you're doing and feel included. Sometimes, your brother or sister may not talk a lot, so when you talk, you're helping to guide them and keep the play going.

Lauren: Talking can be simple! You can say things like, "Look at this!" or, "Your turn!" You can also ask questions like, "What should we do next?" or "Can I try that?" Talking helps you both feel connected and makes playtime more fun.

Lauren: Let's practice!

Scenario 1: Imagine you're building a tower with blocks, and your brother or sister is sitting beside you. What could you say to help him/her join in? (Wait for response—examples might include "Want to help me?" or "Let's build it taller!")

Lauren: That's great! You could say something like, "Let's build together!" or "Do you want to add a block?" This way, you're inviting your brother or sister to be part of the play by using your words. Let's try another one.

Scenario 2: Suppose you're playing with cars, and your brother or sister looks like they're interested but aren't saying anything. What could you say to get them involved? (Wait for response—suggestions might include "Want to race?" or "Here, try this car!")

Lauren: Nice! Saying something like, "Want to race?" or "I'll drive this car, and you drive that one," shows your brother or sister that you want to play together and makes it easier for them to join in.

Lauren: So, to review, what's the third step to being a good play partner? (Wait for response or prompt: Talk)

Lauren: That's right! *Talk* to your brother or sister to make them feel included. Remember, when you *stay*, *play*, and *talk*, you're being a great play partner.

Lauren: Do you have any questions about how to talk with your brother or sister during playtime?

—

Lauren: Do you have any questions about the Talk training? *Wait for response.* Now to check for your understanding, can you explain to me Stay, Play, and Talk?

Lastly, I am going to go over what the review sessions look like after you finish the Stay, Play, Talk training.

**All Intervention Sessions Following First Three:
Review + Play Sessions**

Lauren: Now you have learned the 3 steps of being a good play partner. Can you tell me what the 3 steps are?

Lauren: That's right. First you stay with your sibling, next you play with your sibling, and lastly you talk with your sibling.

*Praise their efforts – “I love how hard you are working.” “I appreciate you wanting to learn each of these skills.” “I have really enjoyed watching you learn these skills.”

Show Visuals

Lauren: What does it mean to stay with your sibling?
Wherever your brother/sister goes, that's where you should go.

Lauren: What does it mean to play with your sibling?
Share, use the same toys; take turns; bring a toy over; ask brother or sister to play with you

Lauren: What does it mean to talk to your sibling?
Can I play with you, what are you doing

Help expand on any skills necessary

Lauren: Nice work! Together the three steps are stay, play, and talk with your brother/sister. Do you have any questions?

Lauren: Now you are going to stay, play, and talk with your brother/sister and I'm going to watch. Remember to stay, play, and talk with them.

Step 3: Baseline

This is the same script that you can use for all baseline sessions. The main idea is that your children are supposed to play “as usual.” Be sure that you don’t use any prompting. However, if they leave the play area for more than 1 minute, **please prompt them to come back**. If they do not come back for 2 minutes, discontinue the play session and please let Lauren know. If there are more than two sessions where they do not come back after 1 minute, I will work with you to determine additional strategies to ensure they stay in the play area. Please be sure that the play materials follow the list of appropriate play materials:

- Pretend play toys (e.g., play food set, tea set, dollhouse, action figures, doctor kits, role-playing sets, toy cars)
- Sensory toys (e.g., sensory balls, squishy toys, sand or water play sets)
- Visual and auditory stimulus toys (e.g., musical instruments)
- Games and interactive toys (e.g., turn-taking games, card games)
- Shared movement toys (e.g., parachutes, small trampoline)
- Arts and craft supplies (e.g., color books, stickers, playdough)
- Cause-and-effect toys (e.g., pop-up toys, toys that light up when manipulated)
- Interactive books (e.g., life-the-flap books)
- Building toys (e.g., blocks, LEGO sets, stacking cups)

RECORD

Parent: Let’s pick out some of your favorite toys to play with. I am going to be watching both of you play, so please stay within this area to play for the next 15-minutes. I will let you know when the timer is up.

Reminders:

- *If siblings leave the play area for more than 1 minute, pause the recording, bring the children back, and resume the play session.*
- *You can provide reinforcement around them staying in the play area. “Great job staying in the play area.” “Thank you both for following the directions.” “I love the toys you are playing with.”*
- *After the session, validate that they did a great job listening and following the directions!*

Step 4: Intervention

~3-10 play sessions recorded and sent to researcher immediately

Stay Training Session***RECORD***

Parent: Today I am going to talk about being a good play partner with your brother/sister. The first step to being a good play partner is to stay with your brother/sister. To do this, you have to see where your brother/sister is and stay with your brother/sister. So, the first thing is to see where your sibling is and stay with your sibling.

Show visual of Stay

Parent: What is the first thing you do when you are a play partner? (Wait for response or prompt)

Parent: *Respond and validate that child is paying attention and listening attentively.*

Example: “Yes, stay is right! I love that you are listening and wanting to learn more about how to play together.” “I appreciate that you are listening to me.” “I am so proud of you for learning this.”

Parent: When you stay with your brother/sister, that means you go to where your sibling is playing and move with them.

Scenario 1: Suppose you see your brother/sister playing with blocks, and you are in the kitchen. What should you do? (Wait for response - go and play with him/her)

Be sure to offer validation

Parent: That’s right, wherever your brother/sister goes, that’s where you should go. Stay with your brother/sister when he/she moves around to different toys.

Scenario 2: Okay, let’s imagine another situation. Suppose your brother/sister is playing with some toy cars on the floor in the living room, and you’re sitting on the couch. What should you do? (Wait for response - go and play with him/her)

Parent: Awesome work! I love how you are always thinking about staying with your sibling. Do you have any questions?

Feel free to do more example scenarios, if needed.

Parent: Now you are going to play with your brother/sister and I’m going to watch. Remember

to stay with them. I am proud of you for trying this out and seeing if this helps play with your brother/sister. I also really appreciate how you are listening throughout this! I know it can be hard to focus after a long day of school.

*Now you will transition to a 15-minute play session with both siblings. **Continue the recording.***

Parent: I am going to be watching both of you play, so please stay within this area to play for the next 15-minutes. I will let you know when the timer is up.

Reminders:

**15-minute play session*

**If the neurotypical sibling does not make an initiation to the neurodiverse sibling within the first minute, please prompt. Continue prompting after every 2 minutes that the NT sibling doesn't use Stay, Play, or Talk.*

"Remember to stay with your sibling"

You can give examples of what stay may look like in vivo.

**Please have the Stay visual present in the play area*

**If siblings leave the play area for more than 1 minute, pause the recording, bring the children back, and resume the play session.*

Play Training Session

RECORD

Parent: I am excited to teach you our next skill today. Do you remember what our first skill was? *Wait for response.* That's right, stay! Stay means you join your sibling where they are playing and move with them. The next step to being a good play partner is to **play** with your brother/sister. Playing with your sibling means that you share your toys and take turns with each other.

Show visual of Play

Parent: What do you do after you stay with your sibling? (Wait for response or prompt of play) That's right play!

**Offer validation* "Thank you for listening!" "I really appreciate how you are engaged."*

Scenario 1: Imagine your brother or sister is playing with a puzzle, and you want to play with it too. What could you do to play together? (Wait for response — take turns with puzzle pieces, help put pieces in, show them how to complete the puzzle)

Parent: Exactly! You could ask to take turns adding pieces to the puzzle, or you could work together by finding pieces that fit. When you share and take turns, it helps make playtime more enjoyable for both of you.

Here you can also add something that is specific to your children.

For example, "I know that you want to play with your brother more and it can feel frustrating when he doesn't want to play with you. By being a leader and playing with your brother by sharing and taking turns, play time is likely going to be more enjoyable."

Scenario 2: Now, suppose you're playing with a toy truck, and your brother or sister wants to join in. What could you do to make sure you're playing together? (Wait for response — sharing the truck, letting them play with another toy truck, or creating a pretend game with the trucks.)

Parent: Great idea! You could let them have a turn with the truck, or you could both drive trucks and pretend you're working together to build something. Playing together means finding ways to make sure you're both involved and having fun!

Parent: Now you are going to stay **and** play with your brother/sister and I'm going to watch. Remember to stay and play with them.

*Now you will transition to a 15-minute play session with both siblings. **Continue the recording.***

Reminders:

**15-minute play session*

**If the neurotypical sibling does not make an initiation to the neurodiverse sibling within the first minute, please prompt. Continue prompting after every 2 minutes that the NT sibling doesn't use Stay, Play, or Talk.*

“Remember to stay and play with your sibling”

**Feel free to give an example of what they may do to use Stay or Play*

**Please have the Stay and Play visual present in the play area*

**If siblings leave the play area for more than 1 minute, pause the recording, bring the children back, and resume the play session.*

Talk Training Session

RECORD

Parent: Last time, we talked about being a good play partner. Specifically, we talked about two steps. Do you remember what the two steps are?

You're right; stay with your brother/sister and play with your brother/sister.

Offer validation

"I really appreciate how you are focusing on these questions." "I am hopeful that these will be skills that will help you play with your sibling."

Parent: Now, there's one more step to being a good play partner and that is to talk with your brother/sister. Talking is really important because it helps your brother or sister understand what you're doing and feel included. Sometimes, your brother or sister may not talk a lot, so when you talk, you're helping to guide them and keep the play going.

Parent: Talking can be simple! You can say things like, "Look at this!" or, "Your turn!" You can also ask questions like, "What should we do next?" or "Can I try that?" Talking helps you both feel connected and makes playtime more fun.

Parent: Let's practice!

Scenario 1: Imagine you're building a tower with blocks, and your brother or sister is sitting beside you. What could you say to help him/her join in? (Wait for response—examples might include "Want to help me?" or "Let's build it taller!")

Parent: That's great! You could say something like, "Let's build together!" or "Do you want to add a block?" This way, you're inviting your brother or sister to be part of the play by using your words. Let's try another one.

Scenario 2: Suppose you're playing with cars, and your brother or sister looks like they're interested but aren't saying anything. What could you say to get them involved? (Wait for response—suggestions might include "Want to race?" or "Here, try this car!")

Parent: Nice! Saying something like, "Want to race?" or "I'll drive this car, and you drive that one," shows your brother or sister that you want to play together and makes it easier for them to join in.

Parent: So, to review, what's the third step to being a good play partner? (Wait for response or prompt: Talk)

Parent: That's right! *Talk* to your brother or sister to make them feel included. Remember, when you *stay*, *play*, and *talk*, you're being a great play partner. Do you have any questions about how to talk with your brother or sister during playtime?

Parent: Now you are going to stay **and** play **and** talk with your brother/sister and I'm going to watch.

*Now you will transition to a 15-minute play session with both siblings. **Continue the recording.***

Parent: I am going to be watching both of you play, so please stay within this area to play for the next 15-minutes. I will let you know when the timer is up.

Reminders:

**15-minute play session*

**If the neurotypical sibling does not make an initiation to the neurodiverse sibling within the first minute, please prompt. Continue prompting after every 2 minutes that the NT sibling doesn't use Stay, Play, or Talk.*

"Remember to stay, play, and talk with your sibling"

**You can also give an example of what the NT sibling might do to stay, play, or talk.*

**Please have the Stay, Play, and Talk visual present in the play area*

**If siblings leave the play area for more than 1 minute, pause the recording, bring the children back, and resume the play session.*

**All Intervention Sessions Following First Three:
Review + Play Sessions**

Parent: Now you have learned the 3 steps of being a good play partner. Can you tell me what the 3 steps are?

Parent: That's right. First you stay with your sibling, next you play with your sibling, and lastly you talk with your sibling.

*Praise their efforts – “I love how hard you are working.” “I appreciate you wanting to learn each of these skills.” “I have really enjoyed watching you learn these skills.”

Show Visuals

Parent: What does it mean to stay with your sibling?
Wherever your brother/sister goes, that's where you should go.

Parent: What does it mean to play with your sibling?
Share, use the same toys; take turns; bring a toy over; ask brother or sister to play with you

Parent: What does it mean to talk to your sibling?
Can I play with you, what are you doing

Help expand on any skills necessary

Parent: Nice work! Together the three steps are stay, play, and talk with your brother/sister. Do you have any questions?

Parent: Now you are going to stay, play, and talk with your brother/sister and I'm going to watch. Remember to stay, play, and talk with them.

**15-minute play session*

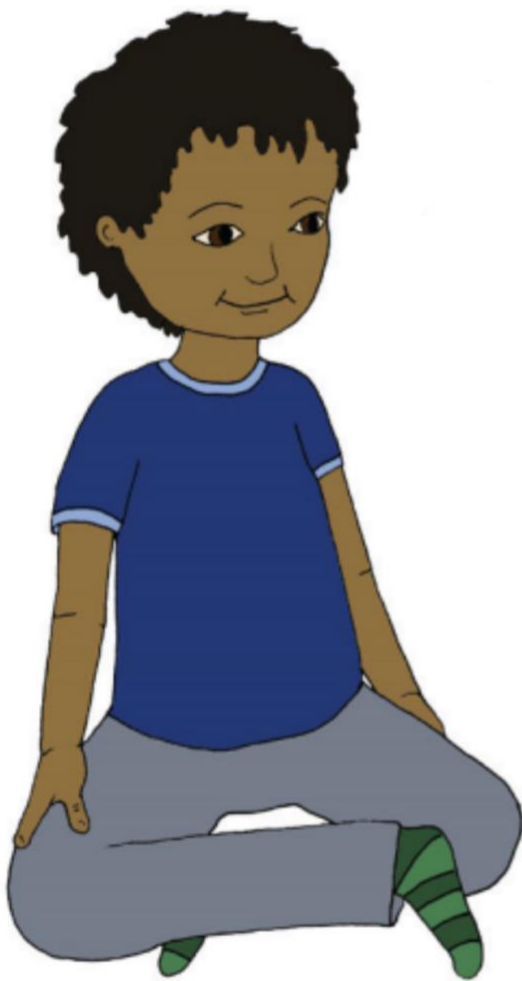
**If the neurotypical sibling does not make an initiation to the neurodiverse sibling within the first minute, please prompt. Continue prompting after every 2 minutes that the NT sibling doesn't use Stay, Play, or Talk.*

**Please have the Stay and Play and Talk visual present in the play area*

**If siblings leave the play area for more than 1 minute, pause the recording, bring the children back, and resume the play session.*

Last Intervention Session: Lauren will ask you and your neurotypical child to complete the social validity questionnaire.

STAY



PLAY



TALK



Appendix D**Implementation Fidelity – Parent Training**Date: _____ Data Collector (*not the researcher*): _____

Start Time: _____ End Time: _____

Session 1

<u>Introduction</u>	
Researcher introduces self	Yes No
Training purpose identified	Yes No
Agenda presented	Yes No
Parent receives copy of training script to follow along	Yes No
<u>Stay</u>	Yes No
Researcher provides clear definition of stay	
Researcher shows the stay visual	Yes No
Researcher describes 2 scenarios of how the neurotypical sibling can stay with their sibling	Yes No
Researcher asks if parent has any questions	Yes No
<u>Play</u>	
Researcher provides clear definition of play	Yes No
Researcher shows the play visual	Yes No
Researcher describes 2 scenarios of how the neurotypical sibling can play with their sibling	Yes No
Researcher asks if parent has any questions	Yes No

Implementation Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	

Total a/ (12) * 100:	
----------------------	--

Session 2

Date: _____ Data Collector: _____

Start Time: _____ End Time: _____

<u>Introduction</u> Researcher asks parents if they have any questions since the last time they met	Yes	No
Training purpose re-identified	Yes	No
Agenda presented	Yes	No
Parent receives copy of training script to follow along	Yes	No
<u>Talk</u> Researcher provides clear definition of talk	Yes	No
Researcher shows the talk visual	Yes	No
Researcher describes 2 scenarios of how the neurotypical sibling can talk with their sibling	Yes	No
Researcher asks if parent has any questions	Yes	No
<u>Review</u> Researcher asks parents to explain stay	Yes	No
Researcher asks parents to explain play	Yes	No
Researcher asks parents to explain talk	Yes	No
Researcher asks if parent has any questions	Yes	No

Implementation Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total a/ (12) * 100:	

Appendix E

Procedural Fidelity – Baseline & Intervention

Baseline

Date: _____ Data Collector: Researcher

Start Time: _____ End Time: _____

<i>Neurotypical sibling did not receive any instruction or prompts from the parent.</i>	Yes No
<i>If the siblings left the play area for more than 1 minute, the parent paused the session recording, brought the children back, and resumed the play session.</i>	Yes No NA

Procedural Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total a/ (a+b) * 100:	

Intervention - Session 1: Stay

Date: _____ Data Collector: Researcher

Start Time: _____ End Time: _____

<u>Training</u> <i>Parent provided a clear definition of stay</i>	Yes No
<i>Parent gave clear examples of stay</i>	Yes No
<i>Parent showed the stay visual</i>	Yes No
<i>Parent reviews scenarios</i>	Yes No
<u>Play Session</u> <i>Prompting occurred by the parent if the</i>	

<i>neurotypical sibling did not make an initiation to the neurodiverse sibling within the first minute.</i>	Yes	No	NA
<i>Prompting continued after every two minutes that the neurotypical sibling did not use a skill taught (stay, play, or talk).</i>	Yes	No	NA
<i>If the siblings left the play area for more than 1 minute, the parent the children back.</i>	Yes	No	NA
<i>Stay visual present</i>	Yes	No	

Procedural Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total a/ (a+b) * 100:	

Intervention - Session 2: Play

Date: _____ Data Collector: Researcher

Start Time: _____ End Time: _____

<u>Training</u> <i>Parent reviewed stay</i>	Yes	No	
<i>Parent provided a clear definition of play</i>	Yes	No	
<i>Parent gave clear examples of play</i>	Yes	No	
<i>Parent showed the play visual</i>	Yes	No	
<i>Parent reviews scenarios</i>	Yes	No	
<u>Play Session</u> <i>Prompting occurred by the parent if the neurotypical sibling did not make an initiation to the neurodiverse sibling within the first minute.</i>	Yes	No	NA

<i>Prompting continued after every two minutes that the neurotypical sibling did not use a skill taught (stay, play, or talk).</i>	Yes	No	NA
<i>If the siblings left the play area for more than 1 minute, the parent the children back.</i>	Yes	No	NA
<i>Stay and play visual present</i>	Yes	No	

Procedural Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total a/ (a+b) * 100:	

Intervention - Session 3: Talk

Date: _____ Data Collector: Researcher

Start Time: _____ End Time: _____

<u>Training</u> <i>Parent reviewed stay and play</i>	Yes	No	
<i>Parent provided a clear definition of talk</i>	Yes	No	
<i>Parent gave clear examples of talk</i>	Yes	No	
<i>Parent showed the talk visual</i>	Yes	No	
<i>Parent reviews scenarios</i>	Yes	No	
<u>Play Session</u> <i>Prompting occurred by the parent if the neurotypical sibling did not make an initiation to the neurodiverse sibling within the first minute.</i>	Yes	No	NA
<i>Prompting continued after every two minutes that the neurotypical sibling did not use a skill taught (stay, play, or talk).</i>	Yes	No	NA

<i>If the siblings left the play area for more than 1 minute, the parent the children back.</i>	Yes	No	NA
<i>Stay, play, and talk visuals present</i>	Yes	No	

Procedural Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total a/ (a+b) * 100:	

Intervention - Sessions 4+

Date: _____ Data Collector: Researcher

Start Time: _____ End Time: _____

<u>Review</u> <i>Parent reviewed stay</i>	Yes	No	
<i>Parent reviewed play</i>	Yes	No	
<i>Parent reviewed talk</i>	Yes	No	
<i>Parent asked if the child had any questions</i>	Yes	No	
<u>Play Session</u> <i>Prompting occurred by the parent if the neurotypical sibling did not make an initiation to the neurodiverse sibling within the first minute.</i>	Yes	No	NA
<i>Prompting continued after every two minutes that the neurotypical sibling did not use a skill taught (stay, play, or talk).</i>	Yes	No	NA
<i>If the siblings left the play area for more than 1 minute, the parent the children back.</i>	Yes	No	NA
<i>Stay, play, and talk visuals present</i>	Yes	No	

Procedural Fidelity Score	
(a) Total correct steps:	
(b) Total incorrect steps:	
Total $a / (a+b) * 100$:	

Appendix F

Parents and neurotypical siblings will be asked to complete a questionnaire regarding their satisfaction with the intervention utilizing a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to assess social validity.

Parent Version

1. The <i>Stay, Play, Talk</i> intervention was beneficial to my neurodiverse child's social development.	1	2	3	4	5
2. The activities and strategies used in <i>Stay, Play, Talk</i> align with our family's cultural values.	1	2	3	4	5
3. The intervention goals matched the developmental goals I have for my neurodiverse child.	1	2	3	4	5
4. The strategies taught in <i>Stay, Play, Talk</i> were easy to implement in our daily routines.	1	2	3	4	5
5. I am likely to continue using <i>Stay, Play, Talk</i> strategies with my children in the future.	1	2	3	4	5
6. I effectively learned how to implement the intervention after the training sessions.	1	2	3	4	5
7. My neurotypical child effectively learned the intervention after the training sessions.	1	2	3	4	5
8. My neurotypical child enjoyed the intervention.	1	2	3	4	5
9. My neurodiverse child enjoyed the intervention.	1	2	3	4	5

Neurotypical Sibling Version

1. I liked having my parent teach me Stay, Play, Talk.	1	2	3	4	5
2. I enjoyed the play sessions with my sibling.	1	2	3	4	5
3. I feel like my sibling enjoyed the intervention.	1	2	3	4	5
4. I will continue to use my <i>Stay, Play, Talk</i> skills with my sibling.	1	2	3	4	5