Exploring best practices, barriers, and supports in family-mediated social communication interventions for children with autism

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Declaration

I declare that this thesis has not been submitted as an exercise at this or any other university.

I declare that this thesis is entirely my own work.

Signed: ___________________

Cressida Pacia

Statement of Contribution

This thesis includes three published studies. The candidate was responsible for the design, data collection, analysis, and write-up of each study conducted and included in this thesis. The supervisors provided advice and support in designing and conducting each research study. The Graduate Research Committee advised and monitored progress over the course of the thesis. The specific contributions of each co-author on each published paper are described below.

Study 1: A Systematic Review of Family-Mediated Social Communication Interventions for Young Children with Autism- Cressida Pacia, Jennifer Holloway, Ciara Gunning, & Helena Lee

CP had overall responsibility for the study, including the design and development of the systematic review methodology and coding systems employed. JH and CG supported CP in designing the study. CP was responsible for completing the searches and study selection, data extraction, data analysis and the write-up of this study. CP and CG contributed to the screening and identification of articles for inclusion. CP, CG, and HL contributed to the data extraction and coding process for included articles. CP, CG, and JH reviewed and edited the manuscript for publication.

Study 2: Developing the Parent-Coaching Assessment, Individualization, and Response to Stressors (PAIRS) Tool for Behavior Analysts- Cressida Pacia, Ciara Gunning, Aoife McTiernan, & Jennifer Holloway

CP had overall responsibility for the design of this study, data collection, and analysis. CG, AM, and JH supported CP on the development of the design of the study. CP prepared and revised the manuscript for publication. CG, AM, and JH reviewed the manuscript for publication.

Study 3: Preliminary Evaluation of the Parent-Coaching Assessment, Individualization, and Response to Stressors (PAIRS) Tool- Cressida Pacia, Ciara Gunning, Jennifer Holloway, & Aoife McTiernan

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List of Works

Below is a list of publications and presentations arising from the thesis.

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Other Publications

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Conference Presentations

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Abstract

Background

Best practice guidelines to improve outcomes for children with autism include involving parents in intervention. Parent-implemented interventions (PIIs) have a growing evidence base for teaching social communication skills. PIIs are associated with a range of benefits for parents and children. However, research conducted in a laboratory or university setting does not always translate to meaningful outcomes in the community. Questions remain about factors that impact intervention effectiveness, and families can experience barriers that impede their ability to participate in and benefit from these evidence-based interventions.

Aim

The aim of this research was to improve family-mediated interventions for autism through identifying characteristics of effective interventions and developing a way to help address barriers and facilitators to family engagement in these interventions.

Methods

Study 1 was a systematic literature review of family-mediated interventions for young children with autism. Data was extracted with regards to participant and intervention agent characteristics, intervention characteristics, target skills, and collateral outcomes. Treatment effectiveness and research strength were evaluated and synthesized by intervention agent, intervention characteristics, target skills, focused intervention practices (FIPs), and intervention packages. Generalization promotion strategies and outcomes were coded. Study 2 involved a three-stage process to develop the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS), a tool to help practitioners assess and address variables impacting parent engagement in parent-implemented interventions (PIIs).

Stage 1 involved identification of common barriers and facilitators to engagement and the proposal of potential solutions; Stage 2 involved evaluation of the content validity of barrier-solution pairings by an expert panel of Board Certified Behaviour Analysts (BCBAs); and Stage 3 involved evaluation of the structure of the PAIRS and its benefits for decision-making and day-to-day work with families. Finally, Study 3 utilized a community-based additive treatment design to explore the use of the PAIRS in conjunction with an evidence-based PII, Project ImPACT. Two community agencies participated in the study, with one delivering Project ImPACT as part of treatment-as-usual (TAU group) and the other delivering Project ImPACT + PAIRS. Attendance and fidelity of Project ImPACT strategy implementation were compared between groups, and interviews were conducted with parents and providers in the PAIRS group to evaluate social validity.

Findings

The systematic review (Study 1) found that NDBIs had a growing evidence base as a family-mediated intervention, partial generalization was observed in PIIs and some generalization strategies are under-utilized, and intervention factors such as setting, modality, and dosage had inconclusive effects on intervention outcomes. In Study 2, the expert panel rated the barrier-solution pairings in the PAIRS as relevant, effective, and appropriate, and rated the tool itself as beneficial for decision-making and day-to-day work with families. Finally, in Study 3, attendance in the Project ImPACT program was significantly higher in the PAIRS group compared to the TAU group, while there was no significant difference in fidelity between groups. A qualitative review of the interviews with parents and practitioners provided support for the social validity of Project ImPACT and the PAIRS, and provided insight into the use of the tool for planning, problem-solving, and reflection.

Conclusion

Overall, the studies in this thesis demonstrate that intervention factors can be adapted to maximize parent engagement. The variable impact of various intervention factors can allow for individualization of these and other relevant factors, while maintaining fidelity to evidence-based intervention packages or FIPs. The present research demonstrates the utility of a systematic, empirical approach to reviewing the literature, developing a practical tool, and conducting community-based research to explore the real-world use of the tool. The PAIRS is thoroughly grounded in the behaviour analytic framework and informed by the existing literature on PIIs and barriers and facilitators to engagement. The findings highlight the importance of using a functional, contextual approach for both child and parent behaviour.

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List of Abbreviations

ABA	Applied Behaviour Analysis
ACT	Acceptance and Commitment Training
AO	Abolishing operation
APA	American Psychiatric Association
ASD	Autism spectrum disorder
BCBA	Board Certified Behaviour Analyst
BST	Behaviour Skills Training
BTPS	Barriers-to-Treatment Participation Scale
CDC	Centers for Disease Control and Prevention
CNC	Contact natural consequences
CVI	Content validity index
CVST	Content Validity Survey Tool
DANCE	Decide Arrange Now Count Enjoy
DTT	Discrete Trial Training
EBP	Evidence-based practice
EIBI	Early Intensive Behavioural Intervention
EMT	Enhanced Milieu Training
EO	Establishing operation
ESDM	Early Start Denver Model
FB	Functional behaviours
FBA	Functional Behaviour Assessment
FCT	Functional Communication Training
FIP	Focused intervention practices
FRAME	Framework for Reporting Adaptations and Modifications-Enhanced

I-CVI	Item-Content Validity Index
IFL	Identity-first language
IOA	Inter-observer agreement
IP	Imitation and play
IRR	Inter-rater reliability
JASPER	Joint Attention, Symbolic Play, Engagement & Regulation
LC	Language and communication
LD	Less discriminable
MA	Multiple agent
MD	Modeling
MMC	Modify maladaptive consequences
MO	Motivating operations
NAP	Natural Language Paradigm
NAP	Nonoverlap of all pairs
NDBI	Naturalistic Developmental Behavioural Intervention
NI	Naturalistic Intervention
OBM	Organizational Behaviour Management
P-ESDM	Parent-delivered Early Start Denver Model
PACT	Parent and Caregiver Active Participation Toolkit
PAND	Percentage of all overlapping data
PAIRS	Parent-coaching Assessment, Individualization, and Response to Stressors
PCIT	Parent-Child Interaction Therapy
PCS	Program common stimuli
PDC	Performance Diagnostic Checklist
PDC-P	Performance Diagnostic Checklist-Parent

PECS	Picture Exchange Communication System
PFL	Person-first language
PII	Parent-implemented intervention
PMII	Peer-mediated instruction or intervention
PND	Percentage of non-overlapping data
PP	Prompting
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRT	Pivotal Response Training/Treatment
R+	Reinforcement
RIT	Reciprocal Imitation Training
RG	Reinforce occurrences of generalization
RGB	Rule-governed behaviour
RNC	Recruit natural consequences
RRBI	Repetitive restrictive behaviours and interests
S-CVI/Ave	Scale-Content Validity Index (Average)
SC	Scripting
SCC	Social Communication Checklist
SD	Discriminative stimuli
S-Delta	Stimulus-delta
SE	Social engagement
SM	Sequential modification
SMS	Incorporate self-mediated stimuli
SR	Sufficient responses
SS	Sufficient stimuli
SSRD	Single-subject research design

TA	Thematic analysis
TAII	Technology-aided instruction and intervention
TAU	Treatment-as-usual
TD	Time delay
TH	Telehealth
UCLA	University of California Los Angeles
VM	Video modelling
VMIT	Video Modeling Imitation Training

1. Introduction

Autism

Autism spectrum disorder (ASD; hereafter referred to as autism) is a neurodevelopmental disorder characterized by differences in social communication and repetitive, restrictive behaviours and interests (RRBIs) (American Psychiatric Association, 2013). According to the Centre for Disease Control and Prevention (CDC) in the USA, one in 36 children are estimated to have autism (Maenner et al., 2023). Worldwide, approximately 1% of children are diagnosed with autism across 37 countries (Zeidan et al., 2022).

In recent years, there has been disagreement in recommended terminology and discourse when discussing autism research (e.g., Botha et al., 2023; Bottema-Beutel et al., 2021; Taboas et al., 2023; Vivanti, 2020). The present thesis will use both identity-first language (IFL), i.e., "autistic individual", and person-first language (PFL), i.e., "individual with autism", as a consensus has not been reached. The published works within this thesis used PFL in accordance with the standards of the individual journals at the time of submission. The introduction, discussion, and other unpublished sections will use IFL. This chapter will discuss strengths and challenges associated with autism, the theoretical framework of the thesis, the interventions developed for autism, and the rationale for the series of studies conducted for this thesis. The primary focus of this thesis is on family-mediated social communication interventions for young autistic children.

Strengths and Challenges Associated with Autism

Discourse on autism often focuses on deficits, burdens, and negative outcomes (e.g., Baxter et al., 2015; Henninger & Taylor, 2013). While it is essential to recognize the significant challenges associated with autism to identify how to teach meaningful skills, alleviate difficulties, and empower autistic individuals to live joyful, fulfilling lives, it is also important to highlight the accompanying strengths (Cosden et al., 2006).

For example, a content analysis of parents' perceptions of their autistic child's strengths found the most common strengths fell into the category of cognitive and learning strengths (e.g., memory, focus and attention to detail), followed by personality strengths (e.g., honesty, trustworthiness, and loyalty), and social and relationship strengths (e.g., being loving, caring, and compassionate) (Clark & Adams, 2020b). It is notable that social and relationship strengths were highlighted, given that social communication difficulties are a central feature of the autism diagnosis. Further, a study of parents' and providers' perceptions of strengths revealed artistic and creative ability, exceptional faculty of memory, mathematical aptitude, musical ability, and heightened visio-spatial perception (Halder et al., 2022). It is also important to explore what autistic individuals themselves see as their strengths. When autistic children were asked what they liked most about themselves, they shared that they liked that they were a good friend or person to be around and were good at particular things, and that they were best at physical activity and math/science (Clark & Adams, 2020c), while in the context of employment-related strengths, autistic adults discussed cognitive advantages such as superior creativity, focus, and memory, increased efficiency and personal qualities such as honesty and dedication, and the ability to offer a unique autism-specific perspective (Cope & Remington, 2022).

One of the primary diagnostic criteria for autism is the presence of RRBIs (APA, 2013). Autistic individuals have shared how RRBIs help promote their participation and attention in situations of sensory overload and high stress (Goldfarb et al., 2021). Perseverative interests can be positively reframed as passionate interests, which have been reported to bring pleasure and relaxation, or “flow”, through repetition or intense immersion (e.g., Murray et al., 2005). Additionally, passionate interests could be viewed as strengths, a means for shared enjoyment and interaction with others and a foundation for learning additional skills with attuned adults (Cosden et al., 2006). On the other hand, engagement in these interests have also been found to interfere with interpersonal interactions, impair daily functioning, increase risk for challenging behaviours, and result in poor long-term outcomes (e.g., Koegel & Covert, 1972; Oliver et al., 2012; Raulston & Machalicek, 2018). There is also a significant association between RRBIs and difficulties with social communication (e.g., Jones et al., 2018; Lampi et al., 2020; Martinez-Gonzalez et al., 2022).

Atypical social communication is another key characteristic of autism (APA, 2013). Social communication is comprised of verbal and non-verbal communication used for social purposes (Mitchell et al., 2006; Stone et al., 1997; Wetherby et al., 2007). Social communication development begins early in life, as infants learn to socially reference the facial expressions and gaze direction of their caregivers, an early form of joint attention. Joint attention refers to purposeful sharing of attention on an object with an interaction partner. Differences in joint attention behaviours are one of the first and most powerful indicators of autism in young children (Bruinsma et al., 2004; Leekam & Ramsden, 2006; Mundy & Sigman, 1989), along with, to a lesser degree, differences in play and imitation behaviours (Charman et al., 1997; Osterling & Dawson, 1994; Stone et al., 1990). Joint attention and language appear to be linked, as autistic children who engage in more joint attention have been found to demonstrate significantly better language skills than autistic children who do not (Hurwitz & Watson, 2016; Mundy et al., 1990; Toth et al., 2006), while intervention targeting joint attention demonstrated collateral improvements in social initiations, positive affect, imitation, play, and spontaneous speech (Whalen et al., 2006).

Atypical early social communication behaviours in young autistic children have a reciprocal relationship with parenting behaviours, particularly in parent-child interactions. For example, a mother may smile and chat affectionately to her infant. If the infant does not smile back, babble, or engage in other expected forms of early social interaction, the mother may engage in these behaviours less frequently over time, leading to fewer opportunities for the infant to reciprocate. Indeed, parental responsiveness and synchronization with their child during play is associated with language development, joint attention, child engagement, social interaction, and socio-emotional functioning (Edmunds et al., 2019; Ruble et al., 2008; Siller & Sigman, 2002). However, parents may connect with their children through different means. A recent qualitative study of mothers' interpretation of their nonverbal autistic children's social behaviours suggests that mothers were able to feel connected with their children through a range of child behaviors, including speech, contact or proximity, response to being together, eye contact, invitations to join activity, or unconventional behaviours (Jaswal et al., 2020).

As autistic children grow, social communication challenges can lead to social difficulties at school, starting as young as pre-school and into adolescence (e.g., Laushey & Heflin, 2000; Larcombe et al., 2019; Macintosh & Dissanayake, 2006). Autistic children and youth may experience social isolation and difficulties making and keeping friends (Carter et al., 2014; Mendelson et al., 2016; Smith, 2015). Developing strong peer relationships may be particularly difficult as individuals with autism may be misunderstood, bullied, or excluded from groups (Chown & Beavan, 2011; Kanfiszer et al., 2017; Sofronoff et al., 2011). Social communication difficulties often continue from childhood into adulthood and can have a significant impact on an individual's day-to-day functioning (Gillepsie-Lynch et al., 2012).

Difficulties with social relationships and loneliness may influence the development of co-occurring mental health concerns such as anxiety and depression (Bellini, 2004; Dall et al., 2022; Ratcliffe et al., 2015). Autistic individuals have higher rates of depression (20% vs 7%), anxiety (11% vs 5%), sleep difficulties (13% vs 5%), and epilepsy (21% with co-occurring intellectual disability vs 0.8%), when compared to non-autistic individuals (Hirota

& King, 2023). Additionally, the prevalence of self-injurious behaviour has been estimated at 28% (Soke et al., 2016), and aggressive behaviour problems have been reported in 25% of autistic children (Hill et al., 2014). Up to 60% of autistic adults do not live independently (Howlin et al., 2004), and quality of life among autistic adults varies (Howlin & Magiati, 2017). Thus, autism is associated with a range of strengths and challenges, and interventions are often required to teach skills that foster communication, connection, and independence, and to support autistic individuals to lead flourishing lives. One of the most established and recommended supports is behavioural intervention, based on the principles of Applied Behaviour Analysis (ABA) (National Autism Centre, 2009, 2015).

Theoretical Framework: Applied Behaviour Analysis

This thesis is firmly grounded in ABA, the applied arm of the radical behaviourist framework espoused by B.F. Skinner (1904-1990). ABA is concerned with applying empirical approaches, drawn from operant learning principles, to teach socially significant skills (Baer et al., 1968). Operant learning refers to the manner is which behaviours are learned through interactions with the environment, particularly antecedents (what comes before the behaviour) and consequences (what comes after the behaviour). ABA therefore involves assessing and systematically arranging environmental variables to increase or decrease behaviours. Within this framework, behaviour is thus a function of its circumstances, rather than the person. In the search for explanations for behaviour, behaviour analysts study the environmental contingencies and learning history of the individual, rather than attributing behaviour to the individual's morality, character, personality, or psyche (Friman, 2020). This leads the practitioner to investigate ways to modify the circumstances, rather than the person, to decrease behaviours that negatively impact the individual or others around them and develop skills and increase behaviours that help the individual lead a more fulfilling life.

Environmental Contingencies

A brief summary of core behavioural principles will be outlined here, and then expanded upon throughout the remainder of this thesis as they relate to social communication, behavioural interventions, and parent engagement behaviours within those interventions. Behaviour can be understood by its antecedents and consequences. There are two primary categories of antecedent variables, i.e., relevant variables that are present prior to the target behaviour: motivating operations (MO) and discriminative stimuli (SD). MOs can have an establishing (EO), i.e., increasing, or abolishing (AO), i.e., decreasing effect on (a) the effectiveness, or value, of reinforcers, and (b) the frequency of the operant response class related to those consequences (Laraway et al., 2003). SDs affect the probability that a behaviour will occur, but through a different mechanism (Edwards et al., 2019). While MOs primarily impact behaviour through alteration of the effectiveness of a reinforcer, SDs signal the availability of a reinforcer and based on availability or non-availability (i.e., S-delta), increase or decrease the probability of a behaviour occurring. For consequences, there are three main types of contingencies in ABA: reinforcement, punishment, and extinction (Skinner, 1963). Reinforcement refers to a consequence following a behaviour that increases the future probability of the behaviour, while punishment refers to a consequence that decreases the future probability of the behaviour. Both processes can be positive (i.e., a stimulus is added) or negative (i.e., a stimulus is removed). Extinction involves discontinuing reinforcement for a previously reinforced response.

Behavioural Framework of Social Communication

Consider the series of operant behaviours in a typical interaction between a toddler and their caregiver. The toddler may build a block tower, and then look to her father and gain his attention by saying "Dada, look!" and point at her block tower. Her father may then look at the tower, look back at his toddler with a smile, and say, "Wow, that's a great big tower!" The toddler smiles back and exclaims "Crash!" She knocks the tower over and looks back at her father. They share a laugh.

In the above example, the toddler initiates a social interaction with her father when she says "Dada, look!" and points at her block tower. This initiation acts as the antecedent for her father's behaviour of smiling at her and praising her tower. The consequence of his behaviour is the continuation of his toddler's happy and interactive play with him. For most parents, this is an appetitive stimulus that is likely to reinforce his behaviour and increase his social initiations and responsiveness with his toddler over time. Meanwhile, from the child's perspective, her father's presence in the room while she is playing may act as an SD for positive attention, if, when she has initiated an interaction in similar scenarios in the past, he has responded to her bids for attention. She then engages in social communication behaviours of requesting (or in behavioural terms, manding) and joint attention. Her father's response acts both as a reinforcer for her behaviour, as well as an SD for another set of social communication behaviours, which is again reinforced when they share a laugh. She is likely to engage in more social communication behaviours in the future.

Now, consider a child with atypical social communication development, such as an autistic child. She plays with her blocks but does not acknowledge her father in the room. Her father attempts to initiate a social interaction with her by smiling and saying, "Wow! That's a great big tower!" She does not acknowledge him and knocks down her tower. In this case, if this is a typical scenario for this family, her father's behaviour of initiating social interactions with her may be put on extinction. If he perceives her knocking down the tower as a negative reaction towards his comment, it may even have a punishing effect. If he does not attempt to initiate social interactions in the future, she does not have the opportunity to practice responding. This creates a negative reciprocal relationship. Behavioural interventions can be implemented to improve this relationship.

Behavioural Interventions for Autism

Behavioural interventions were one of the first developed and evaluated approaches for supporting autistic individuals. As noted above, key social communication behaviours, such as social engagement, communication, imitation, and play, are learned through interactions with the environment, especially with caregivers in early childhood. Early intervention, beginning as early as the first year of life, is associated with increased social communication skills (Fuller and Kaiser, 2019; Sandbank et al. 2020; Tiede & Walton, 2019). Early intervention can have a significant impact on long-term outcomes (Estes et al. 2011; Howlin, 1997; McEachin et al., 1993).

Early Intensive Behavioural Intervention (EIBI)

One of the most influential studies in early intervention for autism is the University of California Los Angeles (UCLA) Young Autism Project conducted by Ivar Lovaas in I987. The program was intensive as children in the study received an average of 40 hours of intervention per week. The program ran for three years and found that 47% of the experimental group achieved normal intellectual and educational functioning compared to 2% of the control group. Target skills included direction-following, imitation, play skills, and behaviour reduction in the first year, expressive language and interactive play with peers in the second year, and emotional expression, pre-academics, and observational learning in the third year. The study demonstrated that children previously deemed “unteachable” were capable of learning when complex skills in a variety of domains were broken down and taught in small, achievable steps. This teaching method, grounded firmly in operant learning principles, is known as discrete trial training (DTT). Within DTT, each small step is taught through the presentation of a stimulus (the antecedent) intended to evoke a specific response (the behaviour), followed by presentation of a reinforcing stimulus if the response was correct, or an error correction procedure if the response was incorrect (the consequence). Each antecedent-behaviour-consequence chain constitutes a single "discrete trial".

DTT is often viewed as highly structured, adult-led, and reliant on extrinsic reinforcers that are unrelated to the target skill, with the skills being decontextualized and taught using short, repetitive trials. While DTT can certainly be applied in this way, and this method of applying DTT has been studied extensively and shown in a multitude of studies to be an effective way to teach new skills (e.g., Hume et al., 2021; Leaf et al., 2016; Wong et al., 2015), discrete trials can also be embedded into contextual interactions (i.e., naturalistic intervention; NI). Even in the earliest applications of EIBI, such as the Lovaas (1987) study, parents received training in the teaching procedures, and teaching was expanded to the community.

Indeed, Stokes and Baer (1977) had delineated recommendations for proactively generalizing skills learned in ABA interventions to the natural environment a decade before the UCLA study. Generalization refers to the repeated occurrence of a target skill or behavior across contexts and individuals, the extension of improvements to other skills or behaviours, and the maintenance of the change over time (Stokes & Baer, 1977). Recommendations for programming generalization into interventions include harnessing current functional contingencies, training diversely, and incorporating functional mediators when developing skill acquisition programs for clients. Generalization is an important consideration in social communication interventions (or any behaviour change intervention) because, depending on the skills taught, the individual most likely needs to be able to engage in the behaviour across people and settings over time for that behaviour to serve a meaningful function. For instance, if a child has learned to state their needs to their parents, but not to other caregivers or outside the home, then they will continue to have difficulty getting their needs met. Autistic individuals, in particular, can have difficulties with generalizing skills learned in a specific context to their everyday life (e.g., Brown & Bebko, 2012; Neely et al., 2015).

Several naturalistic interventions (NI) have a long history, such as incidental teaching (Hart & Risley, 1968), milieu teaching (Alpert & Kaiser, 1992), and the natural language paradigm/pivotal response training (Koegel et al., 1987). Within NI, teaching occurs in the child's natural environment, such as play, snack, or other daily routines. Teaching trials are typically child-led, in that the adult prompts the target response only when the child shows interest in an item or activity. The adult then reinforces attempts at the target behaviour, and the reinforcer is related to the ongoing activity.

Naturalistic Developmental Behavioural Intervention (NDBI)

In 2015, the term Naturalistic Developmental Behavioural Interventions (NDBI) was coined to describe a group of interventions that shared similar characteristics (Schreibman et al., 2015). Some examples of intervention packages in the NDBI category include Pivotal Response Treatment (PRT; Koegel & Koegel, 2006), the Early Start Denver Model (ESDM; Vismara & Rogers, 2008), and Project ImPACT (Ingersoll & Dvortcsak, 2010). NDBIs are firmly grounded in ABA principles, in that skills are taught using behavioural technologies such as reinforcement, prompting, shaping, and chaining (Schreibman et al., 2015). Similar to NIs, teaching trials are embedded into naturally occurring or contextualized opportunities. An added component in NDBIs involves incorporating strategies from developmental-based interventions, such as selecting intervention goals informed by typical developmental sequences. Another influence from the developmental approach is that NDBIs focus on skills that allow the child to engage in reciprocal social interactions, as a key developmental assumption is that children learn through their interactions with responsive caregivers. In behavioural terms, the antecedents and consequences for the skills being taught are explicitly social and affect-laden in nature.

Ingersoll (2010) broke down developmental and naturalistic behavioural approaches and demonstrated more similarities than differences. Both approaches use natural settings, child-initiated teaching episodes, child-selected activities and materials, environmental arrangement, and natural reinforcement. Three areas of difference include skills chosen for intervention (behavioural target skills tend to be more specific than developmental target skills), the use of facilitative strategies such as heightened animation (developmental approaches use these as active intervention components while behavioural approaches tend to use these as rapport-building strategies), prompting strategies (these are explicitly outlined in behavioural approaches while not a defined component in developmental approaches), and reinforcement contingencies (behavioural approaches use shaping to reinforce attempts closer to the target behaviour, while developmental approaches reinforce all communicative attempts). These differences are complementary rather than contradictory, and NDBIs fuse both approaches (e.g., by explicitly outlining both facilitative and prompting procedures). While there are a number of manualized intervention packages in the NDBI category, NDBIs share several core components. Frost and colleagues (2020) developed the NDBI-Fi, an observational rating scheme of common elements across NDBIs. The NDBI-Fi contains the following eight items: (1) Face-to-face and on the child's level; (2) Following the child's lead; (3) Positive affect and animation; (4) Modeling appropriate language; (5) Responding to attempts to communicate; (6) Using communicative temptation; (7) Frequency of direct teaching episodes; and (8) Quality of direct teaching episodes.

In a typical NI, without overt influence from a developmental perspective, a session to increase social communication skills might begin with the practitioner bringing out a clear container with blocks inside. When the toddler attempts to take a block, the practitioner may verbally prompt "Open" and wait for a response. The toddler continues to try to open the container while the practitioner waits. The practitioner prompts again, "Open". This time, the toddler says, "Opuh". The practitioner opens the container and allows the toddler to take one block. The toddler reaches for a second block and then the practitioner keeps them out of reach. The practitioner prompts, "Block". The toddler says "ock" and the practitioner giver her another block. This interaction repeats until all the blocks are used. The toddler crashes the tower and the practitioner puts all the blocks back in the container. In this activity, the child initiates the teaching episodes by indicating interest in the blocks. The practitioner prompts verbal requests, or mands, and reinforces the child's communication attempts. This procedure, known as mand training, is an effective evidence-based procedure that has been shown to increase verbal requesting skills (e.g., Carnett et al., 2017; Coleman et al., 2020; DeSouza et al., 2017).

Now consider an NDBI, which adds facilitative strategies as active treatment components (Frost et al., 2020; Ingersoll, 2010). The core behavioural strategies - capitalizing on establishing operations, setting up discriminative stimuli, prompting, shaping, and reinforcement - remain present but are more explicitly socially driven (Schreibman et al., 2015). Additionally, more emphasis is placed on pairing the practitioner's social interactions with reinforcement and infusing the interactions with positive affect (Frost et al., 2020). In an NDBI session, the practitioner may bring out a container of blocks and prompt "Open" as above. The practitioner ensures they are sitting face-to-face throughout the interaction. When the child is building, the practitioner may engage in contingent imitation, building a similar structure beside hers. Alternatively, the practitioner may practice shared control by building the tower with her, interspersing some opportunities to request "block" while building together. The practitioner may model varied comments and different ways to play with the blocks. The practitioner may use heightened animation to describe what they are doing, and use expansion to expand the child's communication (e.g., saying "Yes! Red block!" after the child says "ock").

It is important to reiterate that purely behavioural interventions do not preclude facilitative strategies. As discussed above, a skilled behavioural practitioner, with no knowledge or experience in developmental approaches or NDBIs, may conduct their session in the manner described above as a way of building rapport and making sessions fun and interactive. The main difference is that the facilitative strategies are explicitly outlined in developmental approaches and NDBIs. Interventions targeting social communication skills also often demonstrate collateral benefits in other areas, such as increases in social engagement (Koegel et al., 2009) and decreases in problem behaviour (Koegel et al., 1992). Identifying high impact skills that lead to additional benefits in other areas allows for more efficient and effective intervention. Additionally, interventions should focus on supporting the “goodness-of-fit” between an individual and their social, emotional, and physical environment (Cosden et al., 2006; Leadbitter et al., 2021).

Parents actively create the social and physical contexts for their children (Krieger et al., 2022) and play a crucial role as their carers, teachers, and advocates (Zhou & Yi, 2014). Thus, supporting caregivers to tune into their child's strengths, challenges, and communicative attempts would be an integral step towards that goal. Additionally, contemporary early interventions should work with the child’s developmental trajectory and their natural way of learning (Fletcher-Watson, 2019). NDBIs, especially when delivered by caregivers, are aligned with this value, in that caregivers can be coached to tune into their child's verbal or non-verbal communication and support their child in building a communication repertoire that honours their communication attempts while guiding towards communicative behaviours that the wider community can understand and reciprocate.

Parent-Implemented Intervention (PII)

PIIs involve coaching parents to implement behavioural teaching strategies with their child. For example, Project ImPACT, a parent-mediated NDBI, teaches parents the strategies outlined above, organized into a parent-friendly progression called the "FACTS" pyramid. Strategies are taught in the following order: (1) Focus on your child; (2) Adjust your communication; (3) Create opportunities; (4) Teach new skills; and (5) Shape the interaction (Ingersoll & Dvortzak, 2010). Systematic reviews and meta-analyses of parent-implemented interventions (PII) have demonstrated improvements in autistic children's communication, socialization, and cognition, along with improvements in parents' interactions with their child (Nevill et al., 2018; Oono et al., 2013). However, there is a high level of variability in PII outcomes (Nevill et al., 2018) and it is unclear which intervention factors (e.g., setting, modality, dosage), practices, and packages are most effective. Therefore, the first study in this thesis is a systematic review of family-mediated social communication interventions that sought to examine those factors (Chapter 2).

Coaching parents adds another layer to the NDBI framework. Most providers who work with autistic children have not had formal training in how to effectively teach adults or implement parent training (Ingersoll et al., 2020; Kaiser & Hancock, 2003). Further, by the time a practitioner starts working with a family, family members have long-standing relationships and expectations and have developed a learning history. Consider the play scenario above between an autistic child and her father. The father's attempts at social interaction with his daughter may have a history of punishment or extinction. If her father has not been attempting to engage with her, her interactions with her father may be limited to the necessary demands of daily routines, such as brushing teeth or getting dressed, which may be aversive to her. Thus, his presence may be paired with aversive stimuli, also having a punishing effect on engagement behaviours. The practitioner's job then has multiple layers.

The practitioner must now work with the motivating operations, discriminative stimuli, competing contingencies, generalization, and rule-governed behaviour, of both the child *and* the parent.

Behavioural Framework of Child and Parent Behaviour

Motivating Operations. When teaching social communication skills, motivating operations are often contrived through reducing the possibility of satiation, which increases the reinforcing value of the items. A recent systematic review of MOs in mand training (a behavioural intervention procedure to increase mands) extracted the following MO manipulation procedures across the studies in order of most-used strategies: hiding an item from view, presenting a vocal statement or an instruction, withholding an item needed for an activity, presenting an unknown task or question, interrupting an ongoing activity, placing an item out of reach or blocking access, providing insufficient amount of item needed for an activity, manipulating an item or behaviour, placing an item to obstruct the child's view, offering a wrong item, and withholding access to toys for at least one day (Ban & McGill, 2023). These are consistent with the "environmental arrangement" component that is central to NDBIs (Frost et al., 2020).

For caregivers, MOs can similarly alter the effectiveness of reinforcement within the intervention environment (Allen & Warzak, 2000). The authors provide the example of considering the learning history the parent may have with other professionals, such as their health care providers. In the past, they may have experienced rapid improvements in the issues they have brought to their doctor if the doctor prescribed a pill that effectively ameliorated their symptoms, without delay and with little to no effort required. Parents may then expect similar results from behavioural practitioners if they have generalized this expectation to all helping professions as a stimulus class, and then their adherence behaviour may be put on extinction, or even be punished, when the expected effects on child behaviour do not immediately occur or if behaviour temporarily worsens (e.g., due to an extinction burst or in response to poorly implemented strategies) (Allen & Warzak, 2000; Fryling, 2014).

In the context of a social communication intervention, a behavioural strategy may be to prompt the desired behaviour (e.g., a mand) while putting undesired behaviour (e.g., screaming and grabbing) on extinction. In a public setting, or even within the home, a child's screaming and grabbing behaviour may be met with social disapproval from others (bystanders or other family members). In this case, the child's silence is established as a reinforcer, and the parent may deviate from the recommended strategies to escape or avoid social disapproval. This can be addressed by teaching parents how to "shape the interaction", one of the domains in the "FACTS" pyramid, i.e., knowing when it would be appropriate to focus on teaching new skills and when it would be better to provide preferred items and activities non-contingently (Ingersoll & Dvorkzak, 2010). This is consistent with the recommendation for practitioners to work with parents to collaboratively and proactively create contextual conditions that are favourable to adherence (Moore & Amado, 2021). That is, practitioners can explore the types of conditions (e.g., setting, time of day, specific routines) that are most likely to promote adherence, and then develop a plan to capitalize on those conditions.

Discriminative Stimuli. In a social communication intervention, while MOs might evoke the target skill, the relevant SD must also be present. For example, if the child wants a block (the MO) and no one else is around (S-delta condition), the child may simply take the block. In a session, the practitioner acts as an SD for the mand "block". For a pre-verbal child, the practitioner may be teaching a non-vocal mand such as a gesture (point) or sign (e.g., sign language for block). If the practitioner reinforces the gesture and the parent does not, over time, the practitioner may act as an SD for the gesture and the parent may act as an S-delta.

When working with caregivers, it is similarly important to consider the SDs occasioning adherence versus non-adherence behaviours (Allen & Warzak, 2000; Moore & Amado, 2021). For example, it is important the instructions provided to parents are clear enough to occasion the appropriate behaviour, that is, the instructions act as effective SDs. In addition, practitioners can help create contextual conditions that are favorable to adherence by inquiring about conditions that have served to strengthen or weaken adherence behaviors in previous interventions, and suggesting adjustments based on this reinforcement history (e.g., if it has historically been difficult to implement strategies in the morning, the practitioner can suggest focusing on the afternoons and asking a grandparent to assist during this time).

Consequences. A pioneer in the field of behavioural parent training (not specifically for autism), Patterson (1976) proposed the “negative reinforcement trap” to explain transactional, escalating coercive behaviours that can occur between parents and children. For example, the parent may provide an instruction to the child. The child may respond by voicing their displeasure with the instruction and refusing to follow it. The parent may then apply coercive strategies (e.g., yelling, threatening) and the child may respond in kind. The parent may eventually withdraw the demand in frustration. In this way, both parties’ behaviours are negatively reinforced (the child escapes the demand, and the parent escapes the negative interaction with their child), leading to more coercive behaviour in the future. When taught behavioural strategies, the parent’s attempts at adhering to the strategies (e.g., escape extinction, differential reinforcement) may be punished by their child’s undesirable reactions. Stocco and Thompson (2015) reviewed the evidence supporting child behaviour as antecedents and consequences for parent behaviour and showed negative reinforcement contingencies in the form of escape or avoidance of child problem behaviours.

Considering schedules of reinforcement is important when considering both social communication skill acquisition as well as parent adherence to recommendations. In the natural environment, there will always be concurrent schedules of reinforcement, and parent and child alike will engage more often in behaviours that lead to more frequent, immediate, higher-magnitude reinforcement, with lower response effort (Allen & Warzak, 2000). As adherence to behavioural strategies requires effort, especially if it involves new skills, and natural reinforcement in the form of child behaviour change is often delayed, competing contingencies in the natural environment may impede implementation of these strategies. Moore and Amado (2021) recommend ensuring reinforcement for adherence have greater value than those for other behaviours, which may include recruiting reinforcement from others (e.g., family members) or helping the parent set up their own reinforcement system (e.g., going out for dinner if they adhere to their plan).

Additionally, Allen and Warzak (2000) recommend establishing the practitioner as a conditioned reinforcer through rapport building. Rapport building is an important part of providing compassionate care (Taylor et al., 2018). Within a behavioural analytic framework, compassionate care comprises a behaviour analyst who can "identify and tact when others are suffering through the process of perspective taking, tact their own personal experiences and how the observed suffering may relate to his or her own, and then act intentionally to alleviate the suffering of the caregiver" (Taylor et al., 2018, pg. 3). LeBlanc and colleagues (2020) recommend specific training for behaviour analysts in therapeutic alliance and compassionate care skills and outline specific subskills to teach within the core skills of engaging in positive social interactions, demonstrating empathy, demonstrating compassion, and demonstrating collaboration.

Generalization. As discussed above, generalization is an important consideration for meaningful change. This applies to parent behaviour as well (Allen & Warzak, 2000). Similar to teaching autistic children directly, difficulties with generalization may occur if the practitioner coached the parent using insufficient exemplars or a narrow range of setting stimuli. For example, insufficient exemplars of target child behaviours may have been taught, e.g., in a social communication intervention, the parent may have been coached in how to respond to vocal mands but is unsure how to respond to non-vocal communication attempts (e.g., pointing). The intervention sessions may also have taken place in one or two contexts (e.g., at the intervention clinic, at the family's home in the living room when everyone else in the family is away), which may not sufficiently represent the wide range of contexts that the family interacts with.

Rule-Governed Behaviour (RGB). Rule-governed behaviour (RGB) is sensitive to verbal behaviour (i.e., rules) rather than direct contingencies (Vaughan, 1989). Since an important reinforcer proposed for RGB is the match between the behaviour and the rule (e.g., Cautilli et al., 2003), RGB can also lead to inflexible responding. For example, when rules are followed despite the current contingencies not aligning with the rule. On the other hand, RGB can be advantageous in that contingencies do not have to be directly contacted in order for learning to occur, which can result in faster learning. Moore and Amado (2021) argue that parent adherence behaviours that are sensitive to rules are more likely to generalize than behaviours that are sensitive only to contingencies. This is because environments that families come into contact with are likely to be wider ranging than the environments that are directly taught, and thus adherence behaviours may fail if specific antecedent or consequent stimuli are not present in the untrained environment (e.g., Baum, 1993; Gilroy & Kaplan, 2020). When behaviour is under the control of rules (e.g., a practice plan, practitioner instructions, or the individual's own verbal behaviour), it is more likely to persist under variable conditions. Pelaez and Moreno (1999) outlined a conceptual analysis of rule-governed behaviour in four domains: complexity, accuracy, clarity, and source. That is, rules that are less complex, more accurate, more explicit, and developed by the individual who is expected to follow the rule are more likely to promote adherence (e.g., Cautilli et al., 2003; Moore & Symons, 2011). Thus, collaboration with caregivers throughout the development and implementation of each stage of the intervention, to develop rules that align with the four domains above, can help support parent engagement. This is also consistent with compassionate care (LeBlanc et al., 2020; Taylor et al., 2018).

Autism and the Family

While involving family members, especially caregivers, in early intervention is essential for meaningful outcomes, it is also important to take a step back and examine family priorities and the impact of autism on the family. A qualitative review of treatment outcomes that matter the most to parents of autistic children found that the most important outcomes were related to everyday life and functioning (i.e., sleep, anxiety, distress, aggression, sibling relationships, social inclusion, and parent stress) (McConachie et al., 2018). The highest ranked outcome of importance was their child's happiness. The main goals of parents who are satisfied with services are to improve daily life with their child and to maintain a good family atmosphere (Robert et al., 2015). Parents who were asked to rank their priorities for autism research in the home ranked parent, sibling, child and family impact as their top priority (Clark & Adams, 2020a).

Indeed, there has been a call for more family-focused research in autism literature, particularly on how autism affects families as a whole and how to best support them (Cridland et al., 2014). Positive aspects of parenting an autistic child that parents have reported include appreciation and celebration of their child's accomplishments, family closeness and advocacy, and learning about diversity and differences (King et al., 2012).

Other strengths reported include positive relationships between siblings, personal growth, and improved marital relationships (e.g., Mount & Dillon, 2014; Orsmond et al., 2009; Rivers & Stoneman, 2003). Most typically developing siblings report positive relationships with their autistic sibling and participating in a range of shared activities (Rivers & Stoneman, 2003; Travers et al., 2020). Siblings of autistic individuals describe their autistic siblings as having multiple strengths (Carter et al., 2020). Siblings may be well-positioned to help build their autistic sibling's social communication skills and strengthen their sibling relationship by learning strategies to positively engage in mutually enjoyable activities, however research in this area is limited (Shivers & Plavnik, 2015). The first study in this thesis, a systematic review of family-mediated interventions, reviews the current literature (up to 2020) on sibling-mediated interventions alongside PIIs (Chapter 2).

Alongside the many positives of having an autistic family member, several challenges have also been reported. One of the most studied areas of challenge is parent stress, with parents of autistic children consistently found to experience higher levels of stress than other parents, including parents of typically developing children along with parents of children with other disabilities (e.g., Duarte et al., 2005; Estes et al., 2009; Rao & Beidel, 2009). Parents of autistic children have also reported increased levels of depression, anxiety, fatigue, and physical health impairments, compared to parents of non-autistic children (e.g., Gau et al. 2011; Ingersoll & Hambrick, 2011; Mugno et al. 2007). High levels of parenting stress has been associated with increased negative affect and reactive parenting (Pinderhughes et al., 2000), which can lead to more frequent or severe challenging behaviour over time (e.g., Davis & Neece, 2017; Lecavalier et al. 2006). This then influences parent and family functioning (Lecavalier et al. 2006), potentially creating a mutually influential effect (Zaidman-Zait et al., 2014). This is consistent with the concept of the "negative reinforcement trap" (Patterson, 1976).

A similar transactional relationship may be that increased stress and mental health concerns is associated with lower parental responsiveness and fewer positive interactions during play and daily social interactions (e.g., Crnic et al., 2005; McKelvey et al., 2002), which is associated with child social communication development. Alongside the challenges, mothers of autistic children reported higher levels of relationship closeness with their child compared with mothers of non-autistic children (Montes & Halterman, 2007), while in another study, despite elevated stress levels in mothers of autistic children, mothers of autistic and non-autistic children did not differ on a measure of emotional closeness with their children (Hoffman et al., 2009).

Relationship between Parent Stress and PIIs

It is important to consider the role of stress in PIIs as it can be a significant contextual factor affecting engagement (Fryling, 2014). The impact of PIIs on stress is mixed. Parents who engage in PIIs have reported decreases in stress (Manohar et al., 2019), however, Rivard and colleagues (2017) found that parents reported significantly more stress after 12 months of the intervention, despite effective reduction of challenging behaviour. A study investigating the link between family stressors and intervention intensity found that mothers who were more involved in their child's intervention program reported more personal strain, while mothers whose children received more therapy hours reported fewer depressive symptoms (Schwichtenberg & Poehlmann, 2007). Several factors impacting parent stress within behavioural interventions have been identified. For example, adaptive coping strategies, informal social support, parent-professional collaboration, high expectations and beliefs in the efficacy of the interventions, and high parental adherence to the intervention are associated with lower levels of parent stress (Brookman-Frazee et al., 2004; Hastings & Johnson, 2001; Rovane et al., 2020; Shepherd et al., 2017), while low beliefs in effectiveness is associated with higher stress (Nock & Kazdin, 2001).

Thus, although best practice recommendations in early intervention advocate for parent involvement in interventions (Division for Early Childhood, 2014), the impact of this involvement on the family can be nuanced and complex. In addition to the variables discussed above, numerous barriers and facilitators have been reported in the literature that impact parents' ability to engage and benefit from PIIs. The literature on barriers and facilitators to parent engagement in PIIs is collated and reviewed as part of the second study in this thesis, discussed in Chapter 3.

Barriers for Practitioners Implementing PIIs

In addition to barriers experienced by families, it is also important to explore variables that impact practitioners' use of PII in the community, and whether practitioners have the necessary capacity and skills for engaging parents. Practitioners have described several barriers to implementing PIIs, including barriers at the family level (e.g., lack of family interest or progress), provider level (e.g., difficulty tailoring parent training to individual families), and organization level (e.g., insufficient opportunities for consultation or training), with practitioners with less training perceiving more barriers (Ingersoll et al., 2020). A mixed-method evaluation of community providers' perspectives on parent coaching found logistical barriers, limited family engagement, limited agency support, limited professional training, and family stressors to be barriers, and logistical facilitators, agency support, high family engagement, and professional training to be facilitators (Straiton et al., 2021).

Parents faced with a high number of barriers are often perceived by providers as unengaged (Stahmer et al., 2019). Practitioners require training in interpersonal skills to notice possible barriers to engagement, and how to address them (Ingoldsby, 2010; Spoth& Redmond, 2000). Additionally, Fryling (2014) lamented that caregiver non-adherence is often met with a standard "train and train more" approach without attention to the function of the non-adherence, despite PIIs being implemented by practitioners well-trained in behavioural principles and functional assessment.

Functional Assessment

A central feature of ABA is the functional assessment of behaviour. Behaviour analysis is concerned with examining functional relationships by conducting functional assessments (i.e., analyzing behaviour), rather than applying arbitrary rewards and punishments in an attempt to change behaviour, without an understanding of its function (i.e., modifying behaviour) (Mace et al., 1994). Functional assessments are concerned with discovering the variables that are maintaining behaviour. In a PII, if a practitioner reacts to non-adherence with a "train and train more" solution, their behaviour may not produce desired effect if the function of non-adherence is a result of other contextual factors (Fryling, 2014). As noted above, the intervention itself may be contributing to parent stress. If so, then the parent may avoid or escape stress through their non-adherence. Thus, assessing and addressing the function of non-adherence, such as facilitating breaks or respite, could improve adherence while also positively impacting their health and other relationships.

Functional assessments are widely used in behavioural interventions, typically for identifying the function of challenging behaviour (e.g., Anderson et al., 2015; Hanley, 2012; Horner, 1994). Research has demonstrated that clinical interventions based on functional variables are more successful that those that are not (e.g., Dunlap & Fox, 2011; Hurl et al., 2016; Ingram et al., 2005; Walker et al., 2018). Additionally, behaviour change is more likely to be maintained, as the original contingency may still be in place after intervention is complete (Vollmer & Smith, 1996). An area where functional assessments have been adapted for verbally sophisticated adult learners is Organizational Behaviour Management (OBM). While there are undoubtedly myriad differences between training employees and training parents, lessons can be gleaned from this application of the behaviour analytic framework.

In 1999, Austin and colleagues argued for extending the use of functional assessments from clinical use to OBM research and practice. The authors proposed three reasons that functional assessments were not often used in OBM, which could also be applied to parent training. First, OBM interventions are often effective without a functional assessment. However, as noted above, clinical interventions are more effective when they are function-based. Second, most target behaviours in this field are rule-governed. Finally, within OBM, behaviours are typically targeted for increase, while function-based interventions are typically focused on decreasing behaviour (Matson et al., 2011). Austin and colleagues (1999) note that while interviews may not be as effective as direct assessments, within the OBM setting, they may be the most practical and sufficient for gathering relevant information for intervention planning. Since then, functional assessment tool within OBM have become more common (Gravina et al., 2018).

These are analogous to targeting parent behaviours in clinical interventions. First, PIIs have demonstrated some effectiveness in the literature without a parent assessment component. However, a meta-analysis of PIIs found that treatment effects are generally small (Neville et al., 2018). Applying a functional assessment lens to PIIs may thus improve their impact. Second, it could be argued that much of parent engagement behaviours are rule-governed (Moore & Amado, 2021). However, this can be seen as a benefit within PII assessments through collaborative information gathering and problem-solving. Finally, within NDBI-based PIIs, most strategies to improve engagement would aim to increase adherence-related behaviours.

OBM practitioners and researchers have leaned on behavior analytic principles and research to further develop assessment methods for organizations (Gravina et al., 2021). There is currently a gap for PII practitioners and researchers to do the same. A recently developed tool in this domain is the Performance Diagnostic Checklist-Parent (PDC-P;

Hodges et al., 2020), derived from the Performance Diagnostic Checklist (PDC; Austin, 2000), one of the most common OBM assessments (Gravina et al., 2021; Johnson et al., 2014). The PDC-P measures items in four domains: (1) training; (2) task clarification and prompting; (3) resources, materials, and processes; and (4) performance consequences, effort, and competition. An initial evaluation of the PDC-P to improve parents' implementation of mand training procedures indicated that the assessment was useful for improving parent fidelity of mand training implementation (Hodges et al., 2020). Hodges and colleagues (2020) noted that one limitation of the PDC-P is that its relatively limited scope may not include all the barriers parents experience participating in PIIs. The second study in this thesis focused on reviewing a wider range of barriers and facilitators and develop a practical tool to help practitioners assess those factors to individualize their PII and increase parent engagement (Chapter 3). This tool is called the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS).

Treatment Effectiveness

Although PIIs have a growing evidence base, families in the community may not have reliable access to them (Drahota et al., 2020; Hume et al., 2021). Additionally, when they are able to access them, effect sizes tend to be smaller in the community compared to university of lab settings (Nahmias et al., 2019). Community-based research has been proposed as a way to bridge this research-to-practice gap (Vivanti et al., 2018). A branch of research concerned with bridging this gap is implementation science, which is the study of factors that influence the effective adoption and integration of evidence-based interventions into practice (Boyd et al., 2022). While implementation science can be focused on large-scale implementation initiatives at the systemic and organizational levels, a central tenet of implementation science involves investigating how evidence-based practices are communicated by professionals, adopted and implemented by natural change agents (e.g., parents), and sustained over time.

Implementation science proponents stress that interventions should fit the perceived needs, values, and beliefs of stakeholders. This can be done at the community level, such as by adapting interventions to fit communities based on cultural or socioeconomic characteristics. Thus, the final study in this thesis evaluated the use of the PAIRS to individualize an evidence-based PII, with input from parents and practitioners within a community setting (Chapter 4).

Summary

PIIs have a growing evidence base for teaching meaningful skills to young autistic children. Although numerous benefits for parents and children have been demonstrated, a research-to-practice gap persists. Questions remain about factors that impact intervention effectiveness, and families can experience barriers that impede their ability to participate in and benefit from these evidence-based interventions.

Overall Aim, Research Questions, and Thesis Outline

The overall aim of this research was to improve family-mediated interventions for autism through identifying characteristics of effective interventions and developing a way to help address barriers and facilitators to family engagement in these interventions. Thus, three studies were conducted to explore the following research questions:

1. What are the characteristics of effective family-mediated social communication interventions for young children with autism? (Chapter 2)
    - Pacia, C., Holloway, J., Gunning, C., & Lee, H. (2021). A systematic review of family-mediated social communication interventions for young children with autism. *Review Journal of Autism and Developmental Disorders.* https://doi.org/10.1007/s40489-021-00249-8

2. What are the barriers and facilitators to family engagement in family-mediated interventions? Can a tool be developed to help behaviour analysts address these barriers? (Chapter 3)
    - Pacia, C., Gunning, C., McTiernan, A., & Holloway, J. (2022). Developing the Parent-Coaching Assessment, Individualization, and Response to Stressors (PAIRS) tool for behavior analysts. *Journal of Autism and Developmental Disorders, 1-24.* https://doi.org/10.1007/s10803-022-05637-5
3. What are the potential impacts of this tool on family-engagement in family-mediated interventions, when implemented in conjunction with an evidence-based NDBI in the community? (Chapter 4)
    - Pacia, C., Gunning, C., McTiernan, A., & Holloway, J. (2023). Preliminary Evaluation of the Parent-Coaching Assessment, Individualization, and Response to Stressors (PAIRS) tool [Manuscript submitted for publication]. School of Psychology, University of Galway.

Study 1 was a systematic literature review of family-mediated interventions for young children with autism. Study 2 focused on the development of the PAIRS tool to help practitioners collaboratively address barriers and facilitators to family engagement in parent-mediated interventions. Study 3 explored the impact of using the PAIRS in conjunction with an evidence-based parent-mediated NDBI, Project ImPACT, on parent engagement in PIIs.

2. A Systematic Review of Family-Mediated Social Communication Interventions for Young Children with Autism

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Abstract

Social communication deficits are a core symptom of autism spectrum disorder (ASD). The present paper reviews 54 studies evaluating social communication interventions delivered by parents and siblings to children with ASD under 6 years old. Fifty studies evaluated parent-mediated intervention and four studies evaluated sibling-mediated intervention. Fourteen studies evaluated interventions using telehealth. Treatment effects and research strength were variable across studies. Treatment modality, setting, and dosage had inconclusive impact on treatment effect. Parent-implemented intervention packages, Pivotal Response Treatment (PRT), Early Start Denver Model (ESDM), and Joint Attention, Symbolic Play, Engagement & Regulation (JASPER), qualified as established evidence-based practice for this population. Most studies reported successful generalization of skills for some, but not all, children. Telehealth and sibling-mediated intervention are promising areas of further research and clinical practice.

Keywords: autism spectrum disorder, family-mediated interventions, social communication, telehealth

Introduction

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental disorder characterized by marked deficits in social communication along with restricted and repetitive behaviors and interests (American Psychiatric Association, 2013). Social communication deficits are strongly associated with negative long-term outcomes (Gillberg & Steffenburg, 1987; Howlin et al., 2004). Early intervention, starting as early as the second year of life, has been shown to have positive long-term outcomes (e.g., Pickles et al., 2016; Wetherby & Woods, 2006), and has been associated with greater developmental gains and reduction in ASD symptoms than intervention delivered later in life (Koegel et al., 2006). Interventions targeting social communication skills have demonstrated collateral benefits in other areas (Ledbetter-Cho et al., 2017). For instance, teaching children with ASD to make requests has resulted in concomitant decreases in problem behavior (Charlop-Christy et al., 2002; Gianoumis et al., 2012).

The recommended intervention for individuals with ASD is Applied Behavior Analysis (ABA) (National Autism Centre, 2009, 2015). Recommended practice guidelines in early behavioral intervention for children with ASD emphasize building parents' capacity to support their child's behavior within the context of daily life (Division for Early Childhood, 2014; National Research Council, 2001). Parent training is an established intervention for increasing interpersonal and play skills and decreasing problem behavior in children with ASD (National Autism Centre, 2015). Parent training has also been shown to have benefits for the parent. Parents of children with ASD report higher levels of stress and affective symptoms than parents of typically developing children and parents of children with other disabilities and chronic illnesses (e.g., Abbeduto et al., 2004; Dumas et al., 1991; Smith et al., 2010). Parents who engage in parent training programs have reported decreases in stress (Keen et al., 2010), improvements in mental health symptoms such as anxiety and depression

(Tonge et al., 2006), increases in the amount of parental leisure and recreation time (Koegel et al., 1982), and increased levels of parental self-efficacy (McConachie & Diggle, 2007) and optimism (Koegel et al., 1982). Participating in parent training has also been shown to have positive effects on parent-child interactions (Koegel et al., 1996).

Despite growing interest in parent training, few studies have examined the role of other family members (i.e., siblings) in intervention. A conceptually similar area of research is peer-mediated intervention (PMI), which involves typically developing peers in teaching a variety of skills to children with ASD. PMI is an established intervention for increasing communication and interpersonal skills with children with ASD (National Autism Centre, 2009, 2015). Benefits of PMI for individuals with ASD include increased opportunities to interact with social partners, improved social competence, and independence (Sperry et al., 2010). PMI has also been shown to have a positive impact on peer implementers. They were found to demonstrate academic gains, increased sensitivity to others, higher self-confidence, and expanded peer networks after participating as peer mediators for individuals with ASD (Carter et al., 2008). Criteria for successful peer candidates include attending the same school as the child with ASD, having developmentally appropriate cognitive and language abilities, a history of compliance, and social competence and enthusiasm (Gunning et al., 2018).

Sibling training potentially combines the benefits of parent training and PMI, as siblings could support skill generalization for the child with ASD along with parents, and increase fun, reciprocal play and learning opportunities comparable to peers. Indeed, a systematic review of sibling-mediated interventions found that results from these interventions were similar to results from PMIs (Shivers & Plavnick, 2015). Target skills included play skills, social skills, academic or functional skills, and physical fitness. Overall, the siblings learned the intervention procedures, and the children with ASD showed increases in skill acquisition and/or decreases in problematic behavior.

Given the high prevalence rates of ASD (1 in 59 children; Baio et al., 2018) and the importance of early intervention, attention has been called to innovating service delivery models that would allow clinicians to maximize their productive time and reach. Additionally, families who live in rural or remote areas often experience barriers in accessing evidence-based intervention (Kogan et al., 2008; Liptak et al., 2008; Mandell et al., 2010). Telehealth is a promising service delivery model in which clinicians consult and deliver treatment over a distance using communication technologies such as videoconferencing or interactive websites (Dudding, 2009). Telehealth has been used to deliver evidence-based intervention to individuals with ASD, including parent training, and has demonstrated positive results, although insufficient methodological rigor is a concern (Boisvert et al., 2010; Knutsen et al., 2016). Continued evaluation of remote parent training, employing stronger research methodologies, is ongoing (e.g., Ingersoll et al., 2016; Vismara et al., 2018).

A key advantage of involving family members in intervention delivery is the potential for improved generalization outcomes. Children with ASD often present with severe challenges in applying skills learned in treatment to everyday use, which is a major barrier to effective intervention (Vismara & Rogers, 2010). Generalization outcomes are improved when intervention addresses functional behaviors within the natural environment, natural consequences are used, training occurs across different settings, people, and stimuli, and mediation strategies such as problem-solving are taught (Chandler et al., 1992; Gunning et al., 2019; Stokes & Baer, 1977; Stokes & Osnes, 1989). As family-mediated interventions are delivered by people closest to the child, it could be expected that increased learning opportunities would occur across contexts and interactions and continue to develop as the child grows. A review of generalization and maintenance of social communication skills in parent-mediated interventions found improved social communication across situations and over time, although not to the extent achieved during acute intervention (Hong et al., 2018).

Similarly, a meta-analysis of early intervention effects on social communication found the largest effect sizes in context-bound measures (i.e., outcomes measured with the same person and context as the treatment context), compared to semi-generalized and generalized measures (i.e., outcomes measured with a different person and/or in a different context) (Fuller & Kaiser, 2019).

Several recent systematic reviews have synthesized the literature on parent training as it relates to language and communication interventions (Akamoglu & Meadan, 2018), toddlers (Beaudoin et al., 2014), school-age children (Black & Therrien, 2018), and functional communication training (Gerow et al., 2018). Overall, parents were able to implement the intervention, and positive outcomes were noted for the parents and children. However, firm conclusions could not be reached given the paucity of studies with strong methodological rigor. A meta-analysis of 19 randomized clinical trials (RCT) of parent-mediated interventions for children with ASD found small improvements in symptom severity, socialization, and cognition, and trivial improvements in communication and language (Nevill et al., 2018). Although small effects are concerning, the reviewers noted that both the quantity and quality of research on parent-delivered interventions have been increasing. Additionally, more research is needed on parent and child variables that may explain the inconsistency in treatment outcomes. A systematic review on potentially influencing factors found mixed results on the impact of broad child factors (e.g., age, verbal ability), fine-grained child factors (e.g., vocal initiation, joint attention, imitation), and contextual child factors (e.g., service access, intervention hours), along with parent factors such as including demographics, intervention factors (e.g., adherence, involvement, fidelity), and contextual factors (e.g., therapist support, accessibility) (Trembath et al., 2019).

The present study aims to extend on these reviews and provide practical guidance for clinicians by synthesizing treatment effectiveness and research strength of family-mediated social communication interventions for children with ASD under 6 in terms of intervention characteristics such as intervention agents, modality, setting, dosage, focused intervention practices (FIP), and intervention packages. This is also the first review to combine and compare in-situ and telehealth interventions along with parent- and sibling-mediated interventions.

Method

Search Procedures

A systematic search of the literature was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009). The following databases were used: EBSCO (Psychology and Behavioral Sciences Collection), Education Resources Information Center (ERIC), PsycINFO, Scopus, and Web of Science. Combinations of the following terms were inputted into each database: (1) "autis*", (2) "parent train*" or "parent mediat*" or "parent implement*" or "sibling train*" or "sibling mediat*" or "sibling implement*", and (3) "social communication" or "social interaction" or "social skills" or "communication skills" or "play". Initial online searches yielded 3682 results. A hand search of the reference sections of studies that met criteria was also conducted to identify additional relevant studies. 2574 records remained after duplicates were removed.

Inclusion Criteria

Studies were included if: (a) at least one child had a confirmed diagnosis of ASD (in studies employing single subject research design; SSRD) or all focal children had a confirmed diagnosis of ASD (in studies employing group designs); (b) at least one child with ASD was between 0-6 years old (in studies employing SSRD) or all focal children were between 0-6 years old (in studies employing group designs), (c) parent or sibling implemented 100% of the intervention; (d) the article presented an evaluation of an intervention to improve one or more social communication skills as defined in the Social Communication Checklist (SCC; Ingersoll & Dvortcsak, 2010); (e) the intervention employed an experimental design, i.e., either a single subject research design (SSRD) or a group comparison design; (f) the intervention employed at least one evidence-based FIP as outlined by Wong and colleagues (2015); and (g) the study must have been published in a peer-reviewed journal. Only studies available electronically and published in English between 1980 and 2019 were included.

Data Extraction and Coding

Each article in the review was summarized in terms of participant and intervention agent characteristics, intervention characteristics, target skills and collateral outcomes. Treatment effectiveness and research strength were then evaluated and synthesized by intervention agent, intervention characteristics, target skills, FIPs and intervention packages. Generalization promotion strategies and outcomes were also coded.

Participant and Intervention Agent Characteristics

Information regarding total number of participants, number of participants that met inclusion criteria, and age was noted. Only data for participants that met criteria were extracted. For intervention agents, relationship to participant (i.e., mother, father, brother, sister) was recorded, along with age of sibling (if sibling was mediating the intervention). If additional characteristics such as sibling skills were reported, these variables were noted.

Intervention Characteristics

Intervention strategies used to teach target skills to the child with ASD were coded by FIP. Intervention packages that used combinations of these FIPs were also recorded. Protocols used to train intervention agents were coded as instructions, modelling, video modelling, role play, rehearsal, and/or feedback. Treatment modality (telehealth or in-situ) and treatment setting (home, clinic, or mixed) were noted. Treatment dosage (i.e., duration and frequency of sessions and total hours of intervention) was also recorded. Total hours of treatment were coded into low-dose interventions (≤10 hours), medium-dose interventions (11-20 hours), high-dose interventions (21-30 hours), and extended interventions (over 30 hours).

Target Skills and Collateral Outcomes

Target skills were recorded as described by the study authors and then coded into one of three social communication domains based on the SCC: social engagement, language and communication, and imitation and play. Collateral outcomes for the participant and intervention agents were recorded. If standardized measures were used, those were noted.

Treatment Effectiveness

In articles using SSRD, percentage of non-overlapping data (PND; Scruggs et al., 1987) was used to measure treatment effectiveness for each dependent variable. Advantages of PND include ease of calculation from graphical rather than raw data, high degree of inter-rater reliability, applicability to any SCD design type, and ease of interpretation (Campbell, 2013; Parker et al., 2007). PND has also been shown to be a more conservative measure of treatment effects compared to other nonoverlap methods [e.g., Nonoverlap of all pairs (NAP) and percentage of all overlapping data (PAND)], and is widely applicable to data gathered for participants with ASD (Carr, 2015). PND is calculated by dividing the number of treatment data points that fall below the lowest baseline data point by the total number of data points in the treatment phase, multiplied by 100 (Scruggs et al., 1987).

PND scores range from 0-100%. An intervention with a PND score of 90% or higher is considered to be a very effective treatment, a PND score between 70-89% indicates effective treatment, an PND score between 51-69% is considered questionable treatment, and an intervention with a PND score of 50% or lower is classified as not effective treatment (Scruggs & Mastropieri, 1998). Where all baseline data points were at zero, this was noted. Graphs with fewer than three baseline data points and graphs that showed ceiling or floor effects at baseline were excluded from calculation (Scruggs et al., 1987; Schlosser et al., 2008).

In articles utilizing group designs, Cohen's *d* was calculated for all primary dependent variables using means, standard deviations, and sample sizes of the treatment and control groups (Cohen, 1988). Cohen's (1988) criteria was then used to determine effect sizes: trivial (<0.2), small (0.2–0.49), medium (0.5–0.79), or large (⩾0.8). Cohen's *d* is commonly used to synthesize studies using group designs (Warner, 2013). Treatment effects were then synthesized by target skills, intervention agents and characteristics, FIPs, and intervention packages.

Research Strength and Determining Evidence-Based Practice (EBP)

Studies were assessed for research quality using primary and secondary quality indicators and rated as strong, adequate, or weak using an operationalized evaluative method outlined by Reichow and colleagues (2008). Primary quality indicators for both SSRDs and group designs included information on participant characteristics and independent and dependent variables. Additional primary quality indicators for SSRDs included demonstration of a stable baseline condition, visual analysis, and experimental control, while additional primary quality indicators for group designs included use of a comparison condition, demonstration of the link between the research question and data analysis, and accurate statistical analysis. Primary quality indicators were rated as high, acceptable, or unacceptable quality. Secondary quality indicators for both SSRDs and group designs included evidence of interobserver agreement, blind raters, measurement of treatment fidelity and generalization and maintenance outcomes, and demonstration of social validity. Additional secondary quality indicators for SSRDs included calculation of the Kappa statistic, while additional secondary quality indicators for group designs included random assignment, details of participant attrition, and reporting of treatment effect sizes. Secondary quality indicators were rated as being present or absent.

To receive a strong rating, studies needed to receive high quality grades on all primary quality indicators and demonstrate evidence of at least three (for SSRDs) or four (for group designs) secondary quality indicators, while to receive an adequate rating, studies needed to receive high quality grades on at least four primary quality indicators and no unacceptable ratings on any primary quality indicators, along with demonstrating evidence of at least two secondary quality indicators. Studies that did not meet these criteria received a weak rating.

From this, Z scores were calculated to determine whether an intervention package could be rated as an evidence-based practice (EBP). The following formula was applied to calculate the Z score ("$Group_S$" equals the total number of group design studies with an overall "strong" rating, "$Group_A$" equals the total number of group design studies with an overall "adequate" rating, "$SSED_S$" equals the total number of participants in single-subject studies with an "strong" rating, and "$SSED_A$" equals the total number of participants in single-subject studies with an "adequate" rating):

$$(Group_S*30) + (Group_A*15) + (SSED_S*4) + (SSED_A*2) = Z$$

Z scores of ≥60 points indicate "established EBP" and >30 indicate "probable EBP". Research strength and EBP status were then synthesized by target skills, intervention agents, intervention characteristics, FIPs, and intervention packages.

Generalization

The studies were assessed for generalization promotion strategies, generalization dimension, latency to maintenance probe, and generalization outcome. Generalization promotion strategies were divided into four categories: exploiting current functional contingencies, training diversely, incorporating functional mediators, and using sequential modification (Chandler et al., 1992; Gunning et al., 2019; Neely et al., 2015; Stokes & Osnes, 1989; Swan et al., 2015). Generalization dimension was coded into settings, materials, people, and maintenance (i.e., generalization over time). Generalization outcome was coded as “complete” if all participants’ generalization scores were above baseline or intervention data, “partial” if some participants’ generalization scores were above baseline or intervention data, and “failure” if none of the participants’ generalization scores were above baseline or intervention data (Chandler, 1992; Gunning et al., 2019).

Inter-rater Reliability

Inter-rater reliability (IRR) was calculated on at least 20% of the literature search, title and abstract screening, full text screening, and data extraction procedures. All IRR scores in this review were calculated by dividing agreements between two independent raters by agreements plus disagreements and multiplying by 100. IRR was 100% for the literature search, 97% for title and abstract screening, 87.8% for full text screening, and 82% for data extraction. If there was disagreement between the raters, the discrepancy was discussed until the raters came to a consensus.

IRR for PND and Cohen’s *d* was calculated on 20% of the included studies. An agreement was defined as both raters recording the same percentage of non-overlapping data per behavior. Overall agreement was determined by the following formula:

# of agreements = # [agreements + disagreements]*100 = %

IRR for the calculation of PND and Cohen's *d* was 90%. When calculations were considered inaccurate, the co-authors reached agreement through discussion. This process was repeated until 100% agreement was achieved.

Results

Fifty-four studies met inclusion criteria. None of the studies were published between 1980-1999. Fourteen studies (25.9%) were published between 2000-2009, while 40 studies (74.1%) were published between 2010-2019. Two studies reported intervention outcomes for the same group of participants (Gengoux et al., 2015; Hardan et al., 2015). Data for these studies were consolidated where appropriate. Participant, intervention agent, and intervention characteristics are presented in Table 2.1, while dependent variables, treatment effects, and research design and strength are presented in Table 2.2.

Table 2.1

Descriptive Summary of Included Studies

Reference	Participants • *N* (*N* eligible) • Gender • Age	Intervention agents • Relationship • Age (siblings)	Intervention characteristics • FIPs* • Intervention package • Setting • Dosage
Cardon (2012)	4 (4) 2 M; 2 F 24-42 months	4 mothers	PII, PP, R+, TAII, VM Video Modelling Imitation Training (VMIT) Home <8 hours
Coolican et al. (2010)	8 (8) 7 M; 1 F 28-56 months	5 mothers, 3 fathers	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Clinic and home 6 hours
Ferraioli & Harris (2011)	4 (4) 3 M; 1 F 41-64 months	4 brothers 6-8 years	DTT, MD, PMII, PP, PRT, R+, TD No program name Home 3-12 hours
Gengoux et al. (2015)	23 (23) See Hardan et al. 2015	See Hardan et al. 2015	See Hardan et al. 2015

Gillett & Leblanc (2007)	3 (3) 3 M 4-5 years	3 mothers	MD, PII, PP, R+, TD Natural Language Paradigm (NLP) 2 clinic, 1 home 1.5-2 hours
Guðmundsdóttir et al. (2019)	3 (3) 3 M 47-55 months	3 mothers	PII, R+, TD Sunny Starts; Decide Arrange Now Count Enjoy (Teaching DANCE) Telehealth (plus one session at home) 14-29 hours
Guðmundsdóttir et al. (2017)	2 (1) 1 M 58 months	1 mother	PII, R+, TD Sunny Starts; Decide Arrange Now Count Enjoy (Teaching DANCE) Telehealth 53 hours
Hansen et al. (2018)	3 (2) 1 M; 1 F 36; 57 months	2 mothers	PII, PP, R+, TD No program name Clinic Average 1.5 hours
Hansen & Shillingsburg (2016)	2 (2) 2 M 32; 45 months	Parent (not specified)	PII, PP, R+, TD Modified Parent-Child Interaction Therapy (PCIT) Clinic 13-14 hours
Hardan et al. (2015)	53 (25) 19 M; 6 F 4.1 (1.2) years	25 parents (not specified)	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment – Group (PRT-G) Clinic 16 hours
Hong et al. (2018)	2 (2) 1 M; 1 F 51 months; 57 months	2 mothers	PII, PP, R+, TD No program name Self-directed, telehealth Total hours not calculated
Ingersoll & Gergans (2007)	3 (3) 2 M; 1 F 31-42 months	3 mothers	MD, PII, PP, R+, TD Reciprocal Imitation Training (RIT) Clinic 10-13 hours
Ingersoll & Wainer (2013)	8 (7) 6 M; 1 F 44-63 months	7 mothers	PII, PP, R+, TD Project ImPACT Clinic 12-24 hours
Ingersoll et al. (2016)	28 (28) 20 M; 8 F 46.08 (13.18) SD; 41.57 (12.24) TA months	26 mothers, 2 fathers	PP, PII, R+, TD Project imPACT Self-directed, telehealth 27 hours

Jones & Feeley (2007)	3 (2) 1 M; 1 F 45; 48 months	2 mothers, 1 father	DTT, MD, PII, PP, PRT, R+, TD No program name Home Total hours unclear
Jull & Mirenda (2011)	2 (2) 2 M 59; 65 months	2 mothers 1 sister, 1 cousin (not directly trained) 6; 4 years	PII, PP, PMI, R+, SPG No program name Home Total hours unclear
Kaiser et al. (2000)	6 (3) 3 M 40-54 months	3 mothers	MD, PII, PP, R+, TD Enhanced Milieu Teaching (EMT) Clinic 18 hours
Kasari et al. (2015)	86 (43) 35 M; 8 F 30.7 (3.5) months	43 mothers	MD, PII, PP, TD Joint Attention, Symbolic Play, Engagement & Regulation (JASPER) Clinic 10 hours
Kasari et al. (2010)	38 (19) 15 M; 4 F 30.35 (0.93) months	Parents (not specified)	MD, PII, PP, TD No program name Clinic 18 hours
Kasari et al. (2014)	112 (60) 50 M; 10 F 41.9 (10.0) months	Parents (not specified)	MD, PII, PP, TD Joint Attention, Symbolic Play, Engagement & Regulation (JASPER) Home 24 hours
Kashinath et al. (2006)	5 (5) 4 M; 1 F 33-65 months	5 mothers	MD, PII, PP, R+, TD No program name Home 40-60 hours
Koegel et al. (2002)	5 (5) 2 M; 3 F 46-67 months	5 mothers, 3 fathers	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Clinic 25 hours
Lane et al. (2016)	2 (2) 2 M 31-35 months	2 mothers	PII, PP, R+, TD No program name Clinic 3 hours
Law et al. (2018)	3 (3) 2 M; 1 F 30-52 months	3 mothers	PII, PP, R+, TD Map4speech (app); Project imPACT Self-directed, Telehealth 4.5-10 hours

Loughrey et al. (2014)	2 (1) 1 M 3 years	1 mother 1 father (not directly trained)	PII, PP, R+ No program name Clinic and home Total hours unclear
Madzharova & Sturmey (2015)	3 (1) 1 M 5 years	1 mother 1 sister (not directly trained) 5 years	PII, PMI, PP, R+, SPG No program name Home Total hours unclear
Mancil et al. (2009)	3 (2) 2 M 49; 58 months	2 mothers	FBA, FCT, PII, PP, R+, TD Modified milieu therapy Home <5 hours
Manohar et al. (2019)	50 (26) 22M 4F 42.6 (17.5) months	Parents (not specified)	MD, PII, PP, R+, SN No program name Clinic and home 5.25-6 hours
McDuffie et al. (2013)	8 (8) 4 M; 4 F 27-69 months	8 mothers	MD, NCR, PP, PII No program name Telehealth 24 hours
McGarry et al. (2019)	11 (11) 8M, 3F 20-46 months	Parents (8 mothers, 3 fathers)	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Telehealth Total hours unclear
Meadan et al. (2016)	3 (3) 2 M; 1 F 2-4 years	3 mothers	MD, PII, TD Internet-Based Parent-Implemented Communication Strategies (i-PiCS) Telehealth Total hours unclear
Nefdt et al. (2010)	27 (13) 92.6% M 38.92 (14.57) months	Parents (not specified)	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Self-directed Average 2 hours
Nunes & Hanline (2007)	1 (1) 1 M 55 months	1 mother	MD, PII, PP, R+ No program name Home Average 1 hour
Oppenheim-Leaf et al. (2012)	3 (2) 2 M Both 4 years	1 brother, 1 sister Both 5 years	PMII, PP, R+, TD Program name not specified Home Total hours unclear
Park et al. (2011)	3 (3) 3 M	3 mothers	PECS, PII, PP, R+ Picture Exchange Communication System (PECS)

	29-31 months		Home 2.5-4 hours
Penny & Schwartz (2018)	3 (3) 2M, 1F 48-65 months	2 mothers, 1 father	MD, PII, PP, R+, TD Reciprocal Imitation Training (RIT) Home and childhood centre < 7 hours
Randolph et al. (2011)	3 (1) 1 M 5 years	1 father	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Clinic 7-9 hours
Reagon & Higbee (2009)	3 (2) 2 M 35; 47 months	2 mothers	PII, PP, SC, R+, TAII No program name Home Approximately 1 hour
Rocha et al. (2007)	3 (3) 2 M; 1 F 26-42 months	2 mothers, 1 father	DTT, MD, PII, PP, PRT, R+, TD No program name Clinic 17 hours
Rogers et al. (2018)	45 (45) 31 M, 13 F 2.1 (0.4) years	Parents (not specified)	FBA, MD, PII, PP, PRT, R+, TD Early Start Denver Model (ESDM) Clinic and home 36 hours
Rollins et al. (2016)	4 (4) 4 M 28-33 months	4 mothers	PII, R+, TD Pathways Early Autism Intervention Home 12-19.5 hours
Simacek et al. (2017)	3 (2) 2 F 3.5; 4 years	2 mothers, 1 father	FBA, FCT, PII, PP, R+, TD No program name Telehealth Total hours unclear
Stahmer & Gist (2001)	22 (22) Gender not specified 19-50 months	Parents (not specified)	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Clinic 12 hours
Symon (2005)	3 (3) 3 M 34-64 months	3 mothers	FBA, MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Clinic 25 hours
Tsao & Odom (2006)	4 (2) 2 M 41; 46 months	1 sister; 1 brother 11; 4 years	PMII, PP, R+ Stay-Play-Talk Play Time/ Social Time Getting Along with Others Home 3 hours

Vernon et al. (2012)	3 (3) 3 M 28-51 months	2 mothers; 1 father	MD, PII, PP, PRT, R+, TD Pivotal Response Treatment (PRT) Home 16 hours
Vismara et al. (2009)	8 (8) Gender not specified 26-35 months	8 parents (not specified)	FBA, MD, PII, PP, PRT, R+, TD Early Start Denver Model (ESDM) Clinic 12 hours
Vismara et al. (2018)	24 (14) 11 M; 3 F 31.9 (10.4) months	11 mothers, 3 fathers	FBA, MD, PII, PP, PRT, R+, TD Parent Early Start Denver Model (P-ESDM) Telehealth 18 hours
Vismara et al. (2013)	8 (8) Gender not reported 20-45 months	7 mothers, 1 father	FBA, MD, PII, PP, PRT, R+, TD Parent Early Start Denver Model (P-ESDM) Telehealth 22.5 hours
Wainer & Ingersoll (2013)	3 (2) 2 M 26; 69 months	2 mothers	MD, PII, PP, R+, TD Reciprocal Imitation Training (RIT) Self-directed, Telehealth <2 hours
Wainer & Ingersoll (2015)	5 (5) Gender not reported 29-59 months	5 mothers	MD, PII, PP, R+, TD Reciprocal Imitation Training (RIT) Telehealth 1.5 hours
Walton & Ingersoll (2012)	4 (4) 4 M 45-57 months	2 brothers, 4 sisters 8-13 years	MD, PMII, PP, R+, TD Reciprocal Imitation Training (RIT) Home 5-10 hours
Wang (2017)	4 (4) 3 M; 1 F 30-50 months	2 mothers, 2 fathers	PII, TD, TAII, VM No program name Home Total hours unclear
Zaghlawan & Ostrosky (2016)	2 (2) 2 M 37; 60 months	1 mother, 1 father	MD, PII, PP, R+, TD Modified Reciprocal Imitation Training (RIT) Home 5.5-8 hours

*All studies included naturalistic interventions (NI), therefore NI was not listed.
FIPs (Wong et al., 2015). DTT: Discrete Trial Training. FBA: Functional Behaviour Assessment. FCT: Functional Communication Training. MD: Modelling. PII: Parent-implemented intervention. PMII: Peer-mediated instruction or intervention. PP: Prompting. PRT: Pivotal Response Treatment. R+: Reinforcement. SC: Scripting. TAII: Technology-aided instruction and intervention. TD: Time delay. VM: Video modelling.

Table 2.2

Treatment Effects and Research Strength

Reference	Dependent variables • Target skills (category of social communication) and treatment effects (PND or Cohen's *d*) • Secondary outcomes • Parent/sibling outcomes	Research characteristics • Design • Strength
Cardon (2012)	Imitation of actions (IP): Very effective; 95.73% (1/4 with 0 baseline) Secondary outcomes: MIS, PLS-5 Parent outcomes: Treatment integrity	SSRD Strong
Coolican et al. (2010)	Functional verbal utterances (LC): Questionable; 54.59% Types of utterances (LC): No visual representation; calculated pre-post Disruptive behaviour (O): No visual representation; calculated pre-post Secondary outcomes: PLS-4, PPVT-III Parent outcomes: Treatment integrity, self-efficacy, social validity	SSRD Weak
Ferraioli & Harris (2011)	Responding to tap/show (SE): Effective; 74.98% Responding to point/gaze (SE): Very effective; 100% Initiating behavioural requests (SE): Very effective; 100% (3/4 excluded due to <3 baseline data points) Initiating joint attention (SE): Not effective; 50% (4/4 with 0 baselines) Secondary outcomes: ESCS, imitation Sibling outcomes: Treatment integrity, social validity	SSRD Weak
Gengoux et al. (2015)	*(3-month follow-up to Hardan et al., 2015)* Total utterances (LC): Small; 0.48 Unintelligible (LC): Small; 0.42 Imitative (LC): Small; 0.49 Verbally prompted (LC): Medium; 0.68 Non-verbally prompted (LC): Large; 0.96 Spontaneous (LC): Small; 0.37 Secondary outcomes: CDI, PLS-4, Vineland-II, SRS, CGI-S and CGI-I Parent outcomes: Treatment integrity	Group Strong
Gillett & Leblanc (2007)	Spontaneous vocalizations (LC): Effective; 83.33% Prompted vocalizations (LC): Not effective; 45.4%	SSRD Adequate

	Secondary outcomes: Mean length of utterance (MLU), appropriate play Parent outcomes: Treatment integrity, social validity	
Guðmundsdóttir et al. (2019)	Requesting (LC): Not effective; 24.7% Social attending (SE): Very effective; 91% Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Guðmundsdóttir et al. (2017)	Requesting (LC): Effective; 78.05% Social attending (SE): Effective; 88.89% Parent outcomes: Treatment integrity	SSRD Adequate
Hansen et al. (2018)	Independent response to joint attention (SE): Effective; 87.86% Prompted response to joint attention (SE): Very effective; 100% Secondary outcomes: Initiating JA Parent outcomes: Treatment integrity	SSRD Adequate
Hansen & Shillingsburg (2016)	Vocalizations (LC), compliance with instructions (O) Could not calculate treatment effectiveness size for AB within-subject design Parent outcomes: Treatment integrity, social validity	SSRD Weak
Hardan et al. (2015)	Total utterances (LC): Small; 0.42 Unintelligible (LC): Trivial; 0.08 Imitative (LC): Large; 1.06 Verbally prompted (LC): Trivial; -0.09 Nonverbally prompted (LC): Large; 0.94 Spontaneous (LC): Small; 0.46 Secondary outcomes: CDI, PLS-4, Vineland-II, SRS, CGI-S and CGI-I Parent outcomes: Treatment integrity	Group Strong
Hong et al. (2018)	Verbal responding (LC): Questionable; 52.4% Use of different words (LC) (1/2 participants): Very effective; 100% Parent outcomes: Treatment integrity, social validity	SSRD Weak
Ingersoll & Gergans (2007)	Object imitation (IP): Not effective; 48.17% Gesture imitation (IP) (1/3 participants): Effective; 75% Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Ingersoll & Wainer (2013)	Spontaneous language (LC): Not effective; 27.15% (1/8 with 0 baseline)	SSRD Adequate

	Parent-selected language goals (LC): No visual representation; percent of goals achieved Parent outcomes: Treatment integrity	
Ingersoll et al. (2016)	Expressive language (LC): Could not calculate effect size due to lack of no-treatment control group Secondary outcomes: CDI, MSEL, VABS-II Parent outcomes: Treatment integrity, sense of competence, family impact	Group Strong
Jones & Feeley (2007)	Respond to joint attention (SE): Questionable; 54.29% Initiate joint attention (SE): Effective; 73% (1/2 with 0 baseline) Parent outcomes: Treatment integrity	SSRD Strong
Jull & Mirenda (2011)	Synchronous reciprocal interactions (SE): Very effective; 97.53% Secondary outcomes: Affect Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Kaiser et al. (2000)	Frequency of communication target use (LC): Questionable; 63.87 Spontaneous verbal utterances (LC), mean length of utterance (MLU; LC), diversity of utterances (LC): No visual representation; pre-post measures used Secondary outcomes: SICD, PPVT-R, EOWPVT-R, SALT Parent outcomes: Treatment integrity, social validity	SSRD Strong
Kasari et al. (2015)	Joint engagement (SE): Large; 1.42 Secondary outcomes: Initiating joint attention, Functional play, Symbolic play, Highest play level, RDLS, MSEL Parent outcomes: Stress (PSI)	Group Strong
Kasari et al. (2010)	Joint engagement (SE): Large; 0.86 Secondary outcomes: Play diversity, play level, joint attention Parent outcomes: Quality of involvement, adherence and competence, Treatment integrity	Group Strong
Kasari et al. (2014)	Joint engagement (SE): Medium; 0.47 Secondary outcomes: Play diversity, joint attention (ESCS)	Group Strong

	Parent outcomes: Treatment integrity, caregiver quality of involvement, adherence and competence	
Kashinath et al. (2006)	Child-specific communication targets (LC): Questionable; 60.49% Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Koegel et al. (2002)	Functional verbal responses (LC): Effective; 88.9% (2/5 excluded due to <3 baseline points) Parent outcomes: Treatment integrity, affect	SSRD Adequate
Lane et al. (2016)	Vocal communicative responding (LC): Questionable; 55.6% (2/2 with 0 baselines) Initiation (LC): Effective; 73.4% (2/2 with 0 baselines) Parent outcomes: Treatment integrity	SSRD Adequate
Law et al. (2018)	Prompted utterances (LC): Not effective; 1.47% Spontaneous utterances (LC): Not effective; 13.8% Prompted pointing (SE): Questionable; 56.55% (2/2 with 0 baselines) Spontaneous pointing (SE): Not effective; 14.65% (2/2 with 0 baselines) Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Loughrey et al. (2014)	Prompted mands (LC): Not effective; 0% Spontaneous mands (LC): Questionable; 53.85% Parent outcomes: Treatment integrity, social validity	SSRD Weak
Madzharova & Sturmey (2015)	Independent mands to peer (LC): Not effective; 0% Parent outcomes: Treatment integrity, social validity	SSRD Weak
Mancil et al. (2009)	Communication with picture cards (LC): Very effective; 100% (2/2 with 0 baselines) Reduction in problem behaviours (O): Very effective; 95.15% Parent outcomes: Treatment integrity, social validity	SSRD Strong
Manohar et al. (2019)	Autism symptom severity (CARS; SE, LC, IP): Small, 0.169 Parent outcomes: Treatment integrity, family interview of stress and coping (FISC), subjective distress, understanding of ASD and intervention techniques, and perceived competence to implement interventions	Group Strong
McDuffie et al. (2013)	Verbal and nonverbal communication acts (LC)	SSRD Weak

	Could not calculate PND due to lack of visual representation of child outcomes Parent outcomes: Treatment integrity, social validity	
McGarry et al. (2019)	Vocalizations (LC), eye contact (SE), positive affect (O): Could not calculate effect size due to lack of control group Parent outcomes: Treatment integrity, social validity	Group Weak
Meadan et al. (2016)	Communication responses (LC): Effective; 86.55% (1/3 excluded due to ceiling effects) Communication initiation (LC): Questionable; 52.6% Parent outcomes: Treatment integrity, social validity	SSRD Weak
Nefdt et al. (2010)	Functional verbal utterances (LC): Large; 0.953 Parent outcomes: Treatment integrity, observed confidence, DVD usage, social validity	Group Strong
Nunes & Hanline (2007)	Communication turn (LC): Questionable; 60% Imitative response (LC): Not effective; 6.25% (2/2 routines with 0 baseline) AAC use (LC): Questionable; 63.75 (1/2 routines with 0 baseline) Verbalizations/vocalizations (LC): Not effective; 25% Gestures and manual signs (LC): Not effective; 35% Parent outcomes: Treatment integrity	SSRD Weak
Oppenheim-Leaf et al. (2012)	Playing with others (IP): Effective; 75% Sharing (IP): Very effective; 100% (1/2 excluded due to ceiling effects) Choosing an activity (IP): Not effective; 0% Following instructions (IP): Not effective; 50% (1/1 with 0 baseline) Sibling outcomes: Treatment integrity, social validity	SSRD Adequate
Park et al. (2011)	Independent picture exchanges (LC): Very effective; 90.47% Word vocalizations (LC): No visual representation Parent outcomes: Treatment integrity, social validity	SSRD Strong
Penny & Schwartz (2018)	Spontaneous imitation (IP): Questionable; 55% Parent outcome: Treatment integrity	SSRD Weak
Randolph et al. (2011)	Initiations (LC): Not effective; 0% Verbal responses (LC): Very effective; 100% (1/1 with 0 baseline) Non-verbal responses (LC): Not effective; 50% Appropriate play (IP): Very effective; 90%	SSRD Adequate

	Varied play (IP): Not effective; 0% Secondary outcomes: VABS-II Parent outcomes: Treatment integrity, social validity	
Reagon & Higbee (2009)	Unscripted verbal initiation in play (IP): Effective; 78.13% Parent outcomes: Treatment integrity	SSRD Adequate
Rocha et al. (2007)	Responding to joint attention (SE): Questionable; 51.77% Secondary outcomes: Initiating joint attention, coordinated joint attention Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Rogers et al. (2018)	*PATH Curriculum Checklist* (SE, LC, IP): Could not calculate effect size due to lack of no-treatment control group Secondary outcomes: ADOS-T, MSEL, Vineland-II, CBCL, Child Intervention History Parent outcomes: Treatment integrity, social validity	Group Strong
Rollins et al. (2016)	Eye contact (SE): Effective; 75% Social engagement (SE): Effective; 81.6% Verbal reciprocity (SE): Effective; 80.55% Non-verbal turn-taking (SE): Questionable; 62.15% (LE stage not included in calculation) Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Simacek et al. (2017)	AAC use (LC): Effective; 72.39% (1/7 with 0 baseline) Idiosyncratic communication (LC; for reduction): Effective; 85.1% (3/7 excluded due to floor effects; 1/7 with 100 baseline) Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Stahmer & Gist (2001)	Language use (LC) and communicative gestures (LC) Could not calculate effect size due to lack of true control group Parent outcomes: Treatment integrity	Groups Weak
Symon (2005)	Functional verbal utterances (LC) and appropriate behaviour (O): Effective; 73.35% (Follow-up data used as no intervention data provided; 1/3 participants excluded due to <3 baseline points) Parent outcomes: Treatment integrity of primary and significant caregivers	SSRD Weak
Tsao & Odom (2006)	Joint attention (SE): Effective; 75%	SSRD Weak

	Social behaviours (SE; verbal or nonverbal initiation or responses): Not effective; 41.1% Sibling outcomes: Treatment integrity, social validity (interaction quality)	
Vernon et al. (2012)	Eye contact (SE): Effective; 89.58% Verbal initiations (LC): Effective; 79.17% (1/3 with 0 baseline) Positive affect (O): Very effective; 93.75% Synchronous engagement (SE): Very effective; 95.83% (2/3 with 0 baseline) Parent outcomes: Treatment integrity, positive affect	SSRD Strong
Vismara et al. (2009)	Spontaneous verbal behaviour (LC), imitation (IP), attentiveness (SE), initiation (SE) Unable to calculate PND due to 8 data paths per graphs Secondary outcomes: ADOS; MSEL Parent outcomes: Treatment integrity	SSRD Weak
Vismara et al. (2018)	Imitation in play (IP): Medium; 0.51 Joint attention (SE): No significant differences Spontaneous functional verbal utterances (LC): Not reported Parent outcomes: Treatment integrity, website use, social validity	Group Strong
Vismara et al. (2013)	Functional verbal utterances (LC): Not effective; 16.66% Joint attention initiations (SE): Not effective; 15.64% Secondary outcomes: CDI Parent outcomes: Treatment integrity, website use, social validity, engagement style	SSRD Weak
Wainer & Ingersoll (2013)	Imitation (IP): Effective; 83.35% Parent outcomes: Treatment integrity, program utilization, knowledge of RIT, social validity	SSRD Strong
Wainer & Ingersoll (2015)	Imitation (IP): Not effective; 44% Parent outcomes: Treatment integrity, program engagement, parent knowledge, relationship between treatment integrity and imitation, social validity	SSRD Weak
Walton & Ingersoll (2012)	Imitation (IP): Not effective; 16.9% (3 excluded due to ceiling effect) Joint engagement (SE): Not effective; 14.15%	SSRD Weak

	Sibling outcomes: Treatment integrity, social validity (satisfaction and engaging sibling, having fun, 'typical' interaction via video ratings)	
Wang (2017)	Turn-taking (SE): Questionable; 63.75% Refusal (O; for reduction): Questionable; 68.63% Parent outcomes: Treatment integrity, social validity	SSRD Adequate
Zaghlawan & Ostrosky (2016)	Object imitation (IP): Not effective; 37,5% Gestural imitation (IP): Not effective; 50% (Calculated when relevant strategy was introduced) Parent outcomes: Treatment integrity, social validity	SSRD Weak

Category of social communication. SE: Social engagement. LC: Language and communication. IP: Imitation and play. O: Other.

Standardized assessments. ADOS: Autism Diagnostic Observation Schedule. CARS: Childhood Autism Rating Scale. CDI: MacArthur-Bates Communicative Development Inventories. CGI-S and CGI-I: Clinical Global Impression Scale severity and improvement subscales. EOWPVT-R: Expressive One Word Picture Vocabulary Test-Revised. ESCS: Early Social-Communication Scales. MIS: Motor Imitation Scale. MSEL: Mullen Scales of Early Learning. PLS-4: Preschool Language Scales, 4^{th} Edition. PLS-5: Preschool Language Scales, 5^{th} Edition. PPVT-III: Peabody Picture Vocabulary Test, 3^{rd} edition. PPVT-R: Peabody Picture Vocabulary Test-Revised. PSI: Parenting Stress Index. RDLS: Reynell Developmental Language scales. SALT: Systematic Analysis of Language Transcript program. SICD: Sequenced Inventory of Communication Development. SRS: Social Responsiveness Scale. Vineland-II: Vineland Adaptive Behavior Scales, Second Edition.

Research design. SSRD: Single-subject research design.

Participant Characteristics

The 54 included studies had a total of 653 participants. 23 participants were included in two studies, a randomized controlled trial (Hardan et al., 2015) and its 3-month follow-up study (Gengoux et al., 2015). 444 participants met inclusion criteria (not including participants who only participated in control conditions). 316 (71.2%) participants were male and 84 participants (18.9%) were female. Gender was not reported for 44 participants (9.9%). Participant age ranged from 19 to 69 months.

Intervention Agent Characteristics

Parents were trained to implement the intervention in 50 studies (92.6%), while siblings were trained in four studies (7.4%). None of the studies trained both parents and siblings together, however two studies (3.7%) trained parents directly and involved siblings indirectly (Jull & Mirenda, 2011; Madzharova & Sturmey, 2015). None of the telehealth interventions involved siblings. 193 mothers acted as intervention agents (43.8%), along with 24 fathers (5.4%), 8 brothers (1.8%), and 6 sisters (1.4%). 220 intervention agents were labelled as 'parent' and not specified as mother or father (49.9%).

Siblings ranged from 4 to 13 years old (*M*=7.86 years). One study reported that the siblings were verbal, exhibited strong interaction skills, and said that they would like to increase their interactions with their sibling with ASD (Oppenheim-Leaf et al., 2012). These siblings were reported to exhibit problem behavior. One sibling had undiagnosed sensory concerns as reported by his mother (Walton & Ingersoll, 2012). None of the siblings had cognitive or developmental concerns. No other sibling characteristics were noted in the articles.

Intervention Characteristics

Modality, Setting, and Dosage

Forty articles evaluated in-situ interventions (74.1%) and 14 articles evaluated telehealth or self-directed interventions (25.9%). Of the in-situ studies, 15 studies took place in a clinic (37.5%), while 18 studies took place in participants' homes (45%). Six studies (15%) took place in multiple settings. Twenty-one studies (38.9%) were categorized as low-dose interventions, 12 studies (22.2%) were categorized as medium-dose interventions, seven studies (13%) were categorized as high-dose interventions, and three studies (5.6%) were categorized as an extended intervention. Total hours were unclear in ten studies (18.5%). Session duration ranged from 5 minutes to 5 hours, and session frequency ranged from 3 per day to one per week. Intervention duration ranged from 5 days to one year.

Intervention Agent Training Methods

All studies (100%) used instructions to train the intervention agent, while 27 (50%) used modelling, 23 (42.6%) used video modelling, 15 (37.8%) used role play, and 34 studies (67%) used rehearsal and feedback. One study (1.9%) read a story with the sibling, and three studies (5.6%; 75% of sibling studies) used a reward system for participating. Of the 14 telehealth interventions, 4 (28.6%) involved partial in-situ training, 10 (71.4%) involved live videoconferencing, and 11 (78.6%) involved self-directed materials (e.g., self-directed websites, apps, videos).

Focused Intervention Practices

Given the selection criteria for this review, all studies used naturalistic intervention (NI; 100%) along with either parent-implemented intervention (PII; *n*=50, 92.6%) or peer-mediated instruction and intervention (PMII; *n*=4, 7.4%). PMII was coded for both sibling and non-sibling peer involvement. In addition, 48 studies used prompting (88.9%), 47 studies used reinforcement (87%), 43 used time delay (79.6%), 32 used modelling (59.3%), 17 used PRT (31.5%), 7 used functional behavior assessment (FBA; 13%), 3 used Discrete Trial Teaching (DTT; 5.6%), 2 used video modelling (3.7%), 2 used functional communication training (FCT; 3.7%), 1 used picture exchange communications system (PECS; 1.9%), and 1 used scripting (1.9%). Prompting, reinforcement, modelling, and time delay were coded where it was outlined within the intervention method, as well as when it was inherent within other FIPs used in the study (e.g., PRT, FCT, PECS), even if it was not explicitly described in the procedure.

Intervention Packages

The most commonly studied intervention was Pivotal Response Treatment (PRT; Koegel et al., 1987). Ten studies (18.5%) used PRT as a standalone intervention package, including a follow-up study and a self-directed study. Seven additional studies (13%)

combined PRT with other FIPs, four of which evaluated the Early Start Denver Model (ESDM; Vismara & Rogers, 2008) and three of which did not specify an intervention package. All PRT studies were delivered by parents. Six studies (11.1%) used Reciprocal Imitation Training (RIT; Ingersoll, 2008), including two telehealth studies and one sibling-mediated study. Four studies (7.4%) used ESDM, including two telehealth studies, and three studies (5.6%) used Project ImPACT, including two telehealth studies. Two studies (3.7%) used Milieu Teaching, including enhanced milieu teaching (EMT) and modified milieu teaching, and two studies (3.7%) used Joint Attention, Symbolic Play, Engagement & Regulation (JASPER), all delivered by parents. One study each (1.9%) used Natural Language Paradigm (NLP), a modified Parent-Child Interaction Therapy (PCIT), Pathways, Picture Exchange Communication System (PECS), Video Modeling Imitation Training (VMIT), and a combination of Stay-Play-Talk, Play Time/ Social Time, and Getting Along with Others. Other telehealth intervention packages include two studies (3.7%) that used Sunny Starts/Decide Arrange Now Count Enjoy (DANCE) and one study (1.9%) that used i-PiCS. All these studies were parent mediated. 17 studies (31.5%) used a combination of FIPs without labelling the intervention, including 3 sibling-mediated studies.

Dependent Variables and Collateral Outcomes

Dependent Variables

117 dependent variables were targeted as primary outcomes, and 6 dependent variables were measured as part of a 3-month follow-up (Gengoux et al., 2015). Primary outcomes were coded into social engagement skills (*n*=32; 28.3%), language and communication skills (*n*=55; 48.7%), and imitation and play skills (*n*=18; 15.9%). Two (1.8%) primary dependent variables were measured using only comprehensive assessments that included social communication skills across multiple domains. Six dependent variables

(5.3%) not directly related to social communication were also measured, including adaptive skills, compliance with instructions, and increasing appropriate behaviors or decreasing problem behaviors.

Collateral Outcomes for Child with ASD

Seventeen studies (31.5%) measured collateral outcomes for the child with ASD. Nine studies (16.7%) evaluated collateral outcomes using standardized pre-post measures that assessed multiple developmental domains (see Table 2 for specific measures). Seven studies (13%) measured specific untargeted behaviors, including joint attention (*n*=6), play (*n*=3), imitation (*n*=1), and affect (n=1).

Family Outcomes

Of the 50 parent-mediated studies, parent outcomes included treatment integrity (*n*=49; 86%), social validity (*n*=30; 50%), program engagement, e.g., DVD or website use (*n*=5; 10%), adherence and/or competence (*n*=3; 6%), knowledge of intervention and/or ASD (*n*=3; 6%), self-efficacy (*n*=2; 4%), quality of involvement (*n*=2; 4%), parent affect (*n*=2; 4%), stress and/or coping (*n*=2; 4%), family impact (*n*=1; 2%), engagement style (*n*=1; 2%), subjective distress (*n*=1; 2%), and observed confidence (*n*=1; 2%). Of the 4 sibling-mediated studies, sibling outcomes included fidelity (*n*=4; 100%) and social validity (*n*=4; 100%), including 2 studies (50%) that assessed social validity through video ratings of sibling interactions such as interaction quality and fun. The most measured outcome for family members was treatment integrity, although a consistent method for assessing treatment integrity was not found. The next most measured outcome for family members was social validity. To assess social validity, 29 studies (54.2%) administered questionnaires, 4 studies (6.3%) conducted open-ended interviews, and 3 studies (6.3%) used video ratings. All participants (100%) who completed questionnaires and open-ended interviews reported being satisfied with the intervention. 9 out of 10 implementers (90%) who were part of social validity video ratings were rated as meeting the author's criteria for social validity. 20 studies (37%) did not explicitly measure social validity.

Treatment Effects and Research Strength

Treatment Effects

Treatment effects were calculated for each primary dependent variable. Where treatment effects could not be calculated, those studies were excluded from the analyses below. In studies that utilized SSRDs, treatment effectiveness could not be calculated for 3 studies. One study used an AB within subject design (Hansen & Shillingsburg, 2016), one study did not provide visual representation of child outcomes (Mcduffie et al., 2013), and one study displayed 8 data paths per graph which made it impossible to calculate PND (Vismara et al., 2009). In studies that utilized group designs, effect sizes could not be calculated using Cohen's *d* for four studies that did not utilize true control groups. One study compared a self-directed and therapist-assisted model of Project ImPACT (Ingersoll et al., 2016), one study compared a parent education group with a parent education plus parent support group, with both groups being trained in PRT methods (Stahmer & Gist, 2001), one study compared a basic and enhanced model of ESDM (Rogers et al., 2019), and one study used pre-post measures (Mcgarry et al., 2019). Additionally, in four studies, treatment effects could be calculated for some, but not all, dependent variables (e.g., PND could be calculated for one dependent variable but could not be calculated for the second dependent variable as the second dependent variable was only measured pre- and post-intervention).

Research Strength

Among all 54 studies, 17 studies (31.5%) received a "strong" rating, 18 studies (33.3%) received an "adequate" rating, and 19 studies (35.2%) received a "weak" rating (See

Table 2). Among the 42 studies that utilized SSRD, 7 studies (16.7%) met criteria for a "strong" rating, 17 studies (40.5%) met criteria for an "adequate" rating, and 18 studies (42.9%) were given a "weak" rating. Among the 12 studies that utilized a group design, 10 studies (83.3%) met criteria for a "strong" rating and two studies (16.7%) were given a "weak" rating. One group study that received a "weak" rating was given this rating only because it did not specify the gender of the participants.

Target Skills, Intervention Agents, and Intervention Characteristics

Treatment effects and research strength were synthesized by target skills, intervention agents, and intervention characteristics, i.e., modality, setting, and dosage (see Table 2.3). Target skills that were categorized into the social engagement domain showed a higher percentage of treatment effectiveness (60% very effective or effective; 75% large or medium effect size), as compared to target skills in the language and communication domain (37.2% very effective or effective; 50% large or medium effect size) and imitation and play domain (43.8% very effective or effective; 100% large or medium effect size, $n=1$). Additionally, social engagement skills were targeted in a larger proportion of studies rated as strong or adequate (70%), compared to language and communication skills (59.3%) and imitation and play skills (58.3%). In two studies (Manohar et al., 2019; Rogers et al., 2018), primary dependent variables were only measured using comprehensive assessments [Childhood Autism Rating Scale (CARS; Schopler et al. 1980); PATH Curriculum Checklist (PATH CC; Rogers et al., 2013], which made it difficult to extract treatment effects for specific social communication categories. The comprehensive assessments measured skills from multiple domains but did not report specific data for each variable. Data from these studies were therefore not included in the calculations for treatment effects by social communication domains.

Parent-mediated interventions were coded as PII and sibling-mediated interventions were coded as PMII (see Table 2.4). Both types of intervention agents had similar proportions of very effective to effective treatment (46.3% for parents and 50% for siblings). However, parent-mediated studies (*n*=50) greatly outnumbered sibling-mediated studies (*n*=4), and parent-mediated studies had a higher proportion of studies rated as strong or adequate (68% compared to 25%).

Evaluating intervention modality, treatment effectiveness was similar in telehealth studies (44.4% very effective or effective) and in-situ studies (47.5% very effective or effective). A larger proportion of effect sizes were in the large or medium range for telehealth studies (100%) than for in-situ studies (50%), although there were more target skills measured in in-situ group studies (*n*=10) compared to telehealth (*n*=2). Telehealth had a smaller proportion of studies rated as strong or adequate (57.2% for telehealth and 66.7% for in-situ). Among in-situ studies, there was no difference in treatment effectiveness for intervention delivered in home (51.2% very effective or effective) or clinic (50% very effective or effective). The proportion of large or medium effect sizes was higher in home (100%) compared to clinic (50%), but fewer skills were targeted in home (*n*=1) than clinic (*n*=8). Research strength was similar across home (66.6% strong or adequate) and clinic studies (73.4% strong or adequate). Interventions in mixed settings had the lowest treatment effectiveness (16.7% very effective or effective) and research strength (50% strong or adequate), although the single outcome measures in a group study showed a large effect (100%).

When considering dosage, the relationship between treatment effects and intervention hours is uncertain. Extended-dose intervention had the highest proportion of skills improved with very effective or effective intervention (66.7%), followed by medium-dose (61.6%), high-dose (50%), and low-dose (39.1%). However, only 3 studies evaluated an extended intervention (Gumundsdottir et al., 2017; Kashinath et al., 2006; Rogers et al., 2019). Examining effect sizes, low- and high-dose interventions showed 100% large or medium effect sizes, compared to 50% for medium-dose and 0% for extended-dose.

FIPs and Intervention Packages

Treatment effects and research strength were synthesized for each FIP (see Table 2.4) and intervention package (see Table 2.5). PRT is separately conceptualized here as an FIP (combined with other FIPs into intervention packages such as ESDM) and as a standalone intervention package (not combined with other FIPs). PRT as an FIP was very effective or effective for 57.2% of target skills and demonstrated large or medium treatment effects for 44.4% of target skills, while PRT as a standalone intervention package was very effective or effective for 66.7% of target skills and demonstrated large or medium effects for 42.9% of target skills.

Most interventions combined at least two FIPs, making it difficult to attribute treatment effects to specific FIPs. All studies utilized naturalistic interventions. Given the inclusion criteria for this review, all studies utilized either parent-mediated intervention or peer-mediated intervention (i.e., sibling-mediated intervention). Unsurprisingly, prompting, reinforcement, modelling, and time delay were commonly utilized, as these practices are inherent to most behavioral interventions. Among the less utilized FIPs, FBA was very effective or effective for 71.5% of target skills and demonstrated large or medium effects for 50% of target skills, DTT was very effective or effective for 62.5% of target skills, and video modelling very effective or effective for 33.3% of target skills. Three FIPs (FCT, PECS, and scripting) demonstrated 100% very effective or effective treatment, however these FIPs were only used to target one (PECS and scripting) or two (FCT) skills.

After Z score calculations for intervention packages, PRT (*Z*=98), JASPER (*Z*=60), and ESDM (Z=60) qualified as established EBP, while Project ImPACT (*Z*=50) qualified as probable EBP. However, while treatment effects were promising for PRT (see above) and JASPER (100% large or medium effects), treatment effects were low for ESDM (0% very effective or effective; 50% large or medium effects) and Project ImPACT (0% very effective or effective; effect size could not be calculated due to lack of true control group). These four intervention packages were the only ones to be evaluated in group studies, which may have contributed to higher Z scores as group studies are weighted higher in calculation. PRT, Project ImPACT, and ESDM were all evaluated in both in-situ and telehealth modalities, while JASPER was only evaluated in-situ. None of these studies involved siblings.

Table 2.3
Treatment Effectiveness, Effect Sizes, and Research Strength by Intervention Characteristics

	Treatment effectiveness using PND*				Effect sizes using Cohen's *d**				Research strength**		
	Very effective	Effective	Question-able	Not effective	Large	Medium	Small	Trivial or none	Strong	Adequate	Weak
Target skills											
SE	6 (24%)	9 (36%)	5 (20%)	5 (20%)	2 (50%)	1 (25%)	0 (0%)	1 (25%)	6 (30%)	8 (40%)	6 (30%)
LC	5 (14.3%)	8 (22.9%)	9 (25.7%)	13 (37.1%)	3 (50%)	0 (0%)	1 (16.7%)	2 (33.3%)	9 (28%)	10 (31.3%)	13 (40.6%)
IP	3 (18.8%)	4 (25%)	1 (6.3%)	8 (50%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	3 (25%)	4 (33.3%)	5 (41.7%)
Modality											
TH	2 (11.1%)	6 (33.3%)	3 (16.7%)	7 (38.9%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	4 (28.6%)	4 (28.6%)	6 (42.9%)
In-situ	13 (21.3%)	16 (26.2%)	14 (23%)	18 (29.5%)	4 (40%)	1 (10%)	3 (30%)	2 (20%)	12 (30.8%)	14 (35.9%)	13 (33.3%)
Setting											
Home	10 (25.6%)	10 (25.6%)	8 (20.5%)	11 (28.2%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	6 (33.3%)	6 (33.3%)	6 (33.3%)
Clinic	3 (18.8%)	5 (31.2%)	3 (18.8%)	5 (31.2%)	4 (50%)	0 (0%)	2 (25%)	2 (25%)	4 (26.7%)	7 (46.7%)	4 (26.7%)
Mixed	0 (0%)	1 (16.7%)	3 (50%)	2 (33.3%)	---	---	1 (100%)	---	2 (33.3%)	1 (16.7%)	3 (50%)
Dosage											
Low	9 (22%)	7 (17.1%)	6 (14.6%)	19 (46.3%)	2 (66.7%)	0 (0%)	1 (33.3%)	0 (0%)	7 (33.3%)	6 (28.6%)	8 (38.1%)
Medium	2 (15.4%)	6 (46.2%)	3 (23.1%)	2 (15.4%)	3 (37.5%)	1 (12.5%)	2 (25%)	2 (25%)	5 (41.7%)	4 (33.3%)	3 (25%)
High	1 (16.7%)	2 (33.3%)	0 (0%)	3 (50%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	2 (28.6%)	2 (28.6%)	3 (50%)
Extended	0 (0%)	2 (66.7%)	1 (33.3%)	0 (0%)	---	---	---	---	1 (33.3%)	2 (66.7%)	0 (0%)

**N* target skills classified by level of effectiveness (percentage of target skills classified by level of effectiveness)
***N* articles classified by research strength (percentage of articles classified by research strength)
SE: Social engagement. LC: Language and communication. IP: Imitation and play. TH: Telehealth.

Table 2.4
Treatment Effectiveness, Effect Sizes, and Research Strength by Focused Intervention Practice (FIP)

	Treatment effectiveness using PND*				Effect sizes using Cohen's *d**				Research strength**		
	Very effective	Effective	Question-able	Not effective	Large	Medium	Small	Trivial or none	Strong	Adequate	Weak
DTT	2 (25%)	3 (37.5%)	2 (25%)	1 (12.5%)	---	---	---	---	1 (33.3%)	1 (33.3%)	1 (33.3%)
FBA	2 (28.6%)	3 (42.9%)	0 (0%)	2 (28.6%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	3 (42.9%)	1 (14.3%)	3 (42.9%)
FCT	2 (50%)	2 (50%)	0 (0%)	0 (0%)	---	---	---	---	1 (50%)	1 (50%)	0 (0%)
MD	6 (15%)	10 (25%)	9 (22.5%)	15 (37.5%)	6 (42.9%)	2 (14.3%)	3 (21.4%)	3 (21.4%)	12 (37.5%)	5 (15.6%)	15 (46.9%)
PECS	1 (100%)	0 (0%)	0 (0%)	0 (0%)	---	---	---	---	1 (100%)	0 (0%)	0 (0%)
PII	12 (17.9%)	19 (28.4%)	16 (23.9%)	20 (29.9%)	5 (38.5%)	2 (15.4%)	3 (23.1%)	3 (23.1%)	17 (34%)	17 (34%)	16 (32%)
PMII	3 (25%)	3 (25%)	0 (0%)	6 (50%)	---	---	---	---	0 (0%)	1 (25%)	3 (75%)
PP	13 (19.7%)	16 (24.2%)	12 (18.2%)	25 (37.9%)	5 (41.7%)	2 (16.7%)	3 (25%)	2 (16.7%)	16 (33.3%)	14 (29.2%)	18 (37.5%)
PRT	6 (28.6%)	6 (28.6%)	3 (14.3%)	6 (28.6%)	3 (33.3%)	1 (11.1%)	2 (22.2%)	3 (33.3%)	7 (41.2%)	3 (17.6%)	7 (41.2%)
R+	15 (20.5%)	20 (27.4%)	13 (17.8%)	25 (34.2%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	2 (28.6%)	13 (28.2%)	16 (34.8%)	17 (37%)
SC	0 (0%)	1 (100%)	0 (0%)	0 (0%)	---	---	---	---	0 (0%)	1	0 (0%)
SN	---	---	---	---	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)
TD	12 (18.5%)	20 (30.8%)	13 (20%)	20 (50.8%)	4 (44.4%)	2 (22.2%)	1 (11.1%)	2 (22.2%)	13 (31%)	15 (35.7%)	14 (33.3%)
VM	1 (33.3%)	0 (0%)	2 (66.7%)	0 (0%)	---	---	---	---	1 (50%)	1 (50%)	0 (0%)

**N* target skills classified by level of effectiveness (percentage of target skills classified by level of effectiveness)
***N* articles classified by research strength (percentage of articles classified by research strength)
Adapted from Wong et al., 2015. DTT: Discrete Trial Training. FBA: Functional Behaviour Assessment. FCT: Functional Communication Training. MD: Modelling. PII: Parent-implemented intervention. PMII: Peer-mediated instruction or intervention. PP: Prompting. PRT: Pivotal Response Treatment. R+: Reinforcement. SC: Scripting. SN: Social narratives. TAII: Technology-aided instruction and intervention. TD: Time delay. VM: Video modelling.

Table 2.5

Treatment Effectiveness, Effect Sizes, and Research Strength by Intervention Package

	Treatment effectiveness using PND*				Effect sizes using Cohen's *d**				Research strength**				
	Very effective	Effective	Question-able	Not effective	Large	Med-ium	Small	Trivial or none	Strong	Ade-quate	Weak	Z score	EBP
ESDM	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	1 (50%)	0 (%)	1 (50%)	2 (50%)	0 (0%)	2 (50%)	60	Esta-blished
i-PiCS	0 (0%)	1 (50%)	1 (50%)	0 (0%)	---	---	---	---	0 (0%)	0 (0%)	1 (100%)	0	No
JASPER	---	---	---	---	1 (50%)	1 (50%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)	60	Esta-blished
Milieu training	2 (66.7%)	0 (0%)	1 (33.3%)	0 (0%)	---	---	---	---	2 (100%)	0 (0%)	0 (0%)	20	No
NLP	0 (0%)	1 (50%)	0 (0%)	1 (50%)	---	---	---	---	0 (0%)	1 (100%)	0 (0%)	6	No
Pathways	0 (0%)	3 (75%)	1 (25%)	0 (0%)	---	---	---	---	0 (0%)	1 (100%)	0 (0%)	8	No
PCIT	0 (0%)	0 (0%)	0 (0%)	0 (0%)	---	---	---	---	0 (0%)	0 (0%)	1 (100%)	0	No
PECS	1 (100%)	0 (0%)	0 (0%)	0 (0%)	---	---	---	---	1 (100%)	0 (0%)	0 (0%)	12	No
PRT	4 (33.3%)	4 (33.3%)	1 (8.3%)	3 (25%)	3 (42.9%)	0 (0%)	2 (28.6%)	2 (28.6%)	4 (40%)	2 (20%)	4 (40%)	98	Esta-blished
Project ImPACT	0 (0%)	0 (0%)	1 (20%)	4 (80%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (66.6%)	1 (33.3%)	0 (0%)	50	Probable
RIT	0 (0%)	2 (22.2%)	1 (11.1%)	6 (66.7%)	---	---	---	---	1 (16.7%)	1 (16.7%)	4 (66.7%)	6	No
S-P-T	0 (0%)	1 (50%)	0 (0%)	1 (50%)	---	---	---	---	0 (0%)	0 (0%)	1 (100%)	0	No
Sunny Starts	1 (25%)	2 (50%)	0 (0%)	1 (25%)	---	---	---	---	0 (0%)	2 (100%)	0 (0%)	4	No
VMIT	1 (100%)	0 (0%)	0 (0%)	0 (0%)	---	---	---	---	1 (100%)	0 (0%)	0 (0%)	16	No

**N* target skills classified by level of effectiveness (percentage of target skills classified by level of effectiveness)

***N* articles classified by research strength (percentage of articles classified by research strength)

EBP: Evidence-based practice. ESDM: Early Start Denver Model. JASPER: Joint Attention, Symbolic Play, Engagement & Regulation. NLP: Natural Language Paradigm. PCIT: Parent Child Interaction Therapy. PECS: Picture Exchange Communication System. PRT: Pivotal Response Training. RIT: Reciprocal Imitation Training. S-P-T: Stay-Play-Talk. VMIT: Video Model Imitation Training.

Generalization

Generalization Promotion Strategies

Generalization promotion strategies are outlined in Table 2.6. In the category of exploiting current functional contingencies, 54 studies (100%) recruited natural contingencies and targeted functional behaviors, 40 studies (74.1%) involved contacting natural reinforcement, 14 studies (25.9%) involved modifying maladaptive consequences, and 12 studies (22.2%) specified reinforcement of occurrences of generalization. In the category of training diversely, 42 studies (77.8%) used sufficient stimulus exemplars, 34 studies (63%) used sufficient response exemplars, 9 studies (16.7%) made antecedents or consequences less discriminable, 37 studies (68.5%) occurred across settings or in natural settings, and 6 studies (11.1%) involved skills teaching across people. In the category of incorporating functional mediators, 54 studies (100%) programmed common stimuli and 5 studies (9.3%) incorporated self-mediated stimuli. Two studies (3.7%) used sequential modification.

Generalization Dimension

16 studies (29.6%) evaluated generalization across settings or situations, 13 studies (24.1%) evaluated generalization across materials, and 8 studies (14.8%) evaluated generalization across people. 33 studies (61.1%) measured generalization across time (i.e., maintenance). 14 studies (25.9%) did not measure any generalization dimension.

Generalization Outcomes

Of the 40 studies that measured generalization, one study (2.5%) demonstrated failure to generalize, 26 studies (65%) demonstrated partial generalization, and 11 studies (27.5%) demonstrated complete generalization. Latency to maintenance probe ranged from one week to 12 months. Of the 33 studies that measured maintenance, four studies (12.1%) had unclear latency. 23 studies (69.7%) measured maintenance once after treatment, 3 studies (9.1%)

measured twice, and 5 studies (15.2%) measured 3 or more times. The maximum number of maintenance checks was 6.

Table 6

Generalization Measures and Outcomes

Reference	Generalization promotion strategies*	Generalization dimension	Generalization outcome	Latency to maintenance probe
Cardon (2012)	FB, RNC, SR, S, PCS	Materials, maintenance	Partial	1 week and 3 weeks
Coolican et al. (2010)	FB, CNC, RNC, MMC, SR, S, PCS	Maintenance	Partial	2-4 months
Ferraioli & Harris (2011)	FB, CNC, RNC, S, PCS	Setting and people, maintenance	Partial	3 months
Gengoux et al. (2015)	See Hardan et al. (2015)	Maintenance (follow-up study to Hardan et al., 2015)	Complete (groups design)	3 months
Gillett & Leblanc (2007)	FB, CNC, RNC, RG, SS, SR, S, PCS	Setting and materials	Partial	None
Guðmundsdóttir et al. (2019)	FB, CNC, RNC, SS, SR, S, PCS	Setting, maintenance (2/3)	Partial	1-3 months
Guðmundsdóttir et al. (2017)	FB, CNC, RNC, SS, SR, S, PCS	Maintenance	Partial	1 month
Hansen et al. (2018)	FB (joint attention), RNC, SS	Maintenance	Partial	3 weeks
Hansen & Shillingsburg (2016)	FB, RNC, MMC, SS	None	N/A	None
Hardan et al. (2015)	FB, CNC, RNC, SR	See Gengoux et al., 2015	See Gengoux et al., 2015	See Gengoux et al., 2015
Hong et al. (2018)	FB, CNC, RNC, SS, SR, S, PCS	Maintenance	Partial	1 month
Ingersoll & Gergans (2007)	FB, RNC, SS, SR	Setting and materials, maintenance	Partial	1 month

Ingersoll & Wainer (2013)	FB, CNC, RNC, SS, SR, S, PCS	Setting and materials, maintenance	Partial	1 month
Ingersoll et al. (2016)	FB, CNC, RNC, SS, SR, S, PCS	Maintenance	Complete (group design)	3 months
Jones & Feeley (2007)	FB, CNC, RNC, SS, LD, S, MA	Materials	Complete (data for one participant lost)	None
Jull & Mirenda (2011)	FB, CNC, RNC, SS, S, PCS	None	N/A	None
Kaiser et al. (2000)	FB, CNC, RNC, SS, SR	Setting and materials, maintenance	Partial	Once a month for 6 months
Kasari et al. (2015)	FB, CNC, RNC, SS, S, PCS	Setting and people, maintenance	Partial (Group design)	6 months
Kasari et al. (2010)	FB, CNC, RNC, RG, SS	Maintenance	Partial	12 months
Kasari et al. (2014)	FB, CNC, RNC, SS, S	Maintenance	Complete (Group design)	3 months
Kashinath et al. (2006)	FB, CNC, RNC, RG, SS, S, PCS	Setting and materials	Partial	None
Koegel et al. (2002)	FB, CNC, RNC, RG, SS, SR, S, MA	Maintenance	Complete	Variable (3-12 months)
Lane et al. (2016)	FB, CNC, RNC, SS	Maintenance (1/2 participants)	Complete	3 weeks
Law et al. (2018)	FB, CNC, RNC, RG, SS, SR, S, SM	Setting	Partial	1 month
Loughrey et al. (2014)	FB, CNC, RNC, MMC, LD, S, MA, PCS	People, maintenance	Partial	4-5 weeks
Madzharova & Sturmey (2015)	FB, RNC, MMC, S	Materials	Complete (1 participant)	None
Mancil et al. (2009)	FB, CNC, RNC, MMC, SS, S, SMS, PCS	Setting and people, maintenance	Complete	2 weeks

Manohar et al. (2019)	FB, CNC, RNC, RG, SS, SR, S, PCS	None	N/A	N/A
McDuffie et al. (2013)	FB, CNC, RNC, SS, SR, S, PCS	None	N/A	None
McGarry et al. (2019)	FB, CNC, RNC, SS, SR, S, PCS	None	N/A	N/A
Meadan et al. (2016)	FB, CNC, RNC, SR, S, PCS	Setting, maintenance	Partial	Unclear
Nefdt et al. (2010)	FB, CNC, RNC, MMC, S, SR, PCS	None	N/A	None
Nunes & Hanline (2007)	FB, CNC, RNC, SS, S, SMS, PCS	Setting and materials	Partial	None
Oppenheim-Leaf et al. (2012)	FB, RNC, MMC, SS, S, PCS	None for children with ASD (siblings were primary participants)	N/A	None
Park et al. (2011)	FB, CNC, RNC, MMC, SS, SR, LD, S, PCS, SMS	People, maintenance	Complete	1x/week for 1 month
Penny & Schwartz (2018)	FB, RNC, SS, SR, S	None	N/A	N/A
Randolph et al. (2011)	FB, CNC, RNC, SS, SR	Maintenance	Partial	2 weeks (1-4 follow-up sessions)
Reagon & Higbee (2009)	FB, CNC, RNC, RG, SS, SR, LD, S, PCS, SMS	Materials, maintenance	Complete	2 weeks
Rocha et al. (2007)	FB, CNC, RNC, RG, SS, LD, S	Setting and materials, maintenance	Partial	Unclear
Rollins et al. (2016)	FB, CNC, RNC, S, PCS	None	N/A	None
Rogers (2018)	FB, CNC, RNC, MMC, RG, SS, SR, LD, S, PCS	None	N/A	N/A
Simacek et al. (2017)	FB, CNC, RNC, MMC, SS, S, MA, PCS, SMS	None	N/A	None

Stahmer & Gist (2001)	FB, CNC, RNC, SS, SR	None	N/A	None
Symon (2005)	FB, CNC, RNC, MMC, RG, SS, SR, S, MA, PCS	~~Setting, materials, and people,~~ Maintenance	Complete	2 weeks-3 months
Tsao & Odom (2006)	FB, RNC, S, PCS	Setting, maintenance	Failure	Unclear
Vernon et al. (2012)	FB, CNC, RNC, SS, SR, S, PCS	Setting, maintenance	Partial	1 week
Vismara et al. (2009)	FB, CNC, RNC, MMC, SS, SR, LD, S, PCS	People, maintenance	Partial	2 weeks, 4 weeks, 3 months, and 4 months
Vismara et al. (2018)	FB, CNC, RNC, MMC, RG, SS, SR, LD, S, PCS	Maintenance	Unclear	12 weeks
Vismara et al. (2013)	FB, CNC, RNC, MMC, RG, SS, SR, LD, S, PCS, SM	Maintenance	Partial	1x/month for 3 months
Wainer & Ingersoll (2013)	FB, RNC, SS, SR, S	None	N/A	None
Wainer & Ingersoll (2015)	FB, RNC, SR, S, PCS	Maintenance	Partial	1 month and 3 months
Walton & Ingersoll (2012)	FB, RNC, SS, SR, S, MA	Setting, materials, and people, maintenance	Partial	1 month
Wang (2017)	FB, RNC, SS, SR, S	People and materials, maintenance	Partial	1 week and 1 month
Zaghlawan & Ostrosky (2016)	FB, RNC, SS, SR, S	None	N/A	None

Discussion

The purpose of this review was to synthesize and evaluate the literature on family-mediated interventions in order to identify the characteristics that impact treatment effectiveness along with generalization strategies and outcomes. 54 studies were included in this review. 74% of the included studies were published in or after 2010, corroborating the recent interest in family-mediated interventions and the relative infancy of the literature on this topic. The current review focused on interventions aiming to improve social communication skills in children with ASD. Social communication was categorized into social engagement, language and communication, and imitation and play. Treatment was evaluated as slightly more effective for social engagement skills when compared to language and communication skills and imitation and play skills, although not by a wide margin.

Consistent with the parent training literature, mothers were found to participate most often in family-mediated interventions. Only four studies investigated sibling-mediated interventions, with 75% of these studies rated as weak. Treatment was found to be very effective or effective for half of the target skills. The study that received an adequate rating (Oppenheim-Leaf et al., 2012) was found to be very effective at improving sharing behaviors and effective at improving play with others. The "weak" studies were shown to be very effective at increasing verbal initiation (Ferraioli & Harris, 2011) and very effective or effective at improving joint attention skills (Ferraioli & Harris, 2011; Tsao & Odom, 2006). Qualitatively, parents reported increased cooperative play, shared enjoyment, amount of time spent together, and improved interaction quality (Ferraioli & Harris, 2011; Oppenheim-Leaf et al., 2012). Taken together, the results tentatively point towards social engagement as a target skill area for researchers and clinicians interested in involving siblings in intervention. The current evidence for sibling-mediated intervention is still weak. However, given the small number of studies, the recent emergence of research interest, and the potential for positive outcomes for children with ASD and their siblings, more high-quality research in this area is recommended.

None of the included studies involved training both parents and siblings, although two studies trained parents directly and involved siblings indirectly. In one study, parents were trained to facilitate play sessions involving mutually reinforcing activities and cooperative arrangements; one of the parent participants arranged for the child's older sister to act as his play partner (Jull & Mirenda, 2011). This intervention was very effective at increasing synchronous reciprocal interactions between siblings. The other study trained parents to teach peer-to-peer manding; one of the parent participants chose to involve the child's younger sister as his peer partner (Madzharova & Sturmey, 2015). In this case, the intervention was not effective at improving the child's independent requests to the sibling. Future research could examine child and family characteristics (e.g., developmental level, communication status, and areas of strength, challenge, and interest) that determine the most beneficial model of sibling-mediated intervention for each family unit (Wright & Benigno, 2019). For instance, researchers could compare horizonal, vertical, and pyramidal approaches, in which the practitioner trains the child and sibling on the same skills together, the practitioner trains the sibling to teach skills to the child, or the practitioner trains parents to teach one or both of their children.

Telehealth is a promising intervention modality due to the potential increased access to intervention for families living in areas where access to evidence-based intervention is scarce. These interventions could also increase access for families who experience barriers related to logistical challenges such as scheduling or childcare issues. Fourteen telehealth studies were evaluated in this review. Telehealth parent training methods included live videoconferencing, self-paced videos, websites, or apps, and training manuals. Training methods typically utilized in-situ, including providing instructions, modelling (in the form of video modelling), rehearsal, and feedback, were also utilized in most telehealth interventions. Treatment effects were similar for telehealth and in-situ interventions, suggesting that children were as able to make gains regardless of whether parents were trained remotely or face-to-face. This represents a promising opportunity for expanding the reach of evidence-based interventions, with minimal sacrifice in terms of outcome.

Surprisingly, of the in-situ interventions, no difference was found in treatment effects between home and clinic settings. We hypothesized that interventions set in the family's home would facilitate both family and child learning, however this was not demonstrated in the current review. Additionally, it would be reasonable to assume that home-based interventions would increase access and adherence by reducing time and resource barriers for families. Given that clinic-based interventions allow clinicians to maximize their clinical time by eliminating commutes between families, the decision to provide home or clinic-based services may be best made on a case-by-case basis.

Greater intervention intensity has historically been associated with greater child gains (e.g., Eldevik et al., 2010; Magiati et al., 2007; Virues-Ortega et al., 2013). Most of the studies in this review provided low to medium hours of intervention (≤20 hours), potentially because of the inherent dynamics of involving family members. Treatment effects demonstrated mixed results based on dose, with no apparent benefit to delivering additional hours of intervention. This is consistent with recent meta-analyses that did not find treatment effects of dosage in parent-mediated interventions (Nevill et al., 2018) and social-communication interventions (Fuller & Kaiser, 2019). There may be advantages to providing lower-dose interventions, such as increasing parents' attendance and adherence (Carr et al., 2016). When involving family members in intervention, it is important to consider its potential effects on the family as a whole and weigh the costs and benefits of increased expectations on the family member delivering the intervention. For instance, in one of the included studies, three parents reported difficulty implementing the intervention at home due to comorbid Attention-Deficit Hyperactivity Disorder (ADHD), and two parents reported difficulty due to personal distress and lack of social support (Manohar et al., 2019). Few studies measured family outcomes other than treatment integrity and social validity. Future studies should consider the collateral effects of intervention on the child and family unit.

Three intervention packages, PRT, ESDM, and JASPER, qualified as established EBPs, while Project ImPACT qualified as a probable EBP. However, Project ImPACT and ESDM did not show strong treatment effects. All these interventions were only evaluated with parents delivering the intervention; adapting these interventions for sibling involvement may provide further opportunities to improve outcomes for the child and family. Several other intervention packages were shown to be very effective or effective for at least two thirds of the target skills, even though their Z scores were not yet high enough to qualify as established or probable EBP. These packages include milieu training, PECS, VMIT, Pathways, and Sunny Starts/DANCE. More research evaluating these intervention packages is recommended. Similarly, focused intervention practices such as FBA, DTT, FCT, PECS, and scripting showed promising treatment effects, but were only utilized in a small number of studies. Incorporating these FIPs into other intervention packages could potentially improve outcomes, depending on child characteristics and target skills.

A major consideration of family-mediated intervention is the potential for generalization, which is often challenging for children with ASD (Vismara & Rogers, 2010). While it is discouraging that a quarter of studies did not evaluate any generalization dimension, it is assuring that among the studies that did evaluate at least one generalization dimension, over 90% demonstrated complete or partial generalization outcomes. Several strategies for promoting generalization are intrinsic to family-mediated intervention, such as recruiting natural contingencies and programming common stimuli. Potentially due to the primary role of family members in family-mediated interventions, addressing functional behaviors, contacting natural reinforcement, and conducting intervention in natural or multiple settings was also prevalent. Less utilized strategies included modifying maladaptive consequences, reinforcing occurrences of generalization, making antecedents or consequences less discriminable, and teaching skills across different people. These strategies are less inherent in family-mediated intervention and would require conscious effort on the part of the clinician to incorporate these strategies. The least utilized generalization promotion strategy was sequential modification, in which further strategies are employed to promote generalization if generalization results are not satisfactory. This could be due to the limitations of conducting research studies (e.g., time constraints) and may not reflect the reality occurring in clinical intervention. The lack of studies that take place in the clinical “real world” has been previously noted (Beaudoin et al., 2014).

Limitations

The articles included in this review were evaluated for quality using Reichow’s (2008) operationalized rubric. It should be noted that this evaluative method has different criteria for SSRD and group comparison designs. Primary quality indicators for SSRD rely on strong research design as well as positive results (i.e., baseline, visual analysis, experimental control), while primary quality indicators for group comparison designs rely on strong research design alone, with no indicators related to results. Additionally, the stringent requirements for primary quality indicators lead to an “unacceptable” rating for baseline if even one out of several baselines is unstable, and an “unacceptable” rating for experimental control if even one out of several data paths did not demonstrate change in the dependent variable with introduction of the independent variable. This may explain the large proportion of “weak” ratings for studies that employed SSRD. Likewise, studies that employed a group design could obtain a “strong” rating even if results were negative or inconclusive. Previous reviews (e.g., Ferguson et al., 2018; Tomlinson et al., 2018) have noted similar issues using this evaluative method. In the current review, these potential discrepancies were partly accounted for by including additional evaluation of treatment effects using PND and Cohen's *d*. Future reviews could evaluate methodological rigor using additional or alternative operationalized methods (e.g., What Works Clearinghouse, 2010).

Treatment effects were only calculated for primary outcome variables, i.e., target skills. Treatment effects were not calculated for secondary outcomes. Future studies could evaluate the relationship between target skills and collateral effects, as this could provide valuable information on which target skills would have the widest-reaching impact on the child and family unit. Collateral benefits have been shown when social communication skills are improved (Ledbetter-Cho et al., 2017), however this has not been systematically evaluated in family-mediated interventions.

Summary

In the current review, parent-mediated PRT, ESDM, and JASPER were the only intervention packages that qualified as established EBP. Treatment was more effective for social engagement skills compared to language and communication skills and imitation and play skills. No major differences in treatment effects were found based on intervention agent, treatment modality, setting, or dosage. Generalization outcomes were encouraging, although more focus should be placed on incorporating additional generalization promotion strategies into family-mediated interventions. Sibling-mediated intervention, while still in its infancy in the literature, has the potential for meaningful impact when incorporated into clinical practice. A further avenue of research could be to explore interventions that involve the complete family unit by addressing motivational variables and intervention outcomes of parents, siblings, and children with ASD to promote integrated learning and benefits within the family. Telehealth is also a promising area of further research, not only during the current climate of social restrictions due to the COVID-19 pandemic, but also when moving forward to reach families who previously had limited access to evidence-based intervention.

3. Developing the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) tool for Behavior Analysts

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Abstract

Parent engagement in early behavioral intervention is essential to achieving meaningful intervention outcomes. However, parents have reported multiple barriers to engagement. The Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) was developed to help practitioners assess families' barriers and facilitators, individualize their intervention, and respond to stressors using a contextual, functional approach. An expert panel of Board Certified Behavior Analysts ® (BCBAs) evaluated the content validity of the PAIRS. Average scale values (S-CVI/Ave) were 0.92 for relevance, 0.85 for effectiveness, and 0.91 for appropriateness. The PAIRS was revised, and a follow-up evaluation was conducted to rate the tool's potential utility. This led to the final version of the PAIRS. Clinical implications and future directions are discussed.

Keywords: autism, family-mediated interventions, parent training, engagement

Introduction

Parent-implemented intervention (PII) is an established evidence-based intervention for improving social communication skills and decreasing problem behavior in children with autism (National Autism Centre, 2015; Steinbrenner et al., 2020), and parent involvement is a critically important element of early behavioral intervention (Division for Early Childhood, 2014; Hyman et al., 2020; National Research Council, 2001). Several systematic reviews (e.g., Akamoglu & Meadan, 2018; Black & Therrien, 2018; Pacia et al., 2021) and meta-analyses (Hampton et al., 2016; Nevill et al., 2018; Roberts et al., 2019) of PIIs have shown positive outcomes in the child's language and communication, social engagement, and cognitive and adaptive functioning. Additionally, parents who engage in parent training programs have reported improvements in stress (e.g., Dillenburger et al., 2004; Rosenthal et al., 2019), mental health (Tonge et al., 2006), optimism (Koegel et al., 1982), self-efficacy (Iadarola et al., 2018), and parent-child interactions (Koegel et al., 1996; Oono et al., 2013).

Parent engagement is critical for the effectiveness of PIIs for young children with autism (e.g., Oono et al., 2013; Schreibman et al., 2015; Stahmer et al., 2011). Parent engagement has been operationalized in three primary domains: attendance, adherence, and cognitions (Becker et al., 2015; Staudt, 2007). Attendance (i.e., enrollment, session attendance, and completion of treatment) is necessary for the other two components of engagement. Adherence (i.e., participation during sessions and use of strategies between sessions) helps to enhance learning of new skills (Kaminski et al., 2008; Nock & Ferriter, 2005) and increases the likelihood that they are generalized to the family's everyday life (Karver et al., 2006; Kazantzis et al., 2010). The final component of engagement involves private events such as agreement with treatment rationale, therapeutic alliance, expectations about treatment outcomes, and satisfaction with treatment.

Simply put, engagement involves a parent who enrolls in and attends coaching sessions, applies strategies learned in those sessions to their daily life, and whose needs, preferences, beliefs, and values are in *concordance* with the rationale, goals, and methods of intervention. The term "concordance" has been advanced in related fields to replace the term "adherence" (e.g., Bissonnette, 2008; Dickinson et al., 1999; Snowden et al., 2013). Concordance emphasizes the collaborative relationship between practitioners and parents, such that the practitioner is responsible for ensuring goodness-of-fit between their intervention and the family's context. The present paper will use the term "adherence" to remain consistent with the parent engagement literature, however, references to concordance will be made where applicable.

A Functional, Contextual Approach to Engagement

Parent engagement has been identified as the lowest in behavioral interventions, compared with speech-language therapy, occupational therapy, developmental treatments, dietary interventions, and medication (Hock et al., 2015a; Moore & Symons, 2009; Shepherd et al., 2018). Additionally, parents have demonstrated difficulties with using behavioral strategies outside the intervention setting and after intervention has ended (Moore & Symons, 2009, 2011; Pickles et al., 2016). While this may be discouraging to behavioral practitioners, it is important to identify the function – the *why* – of low engagement before attempting to address it.

Allen and Warzak (2000) proposed a functional assessment of parental adherence by presenting an analysis of contingencies, including establishing operations (e.g., failure to establish early outcomes as reinforcers for engagement), stimulus generalization (e.g., insufficient training across different contexts), response acquisition (e.g., excessive complexity of intervention strategies), and consequent events (e.g., competing environmental contingencies). For instance, a parent's engagement may decline when the intervention strategies fail to produce immediate changes in their child's behavior. By setting realistic expectations from the outset, the practitioner can establish intermediate outcomes (e.g., child appropriately requesting ice cream instead of hitting) as reinforcers for adherence when access to the parents' end goal (e.g., child tolerating being denied ice cream) is delayed.

Meanwhile, Fryling (2014) outlined a contextual approach to non-adherence, with an emphasis on addressing their wider context, i.e., potential background factors such as stress or isolation. When practitioners respond to non-adherence without considering the family context, they may inadvertently worsen adherence. For instance, in cases where the function of non-adherence is avoiding stress, simply providing additional training as a blanket response could make adherence even more aversive. By providing a function-based response that takes contextual setting factors into account, such as facilitating breaks or respite, improvements can be made not only in adherence but in the family's health, well-being, and relationships. Thus, identifying the function of non-adherence and specific barriers to engagement can have a positive impact on intervention outcomes, along with collateral benefits for the family.

Factors Affecting Engagement

Identifying and functionally addressing barriers to parent engagement is a challenging and prevalent facet of applied practice (Ingersoll et al., 2020), and as such, has garnered research attention, a sample of which is outlined below. The Barriers-to-Treatment Participation Scale (BTPS; Kazdin et al., 1997), which was developed to measure barriers to participation in outpatient therapy for children and families, suggests that barriers to treatment include stressors and obstacles that complete with treatment, treatment demands and issues, perceived relevance of treatment, and relationship with the therapist. While this measure was not specifically intended for families of children with autism, parents of children with autism have indeed been found to be more likely to engage in behavioral interventions if the intervention is perceived to be effective (Bowker et al., 2011; Moore & Symons, 2011; Solish & Perry, 2008) and if it is not too burdensome (Carlon et al., 2013) or complex (Osborne et al., 2008). Other factors that have been found to impact engagement include access to funding, treatment contextualization (i.e., the degree to which the treatment focus matches family needs and the approach fits with their available resources and caregiving style), spousal agreement on goals and strategies, parental confidence and self-efficacy, and perceived acceptance of the child in the family and community (McConnell et al., 2015; Moore & Symons, 2011; Shepherd et al., 2018). Barriers to engagement can be thus multiple and complex, and span a wide range of factors, including logistical, sibling, child, parent, and intervention factors.

Qualitative studies have also been used to elucidate common themes in parents' barriers and facilitators to treatment engagement (e.g., Amsbary et al., 2020; Hock et al., 2015b; Mackintosh et al., 2012; Raulston et al., 2018; Stahmer et al., 2017). The most common themes were parents' relationship with the practitioner and program logistics such as distance, scheduling, and childcare. Other themes included perceived effectiveness and relevance of the intervention, costs in terms of money, time, and energy, parent stress and overwhelm, social support, effective training approaches, match between intervention design and child skills, and overall satisfaction, particularly relating to improved parent-child relationships. Given the body of literature regarding barriers to engagement, identifying the resources necessary to adhere to the treatment, monitoring the ongoing burden on families, and discussing and working collaboratively to find solutions to anticipated barriers could help improve engagement (Hock et al., 2015b).

Variations in the use of PIIs may reflect a mismatch between the interventions and the needs, values, and preferences of families, particularly across socio-economic and cultural groups (e.g., Burkett et al., 2015; Iland et al., 2012; Jegatheesan et al., 2010). Qualitative studies of minority experiences showed unique barriers such as language difficulties, limited services in rural communities, friends and family being dismissive or trivializing, stigma, blaming poor parenting, cultural concerns, and unmet needs from service providers (DuBay et al., 2017; Stahmer et al., 2019). Suggested adaptations and strategies to improve engagement include reduced intervention complexity, improved parent-professional collaboration, more explicit use of family-centered goals, better adult learning strategies, and more peer support for parents (Pellecchia et al., 2018; Stahmer & Pellecchia, 2015).

Challenges for Behavior Analysts

Despite the importance and the challenges of parent engagement in PIIs, only 27% of behavior analysts report having taken a course on parent training towards their degree or certification, and only 15% reported receiving training in a specific parent training approach (Ingersoll et al., 2020). Behavior analysts reported challenges such as having difficulty engaging families, families not progressing, not having enough skills or knowledge about parent training, and difficulty tailoring parent training to individual families (Ehrhart et al., 2014; Ingersoll et al., 2020; Shapiro et al., 2012).

An important component of parent engagement is therapeutic alliance. Parents of children with autism have reported that a positive and supportive relationship with practitioners contributes to family satisfaction and intervention engagement (e.g., Amsbary et al., 2020; Freuler et al., 2014; Hock et al., 2015b). A survey of parents regarding their impressions of behavior analysts' relationship and compassionate care skills indicated that behavior analysts show some core deficits, such as compromising, inquiring about satisfaction, and not being too authoritarian (Taylor et al., 2018). A follow-up survey by LeBlanc and colleagues (2020) found that most behavior analysts view skills in compassionate care as very or extremely important but received little or no training in these areas. Given the gaps in training and the difficulties behavior analysts have reported in their delivery of parent coaching, practical guidance can help practitioners develop and implement a successful PII.

A Potential Solution

One potential avenue to assist behavioral practitioners is to provide them with a practical, systematic tool to complement their PII. For example, the BTPS (Kazdin et al., 1997) was developed to measure potential barriers to treatment on a 5-point scale. This scale helps researchers and practitioners identify potential barriers but does not provide guidance in how to address them. Another tool, the Parent and Caregiver Active Participation Toolkit (PACT; Haine-Schlagel & Bustos, 2013), focuses on teaching evidence-based strategies to build a positive therapeutic relationship and increase engagement, such as focusing on strengths and effort and jointly identifying and problem-solving barriers. This toolkit effectively provides guidance on general engagement strategies, but does not focus on identifying unique family factors that impact engagement. A gap persists for a tool that helps practitioners identify barriers and facilitators to engagement, while also providing strategies to improve engagement by systematically adapting a PII to fit an individual family's needs.

Thus, the purpose of the current study is to develop the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS), a tool to help behavioral practitioners identify and address barriers and facilitators to intervention engagement using a contextual, functional approach within a compassionate care framework. The current study sought to develop the PAIRS in three stages and answer the following research questions:

Stage 1: What are potential solutions to common barriers to parent engagement?

Stage 2: Are the solutions to these barriers relevant, effective, and appropriate, as rated by a panel of BCBAs?

Stage 3: Do BCBAs think the PAIRS tool would be useful for implementing PIIs?

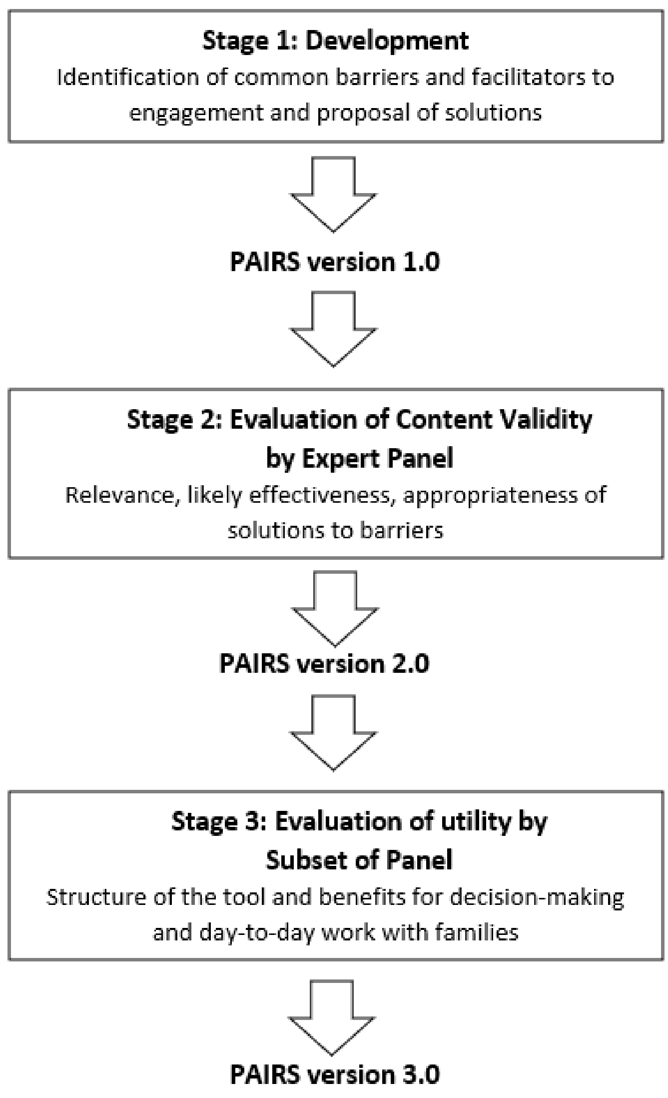
Method

The process of developing the PAIRS was adapted from the approaches outlined by Kassam-Adams and colleagues (2015) and Halek and colleagues (2017), who developed an e-health intervention for teaching coping skills and an assessment system for challenging behavior in residents with dementia, respectively. To the authors' knowledge, this approach to tool development is novel in the field of behavior analysis. The development of the PAIRS consisted of three stages (Figure 3.1): Stage 1 consisted of a non-systematic collation of barriers and facilitators from the literature and the proposal of function-based solutions to common barriers; Stage 2 consisted of an evaluation by an expert panel of the content validity of the proposed solutions, i.e., relevance of solution to barrier, likely effectiveness of solution to address barrier, and appropriateness for BCBAs to implement solution; and Stage 3 consisted of a follow-up evaluation by a smaller subset of the original panel on the structure of the tool and its potential utility for decision-making and day-to-day work with families. The first evaluation of the PAIRS focused on barrier-solution pairings at the item level using a content validity survey, while the second evaluation examined the tool as a whole by presenting a workshop on the PAIRS and then engaging in discussion and completing a questionnaire.

Parents were not consulted during this early stage of tool development because (1) the barriers, facilitators, and potential solutions were drawn from studies that showcased parent perspectives, allowing the research team to draw from parent experiences to develop the tool without recruiting new parent participants; (2) parent evaluation of the tool is likely to be most valuable and representative when recruited at a later stage of tool development, during real-world clinical practice when they are engaged in a PII; and (3) participation in a later stage of tool development allows the research team to ensure parent participants receive an improved version of the tool, after it has been refined through multiple evaluations.

Figure 3.1

Stages of the development and evaluation of the PAIRS



Adapted from Halek et al., 2017

Stage 1: Development of the PAIRS

First, common barriers and facilitators were listed, using information obtained from a collation of relevant research. This was not a systematic review of the literature on this topic; the first author identified relevant articles by searching databases using combinations of terms such as “barriers”, “facilitators”, “autism”, “behavior”, “intervention”, and “parents”, and recorded the barriers and facilitators reported. Searches concluded when no new barriers and facilitators were identified through additional searches. Findings from over sixty relevant articles informed the initial list of barriers and facilitators (see Table 3.1 for a sample). This list was condensed by grouping similar facilitators and barriers together, and then further collapsed by the second author. This was done to allow for enough differentiation to propose distinct function-based solutions, while avoiding an unnecessarily lengthy list of barriers that could impact the practicality and utility of the tool for everyday clinical use.

Specific barrier-solution pairings were then delineated by proposing potential function-based solutions to address each identified barrier. Solutions were developed based on findings drawn from the literature, including identified facilitators to engagement (see Table 3.1 for a list of common facilitators) and specific recommendations provided by parents when discussing their barriers and experiences with PIIs (e.g., Amsbary et al., 2020; Stahmer et al., 2011). Solutions were also informed by the collective professional experience of the research team, which comprises two BCBAs and two BCBA-Ds. This led to the first version of the PAIRS (version 1.0), which comprised a table of barriers and potential solutions.

Table 3.1

Definitions of facilitators and barriers and examples of research

Factor	Definition	Examples of studies drawn from	Study design	Participants
Facilitators				
Effective intervention	Parent and child gain knowledge and skills, and family interactions improve. Effective adult learning strategies are used.	Bowker et al., 2011	Survey	970 parents
		Carlon et al., 2013	Systematic review	2,141 parents across 16 studies
Parent self-efficacy and empowerment	Parents are empowered to understand their child's development and how they could facilitate their child's developmental successes.	Brookman-Frazee, 2004	Repeated reversal design	3 children and parents
		Russell & Ingersoll, 2021	Mixed method	51 parents
Family, peer, and community support	Spousal agreement, peer support, and support and acceptance from extended family and wider community.	DuBay et al., 2017	Mixed method	55 parents
		Moore & Symons, 2011	Survey	21 parents
Child- and family-centred goals and strategies	Contextualization and compatibility with values and lifestyle. Intervention is specific to the needs of the child and provided in a flexible, responsive manner.	Coogle & Hanline, 2016	Interviews, observations and document analyses	5 families and 5 service providers
		Stanford et al., 2020	Thematic analysis	17 mothers
Positive relationship with practitioner	Practitioner uses a non-directive collaborative approach and orients to family strengths.	Amsbary et al., 2020	Exploratory qualitative approach	6 parents
		Freuler et al., 2014	Thematic analysis	14 families
Additional supports and key provider partnerships	Additional supports are provided where necessary. Collaboration between different service providers is positive and coordinated.	Carr & Lord, 2016	Mixed method	8 mother-child dyads
		Helkkula et al., 2020	Qualitative content analysis	

				26 parents and 14 service providers
Barriers				
Logistical Factors				
Difficulties with access	Affordability, availability, and scheduling.	Parker & Childs, 2019	Interpretive phenomenological analysis	5 parents
		Pickard & Ingersoll, 2016	Mixed method	244 parents
Administrative difficulties	Difficulties with therapists, equipment, or materials.	Grindle et al., 2009	Content analysis	53 parents
		Mackintosh et al., 2012	Web-based qualitative study	486 parents
Child Factors				
Complex child profile	Child factors that may impact their ability to benefit from intervention such as verbal skills and problem behaviour	Carr et al., 2016	Randomized controlled trial	147 child-caregiver dyads
		Stahmer et al., 2017	Mixed method	13 parents
Sibling Factors				
Difficulties for siblings	Challenges for siblings such as lack of attention, having to stay out of the way during sessions, or exhibiting increased problem behaviour.	McPhilemy et al., 2013	Survey	15 families
		Pickard et al., 2017	Mixed method	103 parents
Parent factors				
Individual or cultural concerns	Mismatch between the intervention and individual needs, values, and preferences of families, including cultural factors.	Stahmer et al., 2019	Thematic analysis (focus groups and interviews)	58 caregivers and 55 service providers
		Mytton et al., 2014	Systematic review and framework synthesis	Parents, researchers, and service providers across 26 studies

Difficult circumstances	Circumstances that are challenging for the family, including chronic and/or acute stressors.	Hock et al., 2015b	Qualitative analysis	13 parents
		Wicks et al., 2019	Hierarchical multiple regression analyses	97 mothers
Treatment burden	Demands placed on the child and family during intervention are too high.	Kazdin et al., 1997	Prospective study	260 families
		Rivard et al., 2020	Content analysis	28 parents
Training not the right fit	Mismatch between parent needs/preferences and intervention characteristics such as training model, adult learning strategies, or treatment complexity.	Leadbitter et al., 2020	Thematic analysis	18 parents
		Raulston et al., 2018	Iterative content analysis (focus groups)	30 parents
Low motivation or belief in effectiveness	Low or fluctuating motivation to engage in intervention and/or low belief that the intervention will be effective.	Shepherd et al., 2018	Survey	570 parents
		Solish & Perry, 2008	Survey	48 parents and 34 therapists
Intervention factors				
Variations in treatment efficacy	Child not progressing as expected, slow progress, or regression in target skills.	Botterill et al., 2019	Thematic analysis	8 parents
		Manohar et al., 2020	Thematic content analysis	30 families
Difficulties with generalization	Difficulties with generalization or maintenance of skills learned in intervention.	Mitteer et al., 2018	Laboratory model	4 caregivers
		Strauss et al., 2012	Hierarchical linear regression analyses	44 families

Stage 2: Evaluation of Content Validity

This stage of evaluation focused on the content validity (i.e., relevance, likely effectiveness, and appropriateness) of each item (barrier-solution pairing). The purpose of this stage was to investigate which solutions needed to be revised or discarded, and to obtain suggestions from an expert panel on additional function-based solutions to address each barrier. This stage of tool development focused on recruiting feedback from BCBAs as the intended administrators of the tool. The research team intends to gain feedback from parents in future studies through the use of the tool in real-world settings, after the tool has been refined through the evaluations and revisions presented here.

Participants and recruitment

Twenty-eight BCBAs were invited to participate, with a response and completion rate of 53.6% (15 participants). This is consistent with recommendations for the first iteration of content validation, which suggests a panel of 8-12 experts (Lynn, 1986; Polit et al., 2007). The research team recruited BCBAs who work regularly with parents and caretakers by sending an email invitation to participate in an expert panel (i.e., convenience sampling). Eligibility requirements for participation included certification with the Behavior Analyst Certification Board (BACB) and professional experience delivering parent training interventions. BCBAs were recruited from several countries, including the United Kingdom, Ireland, Australia, and the United Arab Emirates. The majority of participants reported 11-20 years of experience in behavior analysis and served clients with ASD aged 3-12 (see Table 3.2 for expert panel demographics). Only responses from BCBAs who completed the survey in full were included in the analysis.

Table 3.2

Demographics of Expert Panel

Category	Demographics	Number	Proportion
Gender	Male	3	20%
	Female	12	80%
Certification	BCBA	13	86.7%
	BCBA-D	2	13.3%
Highest level of education	MA/MSc	12	80%
	PhD	3	20%
Years of experience	6-10 years	4	26.7%
	11-20 years	10	66.7%
	Over 20 years	1	6.7%
Area of emphasis[a]	Early Intensive Behavioural Intervention (EIBI)	13	86.7%
	Positive Behaviour Support (PBS)	10	66.7%
	Activities of Daily Living (ADLs)	13	86.7%
	Social and Communication skills	13	86.7%
	Sleep issues	4	26.7%
	Feeding issues	6	40%
	Academic/Educational skills	7	46.7%
	Vocational/Employment skills	3	20%
	Other[b]	1	6.7%
Types of parent training provided[a]	In-person	15	100%
	Telehealth	7	46.7%
	Individual	11	73.3%
	Group	6	40%
	Primary (all parent-mediated)	10	66.7%
	Secondary (therapist-delivered with some PT)	11	73.3%
	Sibling training	1	6.7%
	Other	1	6.7%
Typical length of parent training services	4-12 weeks	2	13.3%
	Over 12 months	6	40%
	Variable/consultative basis	7	46.7%
Age of clients[a]	0-2	7	46.7%
	3-6	14	93.3%

	7-12	11	73.3%
	13-17	10	66.7%
	18-25	7	46.7%
	26-40	4	26.7%
	41-64	1	6.7%
	65 and above	1	6.7%
Typical client profile[a]	Autism Spectrum Disorder	15	100%
	Intellectual/Developmental Disabilities	11	73.3%
	Emotional or Behavioural Disorders	3	20%
	Typically Developing	3	20%
Approximate number of families who have received PT services	10 or fewer	2	13.3%
	11-20	3	20%
	21-30	4	26.7%
	31-50	5	33.3%
	Over 50	1	6.7%

[a]Participants can choose more than one option
[b]Human Rights and Challenging Behaviour (restrictive practices, restraint reduction)

Instrument and Distribution

The Content Validity Survey Tool (CVST; Kassam-Adams et al., 2015) was adapted for the current study and the three dimensions of content validity were revised to apply to barriers and proposed solutions: (1) relevance, i.e., the extent to which a solution is pertinent to its barrier; (2) likely effectiveness, i.e., the extent to which the solution would successfully address its barrier; and (3) appropriateness of the solution for BCBAs delivering parent training services. The proposed solutions from PAIRS version 1.0 were divided into two groups: intervention adaptations and additional services or referrals. This was done to streamline the content validity evaluation by only presenting the intervention adaptations in the CVST. The adapted CVST was thus populated with 45 barrier-solution pairings, consisting of eleven barriers and 2-6 proposed solutions per barrier. Response options were on a four-point scale ranging from “not at all” to “very”. The CVST also contained a suggestion box for reviewer comments after each barrier and a final section for comments on the PAIRS as a whole. The CVST was uploaded to Qualtrics, an online survey tool, and a link to the survey was emailed to all invited BCBAs.

Analysis

Results of the CVST were analyzed quantitatively (via calculation of content validity indices; CVI) and qualitatively (via examination of narrative comments). The CVI was calculated for each scale of item (I-CVI), i.e., the relevance, effectiveness, and appropriateness of each barrier-solution pairing, and each scale overall (S-CVI/Ave), i.e., the solutions' overall relevance, effectiveness, and appropriateness. For each item, the I-CVI was computed as the number of experts giving a rating of either 3 or 4 divided by the number of experts. The recommended minimum I-CVI value for five or more experts is 0.78 (Polit et al., 2007). The average agreement for each scale overall (S-CVI/Ave) was calculated by calculating the average I-CVI across all items. The recommended minimum value for S-CVI/Ave is 0.9 (Polit et al., 2007). Qualitative comments were categorized into suggestions and comments, and the suggestions were grouped into similar factors within each barrier to allow for narrative examination. The PAIRS table of barriers and solutions was then refined based on the combined quantitative and qualitative findings. To better support practitioners for whom the PAIRS is intended, a more comprehensive tool was developed with additional components derived from this table that corresponded with the typical stages of implementing a PII (i.e., developing and planning, conducting an intake assessment, and finally implementing the intervention). This expanded tool was labelled PAIRS version 2.0.

Stage 3: Evaluation of Utility

While the first iteration of evaluation focused on barrier-solution pairings at the item level, this second iteration sought feedback on the revised tool as a whole, specifically its structural aspects and potential benefits for decision-making and day-to-day work with families. This was done through a workshop presenting PAIRS version 2.0 to a subset of the original panel, followed by a discussion and questionnaire.

Participants and Recruitment

In line with previous recommendations, a subset of the same experts who participated in the primary evaluation of an instrument re-evaluated the revised version (Halek et al., 2017; Lynn, 1986). All the members of the original panel were invited via email to attend the PAIRS workshop and re-evaluation (*n*=15). Six members of the panel were unable to attend due to scheduling conflicts, two members registered for the workshop but did not attend, and three members did not respond to the invitation. Four members of the panel attended the workshop and participated in the re-evaluation. Caution should be taken when evaluating the results of the second evaluation due to the relatively small number of participants, although the size of the panel is consistent with the recommendation of recruiting 3-5 reviewers for a secondary review (Polit et al., 2007).

Workshop

The workshop took place over Zoom, an online meeting platform. The first author delivered the one-hour workshop to the subpanel. At the beginning of the workshop, participants were asked to describe a family they had worked with who they found difficult to engage, and the circumstances that made it challenging. Participants were then asked to keep this family in mind as the PAIRS was introduced, and to consider how having access to the PAIRS may have impacted how they worked with the family. An introduction to the background and rationale of the PAIRS was presented, including the functional, contextual approach to engagement and the role of concordance. This was followed by an overview of the results from the first evaluation (i.e., CVI, narrative comments, and item revisions), which they had participated in. Finally, the PAIRS tool was presented and explained in full.

Evaluation and Analysis

At the end of the workshop, participants engaged in a brief discussion and were then provided a link to a questionnaire. The questionnaire had four sections: (1) Structure; (2) Benefits of the tool for planning and decision-making; (3) Benefits of the tool for day-to-day work with families; and (4) Overall impression of the tool. Response options were on a four-point scale ranging from "strongly disagree" to "strongly agree." Comments and suggestions were requested at the end of each section. The discussion portion of the workshop was also transcribed and qualitatively examined. Questionnaire data (quantitative and qualitative) were reviewed. The PAIRS was then further revised based on this feedback (PAIRS version 3.0).

Results

Stage 1 results included the collation of common barriers and facilitators and the development of potential solutions, Stage 2 results included the quantitative (i.e., content validity indices) and qualitative (i.e., examination of narrative comments) findings from the content validity evaluation, and Stage 3 results included descriptive statistics from the questionnaire and revisions based on the post-workshop discussion and written comments.

Stage 1: Development

Forty-eight barriers and 41 facilitators were identified. After grouping similar factors together, 11 barriers and six facilitators remained (Table 3.1). Multiple solutions were proposed for each barrier (Table 3.3). For example, for the barrier "Difficulties with access", four solutions were proposed, including connecting families with charities, insurance, funding supports, etc., where appropriate, providing Telehealth or home-based training, providing flexible training days/times, and developing explicit strategies for involving the child and/or sibling. Thus, PAIRS Version 1.0 consisted of a list of 6 facilitators and a table of barriers and proposed solutions. This table comprised 11 barriers and 2-6 solutions per barrier, for a total of 45 barrier-solution pairings.

Stage 2: Evaluation of Content Validity

The 45 barrier-solution pairings were reviewed by fifteen BCBAs for content validity (i.e., relevance, effectiveness, and appropriateness) (see Table 3.3). I-CVI values ranged from 0.53 (N=1) to 1 (N=35), which is the highest possible I-CVI value. The recommended minimum I-CVI value for five or more experts is 0.78 (Polit et al., 2007). Content validity indices across barrier-solution pairings are presented in Table 4. Thirty-three (73.3%) items had I-CVI values at or above the recommended minimum value across all three scales. Eight items (17.8%) had one scale below the recommended value, while four items (8.9%) had two scales below the recommended value. Overall scale values were above the recommended minimum value of 0.9 for relevance (S-CVI/Ave=0.92) and appropriateness (S-CVI/Ave=0.91), but slightly below the recommended minimum value for effectiveness (S-CVI/Ave=0.85).

CVI for Logistical Factors

For the barrier "Difficulties with access", two solutions (50%) had I-CVI values above the recommended value for all scales. The proposed solution to connect families with charities, insurance, funding supports, etc. was below the recommended value for effectiveness (I-CVI=0.73) and the solution to include explicit strategies for involving child/sibling was below the recommended value for relevance (I-CVI=0.73) and effectiveness (I-CVI=0.67). For the barrier "Administrative difficulties", one solution (33.3%) had I-CVI values above the recommended value across all scales. One solution (Provide or reduce need for additional therapy materials) had was below the recommended value for appropriateness

(I-CVI=0.67), and one solution (Telehealth or clinic-based training) was below the recommended value for relevance (I-CVI=0.73) and effectiveness (I-CVI=0.73).

CVI for Child and Sibling Factors

For the barrier “Complex child profile”, two solutions (66.7%) had I-CVI values of 1 across all scales, which represents the maximum value. One solution (Multidisciplinary collaboration) was below the recommended value for effectiveness (I-CVI=0.73). For the barrier “Difficulties with siblings”, both solutions (100%) had I-CVI values above the recommended value across all scales.

CVI for Parent Factors

For the barrier “Individual or cultural concerns”, five solutions (83.3%) had I-CVI values above the recommended value across all scales. One solution (Shape successive approximations and establish intermediate outcomes as reinforcers) was below the recommended value for relevance (I-CVI=0.67) and effectiveness (I-CVI=0.73). For the barrier “Difficult living circumstances”, three solutions (75%) had I-CVI values above the recommended value across all scales. One solution (Reduce treatment burden and/or complexity) was below the recommended value for effectiveness (I-CVI=0.73). For the barrier “Treatment burden and stress”, five solutions (83.3%) had I-CVI values above the recommended value across all scales. One solution (Distance-learning options) had was below the recommended value for effectiveness (I-CVI=0.6). For the barrier “Training not the right fit”, two solutions (66.7%) had I-CVI values above the recommended value across all scales. One solution (Provide different training options) was below the recommended value for effectiveness (I-CVI=0.73). Finally, for the barrier “Low motivation/belief in effectiveness”, four solutions (80%) had I-CVI values above the recommended value across all scales. One solution (Share parent-friendly data sheets) had was below the recommended value for effectiveness (I-CVI=0.67).

CVI for Intervention Factors

For the barrier "Variations in treatment efficacy", three solutions (75%) had I-CVI values above the recommended value across all scales. One solution (Explicitly acknowledge that strategies may not always be effective or that there may be setbacks and plan for this early on) was below the recommended value for effectiveness (I-CVI=0.53). For the barrier "Difficulties with generalization", four solutions (80%) had I-CVI values above the recommended value across all scales. One solution (Connect with peer support) had was below the recommended value for effectiveness (I-CVI=0.73) and appropriateness (I-CVI=0.73).

Narrative Suggestions

Narrative suggestions were examined for overarching factors leading to the identification of six common factors: Flexibility and accommodation, coordination between services, addressing additional needs/providing additional services, incorporating Acceptance and Commitment Therapy (ACT), parent-practitioner collaboration, and proactive planning and setting of initial expectations. These factors were consistent with identified facilitators from the literature, except for incorporating ACT and proactive planning and setting of initial expectations. These two suggestions were novel findings and were incorporated into the proposed solutions. The narrative comments were then divided into comments and specific suggestions. For each barrier, similar suggestions were grouped together and summarized for examination. Individual solutions were then revised based on a combination of the quantitative and qualitative feedback (see Table 3.3 for revised solutions and the relevant comments/suggestions).

Table 3

Barriers with original and revised solutions based on I-CVI values and narrative suggestions

Barrier	Original solutions	I-CVI values Rele-vance	Effect-iveness	Appro-priate-ness	Relevant comments/suggestions	Revised solutions
Difficulties with access	Connect families with charities, insurance, funding supports, etc., where appropriate	0.87*	0.73	0.8*	Some comments noted how these were not possible for them	Connect families with charities, insurance, funding supports, etc., where possible and appropriate
	Telehealth or home-based training	1*	0.93*	0.93*	Include pre-recorded trainings	Telehealth, self-directed learning, or home-based training
	Flexible training days/times	0.93*	0.87*	0.93*	Flexibility to follow up with staff and consultants on a regular basis when issues arise; Re-scheduling	Flexible training days/times, including flexibility to reschedule or follow up with staff as needed
	Explicit strategies for involving child/sibling (e.g., sibling training component)	0.73	0.67	0.87*	Approach family as a whole early on	Approach family as a whole, including strategies for occupying or involving child and siblings
	N/A	N/A	N/A	N/A	Coordinated team approach to scheduling of appointments	Coordinate a team approach to scheduling of appointments
	N/A	N/A	N/A	N/A	Providing childcare, meals or meeting other needs for families	Provide or connect family with childcare, meals, or other needs
Administrative difficulties	Telehealth or clinic-based training	0.73	0.73	0.8*	Easy to access modes of contact, e.g., phone, WhatsApp, Teams	Flexible models of service delivery, including easy-to-access modes of contact (e.g., WhatsApp)
	Provide (or reduce need for) additional therapy materials	0.87*	0.87*	0.67	Online portal to request materials; Toy/game lending library; Use of apps and software	Provide (or reduce need for) additional therapy materials (e.g., apps and software, online portal to request materials, toy lending library)
	Collaboratively problem-solve on setting up home environment or choosing appropriate community settings	0.87*	0.87*	0.8*	N/A	*Keep same solution*

	N/A	N/A	N/A	N/A	Provide parent-friendly data sheets	Provide parent-friendly data sheets
Complex child profile	Individualize child programming (e.g., adaptations for non-verbal children)	1*	1*	1*	N/A	*Keep same solution*
	Multidisciplinary collaboration (e.g., with SLT, OT)	0.93*	0.73	0.93*	MDT should meet to discuss recommendations and use an agreed framework to decide order of recommendations and how to evaluate effectiveness	Multidisciplinary collaboration (e.g., with SLT, OT) using a coordinated, positive approach
	Additional parent training in Positive Behaviour Support	1*	1*	1*	Provide an understanding of the function of behaviour and a collaboratively designed treatment plan; Parents need a basic understanding of PBS prior to seeing you	Additional parent training in Positive Behaviour Support, including a basic understanding of PBS prior to intervention and clear mutual understanding of the function of behaviour
Difficulties for siblings	Identify and collaboratively problem-solve source of sibling difficulty	1*	0.93*	0.93*	N/A	*Keep same solution*
	Explicit strategies for including siblings (e.g., sibling training, parent training specific to sibling)	1*	0.8*	0.87*	Sibling support group, e.g., Sibshops	Explicit strategies for including siblings (e.g., sibling training, sibling groups)
Individual or cultural concerns	Clarify values and goals at the outset and on an ongoing basis	1*	0.8*	1*	N/A	*Keep same solution*
	Collaborate with both parents on goal-setting, selecting target behaviour, and implementation strategies	1*	0.87*	0.93*	N/A	*Keep same solution*
	Provide clear rationale for intervention strategies	0.93*	1*	0.93*	N/A	*Keep same solution*
	Shape successive approximations and establish intermediate outcomes as reinforcers (e.g., when trying to transition away from discipline practices such as spanking)	0.67	0.73	0.67	Several comments focused on the example of spanking so example was changed	Shape successive approximations and establish intermediate outcomes as reinforcers (e.g., when trying to transition away from discipline practices such as yelling)

	Collaborate with (or refer to) professionals from the same culture where appropriate	0.8*	0.87*	0.8*	Needs of second-language learners	Collaborate with (or refer to) professionals from the same culture where appropriate, especially if there is a language barrier
	Seek training in cultural competence (e.g., on maintenance of cultural identities, upholding religious practices, role of extended family and community, gender roles)	0.93*	0.93*	0.93*	N/A	*Keep same solution*
Difficult living circumstances	Multidisciplinary collaboration (e.g., with social worker)	0.93*	0.87*	0.93*	N/A	*Keep same solution*
	Reduce treatment burden and/or complexity	1*	0.73	1*	N/A	*Keep same solution*
	Increase treatment relevance	0.93*	0.93*	0.93*	N/A	*Keep same solution*
	Collaborative problem-solving (e.g., around structural barriers)	1*	0.93*	0.93*	N/A	*Keep same solution*
	N/A	N/A	N/A	N/A	Outreach/respite; Identify whether other services need to be prioritized	Connect with outreach/respite services, which may need to be prioritized over behavioural services
Treatment burden and stress	Identify source of stress (e.g., demand for involvement too high, lack of time for other activities)	1*	0.8*	0.93*	N/A	*Keep same solution*
	Reduce treatment burden, intensity, and/or complexity	1*	0.93*	1*	N/A	*Keep same solution*
	Regular check-ins with family	0.93*	0.87*	0.93*	N/A	*Keep same solution*
	Flexible training days/times	0.87*	0.8*	0.93*	Mixed models e.g., in person and online	Flexible training days/times and models of delivery (e.g., blended models)
	Distance-learning options	0.8*	0.6	0.87*	N/A	*Incorporated into above solution*
	Proactively problem-solve for challenging situations	0.93*	0.93*	0.93*	N/A	*Keep same solution*

	N/A	N/A	N/A	N/A	Incorporate ACT; Identify stage of readiness of change	Incorporate ACT strategies
	N/A	N/A	N/A	N/A	Outreach/respite	Connect family with outreach/respite services
Training not the right fit	Provide different training options (e.g., self-directed, Telehealth, individual, group, etc) depending on parent needs/preferences	0.93*	0.73	0.8*	N/A	*Keep same solution*
	Teaching materials incorporate a variety of effective adult learning strategies	0.93*	0.87*	1*	N/A	*Keep same solution*
	Adjust intervention complexity as needed	0.87*	0.87*	0.93*	N/A	*Keep same solution*
	N/A	N/A	N/A	N/A	Incorporate ACT	Incorporate ACT strategies
Low motivation/belief in effectiveness	Collaborate with both parents on goal setting, selecting target behaviour, and implementation strategies	0.87*	0.87*	0.93*	N/A	*Keep same solution*
	Establish intermediate outcomes as reinforcers	1*	0.93*	1*	N/A	*Keep same solution*
	Establish treatment relevance through regular check-ins on priority family goals	0.87*	1*	0.93*	N/A	*Keep same solution*
	Share parent-friendly data sheets	0.8*	0.67	0.87*	N/A	Share parent-friendly graphs to show progress
	Create behavioural momentum by setting smaller, achievable goals at the start and as needed throughout the intervention	1*	1*	1*	N/A	*Keep same solution*
	N/A	N/A	N/A	N/A	Incorporate ACT	Incorporate ACT strategies
	N/A	N/A	N/A	N/A	Detailed discussion of previous interventions and the reasons for why those interventions were not effective	Discuss previous interventions in detail and why they were not effective
	N/A	N/A	N/A	N/A	N/A	*Moved from barrier "Difficulties with Generalization":* Connect with peer support

						(e.g., other parents who completed the same training)
Variations in treatment efficacy	Explicitly acknowledge that strategies may not always be effective or that there may be setbacks and plan for this early on[a]	0.93*	0.53	1*	Set expectations and highlight level of commitment and involvement; Realistic expectations for how often data is collected, how long they will need to collect it, and a plan for when it's reviewed	Set clear and realistic expectations at the outset, including levels of involvement, a plan for collecting and reviewing data, and explicit acknowledgment that there may be setbacks
	Involve parents in problem-solving solutions and adaptations	1*	0.87*	0.93*	Give general info and then collaboratively problem-solve; Shared understanding of function of behaviour	Promote shared understanding and collaborative problem-solving
	Program for generalization	0.93*	1*	1*	N/A	*Keep same solution*
	Share parent-friendly data sheets	0.93*	0.87*	0.93*	N/A	*Keep same solution*
	N/A	N/A	N/A	N/A	Incorporate ACT	Incorporate ACT strategies
Difficulties with generalization	Program for generalization	1*	1*	1*	N/A	*Keep same solution*
	Discuss and problem-solve potential difficulties in advance (e.g., implementing strategies around disapproving family members)	1*	0.87*	1*	N/A	*Keep same solution*
	Connect with peer support (e.g., other parents who completed the same training)	0.87*	0.73	0.73	N/A	*Moved to Low motivation/belief in effectiveness*
	Incorporate a self-management system	0.93*	0.8*	0.93*	Develop a reinforcer system for the parents for their fidelity to treatment behaviours	Incorporate a self-management system or work with parent to recruit reinforcement (e.g., spouse)
	Establish a check-in schedule (e.g., short check-ins between sessions, monthly check-ins after completion of training)	0.93*	0.87*	0.93*	Tailor amount of contact	Establish an individualized check-in schedule (e.g., short check-ins between sessions, monthly check-ins after completion of training)

Total	S-CVI/Ave	0.92**	0.85	0.91**	N/A	N/A

I-CVI: Item-Content Validity Index. S-CVI/Ave: Scale-Content Validity Index/Average Agreement.

*Above recommended I-CVI value (0.78)

**Above recommended S-CVI/Ave value (0.9)

Revision

The table of barrier-solution pairings from PAIRS Version 1.0 was updated with the revised solutions. To support practitioners using the tool, additional components of the PAIRS were derived (see Table 3.4), and the table of barrier-solution pairings was named the PAIRS Table of Function-Based Solutions. As using a strengths-based approach was identified as a facilitator, facilitators are always presented before barriers within each component of the tool.

Stage 3: Evaluation of Utility

The four members of the sub-panel responded “agree” or “strongly agree” to all items on the questionnaire, including items evaluating the structure of the PAIRS (i.e., clarity, meaningfulness, completeness, length and scope, and comprehensibility), its potential benefits as for day-to-day work with families (i.e., time required and utility as an information aid, communication aid, planning aid, and evaluation aid), potential benefits as a tool for assessment and decision-making (see Table 3.5), and overall assessment of the PAIRS (i.e., usefulness and practicability, use in day-to-day work, recommendation to other BCBAs).

Comments were also received within each of the four sections. Based on a combination of the verbal (during discussion) and written (from questionnaire) comments and suggestions, the following revisions were made: (1) Background and rationale were added to the tool, as a participant noted that concepts introduced during this section of the presentation were impactful; (2) Contents of the appendix (definitions of barriers and facilitators and a list of terms) were moved to the front of the tool to improve clarity; (3) Practitioner skills and behaviors (i.e., using a non-directive collaborative approach, using a strengths-based approach) were operationalized more clearly within the body of the tool, as suggested by a participant; (4) Additional readings were added to the list of terms, including specific suggestions from participants; (5) Motivational Interviewing was added as a potential solution alongside ACT, as suggested by a participant; (6) A section of "Additional Considerations and Limitations" was added with advice on administration, adaptation, and limits of the tool, based on comments from multiple participants during the discussion.

Discussion

The PAIRS was developed grounded in the functional contextual approach to engagement (Allen & Warzak, 2000; Fryling, 2014; Moore & Armado, 2021) and in response to recent calls for increased attention to compassionate care for behavior analysts (Callahan et al., 2019; Leblanc et al., 2019; Taylor et al., 2018). The PAIRS was designed to collate the information drawn from a growing body of literature examining common barriers and facilitators to engagement and make it accessible to practitioners delivering PIIs, and help them tailor their intervention to individual families. In the first evaluation of the PAIRS by a panel of fifteen BCBAs, the overall average rating of the relevance and appropriateness of all proposed solutions were each over 0.9, indicating that on average, over 90% of ratings agreed that the proposed solutions were relevant to the barriers and appropriate for use by BCBAs. The average rating of the effectiveness of the solutions was slightly lower, at 0.85. This indicates that on average, 85% of ratings agreed that the proposed solutions were likely to be effective at addressing the barriers. One potential explanation for this slightly lower rating for effectiveness is that family barriers are complex and are unlikely to be easily addressed with a single solution. Thus, the individual barrier-solution pairings presented in the CVST may have been rated as less effective at the item level since multiple solutions were proposed for each barrier. Nevertheless, it is worthwhile to note that 85% is still a high level of agreement.

Table 3.4
Comprehensive PAIRS Components

Name	When to use	Purpose	Content
Introduction to the PAIRS	• First time using the PAIRS • As needed for clarification or guidance	Provide background information and instructions on how to use the tool	• Information on the purpose and development of the PAIRS • An overview of the components of the PAIRS • A flowchart of how to use the PAIRS in practice
PAIRS Good Practice Checklist for Practitioners	• Developing or planning general PII	Provide practitioners with strategies to develop an intervention that is likely to promote parent engagement, by building on common facilitators and avoiding negative effects of common barriers.	• Instructions for using the Checklist • 23 items mapping onto identified facilitators and barriers • Potential adjustments to intervention factors • Suggested practitioner skills and behaviors
PAIRS Assessment and Individualization Plan	• Intake with a new family • As needed when parent engagement is low or decreasing	Aid practitioners in gathering information about a family's unique barriers and facilitators, identifying the most critical barriers and facilitators, and collaboratively developing a plan to adapt the intervention or provide additional services or referrals	• Instructions for using the Assessment and Individualization Plan • A sample completed Assessment and Individualization Plan • 30 items mapping onto identified facilitators and barriers • Space to list top 3 facilitators and top 3 barriers • Space to record intervention adaptations and/or additional services and referrals
PAIRS Table of Function-Based Solutions	• In conjunction with the PAIRS Assessment and Individualization Plan	Suggest potential function-based solutions to common barriers as a guide for collaborative problem-solving with the parent	• Instructions for using the Table • 50 suggestions for intervention adaptions • 9 suggestions for additional services and referrals
Appendix	• First time using the PAIRS • As needed for clarification or guidance	Provide operational definitions of terms used in the PAIRS and suggestions for further reading	• Definitions of 6 facilitators • Definitions of 11 barriers • List of potentially unfamiliar terms and concepts with suggestions for further reading (e.g., compassionate care, ACT)

Table 3.5

Questionnaire Results for PAIRS Benefits for Day-to-day Work with Families

Item	**Number of ratings[a]** Agree	Strongly agree
The PAIRS has encouraged me to think more intensively about the family's contextual barriers	0	4
The PAIRS contains factors that I had not thought about in the context of the family's intervention engagement and progress	0	4
I see a relationship between the PAIRS and my daily work	1	3
By using the PAIRS, I see the family's challenges from another perspective	0	4
With the PAIRS, I can better describe the family's barriers and facilitators to others (e.g., colleagues, multidisciplinary teams)	0	4
Planning and adapting interventions to address the family's barriers is easier with the information provided by the PAIRS	1	3
Using the PAIRS provides information about the families that I did not know before	1	3
Since the introduction of the PAIRS, I have a better understanding of the barriers the family faces	2	2
I feel that the family's engagement and progress will change positively with the introduction of the PAIRS	2	2
The PAIRS gives me the opportunity to build on the strengths and individuality of the child and family	2	2
The PAIRS will help me build and maintain a positive collaborative relationship with the family	2	2
The PAIRS provides helpful guidance for professional development and further reading	2	2

While the first evaluation of the PAIRS focused on evaluating the tool at the item level, the second evaluation examined the tool as a whole. A subset of the original panel attended a workshop which introduced them to the comprehensive PAIRS tool. It should be noted that the second evaluation was conducted with only four participants. While this is in line with recommendations for studies of content validity (e.g., Polit et al., 2017), their evaluation may not fully generalize to the wider behavior analytic community. Nevertheless, in a discussion at the end of the workshop, all participants noted the lack of training and guidance they had received on how to work with parents. One participant noted, “A lot of the things you’ve gone through in the last hour [of the workshop], it just made me think, where have all these things been over the last few years?” This is consistent with Ingersoll and colleagues’ (2020) findings that the majority of behavior analysts have not received adequate support in how to effectively conduct parent training. All participants highly rated the PAIRS’ structure and benefits for decision-making and day-to-day work with families. One participant commented, “I see it becoming part of the essential guides required to implementing successful parent training. Its comprehensive and user-friendly layout is exactly what is needed for behavior analysts to effectively support and train parents.”

The PAIRS was designed to be complementary and collaborative. That is, the PAIRS is intended to complement an evidence-based intervention; it is not a standalone program. The use of a tool to enhance and complement existing interventions is preceded by PACT, a toolkit for promoting parent engagement (Haine-Schlagel & Bustos, 2013). For instance, PACT has been integrated into Project ImPACT (Ingersoll & Dvortcsak, 2010), an evidence-based PII for improving social communication skills in children with ASD. The engagement strategies are incorporated into the parent training lessons, e.g., when teaching parents of children with ASD how to make play interactive, practitioners are encouraged to make suggestions rather than giving directions (Rieth et al., 2018). While PACT provides good-practice strategies that are helpful for practitioner interactions with most families, the PAIRS provides strategies for individualizing interventions based on specific family variables. Thus, the PAIRS can similarly be incorporated into a PII, where it can provide systematic guidance to practitioners on jointly identifying barriers and facilitators and problem-solving challenges unique to each family, consistent with building a positive and empowering therapeutic relationship. Furthermore, the PAIRS is complementary in that it provides information and suggestions for further reading and training for skills and concepts that may be unfamiliar to practicing behavior analysts (e.g., therapeutic relationship skills), but may be required to produce the greatest benefit.

The PAIRS is also intended to be used collaboratively. The function-based solutions presented are intended to guide the collaborative problem-solving process with families, not to prescribe rigid responses to complex situations. The PAIRS thus encourages concordance rather than strict adherence and emphasizes open communication and joint problem-solving. This is supported by the narrative comments received. For example, one reviewer noted "…the importance of including the parents and facilitating them to elicit the solutions for change, as then there is more buy in, and it reduces the 'expert model' of the parents relying on you to solve this problem." Another reviewer commented, "Adopting a collaborative approach, which listens carefully to the concerns of the family, is vital. This is an ongoing 'soft' skill for BCBAs to develop and requires ongoing work." During the second evaluation discussion, several members of the panel noted how going through the PAIRS with a family could be a way to connect and foster concordance by helping practitioners better understand the family's context.

This is in line with improving relationship and compassionate care skills for behavior analysts. In the second evaluation of the PAIRS, the four members of the secondary panel strongly agreed that the PAIRS encouraged them to think more intensively about the family's contextual barriers and see the family's challenges from another perspective. One participant commented, "The categories of barriers and facilitators help me to think through other idiosyncratic variables specific to the family and how they might fit within the PAIRS framework." By illustrating the contextual variables that commonly impact families of children with ASD and providing guidance on potential areas of professional development, the PAIRS seeks to help practitioners build positive therapeutic alliance with families. The feedback received from the panel is encouraging in this regard, however further evaluation by both practitioners and families in real-world clinical settings is needed.

When considering the barriers and facilitators to engagement within a family system, the PAIRS takes a multi-level approach, with the chosen level of analysis defined by its pragmatic purpose (Hayes et al., 2021). That is, the PAIRS expands the traditional behavioral paradigm from the level of the individual to the level of the family, and from immediate environmental contingencies to nonlinear contextual variables, including private events (e.g., values and beliefs) on one end of the spectrum and large-scale external factors (e.g., socioeconomic disadvantage, cultural concerns) on the other. This breadth of scope is necessary because the barriers and facilitators to engagement identified in the literature cover this continuum. The PAIRS recognizes that a single practitioner cannot address all the potential challenges a family may experience. Thus, the PAIRS encourages practitioners to focus on adaptations that they can make within their program, and advocates for appropriate referrals to other services as well as positive and coordinated multi-disciplinary collaboration. It is important to note that any given analytic focus should not diminish the relevance of other levels of analysis (Hayes et al., 2021). Thus, the PAIRS does not eschew the importance of careful analysis of behavior using information gathered around proximal antecedent and consequent variables. Instead, the PAIRS aims to expand on this information to provide practitioners with a systematic and practical way of identifying and addressing a wide range of difficulties, utilizing the level of analysis that is pertinent and helpful to a given situation.

Strengths, Limitations, and Future Directions

Within this research, a systematic literature review of the barriers and facilitators to parent engagement was not conducted. However, as previously outlined, a growing literature base exists on this topic, and collation of common barriers and facilitators from over sixty research articles was possible without utilising a systematic review methodology. The eleven barriers and six facilitators represent a synthesis of the specific factors found in a sample of the literature, which had numerous areas of overlap. It is recognised that this is not necessarily a definitive list, and the PAIRS is designed to be a flexible and adaptive tool that can continue to be updated with new literature as well as individualized to a specific family's unique strengths and needs.

The present study utilizes a methodology for content validation that is novel in the field of behavior analysis. The CVST was adapted from a medical context to fit the parameters of the PAIRS. By recruiting an expert panel to evaluate the content validity of each barrier-solution pairing and consulting a subset of that panel to evaluate the tool as a whole, the PAIRS is thus developed with the expertise of the professionals it is designed for. While the present study focused on developing the PAIRS based on the available literature and conducting two rounds of expert review to evaluate its content validity, it is recognised that the sample of fifteen BCBAs, and especially the smaller subset of four BCBAs who participated in the second evaluation, may not fully represent the professional experiences of behavioral practitioners working in a variety of contexts. Therefore, future research will examine the use of the PAIRS with larger samples within real-world clinical practice. The PAIRS is a tool developed by BCBAs for BCBAs and related practitioners (e.g. behavioral psychologists, assistant behavior analysts). In this way, the current intended use of the PAIRS is limited to behavioral PIIs. Given the novelty of the PAIRS, the research team wishes to avoid overextending its reach at the outset. As further research is conducted using the tool to complement evidence-based PIIs, there may be scope to adapt and expand its utility for professionals from other disciplines (e.g., early childhood educators, early interventionists) who likewise work with families of children with autism.

Finally, the present study focused on evaluation of the tool by a panel of professionals. Direct parent input was not sought at this stage of tool development for a few reasons. First, the barriers, facilitators, and solutions in the PAIRS were drawn from the literature presenting parents' views in the form of interviews (e.g., Amsbary et al., 2020; Botterill et al., 2019; Freuler et al., 2014) or surveys (e.g., Bowker et al., 2011; DuBay et al., 2018; Rovane et al., 2020). Thus, the tool is created from the experiences and recommendations of the parents it is intended to serve, using research that is already available. Second, parent feedback would likely be most valuable and representative when the PAIRS is used in practice to address facilitators and barriers that are relevant to their unique situation. Finally, parent participation at a later stage of tool development is also likely to benefit families, as the PAIRS will have gone through the present evaluation and piloted before it is administered. Therefore, future research will focus on the family's evaluation of the revised tool's goals, procedures, and outcomes (i.e., social validity; Wolf, 1978) when it is used in clinical practice.

Summary

The PAIRS was developed and revised in conjunction with an expert panel of BCBAs through two rounds of content evaluation to fill a gap in parent training literature and practice. It is a systematic, practical tool designed to complement evidence-based PIIs. Parent engagement is an essential component of PIIs, but can be impacted by numerous barriers. The PAIRS is the first tool designed to help practitioner assess barriers and facilitators to engagement, individualize their parent training approach, and respond to stressors using a contextual, functional approach.

4. Preliminary Evaluation of the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) Tool

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Abstract

Parent engagement in early intervention is important in achieving meaningful outcomes. However, parents often experience barriers to engagement. The Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) was developed to help practitioners assess families' barriers and facilitators, individualize their intervention, and respond to stressors. The present study explores preliminary implementation of the PAIRS in conjunction with an evidence-based program, Project ImPACT, delivered by two community agencies in Canada. One agency delivered Project ImPACT to nine participants (treatment as usual; TAU group), and the other delivered Project ImPACT + PAIRS to eight participants (PAIRS group). Initial findings suggest that the PAIRS group demonstrated higher attendance than the TAU group in the Project ImPACT program. Interviews with parents revealed high social validity for the program and support for the core components of the PAIRS. A discussion with practitioners revealed the utility of the PAIRS as a tool for planning, problem-solving, and reflection.

Keywords: autism, parent coaching, engagement

Introduction

Best practice recommendations for early intervention for children with autism include integrating behavioral and developmental strategies, focusing on pivotal skills such as social interaction and communication, involving caregivers as active participants in treatment, and individualizing the service based on family needs and culture (Zwaigenbaum et al., 2015). Naturalistic developmental behavioral interventions (NDBIs), which combine behavioral and developmental strategies, meet many of these criteria (Schreibman et al., 2015). NDBIs draw heavily from behavioral principles and technologies, such as reinforcement, prompting, shaping, and chaining (Schreibman et al., 2015). Consistent with the developmental literature, NDBIs focus on intervention goals informed by typical developmental sequences and reciprocal social interactions. Additionally, NDBIs are well-suited to parent involvement and delivery, as the intervention strategies can be integrated into everyday routines and interactions. Interventions with parents as primary implementers, i.e., parent-implemented interventions (PII), have been shown to increase social communication skills in young children with autism (e.g., Akamoglu & Meadan, 2018; Pacia et al., 2021). PIIs have also been shown to increase parent self-efficacy and positive family interactions, while decreasing stress and negative mental health symptoms (Coolican et al., 2010; Estes et al., 2014; Ingersoll et al., 2016).

One example of an evidence-based, parent-implemented NDBI is Project ImPACT (Ingersoll & Dvortcsak, 2010). In Project ImPACT, parents of young children with autism are taught practical strategies to improve their social, communication, imitation, and play skills. NDBI strategies are organized into the parent-friendly "FACTS" pyramid and taught sequentially: (1) Focus on your child; (2) Adjust your communication; (3) Create opportunities; (4) Teach new skills; and (5) Shape the interaction (Ingersoll & Dvortcsak, 2010). Options for individualizing the program to suit family needs and preferences include varying modalities, settings, and duration. For example, the program can be delivered one-on-one or in a group training format and can be conducted in-person or over Telehealth. Sessions can be delivered once or twice a week for twelve or twenty-four weeks. The program utilizes coaching strategies derived from adult learning principles (Merriam, 2001), such as parent-selected goals, sequenced instruction (i.e., the FACTS pyramid), behavior skills training, and collaborative problem-solving (Ingersoll & Dvortcsak, 2010). Project ImPACT also employs strategies to increase parent engagement, such as discussing parent expectations, developing a strong collaborative relationship, and discussing concrete solutions to family barriers (Ingoldsby, 2010).

Barriers to Engagement

Given that parents are the primary implementers in PIIs, parent engagement is critical for meaningful outcomes (e.g., Oono et al., 2013; Schreibman et al., 2015; Stahmer et al., 2011), and thus it is important to address barriers to engagement. Three proposed components of parent engagement include attendance, adherence, and cognitions (Becker et al., 2015; Staudt, 2007). The first component, attendance, involves program enrollment, session attendance, and program completion. The second component, adherence, refers to parents' active participation during sessions (e.g., practicing strategies, asking questions), along with their implementation of intervention strategies outside sessions. Finally, "cognitions" comprise verbal behavior such as agreement with intervention rationale, positive relationship with the practitioner, intervention expectations, and overall satisfaction. This definition of engagement cognitions is consistent with Wolf's (1978) conceptualization of social validity, namely the social significance of the goals, the social appropriateness of the procedures, and the social importance of the effects.

Parents can experience a range of substantial barriers that impact their ability to engage effectively with intervention, such as logistical challenges (e.g., Leadbitter et al., 2020) and treatment burden (e.g., Amsbary et al., 2020). Fryling (2014) noted that behavioral practitioners can often respond to low engagement using a blanket “train and train more” strategy. If the reason for low engagement is a contextual factor such as parent stress, this response may result in even lower engagement (or avoidance). This stands in contrast to a functional, contextual approach, which is the core of the behavior analytic framework (Friman, 2020). Without functional assessment and function-based responding, we run the risk of falling into less effective and less compassionate behavior modification, rather than behavior analysis (Mace et al., 1994; Fryling, 2014). Thus, the same thoughtful analysis applied to direct work with clients can be extended to their caregivers in PIIs. This would also be consistent with Zwaigenbaum and colleagues’ (2015) best-practice recommendation to individualize services based on family needs and culture.

An example of a cultural adaptation is an adapted Project ImPACT program for the Indian context. Adaptations included logistical adaptations, changing language and metaphors, adding psychoeducation, encouraging participation from extended family, and taking regular Indian household routines into account (Sengupta et al., 2020). Proactive adaptations to intervention and general good-practice strategies are clearly important to create wider access and engagement. Such adaptations may need to be individualized further for each family accessing early intervention supports.

Parent-coaching assessment, Individualization, and Response to Stressors (PAIRS)

While there are several approaches and intervention manuals to individualise NDBIs to fit each child’s needs, fewer tools are available for adapting supports to the needs of the caregiver and wider family unit (Bradshaw et al., 2022). Effective caregiver coaching necessitates a layered, more complex set of skills on the part of the practitioner, in that their intervention delivery must support both the adult's and the child's learning (Tomeny et al., 2020). Thus, the Parent-coaching assessment, Individualization, and Response to Stressors (PAIRS) was developed, to help practitioners *assess* the family's barriers and facilitators to engagement, *individualize* the intervention based on the assessment, and *respond* effectively to stressors and challenges that occur over the course of the intervention (Pacia et al., 2022). The PAIRS was designed to be used in conjunction with an evidence-based PII, such as Project ImPACT. Project ImPACT was developed with adult learning and engagement strategies built in, and the PAIRS could add a more detailed, systematic process for problem-solving barriers to engagement in the program. The tool contains multiple elements, with three core components: the Good Practice Checklist for Practitioners, the Assessment and Individualization Plan, and the Table of Function-Based Solutions (see Pacia et al., 2022 for a detailed description of the components).

The present study aims to build on the findings from the three-stage development of the PAIRS. The first stage involved reviewing the literature on barriers and facilitators to parent engagement. These barriers were organized into five categories: logistical factors, child factors, sibling factors, parent factors, and intervention factors. Potential solutions to common barriers were proposed. In the second stage, a panel of fifteen Board Certified Behavior Analysts (BCBAs) rated each barrier-solution pairing on the relevance, likely effectiveness, and appropriateness of the solution (i.e., content validity). The final stage was comprised of a workshop delivered by the first author to a subset of the panel and a follow-up evaluation by that subset to assess the structure of the tool and its potential utility for decision-making and day-to-day work with families. The PAIRS was revised based on this feedback.

While the initial feedback was promising, the PAIRS has not been evaluated in clinical practice. To bridge the gap between research and practice, it is important to expand beyond treatment efficacy to evaluating treatment effectiveness (Ghaemmaghami et al., 2021). In contrast to most efficacy research, effectiveness research is typically conducted with more heterogeneous populations, in typical community settings, using multicomponent treatments, and implemented with variable integrity by community providers of varied educational backgrounds (Singal et al., 2014). Although there have been promising studies demonstrating effectiveness of NDBIs in the community (e.g., Brian et al., 2022; Shire et al., 2022; Stadnick et al., 2015), a meta-analysis of community-based early intervention for children with autism found that children who received intervention in clinic or university settings made greater gains than those who received intervention in community settings (Nahmias et al., 2019), highlighting the need for more community-based research.

Additionally, although the PAIRS was systematically developed with BCBA feedback, stakeholder feedback for the PAIRS from practitioners who have used the tool in practice, and parents who have received services with the tool, had not yet been sought. Exploring both parent and provider perspectives contributes a multifaceted evaluation of social validity. For instance, providers who participated in training and delivery of an adapted Project ImPACT program in the community noted difficulties with large amounts of intervention content and time required for training, and the need for structure, accountability, compatibility with their existing knowledge and skills, alignment with their values, and explicit strategies to improve parent engagement (Rieth et al., 2022). Further, a mixed-method evaluation of community providers' perspectives on parent coaching found logistical barriers, limited family engagement, limited agency support, limited professional training, and family stressors to be barriers, and logistical facilitators, agency support, high family engagement, and professional training to be facilitators (Straiton et al., 2021). D'Agostino and colleagues (2019) recommended that researchers plan for collaboration, choice, and input from practitioners and direct and indirect respondents (e.g., family and coworkers) to socially validate the goals, procedures, and outcomes of intervention packages.

Aims and Objectives

Thus, the central aim of the present study was to explore the preliminary impact of the PAIRS on parent engagement (i.e., attendance, adherence, cognitions) in an evidence-based parent-mediated intervention (Project ImPACT) delivered by community practitioners in everyday practice. The present study has two objectives: (1) explore the preliminary impact of the PAIRS on parent engagement by comparing attendance and adherence between parents receiving Project ImPACT in conjunction with the PAIRS and parents receiving Project ImPACT only; and (2) evaluate the social validity (i.e., cognitions component of engagement) of Project ImPACT and the PAIRS through qualitative interviews with parents and practitioners. A descriptive summary of the information gathered using the PAIRS will also be outlined to provide context.

Method

Participants and Setting

Setting

The study took place in Ontario, Canada, where publicly funded support for children with autism and their families is provided by the Ontario Autism Program (OAP), through the Ministry of Children, Community and Social Services (MCCSS). To be eligible for OAP services, a child must be under 18 years old, live in Ontario, and have a written diagnosis of Autism Spectrum Disorder from a qualified professional (Government of Ontario, 2019). One type of OAP service is called the Caregiver-Mediated Early Years (CMEY) program. This service is designed to teach parents strategies to support their child's development between the ages of 12-48 months. CMEY programs are free of charge and available for up to six months per child. Project ImPACT is one of the six CMEY programs offered by community agencies across the province. Two community agencies in Ontario were selected for the study as they operated separately but delivered the Project ImPACT program in partnership, using the same settings, modalities, and duration. This allowed the researchers to explore the impact of the PAIRS on engagement by providing PAIRS training to practitioners in one of the agencies, while the other agency implemented treatment-as-usual. Both agencies provide autism and mental health services to families, children, and youth up to the age of 18.

Parents

Both agencies deliver the Project ImPACT program to cohorts of up to twelve parents every 3 months. As per OAP guidelines, to enroll in the Project ImPACT program in Ontario, parents must have a child with autism between 12-48 months old, their child must be enrolled in the OAP, and they must have received an invitation letter from the MCCSS to register for a CMEY program. For two consecutive twelve-week cohorts, all parents enrolled in Project ImPACT at either agency were invited to participate in the study (*n*=24). Seventeen parents (70.8%) consented to participate in the present study (Table 4.1). One week prior to the first session of a cohort, the first author called all enrolled parents across both agencies. Parents were given a brief verbal description of the study and asked if they would be interested in participating. If they agreed, they were emailed a Participant Information Sheet and Participant Consent Form. If a parent declined to participate in the study, they received treatment-as-usual, regardless of which agency they were enrolled in.

Table 4.1

Participant Demographics

Demographic Information	TAU Group	PAIRS group
Gender (Child)		
Male	7	8
Female	2	0
Mediator[a]		
Father	4	1
Mother	9	7
Ethnicity (Child)		
South Asian	6	5
Southeast Asian	1	0
White	2	2
Mixed Heritage	0	1
Household income (Canadian dollars)		
0-59,999	1	0
60-119,999	1	3
120,000 or more	5	2
Prefer not to say	2	3

[a]More than one mediator could participate in the program

Practitioners

Project ImPACT is designed to be implemented by practitioners (or "coaches") with graduate-level training who work with young children with autism, without exclusion to a particular discipline (e.g., behavioral specialists, speech-language pathologists, occupational therapists) (Ingersoll & Dvortcsak, 2010). Within the two agencies in the present study, all Project ImPACT coaches were behavioral specialists. Both agencies employed three coaches, with at least one Board Certified Behavior Analyst (BCBA) per agency. All coaches at both agencies had completed the Advanced workshops delivered by certified Project ImPACT trainers. Three coaches from one agency were trained in the PAIRS. These included one BCBA and two non-certified behavioral specialists. All three identified as female. Two identified as White and one identified as South Asian. Highest educational attainment ranged from bachelor's (n = 1) to master's (n = 2) degrees. Years of experience working directly with children with autism ranged from 1 to >10 years.

Intervention

The Project ImPACT program was delivered in a 12-week group format at both agencies. Sessions occurred with parents once a week for 12 weeks, alternating weekly between didactic group sessions and individual coaching sessions. Didactic group sessions were all delivered virtually, while individual coaching sessions were delivered virtually or in-person (in participant homes or agency locations) based on parent preference. Didactic group sessions introduced strategies in the FACTS pyramid using PowerPoint slides and video models, while individual coaching sessions involved in vivo modeling, rehearsal, and feedback on caregiver use of strategies with their child (for more detail on Project ImPACT program delivery, see Ingersoll & Dvortcsak, 2010).

Research Design

The study utilized an additive treatment design. Half the families received only Project ImPACT, i.e., treatment as usual (TAU group, n=9), and half received Project ImPACT + PAIRS (PAIRS group, n=8). Prior to study recruitment, parents were assigned to each agency using block randomization, with some logistical considerations (e.g., proximity to agency, scheduling). Parents registered at the first agency were assigned to the TAU group, while parents registered at the second agency were assigned to the PAIRS group. The study ran across two 12-week cohorts of Project ImPACT.

PAIRS Training and Administration

Coaches in the PAIRS group were trained in how to use the PAIRS. Training was conducted by the first author and took place over Zoom. Training involved two one-hour sessions, with “homework” in between. The first training session included didactic teaching on the theoretical background and rationale of the PAIRS, the development of the PAIRS, definitions of barriers and facilitators outlined in the PAIRS, and instructions and overview of each component of the tool. Practitioners were asked to complete the Good Practice Checklist and the Program-specific Adaptations section of the Table of Function-based Solutions prior to the next training session. During the second training session, feedback was provided on their completed forms. The first author modeled how to complete the Assessment and Individualization Plan by completing the form with the coaches based on a real-world case. After training, practitioners were given discretion on when they would utilize the PAIRS within the program, as well as what format they would administer it in (i.e., practitioner-scored checklist, parent interview, or a combination). Practitioners administered the PAIRS at least once with each participant.

Dependent Variables

Dependent variables included the three components of engagement (attendance, adherence, and cognitions). Attendance data were collected for all parent participants, i.e., number of Project ImpACT sessions attended (out of twelve possible sessions). Adherence was measured by evaluating parent fidelity of implementation during sessions. Parent fidelity was measured using the Project ImPACT Intervention Fidelity Checklist (Ingersoll & Dvortcsak, 2019), as scored during individual coaching sessions by the parent's coach. The Intervention Fidelity Checklist measures fidelity on a scale of 1-5, with 1 corresponding to "Adult does not implement the strategy, or almost all attempts to use the strategy are incorrect" and 5 corresponding to "Adult implements the strategy effectively throughout the session, missing no more than a few opportunities." The Checklist is divided into five sections corresponding to the components of the FACTS pyramid. Each of the first four sections contains 4-10 specific strategies. Each strategy is scored individually, and then each section, including the fifth, is scored as a whole. Parent fidelity was measured at four points during the 12-week program (Week 4, 6, 10, and 12).

Inter-observer agreement (IOA) was conducted by each agency's BCBA for 25% of fidelity checks using percent agreement. Agreement was defined as both coders assigning a rating for each of the six summary scores that was within one point, as measured in previous studies evaluating fidelity in Project ImPACT (e.g., Stadnick et al., 2015). Percent agreement was the quotient of the sum of the total number of agreements and the sum of the total number of agreements and disagreements, multiplied by 100. Percent agreement was 92.9% for the TAU group and 88.7% for the PAIRS group.

Social validity (Cognitions)

Parent perceptions

The third component of engagement, cognitions, were explored in parent interviews. This also served as an evaluation of social validity. Semi-structured interviews were conducted with parent participants in the PAIRS group after completion of the Project ImPACT program. Seven participants were interviewed (87.5% of participants), while one participant could not be contacted. Interviews were conducted over the phone and interview duration ranged from 5-20 minutes. The intent of parent interviews was to evaluate the social validity of the PAIRS tool. However, due to coaches' use of the PAIRS as a practitioner-completed checklist, parents did not explicitly contact the tool. Thus, although they could not comment on it directly, they could speak to the barriers and facilitators for their engagement.

The interviewer (first author) focused the interviews on parents' experience with the program, with some guiding questions on barriers and individualization (the focus of the PAIRS tool). Interview questions included five primary questions:

1. How did you find the program overall?

2. Did you find it well individualized to your child and your family?

3. Were there things that you found made it difficult to participate in the program?

4. Is this something you would recommend to other parents?

5. Do you have suggestions for us, to help us improve the program?

Each section of the interview began with broad probes about parents' experience (e.g., "How did you find your experience in the Project ImPACT program?"); depending on initial responses, narrower probes regarding both positive and negative aspects of the four interview topics were provided (e.g., "Did you find that your coach was able to adapt the program to address [specific barrier]?").

Additionally, surveys regarding parent satisfaction (Project ImPACT Parent Satisfaction Survey; Ingersoll & Dvortcsak, 2019), stress (Parental Stress Scale; Berry & Jones, 1995), and self-efficacy (Short Form of the Self-Efficacy for Parenting Tasks Index-Toddler Scale; Van Rijen et al., 2014) were provided to participants for completion. However, survey results could not be analyzed due to low return rates, and all returned surveys contained numerous skipped items which precluded reliable analysis.

Practitioner perceptions

A virtual discussion session was conducted with the coaches who were trained in the PAIRS (*n*=3). The discussion session was conducted over Zoom and lasted about 30 minutes. Similar to parent interviews, each question began with broad questions, and then follow-up questions were asked depending on the responses. Discussion questions included the following:

1. What was your perception of the last two cohorts [cohorts that included the PAIRS] and what barriers stood out to you?

2. What were the facilitators or family strengths that you found helped with engagement?
3. What were your perceptions of the training you received for the PAIRS?
4. What are your suggestions for improving the training for the PAIRS?
5. What do you feel would be helpful in improving the PAIRS?
6. What are some barriers you found to using the PAIRS?
7. When did you find it helpful to use the PAIRS?
8. What modality did you find it helpful to use the PAIRS?
9. Do you see this tool potentially being useful in other programs?

Analysis

Attendance and Adherence

An independent t-test was conducted to compare means of attendance. A two-way repeated-measures ANOVA was conducted with time as the within group variable and group as the between group variable on Fidelity of Implementation scores.

Cognitions

Thematic analysis (TA) was used to analyze parent and practitioner interviews due to the method's flexibility and alignment with the exploration of social validity in ABA (e.g., Anderson et al., 2021; Walsh et al., 2019). Existing research on barriers and facilitators provided the lens through which the data was analyzed and interpreted. Analysis was primarily conducted by the first author, and therefore also influenced by the first author’s position as the developer of the PAIRS and a practicing behaviour analyst. For example, while the author did not set out to elicit barriers in accordance with those outlined in the

PAIRS, through the TA process the author organized codes corresponding to parent barriers into sub-themes that reflected the barrier categories in the PAIRS (see reflexivity statement in Appendix J for more details). The specific phases used to analyze the qualitative data, broadly based on steps delineated by Braun and Clark (2006), is outlined in Table 4.2. While these are described in a stepwise fashion, the analysis was conducted recursively, moving up and down the phases throughout the process. An example of a theme's sub-theme, references, and data extracts are presented in Table 4.3.

Table 4.2

Phases of Analysis

Phase	Description
1. Familiarization with data	Data was initially transcribed using the online transcription tool Otterai. The first author conducted a second round of transcription by listening to each audio recording and correcting errors found in the transcription. The first author then read through each transcription in full at least once prior to generating any codes.
2. Coding	Transcribed data were uploaded into NVivo, a qualitative data analysis software. The first author read through each transcript and generated initial codes, paying equal attention to all parts of the text. Codes were not pre-specified, i.e., all codes were generated ad hoc. Sixty-seven initial codes were generated for parent data and 21 initial codes were generated for practitioner data. Codes were primarily semantic, with the first author's interpretation of the explicit and surface meanings of the text used to construct codes.
3. Searching for themes	A complete list of all codes generated was compiled. The first author searched for patterns in the coded data and generated initial categories (i.e., sub-themes) to group related codes together, and initial overarching themes to organize the sub-themes. Mind maps were created to aid the review and organization of themes (Appendix K-O). Twelve initial themes were generated for parent data and five initial themes for practitioner data.
4. Reviewing themes	The construction and review of themes was conducted recursively. Codes were renamed, combined, separated, removed from analysis, or moved into different sub-themes. Similarly, as codes were revised, sub-themes were renamed, combined, separated, or removed. Finally, themes were constructed and reviewed to group sub-themes together, using the same iterative methods.
5. Defining and naming themes	Themes were conceptualized and named using domain summaries. Theme names were assigned ad-hoc, but were informed by previous research on barriers and facilitators to parent engagement.

Table 4.3

Coding Example for Barriers Theme

Sub-Theme	Code	References	Example
Logistical factors	Difficulties with scheduling	7	*"I just have one session [of the Maintenance period]. I'll be gone and when I come back… I won't be eligible for that."*
	Difficulties with access	3	*"You're already waiting for the actual resources to come in. So it just feels like you have a lollipop in your hand while you wait for it and even that you cannot enjoy."*
Child factors	Challenging behaviour	1	*"I didn't know how I'm going to play with my child because he has got some tantrums."*
	Difficulties engaging child	8	*"So [child] was like, okay, she's not getting what I want. So he doesn't bother, he plays his own."*
Parent factors	Treatment burden	2	*"I'm just a human…I'm not the machine I need…because I'm working."*
	Self-efficacy	6	*"We parents, most of the time what happened is we don't know the exact way right? Though we are parents, we don't know the exact way."*
Intervention factors	Variations in effectiveness	7	*"It's hard for me when he does something inconsistent."*
	Difficulties with generalization	5	*"But when he's being asked at home, he wouldn't do that"*

Results

First, information gathered using the PAIRS will be presented to provide context for the results. Then, results from the t-test and repeated-measures ANOVA will be outlined. Finally, a qualitative summary of the parent and practitioner interviews will be discussed.

Information Gathered from the PAIRS

Coaches in the PAIRS group completed the Good Practice Checklist for Practitioners and Organization-Specific Adaptations section of the Table of Function-based Solutions prior to the first participating cohort and administered the PAIRS Assessment and Individualization Plan with each of their parent participants during the program.

Good Practice Checklist for Practitioners

For facilitators, 100% (7 items) were checked. For barriers, 60% (3 items) of logistical factors, 100% (2 items) of child factors, 33.3% (1 item) of sibling factors, 66.7% (2 items) of parent factors, and 50% (1 item) of intervention factors were checked (Table 4.4). The Priorities and Development Plan section included coordinating with other programs the child is involved in at the agency, coordinating with the child's other services outside of the agency, providing Project ImPACT manuals in other languages, providing Bluetooth earpieces for virtual coaching sessions, developing a plan for occupying siblings during sessions (e.g., by bringing toys and activities the sibling enjoys), developing a plan for coaching siblings who want to be involved, looking into training in Acceptance and Commitment Training or Motivational Interviewing, including information during the first coaching session about setbacks and how it can take time for these skills to develop, and gathering more information on culturally sensitive ways to collaborate with diverse families.

Table 4.4

Good Practice Checklist for Practitioners

Relevant factors	Good practice strategies to consider	Checked
Facilitators	My intervention is evidence-based and follows best practice guidelines for children with autism, parents, and siblings (if applicable).	Yes
	My intervention utilizes effective adult learning strategies.	Yes
	My intervention supports parent self-efficacy and empowers parents to understand their child's development and how they could facilitate their child's learning.	Yes
	My intervention is flexible, responsive, and can be tailored to meet individual needs.	Yes
	I am confident in my therapeutic relationship skills.	Yes
	I am confident in my ability to provide a non-directive collaborative and strengths-based approach.	Yes
	I am familiar with relevant services in my area and can connect families with them when necessary and appropriate (e.g., respite).	Yes
Logistical factors	My intervention supports flexibility in service delivery models.	Yes
	My intervention supports flexibility in days/times of contact.	Yes
	My intervention considers the child in context of the family unit.	Yes
	My intervention supports a coordinated approach with interdisciplinary teams, including concordance of strategies and scheduling of appointments.	No
	I have a plan for supporting families with limited access to materials and equipment.	No
Child factors	I am clear on pre-requisite child skills required to successfully complete my intervention (e.g., verbal skills, attending skills).	Yes
	I am clear on the level of child problem behaviour my intervention can support.	Yes
Sibling factors	I have a plan for occupying or involving siblings during sessions.	No
	I have a plan for developing goals and developmentally appropriate teaching strategies for siblings if requested by the family.	Yes
Parent factors	I am confident in my ability to integrate complementary strategies into intervention within my scope of practice and competence (e.g., ACT, Motivational Interviewing).	No
	I have outlined a clear rationale for all strategies taught in my intervention.	Yes
	I am continuously developing cultural humility through formal and informal learning opportunities.	Yes
Intervention factors	I have a plan for establishing appropriate and shared expectations at the outset, including the possibility of setbacks.	No
	My intervention is proactively programmed for generalization.	Yes

Table of Function-Based Solutions

Program-specific solutions were outlined for each section. For example, for logistical factors, solutions outlined included virtual, in-home, in-centre coaching; flexible scheduling and up to 2 reschedules per appointment; coach siblings in bottom two tiers of PI pyramid if needed; obtain schedule of other services; and refer to *[organization-specific service coordination program]* as needed. The complete list of practitioner-generated solutions is outlined in Table 4.5 below.

Table 4.5

Program-specific Solutions

Barrier	Suggested solutions	Program-specific solutions
1. Logistical factors		
1.1-1.4 Difficulties with access	Telehealth, self-directed learning, or home-based training Flexible training days/times, including flexibility to reschedule or follow up with staff as needed Approach family as a whole (e.g., plan for occupying or involving child and siblings) Coordinate scheduling of appointments with interdisciplinary team Connect with charities, insurance, funding supports, etc. Provide or connect with resources such as childcare, meals, or other needs.	Provide families with options of telehealth, in-person, or hybrid coaching sessions Behaviour therapist flexibility in days/times of group and coaching sessions [Agency] is able to connect with other services at [Agency] or in the community for children, supports, meals, and other needs.
1.5-1.6 Administrative difficulties	Flexible models of service delivery, including easy-to-access modes of contact (e.g., WhatsApp) Provide (or reduce need for) additional therapy materials (e.g., apps and software, online portal to request materials, toy lending library) Collaboratively problem-solve on setting up home environment or choosing appropriate community settings Provide parent-friendly data sheets	Able to communicate with families by email, phone, or text in between sessions. Provide materials and toys (on some occasions) to implement and model strategies Work with families to set up their homes for success at the beginning of services. Parents do not need to collect data for their children.

2. Child factors		
2.1-2.2 Complex child profile	Individualize child programming (e.g., adaptations for non-verbal children) Interdisciplinary collaboration (e.g., with SLT, OT) using a coordinated, positive approach Additional parent training in Positive Behaviour Support, including a basic understanding of PBS prior to intervention and clear mutual understanding of the function of behaviour Connect with PBS services if you are not able to provide PBS as part of your intervention. Refer out if your intervention is not the right fit.	Individualized programming within the PI program (e.g., goals based on current skill level and parents long term goals). Adaptations for children at different communication levels (different strategies, prompt levels and video examples) Provide parents with optional behaviour management training any time throughout program.
3. Sibling factors		
3.1-3.3 Difficulties for siblings	Identify and collaboratively problem-solve source of sibling difficulty Explicit strategies for including siblings (e.g., sibling training) Connect with sibling groups (e.g., SibShop) if appropriate.	Identify family supports during initial sessions (someone they can rely on) where siblings can stay or be watched Can train siblings (bottom of pyramid) Refer to SibShop at [Agency].
4. Parent factors		
4.1 Individual or cultural concerns	Clarify values and goals at the outset and on an ongoing basis (e.g., using ACT, MI) Set clear and realistic expectations at the outset, including levels of involvement, a plan for collecting and reviewing data, and explicit acknowledgment that there may be setbacks Collaborate with both parents on goal-setting and implementation strategies Provide clear rationale for intervention strategies Shape successive approximations and establish intermediate outcomes as reinforcers (e.g., when trying to transition away from discipline practices such as yelling) Collaborate with professionals from the same culture where appropriate Seek training in cultural competence and continue to develop cultural humility (e.g., on maintenance of cultural identities, upholding religious practices, role of extended family and community, gender roles, etc) Connect with a translator if required.	Collaborate with parents from the beginning on goals and identify expectations Provide rationale for intervention strategies during the group session and reiterate during the coaching sessions. Break goals down or shape goals to help learner access reinforcement. [Agency] provided training on cultural competence and humility - looking into other ways to support families in culturally specific ways. Outline to parents that they can share more or less depending on comfort level during group sessions When available, transfer to therapists who speak more than one language.

4.2 Difficult living circumstances	Interdisciplinary collaboration (e.g., with social worker) Reduce treatment burden and/or complexity Increase treatment relevance Collaborative problem-solving (e.g., around structural barriers such as space to conduct intervention) Connect with outreach or respite services, which may need to be prioritized over behavioural services	Reduce treatment complexity by reducing goals and what parents need to do (i.e., practice plans done during group sessions rather than on their own). Collaborative problem solving at the beginning of group and coaching sessions. Can find ways to simplify practice plans Continually emphasize that you don't need to be practicing all the time Provide options of in-office coaching session
4.3 Treatment burden and stress	Identify source of stress (e.g., demand for parent involvement too high, intervention too onerous on child) Reduce treatment burden, intensity, and/or complexity Regular check-ins with family Flexible training days/times and models of delivery (e.g., blended models) Proactively problem-solve for challenging situations Incorporate ACT or MI strategies Connect with outreach or respite services	Check in with families at the beginning of group and breakout rooms (if parents are more comfortable then) as well as coaching sessions. Flexible group/coaching session days and times, able to reschedule if necessary. Be open and communicative with parents by building rapport Identify individuals in their life who could be supportive during this time. Continuously asking for potential barriers and possible solutions Connect with outreach program at [Agency]
4.4 Training not the right fit	Provide different training options (e.g., self-directed, Telehealth, individual, group, etc) depending on parent needs/preferences Adjust teaching strategies (e.g., video vs in vivo feedback) as needed Adjust intervention complexity as needed Incorporate ACT or MI strategies	Different ways to teach strategies (i.e., group, videos, model with child, read manual, etc.). Adjust teaching strategies (i.e., feedback after observation). Adjust complexity of prompts

4.5 Fluctuating motivation/belief in effectiveness	Collaborate with both parents on goal-setting and implementation strategies Establish intermediate outcomes as reinforcers Establish treatment relevance through regular check-ins on priority family goals Share parent-friendly graphs to show progress Create behavioural momentum by setting smaller, achievable goals at the start and as needed throughout the intervention Discuss previous interventions in detail, including why they were or were not effective Incorporate ACT or MI strategies Connect with peer support (e.g., other parents who completed the same training)	Collaborate with both parents on goal setting (when possible). Peer support through group sessions. PI strategies connected to improving goals identified Goal development form includes both short- and long-term goals
5. Intervention factors		
5.1 Variations in treatment efficacy	Set clear and realistic expectations at the outset, including levels of involvement, a plan for collecting and reviewing data, and explicit acknowledgment that there may be setbacks Promote shared understanding and collaborative problem-solving Program for generalization Share parent-friendly data sheets Incorporate ACT or MI strategies	Clear and realistic expectations during collaborative goal setting and levels of involvement during first group session. Generalization during week 6. Collaborative problem-solving during practice plans. Clear expectations and roles of each individual identified Various opportunities to share any problems encountered and active problem solving PI includes generalization and maintenance pieces, and boosters
5.2 Difficulties with generalization	Program for generalization Discuss and problem-solve potential difficulties in advance (e.g., implementing strategies around disapproving family members) Incorporate a self-management system Establish an individualized check-in schedule (e.g., short check-ins between sessions, monthly check-ins after completion of training) Incorporate ACT or MI strategies	Generalization during week 6. Some problem-solving discussed during week 1 (e.g., ask for help from family when possible, partner makes dinner while practicing with child, etc.). Ongoing discussion about challenges Maintenance sessions allow for the opportunity to discuss barriers and solutions every month

Assessment and Individualization Plan

In the PAIRS Assessment and Individualization Plan conducted for each parent participant by their coaches, parents demonstrated a range of 6-11 facilitators (average 8.38), as rated by their coaches. The most common barriers were extenuating circumstances that impact engagement, such as parenting without support, socioeconomic disadvantage, and mental health difficulties (50% of participants in PAIRS group, *n*=4) and variations in treatment efficacy affecting engagement (37.5% of participants in PAIRS group, *n*=3).

Dependent Variables

Attendance

An independent-samples t-test was conducted. There were no outliers in the data, as assessed by inspection of a boxplot. Engagement scores for each group were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .102$).Attendance was higher in the PAIRS group ($M = 11.88$, $SD = 0.354$) than the TAU group ($M = 10$, $SD = 1.414$), a statistically significant difference, $M = -1.875$, 95% CI [-2.974, -0.776], $t(15) = -3.638$, $p = .002$.

Adherence

Baseline and final fidelity scores were statistically compared using two-way repeated-measures ANOVA. There were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk's test of normality ($p > .05$). There was no statistically significant interaction between the intervention and time on fidelity, $F(1, 13) = 1.34$, $p = .268$, partial $\eta 2 = .093$. The main effect of time showed a statistically significant difference in fidelity at the different time points, $F(1, 14) = 57.278$, $p < .001$, partial $\eta 2 = .85$. The main effect of group showed that there was a statistically significant difference in fidelity between intervention groups *F*(1, 14) = 6.617, *p* = .023, partial η2 = .337. Univariate analyses of variance were conducted for baseline and final fidelity. Results showed that there was a statistically significant difference at baseline *F*(1, 14) = 5.357, *p* = .036, partial η2 = .277, with lower baseline scores for the PAIRS group (*M* = 10.5) than the TAU group (*M* = 14.625), and no statistically significant difference between groups (PAIRS *M* = 19.25; TAU *M* = 22.125) at the final session *F*(1, 14) = 3.62, *p* = .097, partial η2 = .184.

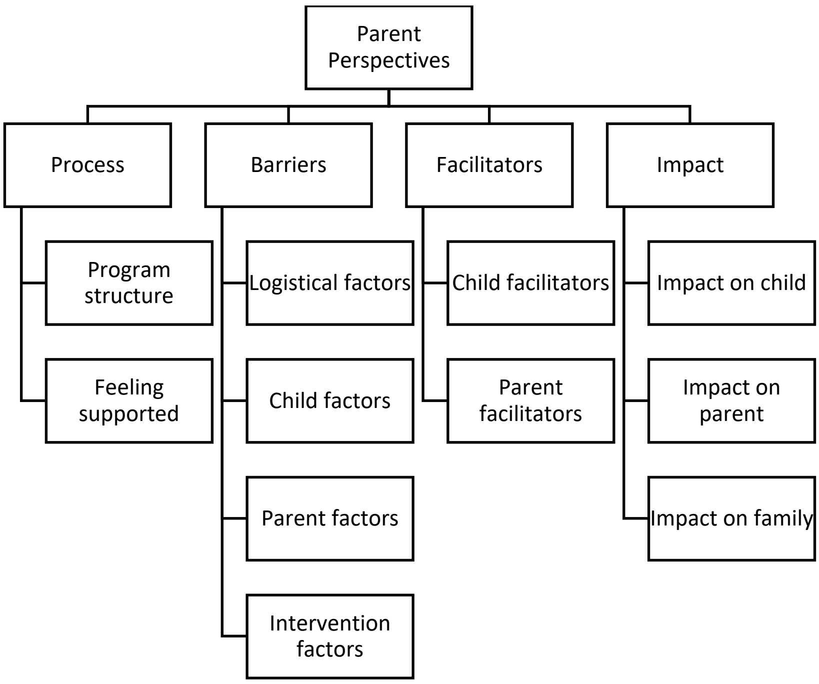
Cognitions

Parent Perceptions

Parent interviews were conducted with seven participants in the PAIRS group. Four themes were constructed through the thematic analysis: process, challenges, facilitators, and impact (Figure 1).

Figure 4.1

Parent perspectives



Process. All parents described the Project ImPACT process. This included two sub-themes, structure of the program and support from the coach. When describing the structure of the program, three parents described the benefits of hands-on practice and two parents each spoke positively on the teaching framework, goal-setting, planning, and maintenance sessions. One parent each noted the location of sessions, organization of program, and restrictions placed on program. Four parents discussed the support they received from their coach and community agency. For example, one parent shared, “Project ImPACT, and [other program from Agency], these two have become lots of support for us as a family and it has not only support, but it has really helped me.”

Barriers. Parents described multiple challenges encountered with the program. The challenges they described aligned with the barrier categories of the PAIRS: logistical factors, child factors, parent factors, and intervention factors. The fifth barrier category of the PAIRS, sibling factors, was not present in this data set.

When discussing logistical factors, four parents shared difficulties with scheduling and two parents described difficulties with access. For difficulties with scheduling, one parent shared that they were unable to access all the sessions due to time limits imposed by the provincial ministry:

> I have to travel, and the follow up sessions, I'm sure they will be very helpful. But they just exist for three months. Yeah, so there is a time limit… so I can't have sessions, right. I just have one [maintenance] session.

When describing difficulties with access, parents described difficulties accessing other programs in the province, e.g., “We haven't involved in any kind of therapy until now. We are looking but it's like long waiting lists for everything.”

In the child factors sub-theme, there was one brief mention of their child’s challenging behavior and three parents discussed difficulties engaging their child. All discussion of challenging child factors were framed as past challenges, prior to learning

Project ImPACT strategies. The parent factors sub-theme included descriptions of treatment burden and self-efficacy. One parent noted, “I'm just a human. I'm not, I'm not a machine…because I'm working…so sometimes I was tired like that. And I don't have time.” Two parents shared their difficulties in not knowing how to respond to their child at the beginning of the program, e.g., “We parents, most of the time, what happened is we don't know the exact way, right? Though we are parents, we don't know the exact way.”

Finally, for intervention factors, variations in effectiveness (3 parents) and difficulties with generalization (2 parents) were discussed. Variations in effectiveness refers to slow or inconsistent progress, such as, “He talk sometimes he doesn't sometimes”. Difficulties with generalization was seen in difficulties generalizing across settings (“But when he's being asked at home, he wouldn't do that”) and people (“My sister, she tried the other day, but still when [Child] doesn't talk…they give what he wants”).

Facilitators. The theme of facilitators was divided into two sub-themes: child facilitators and parent facilitators. Four parents discussed how the strategies were adapted to fit their child’s interests, skills, and other needs, such as:

> I'm happy that my coach was able to make it that as soon as I picked him up from his school, like, go on right there…because that's when he's got still that little bit of energy left over from school that we might, you know, be able to focus on it.

Five parents discussed parent facilitators. Of those, three parents discussed how the strategies fit in their everyday life, for example:

> We were making goals according to what I can do only… She was asking me what is comfortable for me, how much time them I can give him, and how I can make that goal setting to work on my daily life. Okay, so we were using the goals, not like to go out of the way and do things, like it's just a regular daily routine. I can use it.

Other parent facilitators included choice of session location and scheduling, as well as flexibility of having their other child attend sessions.

Impact. The theme of impact included impact on child, impact on parent, and impact on family. Impact on child included skill acquisition, i.e., improvement in communication (6 parents) and improvement in social engagement (2 parents), and size of gains (7 parents). For instance, one parent shared uncertainty about their child's progress ("I'm not sure overall, how much progress we made, but maybe that's just, these things do take time"), while another parent shared large improvements in their child ("We are feeling that, is this the same [Child], he was like three, four months ago it was completely different").

Impact on parent included knowledge gained, strategies implemented, and parent cognitions. When discussing knowledge gained, six parents discussed learning from their coach (e.g., "[Coach] was very helpful, and she gave me all the answers [to] my questions.") and five parents discussed lasting impact of attending the program (e.g., "It's not for three months only. It's gonna be with me forever."). For strategies implemented, five parents discussed how they changed their own behavior, and six parents discussed how implementing the strategies changed their child's behavior, e.g., "It was really great when I started imitating him. So he was like, okay, she's doing same thing what I'm doing, so he got more engaged with me."

For parent cognitions, five parents indicated their satisfaction with the program (e.g., "I love the Project ImPACT"), four parents indicated their confidence (e.g., "You always need a strategy…then my mind is always clear, like what I want to do when he's in that state of mind"), and three parents expressed gratitude (e.g., "She adjusts her schedule for me, that's why I'm so thankful to her"). Two parents each expressed their joy and their frustration. One parent described frustration in relation to interference with strategy implementation by family members, and the other parent described their frustration with limits set by the provincial ministry ("Because you're already waiting for the actual resources to come in. So, it just feels like you have a lollipop in your hand while you wait for it and even that you cannot enjoy.")

Finally, three parents discussed the impact of the program on the wider family unit. One parent shared difficulty remaining consistent between family members ("I need to be consistent like I was trying to keep reminding my sister and her boyfriend"). Another parent shared the changes that occurred in the family relationships:

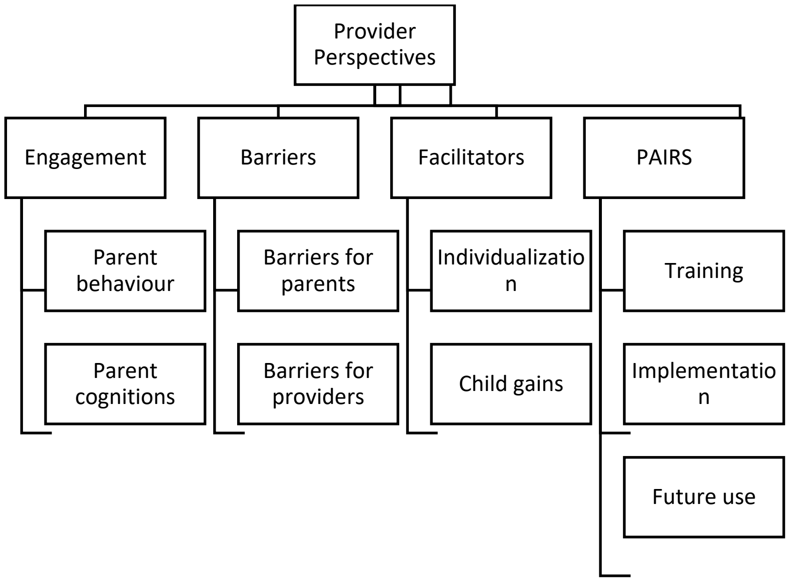
> I think because of the Project ImPACT, me along with my family, like my husband and my elder son, we know how to how exactly to play with [Child]. So that had changed a lot…So now my big one, he's getting so used to my little one…all of a sudden, it's, after years, he gives hugs and kisses to my elder son.

Practitioner Perceptions

The practitioner discussion, with the three coaches who implemented PAIRS alongside Project ImPACT, was organized into four themes: Engagement, barriers, facilitators, and PAIRS (Figure 2).

Figure 4.2

Provider Perspectives



Engagement. Engagement was discussed in terms of parent behavior and parent cognitions. When discussing parent behavior, practitioners discussed the importance of adherence, e.g., “They're using these strategies, and the more time that they’re using these strategies, the more change they will see.” For parent cognitions, practitioners shared parents’ joy (e.g., “He finally said gummy and then Mom was ecstatic”), frustration (e.g., “She really expressed a lot of concern and struggle with that, she's very frustrated because she really wants to, you know, implement these strategies”), and ambivalence (e.g., “And then they're kind of like, well, why am I in this program?”).

Barriers. Barriers included barriers for parents and barriers for practitioners. Barriers for parents included unclear expectations about amount of parent involvement, slow progress, idiosyncratic barriers, and insurmountable barriers. When discussing idiosyncratic barriers, practitioners shared that they felt there were barriers to engagement that were not identified in the PAIRS:

> I feel like there weren't a lot of categories that I checked off as like where we need to make changes or anything like that for that family… there was still some things that didn't quite work out well for that family, but it wasn't those things.

The specific idiosyncratic barriers discussed included interference from family members, being "too good" for the program, and sustaining an injury that impacted the parent's participation in the program. For example:

> The mom had quite a bit of skill already. So, I felt like she kind of felt like she knew what she was doing, and that was one of the barriers with her – where she kind of felt like "I already know how to do some of these things."

For insurmountable barriers, practitioners discussed how they tried to address certain barriers but were unable to:

> We offered…to do some other things for her, but…those things weren't really going to work for them. So, we did try and work around those barriers, but I think it just, you know, there's some barriers that it's, you can't really overcome it.

When discussing barriers for practitioners, practitioners shared difficulties with the insurmountable barriers discussed above, as well as challenges with individualizing the program due to constraints of the model. In particular, coaches shared the challenge of individual parents falling behind the group and having to move forward before mastering foundational strategies:

> Then it's like, okay, well, let's practice now and then it's not the same, because…it's always like, go, go, go with the [FACTS] pyramid. And I feel like they get caught up in practicing that, and then Project ImPACT is already moving forward.

Facilitators. Facilitators included individualization and child gains. Individualization referred to offering solutions to barriers, such as being flexible with scheduling and location, or referring parents to other programs to attend alongside Project ImPACT. For example:

> It's just really individualizing and recognizing, you know, what [Agency] does…There's so many times where I've offered you know, like, "Oh, there's workshops at [Agency] that can be beneficial. You can do a walk-in appointment with this. Why don't you try doing this?"

When discussing child gains, practitioners shared how seeing improvements helped with engagement, e.g., "Parents who saw changes quickly, you know, they were so much more invested into it," and how this allowed them to stay engaged even when there were delays, e.g., "There's a little bit of delay but parents are on top of it, for sure they see changes and it's so nice to see parents so happy."

PAIRS. PAIRS was discussed in terms of training, implementation, and future use. When discussing training, practitioners shared the utility of discussion and practice. For discussion, one coach noted that it was helpful to be able to ask questions. For practice, one coach mentioned that completing the Good Practice Checklist for homework was helpful and "kind of fun to do," and another coach noted that practicing the Assessment and Individualization Plan with a real-world case worked well. As far as implementation of the PAIRS, practitioners discussed using the PAIRS for preparation, for problem-solving, and for reflection. When using the PAIRS for preparation, practitioners noted the utility of the PAIRS as a planning tool:

> "I think planning was nice. You know, the barriers and solutions…identifying that beforehand, so you are prepared. If something comes up, you're like, "Oh, I have something to reference quickly."

In particular, coaches emphasized the utility of completing the Program-Specific Solutions section of the Table of Function-based Solutions in identifying specific adaptations that could be made as required, along with updating it periodically as new services are added to the Agency:

> Being able to go through first and find out you know, this is a possible barrier, how does [Agency] support it? So, we can…take from that list if needed, was really helpful.

Practitioners described how the tool was helpful for problem-solving as it provided another perspective, and how the tool could be further improved to assist in the problem-solving process:

> So, I think that would definitely be helpful, because even though we're so ingrained in all the programs, sometimes we need that outside perspective, and maybe even that outside perspective is a solutions table, not necessarily another person.

Practitioners discussed how they preferred using the PAIRS as a tool for reflection, and also to review when the adaptations didn't result in the outcomes they had hoped for, e.g., "So that you can actually see, you know, where have I made those adaptations? Where have I encountered those barriers? What solutions have I provided?"

In the discussion of future use, practitioners shared their recommendations for improvements and ideas for other applications of the PAIRS. Recommendations for improvement involved including a problem-solving framework, as described above, and simplifying some of the checklist items ("Some of the questions were worded, where I was like, yes? Yes or no?...I just had a couple of double negatives.") There was also some confusion around whether to score an item as a barrier when the practitioner had an immediate solution:

> When I was going through for my current family, one of them was…they don't have childcare…so I said no, but it was, they needed childcare, but they were just able to bring sibling to session, it wasn't an issue.

Finally, they discussed the potential utility of the PAIRS in other programs the agency offered (“We still individualize and adapt so many times during [other program] as well, so I think it could be definitely helpful”) and for supporting new employees.

Discussion

The present study provides further support for the Project ImPACT program, this time in a multi-cultural Canadian community, as well as preliminary support for the PAIRS when used to complement an evidence-based intervention. Evidence-based interventions do not always translate to effective services in routine-care settings (Ghaemmaghami et al., 2020; Singal et al., 2014), and parents often encounter barriers to engaging and benefitting from services (e.g., Carruthers et al., 2022). Furthermore, despite rigorous training in behavioral principles and technologies, practitioners receive little to no training in how to effectively apply these strategies with parents (Ingersoll et al., 2020). Thus, the PAIRS was developed to help practitioners use a contextual, functional approach to working with parents by providing a systematic tool for assessing, individualizing, and responding to families during a PII. The present study sought to explore the preliminary impact of the PAIRS on parent engagement in community practice and evaluate its social validity. Preliminary data suggested that the PAIRS may have a positive impact on attendance in the Project ImPACT program, and that parents and practitioners found it relevant and helpful.

Attendance was significantly higher in the PAIRS group compared to the TAU group. Coaches in both groups reported that they adapted the schedule for over 80% of participants, suggesting that attendance would be lower overall without this individualization. Parents from both groups demonstrated statistically significant improvement in their implementation of Project ImPACT strategies with their child from baseline to final session. This adds to the growing evidence base for Project ImPACT as an effective PII. There were no statistically significant differences between groups in their final fidelity scores, but there were statistically significant differences between groups in their baseline fidelity scores, with participants in the TAU group scoring higher at baseline than participants in the PAIRS group. Further evaluations are necessary with larger sample sizes to fully understand the impact of PAIRS on implementation.

Parents shared positive comments about the different program components, indicating the social validity of the Project ImPACT program. Parents also highlighted the importance of a supportive relationship with their coach and agency, consistent with facilitators outlined in the PAIRS. The challenges they described fit into the categories outlined in the PAIRS, which provides additional support for the barrier categories of the tool. Sibling challenges were the only barrier category in the PAIRS not discussed. It is possible that sibling challenges are not as common as the other barriers, and therefore the small sample size here did not capture this barrier. Another possibility is that sibling challenges may be more prevalent in other types of programs, such as more time-intensive programs or programs that focus on challenging behaviors.

Consistent with effectiveness research (Singal et al., 2014), the present practitioners presented insight into the utility of the tool in a community setting. As expected, practitioners described their use of the PAIRS as a tool for preparation (i.e., assessment and individualization) and for problem-solving (i.e., responding to stressors). Unexpectedly, practitioners also described their use of the PAIRS as tool for reflection. In fact, practitioners shared that this was the most helpful use of the Assessment and Individualization Plan component of the tool, which was not the intent of that component. A future version of the

PAIRS could include a section for reflection, which may then help with individualization for future families as practitioners reflect on each family's engagement in the program.

Another suggested improvement to the PAIRS was a problem-solving template, to help practitioners collaboratively problem-solve idiosyncratic barriers or barriers for which the suggested solutions do not fit. In the discussion on barriers, practitioners noted that there were idiosyncratic barriers identified that were not outlined in the PAIRS. However, closer inspection of the idiosyncratic barriers showed that they did in fact align with categories in the tool (e.g., difficulties with generalization, training not the right fit, difficult living circumstances). This suggests that the PAIRS could be improved by providing more detailed definitions and examples of each of the barrier categories and items. Additionally, the training process may need to be improved, or an extended supervision period may need to be provided.

Overall, the barriers were reported by both parents and practitioners to be addressed within the program. There was significant overlap between the barriers discussed by parents and practitioners, suggesting that practitioners were able to successfully identify parents' barriers. Additionally, parents were satisfied with the goodness-of-fit between the program and their daily life and goals for their child, and the quantitative data showed higher parent attendance and larger gains in parent fidelity for the PAIRS group when compared to treatment as usual, suggesting preliminary effectiveness of the PAIRS on parent engagement.

64.7% of participants identified as South Asian, 5.9% as Southeast Asian, and 5.9% as mixed heritage. None of the participants shared any conflict between their culture and the Project ImPACT program, which was implemented in its original format. When compared to adaptations made in the Indian context (Sengupta et al., 2020), some of the same adaptations were made here on a case-by-case basis (e.g., providing childcare, encouraging participation from extended family, teaching within family's daily routines). This suggests that even when proactive cultural adaptations are not explicitly made, individualized adaptations can help to promote cultural fit between the program and family. Additionally, practices implemented during the program were consistent with general recommendations for working with ethnically diverse families, namely community engagement (e.g., building trust and relationship with caregivers), embracing flexibility (e.g., allowing cancellations), and adopting a holistic approach (e.g., providing referrals and resources to services and supports in the community) (Vanegas et al., 2022).

Limitations

A significant limitation of this preliminary evaluation is the small sample size. Both agencies reported low program registration. A combined twenty-four families registered across both agencies across two cohorts (average of 50% of each agency's maximum program capacity). Given the stringent eligibility criteria and complex registration process set out by the OAP, it is possible that many families in the community who would benefit from the program were unable to access it. Thus, the sample allowed for an initial exploration of potential effects of the PAIRS on parent engagement, however results must be interpreted with caution. A larger sample is necessary to draw more reliable conclusions on the effectiveness of the PAIRS.

Another limitation was the lack of a fidelity criterion for the PAIRS. After the initial PAIRS training, practitioners in the present study were asked to use their clinical judgment on when and how to utilize the PAIRS. This was done to explore the preliminary effectiveness, rather than efficacy, of the PAIRS, when busy community practitioners are provided with a tool to complement their clinical work. However, training to a specific criterion would increase internal validity of future studies.

Finally, surveys conducted could not be analyzed due to low completion rates, which precluded the comparison of program satisfaction, stress, and self-efficacy scores between groups. The same barriers that impact caregiver engagement in interventions may impact caregiver engagement in research, if not more so as there is less reward in participating in research than in intervention. Although steps were taken to reduce the response effort for completing the surveys (e.g., setting aside time during sessions for survey completion), this may not have been enough to alleviate the burden this additional task may have placed. For future studies, strategies from the PAIRS could be used to address barriers to research participation alongside program engagement. For instance, researchers could take the time to develop a positive relationship with participants, reduce the burden of research participation by minimizing response effort, and providing choices in modality (e.g., online or paper copies) and survey complexity.

Future Directions

Based on results from the present study, particularly feedback from the practitioners who implemented the PAIRS, the PAIRS will be revised in the following areas: (1) Adding definitions and examples of each barrier; (2) Re-wording elements for clarity; (3) Adding a problem-solving template; and (4) Adding a Reflection section. The PAIRS training will also be revised, to include multiple exemplar training on completing the Assessment and Individualization Plan, a fidelity of implementation checklist, and ongoing supervision in the use of the PAIRS.

Future studies should evaluate the PAIRS with a larger sample and with different types of practitioners and programs. The present study was exploratory in nature and a larger sample size would provide a more robust examination of the effectiveness of the PAIRS. Additionally, coaches across both agencies were hired and trained specifically to implement

Project ImPACT, a manualized, evidence-based intervention that guides practitioners to use best-practice strategies for both child and caregiver. Thus, while behavior analysts generally report a lack of training and support in implementing parent coaching (Ingersoll et al., 2020), the coaches in this study likely have more training in caregiver-mediated approaches than the average behavioral specialist, and the Project ImPACT program may not represent the wide range of programs, of variable structure and quality, that BCBAs use in their everyday practice. Finally, caregiver engagement in Project ImPACT and other NDBIs, which primarily teach play-based strategies to improve social communication within daily routines, may be higher on average than caregiver engagement in more complex or demanding programs, such as programs for reducing disruptive behavior (e.g., Nathanson et al., 2021). Future research could evaluate how the PAIRS can be utilized within particularly low-adherence contexts.

Conclusion

In this exploratory study, the addition of the PAIRS tool to a community-based Project ImPACT program demonstrated preliminary effectiveness in increased attendance when compared to treatment-as-usual. Parent interviews provided support for the barriers outlined in the PAIRS and satisfaction with adaptations made in the program. Practitioner discussion showed that practitioners found the tool helpful for planning, problem-solving, and reflection, and were able to correctly identify the barriers that parents experienced and address most of these challenges. They also illuminated ways to enhance both the training process for the PAIRS as well as the content of the tool itself. Future research could evaluate an improved version of the tool with a larger sample and explore the use of the tool with different types of practitioners and programs.

5. Discussion

Overview

Early intervention has been shown to improve developmental trajectory for autistic children and improve long-term outcomes (Estes et al. 2011; Howlin, 1997; McEachin et al., 1993). Best practice recommendations for early intervention include involving parents in intervention (Division for Early Childhood, 2014; Hyman et al., 2020; National Research Council, 2001). The overall aim of the present thesis was to evaluate the factors that impact the effectiveness of family-mediated social communication interventions and synthesize the literature into a tool that community practitioners can use in their day-to-day work with families. While there has been an increased focus on Parent-Implemented Interventions (PII) in the last fifteen years, as shown in the systematic literature review described in Chapter 2, a research-to-practice gap persists. Families receiving community services demonstrate smaller intervention gains than those who participate in university laboratories and clinics (Nahmias et al., 2019). A potential reason for this discrepancy is the heterogeneous nature of how interventions are delivered in practice (Neville et al., 2018), by practitioners with variable levels of training in PII (Ingersoll et al., 2020), to families who experience a range of barriers and require individualized services (Carruthers et al., 2022). Thus, this body of work aimed to narrow the research-to-practice gap by exploring two primary research questions. First, which intervention factors (e.g., intervention packages, focused intervention practices, setting, modality, dosage) are associated with the largest gains in social communication skills? Second, which functional, contextual factors (i.e., barriers and facilitators) impact parent engagement in these interventions, and can a tool be developed to help practitioners address these factors in clinical practice? These two areas of focus align to provide a layered analysis of PIIs, which is needed when working with parents to improve child outcomes.

The present thesis therefore links together a conceptually systematic series of studies designed to inform practical applications of family-mediated social communication interventions. The first study, a systematic literature review outlined in Chapter 2, followed a rigorous method that is considered the gold standard of synthesizing a body of research (e.g., Smith & Iadarola, 2015; Vale et al., 2015). This study was a necessary step in identifying elements of effective interventions. Next, the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) tool was developed to help practitioners individualize PIIs for families using a content validity evaluation procedure adapted from public health research (Kassam-Adams et al., 2012). Finally, a community-based study utilizing an additive treatment design was conducted to explore the use of the PAIRS in conjunction with an evidence-based PII (Chapter 4). The present chapter will provide a summary of the overall findings and discuss its theoretical implications. Research and practice implications will also be discussed, along with strengths, limitations, and future directions for this body of research.

Summary of Findings

Study 1: Systematic Literature Review

The first study, a systematic review of family-mediated social communication interventions (Chapter 2), highlighted the evidence supporting Naturalistic Developmental Behavioural Interventions (NDBIs) as effective PIIs. Given that the review did not specifically focus on NDBIs, it is notable that all the intervention packages that qualified as established or probable evidence-based practice (EBP) for this population were types of NDBIs. The review also provided insight into the inconclusive impact of several intervention factors (modality, setting, dosage) on treatment effects, suggesting that other factors may be important to consider.

One proposed benefit of PIIs over practitioner-delivered interventions is the opportunity for generalization of learned skills to everyday life. Thus, specific generalization promotion strategies, based on Stokes and Baer's (1977) recommendations, were investigated in Chapter 2. Some generalization strategies, particularly the most common strategies found in the review, are inherent in NIs and NDBIs. Other strategies can require more intentional and proactive planning by the practitioner. The review found that less than a third of studies involved these types of strategies, such as modifying maladaptive consequences, making antecedents or consequences less discriminable, incorporating self-mediated stimuli, and using sequential modification. Most studies (65%) demonstrated partial generalization, in line with Hong and colleagues' (2018) systematic review findings. This study also highlighted the paucity of sibling-mediated interventions, with only four studies meeting inclusion criteria.

Study 2: Development of the PAIRS

The second study, outlined in Chapter 3, focused on systematically developing the PAIRS, a tool that collates the existing literature on barriers and facilitators to parent engagement and proposes potential solutions to common barriers. The results provided insight into the range of variables that impact parent engagement and demonstrated that the solutions proposed in the tool were relevant, effective, and appropriate, as rated by a panel of fifteen practicing Board Certified Behaviour Analysts (BCBAs). Additionally, in a follow-up evaluation, all members of the sub-panel agreed or strongly agreed that the tool was well-structured and would be beneficial to their work with families, suggesting promise for its utility in clinical application.

Study 3: Preliminary Evaluation of the PAIRS

Findings from the third study, a community-based study outlined in Chapter 4, suggested that the PAIRS could improve parent attendance when used in conjunction with

Project ImPACT, a parent-mediated NDBI. Interviews with parents added to the social validity literature for Project ImPACT and suggested support for the core components of the PAIRS, in that the barriers discussed by parents aligned with the barriers outlined in the PAIRS. Interviews with the providers revealed the utility of the PAIRS as a tool for planning, problem-solving, and reflection. Overall, the studies demonstrated that intervention variables including modality, setting, and dosage had inconclusive impact on parent and child outcomes (Chapter 2), NDBIs had a growing evidence base as a family-mediated intervention (Chapter 2), partial generalization was observed in PIIs and some generalization strategies are under-utilized (Chapter 2), and the PAIRS shows promise for helping practitioners address challenges with parent engagement in evidence-based programs in the community (Chapters 3 and 4).

Theoretical Implications

Functional Assessment of Parent Behaviour

The studies in this thesis are firmly grounded in Applied Behaviour Analysis (ABA) principles. At its core, this approach is concerned with examining and addressing the environmental variables that impact socially significant behaviours. While BCBAs are rigorously trained to apply this approach (along with its associated principles and technologies) to direct work with clients, a large proportion of BCBAs receive little to no training in how to do the same for parents (Ingersoll et al., 2020). Thus, this thesis contributes to the scant literature on functional assessments of parent behaviour by exploring the role that the PAIRS can play in helping practitioners adapt these principles for parents, in line with the behavioural framework of treatment adherence outlined by Allen and Warzak (2000), Fryling (2014), and Moore and Amado (2021). The primary purpose of the PAIRS is to help practitioners identify the function of non-concordant caregiver behaviours and provide a function-matched solution to increase concordant behaviour and decrease non-concordant behaviour.

The three general procedures within functional assessments include informant assessment, descriptive assessment, and experimental (functional) analysis (Lennox & Miltenberger, 1989). The components of the PAIRS (the Good Practice Checklist for Practitioners, the Assessment and Individualization Plan, and the Table of Function-based Solutions) primarily rely on informant assessment (checklists, interviews) without experimental manipulation of specific barriers and facilitators. However, the results of the third study (Chapter 4) demonstrated that operationalized engagement behaviours such as session attendance and parent fidelity of implementation strategies can be measured to track parent adherence. Similar to functional assessments of child behaviour, which typically involve a combination of the three general procedures described above, these measures can be used in tandem to help practitioners assess and respond to challenges over the course of a PII.

Motivating Operations and Setting Factors in Parent Engagement

The PAIRS offers a framework to consider parents' motivating operations and setting factors when implementing a PII. In Chapter 3, the review of parent barriers reported in the literature led to a multi-level approach, with the chosen level of analysis defined by its pragmatic purpose. The variables reported to impact engagement ranged from private events (e.g., values and beliefs; Mytton et al., 2014) to large-scale external factors (e.g., socioeconomic disadvantage, cultural influences; Stahmer et al., 2019). The barriers and solutions outlined in the PAIRS therefore expand traditional behavioural paradigms from the level of the individual to the level of the family, and from immediate environmental contingencies to nonlinear contextual variables. This is in line with Fryling's (2014) recommendation to consider contextual factors in the analysis of parent adherence, such as parent stress and social isolation. Within this framework, addressing these contextual variables may not act directly on the adherence behaviours, but impact the caregiving context in which relevant antecedent and consequent stimuli for adherence occur.

It is important to note that any given analytic focus should not diminish the relevance of other levels of analysis (Hayes et al., 2021). Thus, the PAIRS does not eschew the importance of careful analysis of behaviour using information gathered around proximal antecedent and consequent variables. These are still important considerations, such as proactively setting up discriminative stimuli for adherence-related behaviours (Moore & Amado, 2021) and considering competing contingencies in the immediate environment (Allen & Warzak, 2000). The PAIRS aims to expand on this information to provide practitioners with a systematic and practical way of identifying and addressing a wide range of difficulties, utilizing the level of analysis that is pertinent to a given situation.

Establishing the Practitioner as a Conditioned Reinforcer

In the review of barriers and facilitators in Chapter 3, parents of autistic children have reported that a positive and supportive relationship with practitioners contributes to family satisfaction and intervention engagement (Amsbary et al., 2020; Freuler et al., 2014; Hock et al., 2015). As such, the PAIRS was designed both to gather information and to help build a positive, collaborative, and compassionate relationship with families. The PAIRS aims to do this by orienting the practitioner to use the functional, contextual lens (i.e., the behaviour analytic framework) to assess non-adherence, instead of placing blame on the parent (Friman, 2020). This is in line recent calls for increased attention to interpersonal and therapeutic relationship skills for behaviour analysts (e.g., Leblanc et al., 2019; Taylor et al., 2018) and with Allen and Warzak's (2000) recommendation to establish the practitioner as a conditioned reinforcer. In the community study discussed in Chapter 4, most parents discussed the support they felt from their coach and expressed gratitude and appreciation towards them. Practitioners were able to identify parent barriers and facilitators and implement individualizations to fit most families.

Generalization of Child and Parent Skills

Generalization is a critical dimension of ABA (Baer et al., 1968). Specific generalization promotion strategies, based on Stokes and Baer's (1977) recommendations, were investigated in the systematic review outlined in Chapter 2. The review highlighted the need to expand beyond the generalization promotion strategies that are inherent to PIIs and program additional strategies with intention to maximize outcomes. Allen and Warzak (2000) proposed generalization to be an important consideration for parents as well. In Chapter 3, "Difficulties with Generalization" was included as a barrier category in the PAIRS as this variable was found to be a barrier (e.g., Mitteer et al., 2018). Concrete suggestions for addressing this barrier are included in the tool, such as discussing and problem-solving potential difficulties in advance, connecting parents with peer support, and incorporating a self-management system. In the preliminary evaluation of the PAIRS (Chapter 4), some parents noted challenges generalizing Project ImPACT strategies across settings and people. More recently, in their conceptual model of treatment adherence in ABA, Moore and Amado (2021) proposed using general case instruction to teach generalized rule-development skills and generalized adherence to those rules. Using general case instruction was added as a solution to the barrier of difficulties with generalization in the updated version of the PAIRS (Appendix J).

Research Implications and Future Directions

Parent-implemented Interventions

This thesis contributes to the research base on PIIs, as the systematic review described in Chapter 2 showed that four manualized NDBIs qualified as established or probable evidence-based interventions when delivered by family members. Project ImPACT, the NDBI used in Chapter 4, was specifically as a PII. Thus, Project ImPACT incorporates many of the facilitators outlined in Chapter 3, namely using effective adult learning strategies, promoting parent self-efficacy and empowerment, and emphasizing collaborative goal-setting and problem-solving. The two agencies delivered Project ImPACT consistent with the solutions to common barriers generated in Chapter 3: treatment incorporated two primary modalities (Telehealth group sessions and Telehealth or in-person coaching sessions) and treatment setting was flexible (in-home or in-centre). Although dosage of direct intervention time was low (1.5 hours a week for 12 weeks), Project ImPACT involves a "practice plan" segment at the end of each session to help parent plan their practice time between sessions. This includes anticipating and proactively addressing any challenges that may arise.

As the literature on PII grows, rigorous, large-scale controlled trials are an important avenue to continue establishing effectiveness of PIIs in different communities. For example, a meta-analysis that examined the effects of the Early Start Denver Model (ESDM), an NDBI, found twelve randomized controlled trials (RCTs), with five of those studies using a parent-mediated approach and another five using a practitioner-implemented model with a parent coaching component (Fuller et al., 2020). Compared to controls, significant and moderate effects were found in language and cognition, two important areas, however differences in social communication were not statistically significant. Future research could focus on further evaluating parent-implemented NDBIs using RCTs.

Additionally, future directions could expand the research focus on PIIs to fathers. There have been studies evaluating father-specific experiences and interventions (e.g., Donaldson et al., 2011; Perzolli et al., 2023), however most research participants in PIIs have been with mothers, as seen in the systematic review in Chapter 2. A recent study comparing mother-child and father-child play found that mothers engaged in more symbolic play than fathers, while fathers engaged in more exploratory play (Perzolli et al., 2023). Thus, the authors note that different parent-child interaction features may have important implications for implementing personalized parental-based interventions. Furthermore, future research should involve autistic perspectives on caregiver coaching and social communication interventions. This can include verbal autistic adults, along with the child participants themselves, regardless of verbal abilities. For example, Morris and colleagues (2021) outlined a concurrent chains procedure for determining whether an individual understands what is being asked of them and provides assent. An important focus for future research is to elicit and document the views of children and adults with severe communication impairments (Flowers & Dawes, 2013; Happé & Frith, 2020).

Barriers and Facilitators

The present thesis contributes to the literature on barriers and facilitators to parent engagement in PIIs (Chapter 3 and 4). Future research could continue to improve the PAIRS as the literature on parent experiences grows. For example, a recent study by Grogan and colleagues (2023) examined whether parent resolution to their child's autism diagnosis affected parent fidelity in Parent-delivered Early Start Denver Model (P-ESDM), an NDBI similar to Project ImPACT. Parent resolution involves adjusting expectations and sensitively responding to the child’s cues, strengths, and needs (Grogan et al., 2023). This may be particularly relevant to participation in early intervention, since early intervention is delivered early in a child's life, likely soon after the child has received the diagnosis. While there was no significant impact on fidelity, parents who were classified as "resolved" had lower depression scores and parenting stress scores than parents classified as "unresolved" (Grogan et al., 2023). Using the contextual approach (Fryling, 2014), it can be reasoned that parents who experienced more stress and depressive symptoms may be less likely to engage fully in the program. Thus, parent resolution could be added as a barrier to a future version of the PAIRS.

Another example of continued research on barriers and facilitators is a study which revealed barriers and facilitators across three themes: motivating factors and alignment of goals and outcomes, opportunity and support, and parent characteristics (Carruthers et al., 2022). While many of the themes and categories align with the results of Chapters 3 and 4, some novel variables from this study could be added to the PAIRS (e.g., specific parent characteristics including behavioural regulation, memory, attention, and decision-making). Also consistent with the results of Chapters 3 and 4, a recent grounded theory analysis indicated that facilitators and barriers were related to timing and expectations, training setting and characteristics, and participant characteristics (de Korte et al., 2022).

Tool Development

The PAIRS contributes to the research on tools and measures in ABA by (a) using an emerging methodology drawn from other fields to evaluate content validity (Kassam-Adams et al., 2012; Halek et al., 2017), (b) utilizing an additive treatment design in a community setting to evaluate its utility, and (c) providing a different lens to consider when implementing a PII. Within NDBIs, manualized intervention packages typically include assessments of child social communication and other relevant skills, such as the Social Communication Checklist in Project ImPACT (Ingersoll & Dvortzak, 2010) and the Early Start Denver Model Curriculum Checklist for Young Children with Autism in ESDM (Rogers & Dawson, 2009). While these interventions can also include measures for parents, such as the Intervention Fidelity Checklist in Project ImPACT strategies, these measures are specific to strategy implementation. A recently developed measure, the Performance Diagnostic Checklist for

Parents (PDC-P; Hodges et al., 2020), can help provide data on training; task clarification and prompting; resources, materials, and processes; and performance consequences, effort, and competition. The PAIRS incorporates a wider range of barriers and facilitators and therefore contributes a novel tool that explores variables that other currently available tools do not. An important future direction for the tool development, including the PAIRS, is large-scale, rigorous controlled studies to evaluate the effectiveness of the tool. Additionally, as more tools for PIIs become available, future research could explore under which circumstances each tool (or combination of tools) would be most beneficial.

While the development and initial evaluation of the PAIRS focused on content validity, social validity, and preliminary effectiveness, further research on the PAIRS could evaluate the reliability of the assessment portion of the tool, such as test-retest and inter-rater reliability. Reliability could also be strengthened by evaluating procedural fidelity. In the community study outlined in Chapter 4, practitioner participants were given flexibility in the timing and modality in which they used the tool. As this was the first implementation of the PAIRS in clinical practice, this allowed for observation of how community practitioners incorporate the tool into their practice. In the practitioner discussion conducted after two cohorts of using the PAIRS in conjunction with Project ImPACT, participants provided valuable insight into practical implementation of the tool, allowing for the addition of a fidelity checklist to the PAIRS (Appendix P). Future research could then include a procedural fidelity component.

The PAIRS is a multi-component tool, with three core sections: the Good Practice Checklist for Practitioners, the Assessment and Individualization Plan, and the Table of Function-Based Solutions. A component analysis could help identify the key components of the tool, potentially leading to streamlining of the tool and improving its feasibility for busy practitioners. Furthermore, given that the primary intent of the PAIRS is to enhance parent engagement, attendance, adherence, and cognitions were the outcomes examined in this thesis. However, through the process of assessing, individualizing, and responding to stressors using the PAIRS, potential collateral benefits such as reduced stress and increased self-efficacy and empowerment could also be examined.

Finally, an important future direction for the PAIRS would be to investigate child social communication outcomes, as this is the core goal of increasing parent engagement in NDBIs. Previous research has shown that gains in child outcomes are associated with parent fidelity (e.g., Shire et al., 2015). Indeed, change in the parent's behaviour has been shown to be the key driver of improvement in child outcomes (e.g., Gulsrud et al., 2016). Thus, it can be tentatively extrapolated that larger gains in parent fidelity in the PAIRS group in Chapter 4 also led to larger gains in child target skills. However, future research should directly examine this hypothesis by comparing child outcomes between parents whose coaches used the PAIRS and parents whose coaches did not. Further, as recommended in Chapter 2, future research could explore collateral effects of intervention, with and without the PAIRS, on other aspects of the child's functioning, such as affect, family and peer relationships, self-advocacy, intense interests, and challenging behaviour.

Effectiveness Research

The third study (Chapter 4) demonstrated how a small group comparison study can be conducted with limited resources (i.e., without external funding or a large research team) in the community. However, community research also comes with its own unique challenges, such as asking busy practitioners, who typically juggle full caseloads and multiple job duties, to make changes or additions to their work, as opposed to recruiting students or research assistants. The small sample size and low survey completion rates in this study highlight these challenges, and the lessons learned can have implications for future community research.

For example, during the data collection period, the Project ImPACT program was only filled to 50% capacity across both community agencies. Participation in the program was potentially hindered by multiple factors, such as lack of awareness about the program and difficulties selecting and registering for a specific program from a range of similar options across the province. The PAIRS was developed to help address barriers to engagement once families have connected with a provider, however addressing barriers to the initial contact is beyond its scope. However, even without increasing enrollment in the program, there are other ways to potentially increase the sample size in future studies. The preliminary study outlined in Chapter 4 recruited participants from two agencies, and data was collected for six months, across two twelve-week cohorts per agency. To increase sample size, future research could extend recruitment across additional agencies that offer Project ImPACT and run the study for a longer duration to capture more cohorts.

Another limitation of the community study was the low survey response rate, which prevented comparison of parent satisfaction, stress, and self-efficacy between groups. Based on lessons learned from Chapter 4, in which practitioners were asked to provide links to electronic surveys during breaks in Project ImPACT sessions, future research could involve the researcher (a) providing the rationale for each survey; (b) providing choice of survey modality, including electronic, paper, phone, virtual, or in-person; (c) being present and engaged during survey completion; and (c) providing opportunities to ask questions during survey completion. These changes to improve parent engagement in research are aligned with recommendations provided in the PAIRS to improve parent engagement in intervention.

This thesis also contributes to the literature on balancing fidelity and adaptations when implementing evidence-based interventions in the community (Stirman et al., 2019). Von Thiele Schwarz and colleagues (2019) proposed that the value of an intervention is a function of the intervention (including fidelity and adaptations), the context (including the system, organizational, provider, and client contexts), and the intervention strategies used (including strategies that optimize the intervention and optimize the context). The PAIRS was developed to help practitioners make planned and proactive adaptations, rather than unplanned or reactive changes (Stirman et al., 2019). Project ImPACT, the chosen intervention for the third study (Chapter 4), has clearly delineated core components (parent coaching, collaborative goal-setting, and teaching at least one strategy from each level of the FACTS pyramid). This provided clear guidance on what could be adapted when using the PAIRS in conjunction with Project ImPACT. Future research on other PIIs and NDBIs can identify the core components that are necessary for positive outcomes.

Future research could examine adaptations made for families using the Framework for Reporting Adaptations and Modifications-Enhanced (FRAME) (Stirman et al., 2019). This scale was used in Pickard and colleagues' (2023) study examining providers' adaptations when delivering Project ImPACT. Items include whether providers: (1) tailored, tweaked, or refined intervention content; (2) integrated content from another treatment approach; (3) removed or skipped core modules of Project ImPACT; (4) integrated or substituted extra topics; (5) changed the length of time spent on a certain topic within Project ImPACT; (6) changed the number of weeks that Project ImPACT was delivered; and (7) adjusted the order of the intervention content. Integrating this framework into future research on the PAIRS could allow for more robust comparisons between PAIRS and TAU groups.

Sibling Factors in PIIs

The systematic review in Chapter 2 reviewed both parent-mediated and sibling-mediated interventions. While only four out of the 54 studies that met inclusion criteria for the review employed siblings as mediators, the study adds to the relatively small evidence base for sibling-mediated intervention (e.g., Bene & Lapina, 2021; Shivers & Plavnik, 2015). Sibling-mediated intervention was found to be effective or very effective for half of the targeted social communication skills. During the development of the PAIRS in Chapter 3, sibling factors were included as a barrier category in the PAIRS. Challenges such as lack of attention for siblings, siblings having to stay out of the way during sessions, or siblings exhibiting increased problem behaviour were discussed by parents in the literature on barriers and facilitators to engagement (e.g., Amsbary et al., 2020; Grindle et al., 2009; Pickard et al., 2017). In the community study outlined in Chapter 4, sibling factors was the only one of the five barrier categories in the PAIRS that did not spontaneously emerge from the parent interviews. Conversely, one parent shared that, outside of sessions, she taught her other child Project ImPACT strategies and observed collateral improvements in sibling interactions. This tentatively suggests that, under the right circumstances, parents who are taught NDBI strategies can then teach other family members. This could potentially lead to improved child social communication as well as more fulsome reciprocal relationships within the family unit. More research on sibling-mediated interventions, with and without parent involvement, is needed due to the potential for meaningful, mutually beneficial outcomes.

Implications for Practice

NDBIs

Based on the results of Chapters 2 and 4, practitioners should consider using NDBIs (or the core strategies outlined in NDBIs) to target social communication skills. As noted in

Chapter 1, NDBIs have a growing evidence base (Sandbank et al., 2021). The present thesis adds to this evidence base through the results of the systematic review (Chapter 2), in which manualized NDBI packages qualified as established or probable EBP when delivered by caregivers. Furthermore, the community study (Chapter 4) added to the literature on the social validity and effectiveness of the Project ImPACT program in increasing parent fidelity of strategy implementation. Although the study in Chapter 4 used a specific manualized NDBI, there is significant overlap between NDBIs as they share several core features (Frost et al., 2020). Thus, Frost and colleagues (2020) note that practitioners concerned about choosing the "right" NDBI can be reassured by the shared core components. The use of manualized interventions is associated with fewer barriers to practitioner implementation of PIIs (Ingersoll et al., 2020). Thus, selecting any of the evidence-based manualized NDBIs could be useful to practitioners.

The systematic review in Chapter 2 also evaluated FIPs alongside the intervention packages noted above. Given the focus of the review, all the studies involved naturalistic interventions (NI) and were delivered by parents (parent-implemented intervention; PII) or siblings (classed as peer-mediated instruction or intervention; PMII). The most common FIPs were prompting, reinforcement, time delay, and modelling, which are all consistent with the core components in NDBIs and most behavioural interventions (Wong et al., 2015). This is an important point because a recent survey of BCBAs indicated that most had little to no knowledge of NDBIs and did not believe that NDBI practices were effective or appropriate (Hampton & Sandbank, 2021). Within the review, PRT (the fifth most common FIP) was classified as both an FIP and an intervention package due to its inclusion in Wong and colleagues' (2015) comprehensive review of evidence-based practices. In a follow-up review (Hume et al., 2020), PRT was merged with naturalistic interventions. Thus, for BCBAs who are resistant to NDBIs, it is likely more important that the core components of NDBIs are integrated into their practice if a specific intervention package does not fit their preference or context.

The PAIRS

The PAIRS was developed with the goal of providing practical guidance for behavioural practitioners (e.g., BCBAs) working with families in the community, such as in early intervention settings or challenging behaviour clinics. Although an assessment of barriers and facilitators is part of the tool, it is not intended to be used as a psychometric measure or diagnostic tool. The identification of barriers is designed to provide a framework for considering each family's unique context and provide a starting point for discussion and collaborative problem-solving between parents and practitioners. Thus, it was developed as a flexible tool and designed for adaptation to different settings. The PAIRS is intended to be a complementary tool for use alongside an evidence-based PII, i.e., it is not a standalone tool. The PAIRS is also not a replacement for continued professional development in critical parent coaching skills (e.g., therapeutic alliance skills).

The community study in Chapter 4 suggested that the PAIRS can be a useful tool for identifying barriers to engagement. In line with the literature on barriers and facilitators to parent engagement reviewed in Chapter 3, participants in Chapter 4 discussed barriers relating to similar factors outlined in the PAIRS. Barriers reported by practitioners aligned with those discussed by parents, indicating that practitioners were attuned to parents' barriers. However, practitioners shared that some of these barriers were idiosyncratic and that they did not fit into the PAIRS barrier categories. Upon closer examination of these specified barriers (i.e., parent being "too good" at the strategies, interference from other family members, and sustaining an injury), the barriers did in fact align with categories in the tool. Therefore, the idiosyncratic stressors reported did not necessarily indicate that the tool was missing important barriers. Rather, these results suggest that the content and presentation of the tool may require revision for clarity, and that training and supervision in the use of the tool needs to be improved and extended. The PAIRS was therefore revised, as seen in Appendix J, and the following improvements to the training process are proposed for future research and implementation: (1) Two-hour didactic workshop (virtual or in-person depending on staff preference); (2) Group Behaviour Skills Training (BST) to complete the Good Practice Checklist, the Organization-Specific Solutions section of the Table of Function-based Solutions, and the Assessment and Individualization Plan based on case examples; (3) One-on-one consultation and fidelity scoring with feedback for their first live administration of the PAIRS; and (4) Fidelity scoring with feedback for 25% of PAIRS administration.

While caution must be taken in interpreting the results of Study 3 due to the small sample size, some tentative recommendations can be made here. First, the practitioners who implemented the PAIRS noted that completing the Organization-specific solutions section of the PAIRS was beneficial. When assessing the value of an intervention, intervention contexts to consider include the system, organizational, provider, and client contexts, and strategies can be used to optimize the intervention as well as the context (Von Thiele Schwarz et al., 2019). While larger systematic challenges require action beyond the scope of the practitioner and the PAIRS, considering what is possible within the organization, and maximizing what the organization can offer, is an important part of the PAIRS.

Also in Chapter 4, community providers were given flexibility to use their clinical judgment on when the PAIRS should be used. Feedback from the providers indicated that the Assessment and Individualization Plan component of the tool, originally thought to be most helpful at the beginning of a relationship with the family, was most useful closer to the end of the Project ImPACT program. Another option would be to use aspects of the tool on a regular basis. For example, a recent study by Cartwright and Mount (2022) examined the impact of a

15-minute pre-session parent support component at the beginning of every parent training session. During this time, the practitioner met individually with the parent, without their child, and the parent led the unstructured discussion. Topics discussed included behavioural concerns, barriers to attendance, implementation of strategies at home, lack of support, stress, and disagreement with learned strategies. The practitioner used this time to validate parents' emotions, use motivational interviewing techniques, and engage in reflective listening and collaborative problem-solving. The purpose of adding this component was to "allow individualization of treatment, to remove barriers to learning, and to encourage collaboration between the parent and therapist" (Cartwright & Mount, 2022). These intentions align directly with the PAIRS. Future use of the PAIRS could involve adding a similar pre-session component to parent coaching sessions with the PAIRS available as an aide for collaborative problem-solving around barriers to engagement.

Problem-solving was another point brought up by the practitioners who implemented the PAIRS in Chapter 4. General guidance around problem-solving barriers was suggested. This is consistent with a problem-solving approach to learning as espoused in adult learning theory (Knowles et al., 1998). In the parent training literature, a study comparing behavioural parent training alone to behavoural parent training with a six-hour problem-solving component resulted in significant reductions in the intensity of challenging behaviour and significant improvements in parent attitudes concerning their child and themselves (Spaccarelli et al., 1992). Problem solving was defined as a behavioral process which makes a variety of responses for dealing with a problem available and increases the probability of selecting the most effective response. Teaching problem-solving has been presented as an alternative to more didactic approaches to both staff and parent training. Thus, including a problem-solving component may have layered benefits, for both the practitioners being trained in and implementing the PAIRS and the parents the practitioner is engaging in collaborative problem-solving with. This is also consistent with the recommendation of using general case instruction to promote parent adherence (Moore & Amado, 2021).

Finally, the practitioners in Chapter 4 proposed the utility of the PAIRS as a tool for reflection. Like problem-solving, reflection is also a central concept in the field of adult learning (Kuk & Holst, 2018). In Kolb's (1984) highly influential model of experiential learning, reflection plays a mediating role between experience and learning. Within this model, the learner has a concrete experience upon which they reflect. They form concepts and appropriate generalizations, and then test these in new situations. This is highly relevant to practical implementation of the PAIRS, which if appropriately designed for reflection, can lead to improvements in the practitioner's work with future families.

Telehealth

Within the systematic review (Chapter 2), there was no difference in treatment effectiveness between Telehealth and in-person interventions. This is a promising finding, as Teleheath interventions could help expand the reach of evidence-based interventions to rural or low-resource contexts. While there was, necessarily, a surge in Telehealth interventions during the 2020 and 2021 lockdowns, it is notable that the studies included in this review were conducted pre-pandemic. Thus, there may be key differences in Telehealth delivery. For instance, almost 30% of the Telehealth interventions included in the systematic review in Chapter 2 included an in-person component. This would not have been possible in many areas during the lockdowns. However, it would likely be possible in many contexts now. The rapid rise of Telehealth led to a proliferation of research on this modality, leading to a wealth of clinical innovation and improvements in its delivery (e.g., Kane et al., 2022; Yi & Dixon, 2021).

Thus, the results of the systematic review in Chapter 2 regarding Telehealth may no longer be as relevant to practitioners now, due to the massive growth of the modality since the study was conducted. However, the use of Telehealth in a post-pandemic era is likely to include improved features and build on the already-promising results shown in the pre-pandemic review. During the development of the PAIRS outlined in Chapter 3, solutions to barriers (e.g., logistical factors) that suggested using Telehealth were rated by the BCBA panel as relevant, effective, and appropriate. In the community study discussed in Chapter 4, Project ImPACT was delivered in a mixed modality, with all group sessions (which accounted for 6 out of 12 sessions) delivered over Telehealth.

Target Skills and Intervention Factors

The most common target skills found in the systematic review (Chapter 2) were in the category of language and communication skills, followed by social engagement, and finally imitation and play skills. In the community study outlined in Chapter 4, although child goals were not tracked for the study, 2-4 goals within those domains are collaboratively set by parents and practitioners. In practice, it is likely more important that the goals selected are relevant to the child and family, rather than falling into a specific domain of social communication. In the systematic review described in Chapter 2, the impact of setting and dosage on treatment effectiveness were inconclusive. Likewise, it may be more important that the setting and dosage fit the context than being strictly prescribed. In the community study in Chapter 4, the setting was collaboratively decided upon by the parent and practitioner. Dosage for the active intervention period was fixed due to organizational constraints (twelve 90-minute sessions), while dosage for the 12-week maintenance period was individualized. The maintenance period was not included in the study.

Strengths-based Approaches in ABA

Based on parent perspectives gathered from the literature in Chapter 3, in which a strengths-based approach was found to be a facilitator (e.g., Amsbary et al., 2020; Freuler et al., 2014), the PAIRS was designed to encourage the use of this approach, along with non-directive collaboration through each stage of intervention. Project ImPACT, the intervention conducted in conjunction with the PAIRS in the third study (Chapter 4), similarly emphasizes these approaches (Ingersoll & Dvortzak, 2013). A strengths-based approach expands the focus from exclusive emphasis on areas of need to viewing positive aspects of the child's behaviour, highlighting areas of competence, and identifying areas that facilitate development (Cosden et al., 2006; Steiner, 2011). Within NDBIs, a strengths-based approach is taken in following the child's interests, building on existing skills, and recognizing unique traits without reducing non-harmful behaviour (Schuck et al., 2021). Additionally, when practitioners made strengths-based statements, parents showed more positive affect and physical affection towards their child (Steiner, 2011). This approach can be extended to encompass the strengths of the parents and family system.

Strengths and Limitations

A strength of this thesis is the combination of established and emerging methodologies in the exploration of the factors that impact PII effectiveness, including a systematic literature review, a content validity study, and a community-based additive treatment study. Systematic reviews represent the "gold standard" of evidence synthesis (Smith & Iadarola, 2015; Vale et al., 2015). This methodology was applied to extract information to delineate the essential components of interventions, in order to determine what can then be adapted (i.e., balancing fidelity and adaptation). This is important for intervention implementation in community settings, where both fidelity to central components and adaptation to communities and families are needed (Edmunds et al., 2023; von Thiele Schwarz et al., 2019).

The three studies outlined in this thesis were conducted sequentially, with the systematic literature review (Chapter 2) conducted first to inform the remainder of the thesis. Therefore, a limitation of this thesis is that the systematic review was conducted in 2019 and thus does not reflect the state of the literature in 2023. Since the systematic review was conducted, interest in PIIs has increased. The COVID-19 pandemic and resultant lockdowns, which precluded direct, practitioner-implemented interventions in many areas of the world, propelled innovations in service delivery models, including an increase in parent coaching and Telehealth interventions (e.g., Vanegas et al., 2022; Pacione, 2022). Thus, theoretical, research, and practice implications derived from the systematic review in Chapter 2 may be different with the inclusion of additional studies from 2019-2023.

In their discussion of recent advances in supporting parents in interventions, Bradshaw and colleagues (2022) reviewed trends such as combining PIIs with stress-reduction interventions (e.g., Andrews et al., 2021; Weitlauf et al., 2020) and reducing treatment burden through diverse service delivery formats such as DVDs, apps, self-paced computer courses, and augmented reality glasses (Cramer et al., 2023; Pi et al., 2022). There has also been a surge of interest in cultural responsiveness and compassionate care in ABA. Recent studies have sought perspectives from parents from diverse communities (e.g., Castro-Hostetler et al., 2023; Čolić et al., 2021; Rivard et al., 2021) and evaluated trainings for behaviour analysts on culturally responsive practices (e.g., Hollins et al., 2023, Gatzunis et al., 2023; Mathur & Rodriguez, 2022). *Behaviour Analysis in Practice*, a journal published by Applied Behaviour Analysis International (ABAI) focused on disseminating best-practice information relevant to ABA service delivery, recently published a Special Issue on Compassion in Applied Behaviour Analysis (February 2023). Included papers explored topics such as perceptions and use of compassionate care with early interventionists and caregivers (D'Agostino et al., 2023), therapeutic alliance in ABA (Plattner & Anderson, 2023), and the development of a tool to support behaviour analysts in providing compassionate care, the Parent Partnership Questionnaire (Marchese & Weiss, 2023).

For sibling-mediated interventions, where research continues to be scarce, additional studies have also been published since the systematic review was conducted. For example, Bilgili-Karabacak and colleagues (2023) conducted a systematic review of sibling-mediated interventions and included nineteen studies, although only two additional studies (Glugatch & Machalicek, 2021; Sheik et al., 2019) would have met the exclusion criteria for the review in Chapter 2. Given that only four studies met criteria in the original review, the addition of these two studies could similarly have implications on the review's findings.

The second study, outlined in Chapter 3, borrowed methodology from the public health literature to develop and validate the PAIRS, a tool that aims to guide adaptation of EBPs for individual families. Specifically, the study was modelled on the five-step method for assessing content validity proposed by Kassam-Adams and colleagues (2015) and the three-stage method utilized by Halek and colleagues (2017) to develop and evaluate the content validity, practicability, and feasibility of a tool. Strengths of this study include the use of a relatively novel approach in ABA research, the contribution of a systematic framework for the development and preliminary evaluation of a tool, and the adaptation of functional assessment principles to fit an under-researched context, i.e., parent engagement in PIIs. A limitation of this study is that expert panel feedback was based on potential use, rather than actual use in the community. This limitation was addressed in the third study, outlined in Chapter 4.

The third study explored the first use of the PAIRS in the community. As discussed earlier in this chapter, significant limitations of this study include its small sample size, lack of a fidelity criterion for practitioner use of the PAIRS, and low survey completion rates. The sample size allowed for a preliminary exploration of the potential impact of the PAIRS, but a follow-up study with a larger sample size is necessary to evaluate its effectiveness. Given that this was the pilot use of the tool, practitioners' feedback was sought prior to setting a fidelity criterion. However, internal validity and reliability would be enhanced with the inclusion of a procedural fidelity measure. Furthermore, surveys to evaluate parent satisfaction, stress, and self-efficacy were sent out, but low completion rates precluded analysis of these outcomes. Future research should incorporate engagement strategies to increase completion rates and evaluate these important collateral outcomes.

ABA research has primarily relied on single-subject research designs that measure overt behaviours (Smith & Iadarola, 2015; Vivanti, 2022). A strength of this study is the utilization of a group design (although small, as discussed above) to add to the ABA group-design literature. Further, there is growing recognition of the importance of stakeholders' cognitions, i.e., private verbal behaviour (e.g., Taylor et al., 2018; Hayes et al., 2021). Gathering perspectives of multiple stakeholders (parents and practitioners) through interviews and discussion is a strength of this study and helps ensure that the approach is appropriate, feasible, and acceptable. However, since practitioners in Chapter 4 used the PAIRS as an indirect checklist, another limitation of this study is that parents did not come in direct contact with the tool. As such, qualitative interviews were focused on parent experience of the program as a whole. Future research could evaluate the use of the tool when conducted in an interview format, which would allow the researchers to ask parents more direct questions about the PAIRS.

Finally, the central strength of the final two studies is the focus on community-based research. The panel of BCBAs in Chapter 3 consisted of community practitioners who provided feedback based on their clinical experiences. The preliminary evaluation of the PAIRS, outlined in Chapter 4, studied the delivery of the PAIRS and Project ImPACT by community practitioners, within treatment-as-usual conditions. Applied research is important for narrowing the research-to-practice gap and evaluating interventions within the community.

Conclusion

PIIs have demonstrated numerous benefits for parents and children, but questions remained about the factors that impact outcomes in the community. The present series of studies sought to narrow the research-to-practice gap in PIIs by using a systematic, empirical approach to review the literature base on PIIs, develop a practical tool to help practitioners adapt PIIs for individual families, and explore the preliminary effectiveness of the tool in real-world settings. These studies contribute to the existing literature by demonstrating that the variable impact of certain intervention factors, as seen in the systematic review, can be viewed as an opportunity to individualize these factors so that they align with a family's needs. This should be done while ensuring that the intervention packages and/or FIPs being implemented are evidence-based. In other words, heterogeneity in the delivery of PIIs should be seen as a feature, not a bug, of implementing EBPs in the community, if the adaptations are planned and proactive, rather than unplanned or reactive (Waller, 2009). Given the limited education that BCBAs receive in parent training (Ingersoll et al., 2020), the PAIRS can be used to help practitioners assess and respond to the evolving contingencies within each family's PII, rather than engaging in rigid rule-governed behaviour or non-function-based strategies such as "train and train more" (Fryling, 2014).

Thus, the core theoretical, research, and practical contribution of this thesis is the extension of functional assessment principles to parents or caregivers within a PII. Despite the centrality of these principles to the behaviour analytic framework (e.g., Friman, 2020) and the prevalence and success of the associated procedures in clinical research and application (e.g., Anderson et al., 2015), there has been little attention paid to widening the scope of functional assessments to include socially significant behaviours within the family unit. Almost 30 years ago, Patterson and Chamberlain (1994) proposed a functional analysis of parent "resistance" (i.e., non-adherence) in behavioural parent training. Since then, a small number of articles have been published to elucidate a behavioural framework of adherence (e.g., Allen & Warzak, 2000; Fryling, 2014; Moore & Amado, 2021). Contemporary ABA research, with emerging emphasis on ideals such as compassionate care (e.g., LeBlanc et al., 2020; Melton et al., 2023; Rohrer et al., 2021), calls for the expansion of our "powerful, humane, and beneficial" (Friman, 2020, p.4) worldview to include the families we serve. The present thesis offers a concrete step in that direction.

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Appendices

Appendix A. Recruitment Poster for Expert Panel of BCBAs (Chapter 3)

Appendix B. Participant Information Sheet and Content Validity Survey Tool - Expert Panel of BCBAs (Chapter 3)

Expert Review of the *Parent-Training Assessment, Individualization, and Responding to Stressors (PAIRS)* tool

Invitation

I would like to invite you to take part in an online survey study. **The purpose of the study is to develop and evaluate the *Parent-training Assessment, Individualization, and Responding to Stressors (PAIRS)* tool, a practical tool to assist BCBAs in identifying and addressing family barriers to engagement in parent training interventions.**

My name is Cressida Pacia and I am a PhD candidate at the National University of Ireland, Galway. I am carrying out my research under the supervision of Dr. Ciara Gunning, BCBA, Dr. Aoife McTiernan, BCBA-D, and Dr. Jennifer Holloway, BCBA-D.

For this research, we are inviting BCBAs who currently provide or have previously provided parent training services to parents of children with autism to take part. This Participant Information Sheet will explain more about the research and what it will involve as well as the benefits of taking part to help you to decide if you would like to participate. If there is anything that you are not clear about or any questions you have, I will be happy to discuss these with you. Please take as much time as you need to review this information. This research has been fully approved by the Research Ethics Committee in National University of Ireland, Galway.

Introduction and purpose

Parents are often highly motivated to participate in parent training interventions for their children with autism. However, they experience barriers that make it difficult to engage in intervention as well as consistently implement intervention strategies. Our aim within the current research is to develop a practical tool to help practitioners identify these barriers that individual families experience and adapt interventions in response to those barriers. We are seeking input from an expert panel of BCBAs to help inform the development of this tool and evaluate its validity.

Participation: What does it involve?

Participation involves completion of a Content Validity Survey to evaluate potential solutions to common family barriers. The survey will take approximately 20-30 minutes to complete.

Potential benefits

There are no foreseeable risks, side effects, or inconveniences involved in taking part in this study. If you choose to take part, taking part will provide you with information on barriers and facilitators to parent engagement in parent training interventions. You will also have the opportunity to access a practical tool for identifying and addressing these barriers during intervention.

Your rights

It is up to you to decide whether you would like to take part. If you decide that you would like to take part, please complete the consent form on the next page and then begin the survey. **Participation is voluntary. You are still free to withdraw at any time and without giving a reason. A decision to withdraw consent at any time will not affect your rights in any way. If you wish to withdraw consent at any stage, any information we have received will be destroyed if you so wish.**

Confidentiality and anonymity

All information concerning your participation in this study is private and confidential and will not be shared with anybody outside the research team. All data collected will be stored under each individual participant's assigned participant number, i.e., no real names will be used within the research. Only the consent form will have your name and signature and this form will be kept separate from all the other materials. All data will be stored on my computer and will be password protected. All hard copies of data will be stored in locked, secure files for five years, after which they will be destroyed.

Further information and queries
When the study is complete, the results will be written up as a paper which I will submit to the University as part of my PhD. I would also aim to publish and present the results within the research field of applied behaviour analysis. No participant will be identified in any publication or presentation.

You are invited to provide your email address if you would like to receive a copy of the final paper and/or the final version of the PAIRS tool once it is completed.

I would like to remind you that you are entitled to change your mind about your participation in this study at any time during the course of the study without disadvantage or penalty to you. If you have any queries at any point during or after the study, the researchers will be at hand to address the issue.

If you would like any further information, please do not hesitate to contact the principal researcher, Cressida Pacia, at any time. If you have any questions about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie.

Please contact the principal researcher or research supervisor to clarify any points on which you remain unclear.

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Phone: 00353 87 7082568

Research Supervisor: Dr. Ciara Gunning, BCBA Email: ciara.gunning@nuigalway.ie
Phone: 00353 91 495773

Thank you kindly for your time and your consideration to participate in this study.

- ○ I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions if I have any. I am satisfied that I understand the information provided and have had enough time to consider the information. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected. I agree to take part in the above study.
- ○ I do not consent to take part in the above study. I will close my browser to exit the survey.

Demographics

Demographics and Professional Background

Gender

Age

Highest level of education

If you responded "Other", please specify:

Certification

Years of experience working with families and/or in the field of ABA

Please respond based on your cumulative experience.

Primary areas of emphasis (Check all that apply)

- ☐ Early Intensive Behavioural Intervention (EIBI)
- ☐ Positive Behaviour Support
- ☐ Social and Communication skills (e.g., verbal behaviour, social skills training)
- ☐ Activities of Daily Living (e.g., toilet training, self-help skills)
- ☐ Sleep issues
- ☐ Feeding issues
- ☐ Academic/Educational skills
- ☐ Vocational/Employment skills
- ☐ Other

If you responded "Other", please specify:

Types of parent training provided (Check all that apply)

- ☐ Primary parent training (all intervention delivered by parent)
- ☐ Secondary parent training (therapist-delivered intervention with parent training component)
- ☐ In-person parent training
- ☐ Telehealth parent training
- ☐ Individual parent training
- ☐ Group parent training
- ☐ Sibling training
- ☐ Other

If you responded "Other", please specify:

Typical frequency of parent training (hours per month)

Typical length of parent training relationship

Age of clients (Check all that apply)

- ☐ 0-2
- ☐ 3-6
- ☐ 7-12
- ☐ 13-17
- ☐ 18-25
- ☐ 26-40
- ☐ 41-64
- ☐ 65 and above

Typical client profile (Check all that apply)

- ☐ Autism Spectrum Disorder
- ☐ Intellectual/Developmental Disabilities
- ☐ Emotional or Behavioural Disorders
- ☐ Typically Developing
- ☐ Other

If you responded "Other", please specify:

Approximate number of families you have provided parent training services to

Survey information

CONTENT VALIDITY SURVEY

Adapted from Kassam-Adams et al., Children's Hospital of Philadelphia, 2012

Thank you for agreeing to serve as an expert reviewer for the Parent-training Assessment, Individualization, and Responding to Barriers (PAIRS) tool. **Your input on this survey will help us to evaluate the content validity of the tool – the extent to which proposed solutions address potential barriers.**

Expert Survey Directions

Each section presents a single identified barrier. The proposed solutions for that barrier are then presented one at a time within that section. There are 11 barriers and 45 solutions in this survey.

You will be asked to rate each solution based on its relevance, effectiveness, and appropriateness to the barriers.

- **RELEVANCE: Extent to which solution is pertinent to barrier**
- **EFFECTIVENESS: Likelihood that solution will successfully address barrier**
- **APPROPRIATENESS FOR PROFESSIONAL USE: Extent to which the nature of the solutions are clear, easy to implement, and appropriate for use by BCBAs**

You will be asked to rate each component (relevance, effectiveness, and appropriateness for professional use) on a 4-point rating scale: 'not at all', 'somewhat', 'moderately', or 'very'.

In each section of the survey there is room for additional comments. In these boxes we welcome any feedback or suggestions you may have based upon your expertise (for example, you may propose another solution for that barrier that was not included in the list). Feedback on the tool as a whole is also welcome.

○ Let's begin!

Difficulties with access

BARRIER: DIFFICULTIES WITH ACCESS

Difficulties with access refers to issues such as

- ***Affordability*** *(i.e., paying for the intervention and any associated costs)*
- ***Availability*** *(i.e., long distance, lack of access to transport, limited services in rural communities)*
- ***Scheduling*** *(i.e., scheduling conflicts, lack of child care)*

Solution 1: **Connect families with charities, insurance, funding supports, etc where appropriate**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2**: Telehealth or home-based training**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3**: Flexible training days/times**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 4**: Explicit strategies for involving child/sibling (e.g., sibling training component)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier DIFFICULTIES WITH ACCESS:

Administrative difficulties

BARRIER: ADMINISTRATIVE DIFFICULTIES

Administrative difficulties refers to issues such as

- ***Difficulties with therapists*** *(e.g., recruitment, unreliability, presence in the home)*
- ***Difficulties with equipment*** *(e.g., laptops for Telehealth)*
- ***Difficulties with materials*** *(e.g., assisting with making PECS, buying new toys).*

Solution 1: **Telehealth or clinic-based training**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2**: Provide (or reduce need for) additional therapy materials**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3**: Collaboratively problem-solve on setting up home environment or choosing appropriate community settings**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier ADMINISTRATIVE DIFFICULTIES:

Complex child profile

BARRIER: COMPLEX CHILD PROFILE

Complex child profile refers to child factors that may impact their ability to benefit from your intervention such as

- ***Verbal skills***
- ***Levels of autism symptomology***
- ***Challenging behaviours***

Solution 1**: Individualize child programming (e.g., adaptations for non-verbal children)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	○	○	○	○

Solution 2: **Multidisciplinary collaboration (e.g., with SLT, OT)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3: **Additional parent training in Positive Behaviour Support**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier COMPLEX CHILD PROFILE:

Sibling

BARRIER: DIFFICULTIES FOR SIBLINGS

Difficulties for siblings refers to challenges such as lack of attention for siblings, siblings having to stay out of the way during therapy, or siblings exhibiting increased behavioural problems.

Solution 1: **Identify and collaboratively problem-solve source of sibling difficulty**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	◯	◯	◯	◯

Solution 2: **Explicit strategies for including siblings (e.g., sibling training, parent training specific to sibling)**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Comments/suggestions regarding the barrier DIFFICULTIES FOR SIBLINGS:

Changes in treatment efficacy

BARRIER: VARIATIONS IN TREATMENT EFFICACY

Variations in treatment efficacy refers to child not progressing as expected, slow progress, or regression in target skills during intervention that impact parent engagement and motivation.

Solution 1: **Explicitly acknowledge that strategies may not always be effective or that there may be setbacks and plan for this early on**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Solution 2: **Involve parents in problem-solving solutions and adaptations**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	◯	◯	◯	◯

Solution 3: **Program for generalization**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Solution 4: **Share parent-friendly data sheets**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Comments/suggestions regarding the barrier VARIATIONS IN TREATMENT EFFICACY:

Treatment burden

BARRIER: TREATMENT BURDEN

Treatment burden refers to ***demands placed on the family*** *during intervention (e.g., high demand for parental involvement, substantial amount of time required to implement the intervention, parents experiencing increased stress or overwhelm).*

Solution 1: **Identify source of stress (e.g., demand for involvement too high, lack of time for other activities)**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	○	○	○	○

Solution 2: **Reduce treatment burden, intensity, and/or complexity**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3: **Regular check-ins with family**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 4: **Flexible training days/times**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 5: **Distance-learning options**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 6: **Proactively problem-solve for challenging situations**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier TREATMENT BURDEN:

Motivation and belief in effectiveness

BARRIER: LOW MOTIVATION OR BELIEF IN EFFECTIVENESS

Low motivation or belief in effectiveness refers to low or fluctuating motivation to engage in intervention and/or low belief in the effectiveness of the intervention.

Solution 1**: Collaborate with both parents on goal-setting, selecting target behaviour, and implementation strategies**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2**: Establish intermediate outcomes as reinforcers**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3**: Establish treatment relevance through regular check-ins on priority family goals**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	◯	◯	◯	◯

Solution 4: **Share parent-friendly data sheets**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Solution 5: **Create behavioural momentum by setting smaller, achievable goals at the start and as needed throughout the intervention**

	Not at all	Somewhat	Moderately	Very
Relevance	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯
Appropriateness for professional use	◯	◯	◯	◯

Comments/suggestions regarding the barrier LOW MOTIVATION OR BELIEF IN EFFECTIVENESS:

Training methods

BARRIER: TRAINING NOT THE RIGHT FIT

Training not the right fit refers to a mismatch between parent needs/preferences and intervention characteristics such as

- ***Training model*** *(e.g., individual, group, Telehealth, in-home)*
- ***Adult learning strategies*** *(e.g., in-vivo coaching, video feedback)*
- ***Treatment complexity*** *(e.g., reading level of material, complexity of intervention strategies)*

Solution 1: **Provide different training options (e.g., self-directed, Telehealth, individual, group, etc) depending on parent needs/preferences**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2: **Teaching materials incorporate a variety of effective adult learning strategies**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3: **Adjust intervention complexity as needed**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier TRAINING NOT THE RIGHT FIT:

Generalization

BARRIER: DIFFICULTIES WITH GENERALIZATION OR MAINTENANCE

Solution 1: **Program for generalization**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	○	○	○	○

Solution 2: **Discuss and problem-solve potential difficulties in advance (e.g., implementing strategies around disapproving family members)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3: **Connect with peer support (e.g., other parents who completed the same training)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 4: **Incorporate a self-management system**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 5: **Establish a check-in schedule (e.g., short check-ins between sessions, monthly check-ins after completion of training)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier DIFFICULTIES WITH GENERALIZATION OR MAINTENANCE:

Living circumstances

BARRIER: DIFFICULT LIVING CIRCUMSTANCES

Difficult living circumstances refers to situations such as single-parent families, family dysfunction, parent psychopathology or impairment, or socio-economic disadvantage.

Solution 1**: Multidisciplinary collaboration (e.g., with social worker)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2**: Reduce treatment burden and/or complexity**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3**: Increase treatment relevance**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 4**: Collaborative problem-solving (e.g., around structural barriers)**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○

	Not at all	Somewhat	Moderately	Very
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier DIFFICULT LIVING CIRCUMSTANCES:

Values and culture

BARRIER: INDIVIDUAL OR CULTURAL CONCERNS

Individual or cultural concerns refers to a mismatch between the intervention and

- ***Individual needs, values, and preferences of families*** *(e.g., beliefs regarding play, praise, discipline methods)*
- ***Cultural factors*** *(e.g., concerns regarding maintenance of cultural identity, gender roles, the role of elders and extended families, disapproval from the family's community)*

Solution 1**: Clarify values and goals at the outset and on an ongoing basis**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 2**: Collaborate with both parents on goal-setting, selecting target behaviour, and implementation strategies**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 3**: Provide clear rationale for intervention strategies**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 4: **Shape successive approximations and establish intermediate outcomes as reinforcers (e.g., when trying to transition away from discipline practices such as spanking).**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 5: **Collaborate with (or refer to) professionals from the same culture where appropriate.**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Solution 6: **Seek training in cultural competence (e.g., on maintenance of cultural identities, upholding religious practices, role of extended family and community, gender roles).**

	Not at all	Somewhat	Moderately	Very
Relevance	○	○	○	○
Effectiveness	○	○	○	○
Appropriateness for professional use	○	○	○	○

Comments/suggestions regarding the barrier INDIVIDUAL OR CULTURAL CONCERNS:

End of survey/Comments

We value your knowledge and expertise. Please feel free to provide any overall comments/suggestions regarding the Parent-training Assessment, Individualization, and Responding to Stressors (PAIRS) tool:

Email address

Optional: Please provide your email address if you would like to be contacted in the future for any of the following reasons (Check all that apply)

- ☐ Receive copy of completed paper
- ☐ Receive copy of completed PAIRS tool

Email address:

Submit

Thank you for participating in our content validity survey.

If you have any questions or concerns, please do not hesitate to contact the principal researcher, Cressida Pacia, at any time.

Principal researcher: Cressida Pacia, BCBA
Email: c.pacia1@nuigalway.ie
Phone: 00353 87 7082568

Research supervisor: Dr. Ciara Gunning, BCBA
Email: ciara.gunning@nuigalway.ie
Phone: 00353 91 495773

If you have any questions about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research

Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie.

- Submit your survey.

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Appendix C. Participant Information Sheet for Follow-Up - Expert Sub-Panel of BCBAs (Chapter 3)

PAIRS Workshop and Evaluation

Thank you for contributing to the development and evaluation of the Parent-training Assessment, Individualization, and Responding to Stressors (PAIRS). I would like to invite you to take part in a follow-up study. **The purpose of the study is to evaluate the tool's structural aspects and its benefits as a planning and decision-making tool.**

My name is Cressida Pacia and I am a PhD candidate at the National University of Ireland, Galway. I am carrying out my research under the supervision of Dr. Ciara Gunning, BCBA, Dr. Aoife McTiernan, BCBA-D, and Dr. Jennifer Holloway, BCBA-D.

For this research, we are inviting BCBAs who participated in the previous PAIRS study to take part. This Participant Information Sheet will explain more about the research and what it will involve as well as the benefits of taking part to help you to decide if you would like to participate. If there is anything that you are not clear about or any questions you have, I will be happy to discuss these with you. Please take as much time as you need to review this information. This research has been fully approved by the Research Ethics Committee in National University of Ireland, Galway.

Introduction and purpose

Parents are often highly motivated to participate in parent training interventions for their children with autism. However, they experience barriers that make it difficult to engage in intervention as well as consistently implement intervention strategies. Our aim within the current research is to develop and evaluate a practical tool to help practitioners identify these barriers that individual families experience and adapt interventions in response to those barriers. We are seeking input from an expert panel of BCBAs to help evaluate the usefulness of the tool.

Participation: What does it involve?

Participation involves participating in an online workshop on the use of the tool. The online workshop will take approximately one hour to complete, and you will receive 1 Continuing Education Unit (CEU). The questionnaire will take about 5 minutes to complete.

Potential benefits

There are no foreseeable risks, side effects, or inconveniences involved in taking part in this study. If you choose to take part, taking part will provide you with information on barriers and facilitators to parent engagement in parent training interventions.

Your rights

It is up to you to decide whether you would like to take part. **If you decide that you would like to take part, please complete the consents below and then proceed to workshop registration on the next page**. Participation is voluntary. You are still free to withdraw at any time and without giving a reason. A decision to withdraw consent at any time will not affect your rights in any way. If you wish to withdraw consent at any stage, any information we have received will be destroyed if you so wish.

Confidentiality and anonymity

The online workshop will be audio and video recorded. All information concerning your participation in this study is private and confidential and will not be shared with anybody outside the research team. All data collected, including any comments you make during the workshop, will be stored under each individual participant's assigned participant number, i.e., no real names will be used within the research. All data will be stored on my password-protected computer and on NUI Galway's OneDrive server. All raw and analyzed data will be held on NUI Galway's OneDrive server for seven years, after which they will be destroyed.

Further information and queries

When the study is complete, the results will be written up as a paper which I will submit to the University as part of my PhD. I would also aim to publish and present the results within the research field of applied behaviour analysis. No participant will be identified in any publication or presentation.

I would like to remind you that you are entitled to change your mind about your participation in this study at any time during the course of the study without disadvantage or penalty to you. If you have any queries at any point during or after the study, the researchers will be at hand to address the issue. If you would like any further information, please do not hesitate to contact the principal researcher, Cressida Pacia, at any time.

If you have any questions about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie. Please contact the principal researcher or research supervisor to clarify any points on which you remain unclear.

Principal researcher: Cressida Pacia, BCBA Email: c.pacia1@nuigalway.ie Phone: +1 519 710 8572
Research Supervisor: Dr. Ciara Gunning, BCBA Email: ciara.gunning@nuigalway.ie Phone: 00353 91 495773

Thank you kindly for your time and your consideration to participate in this study.

Please check all applicable boxes below. If you do not consent, please close your browser now.

- ☐ I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions if I have any
- ☐ I am satisfied that I understand the information provided and have had enough time to consider the information.
- ☐ I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.
- ☐ I understand that the online workshop will be video and audio recorded, including my own participation during the workshop.
- ☐ I agree to take part in the above study.

Block 2

The workshop will take place on Monday, September 20th, 2021 at 7pm.

Topic: PAIRS Workshop

Time: Sep 20, 2021 07:00 PM London

Join Zoom Meeting https://nuigalway-ie.zoom.us/j/97533723606?pwd=MEhTK2NxRWJhblRya1dKbGdRU2oyQT09

Meeting ID: 975 3372 3606

Passcode: 463975

If you would like to receive 1 CEU for your participation, please enter your BCBA Certificant number below.

BCBA Certificant Number

Name

Email address

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Appendix D. PAIRS Workshop Outline - Expert Sub-Panel of BCBAs (Chapter 3)

PAIRS Workshop

Abstract: Parent engagement in behavioural intervention for young children with autism is essential to achieving positive intervention outcomes for the child and family. Although parents are often highly motivated, they can experience various barriers that impact their ability to engage consistently in intervention. The Parent-training Assessment, Individualization, and Response to Stressors (PAIRS) was developed to help practitioners identify and address each family's unique barriers and facilitators. The purpose of the workshop is to review the literature on parent engagement, present the results of a study evaluating the content validity of the PAIRS, and introduce attendees to the PAIRS tool.

Suitable for: BCBAs, BCaBAs, BCBA-Ds

CEUs available: 1

Learning objectives:

1. Attendees will be able to describe the three components of parent engagement
2. Attendees will be able to analyze parent non-engagement using a functional, contextual approach
3. Attendees will be able to identify 11 common barriers and 6 common facilitators to parent engagement
4. Attendees will be able to use the PAIRS to assess a family's barriers and facilitators and formulate a plan to individualize their parent training intervention

This PAIRS evaluation is comprised of three sections: (1) Structural aspects; (2) Benefits as a tool for day-to-day work with families; and (3) Benefits as a tool for decision-making.

Section 1: Structural aspects

Clarity

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS is clear	○	○	○	○
The PAIRS is meaningfully constructed	○	○	○	○
The PAIRS is convenient	○	○	○	○
The PAIRS allows prompt access to client information	○	○	○	○

Meaningfulness

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS contains only relevant information	○	○	○	○
No double documentation is needed when using the PAIRS (e.g., when used with other intake forms)	○	○	○	○

Completeness

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS is complete	○	○	○	○

Length/scope

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS is not too detailed	○	○	○	○
The PAIRS is not too time-consuming	○	○	○	○
The PAIRS is not too extensive	○	○	○	○

Comprehensibility

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS uses clear language	○	○	○	○
The PAIRS does not require extensive training	○	○	○	○
The PAIRS is not too complicated	○	○	○	○

Please provide any comments/suggestions you have on the **structure** of the PAIRS:

Block 1

Section 2: Benefits for day-to-day work with families

Time

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS does not take time away from intervention	○	○	○	○

Information aid

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS provides information about relevant barriers and facilitators	○	○	○	○

Communication aid

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS is helpful for communication with families	○	○	○	○
The PAIRS is helpful for communication with colleagues or multidisciplinary teams	○	○	○	○

Planning aid

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS supports initial planning of intervention	○	○	○	○
The PAIRS supports proactive and collaborative problem-solving with families	○	○	○	○

Evaluation aid

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS supports continued evaluation of intervention progress	○	○	○	○
The PAIRS supports responsive adaptation of intervention	○	○	○	○

Please provide any comments/suggestions you have on the PAIRS' **benefits for day-to-day work with families:**

Block 2

Section 3: Benefits as a tool for decision-making

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS has encouraged me to think more intensively about the family's contextual barriers	○	○	○	○
The PAIRS contains factors that I had not thought about in the context of the family's intervention engagement and progress	○	○	○	○
I see a relationship between the PAIRS and my daily work	○	○	○	○
By using the PAIRS, I see the family's challenges from another perspective	○	○	○	○
With the PAIRS, I can better describe the family's barriers and facilitators to others (e.g., colleagues, multidisciplinary teams)	○	○	○	○
Planning and adapting interventions to address the family's barriers is easier with the information provided by the PAIRS	○	○	○	○
Using the PAIRS provides information about the families that I did not know before	○	○	○	○

	Strongly disagree	Disagree	Agree	Strongly agree
Since the introduction of the PAIRS, I have a better understanding of the barriers the family faces	○	○	○	○
I feel that the family's engagement and progress will change positively with the introduction of the PAIRS	○	○	○	○
The PAIRS gives me the opportunity to build on the strengths and individuality of the child and family	○	○	○	○
The PAIRS will help me build and maintain a positive collaborative relationship with the family	○	○	○	○
The PAIRS provides helpful guidance for professional development and further reading	○	○	○	○

Please provide any questions/comments you have on the PAIRS' **benefits as a tool for decision-making:**

Block 3

Section 4: Overall assessment of the PAIRS

	Strongly disagree	Disagree	Agree	Strongly agree
The PAIRS is a useful and practical tool	○	○	○	○

	Strongly disagree	Disagree	Agree	Strongly agree
I would use the PAIRS in my day-to-day work with others	○	○	○	○
I would recommend the PAIRS to other BCBAs	○	○	○	○

Your feedback is valuable to us. Please provide your comments and/or suggestions on the PAIRS as a whole.

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Appendix F. Participant Information Sheet for Agency A - Parents in PAIRS group (Chapter 4)

NUI Galway
OÉ Gaillimh

Participant Information Sheet – Agency A

I would like to invite you to take part in a study evaluating the PAIRS, a tool to help parent coaches tailor their parent coaching program (e.g., Project ImPACT) to individual families. The purpose of the study is to evaluate the outcomes of Project ImPACT with the PAIRS.

My name is Cressida Pacia and I am a PhD candidate at the National University of Ireland Galway (NUI Galway). NUI Galway is a public research university located in the city of Galway, Ireland, where I am completing my PhD remotely from Canada. While completing my PhD at NUI Galway, I am also working at [Agency A - redacted]. I am carrying out my research under the supervision of Dr. Ciara Gunning, BCBA, Dr. Aoife McTiernan, BCBA-D, and Dr. Jennifer Holloway, BCBA-D.

We are inviting parents enrolled in the Project ImPACT program to take part. You will receive the standard Project ImPACT program along with the complementary PAIRS to help us tailor the program to your family. This Participant Information Sheet will explain more about the research and what it will involve as well as the benefits of taking part to help you to decide if you would like to participate.

If there is anything that you are not clear about or any questions you have, I will be happy to discuss these with you. Please take as much time as you need to review this information. This research has been fully approved by the Research Ethics Committee at NUI Galway and the Research Ethics Committee at [Agency A - redacted].

<u>Participation: What does it involve?</u>

Participation primarily involves attending Project ImPACT sessions and implementing the strategies you learn with your child. This expectation is the same regardless of your participation in the study. There are three additional components to participating in the study:

1. **Questionnaires and Interview:** You will be asked to complete an additional questionnaire at the beginning and end of the 12-week program. You will be given time during your first and last Project ImPACT session to complete the questionnaires (approximately 10 minutes) so that you will not have to take extra time out of your day. At the end of the program, you will be invited to participate in a short interview about your experience and satisfaction with the program. This interview will take about 15 minutes.

2. **PAIRS:** Participation in the PAIRS involves answering some questions about logistical, family, and intervention factors, which can help your coach tailor the Project ImPACT to best fit your family's strengths and needs. You can decline to answer any question.

3. **Project ImPACT data:** Data is taken for program purposes as part of the Project ImPACT program. If you agree to participate in the study, some of these data will be used in the study. Any data used in the study will be de-identified. **This means that your data will always be private, confidential, and anonymous.**

If you decline to participate in the study, you will receive the <u>same</u> Project ImPACT services as parents who agree to participate. Data will be taken for program purposes as normal. Your program data will not be used in the study, and you will not be asked to complete any additional questionnaires or participate in any interviews.

<u>Potential benefits</u>

A potential benefit of participating is that the Project ImPACT program will be tailored to your family's needs using the PAIRS. There are no foreseeable risks or side effects involved in taking part in this study. Some inconvenience may be involved (i.e., taking part in short questionnaires). If you choose to take part, your participation will help us understand the effects of Project ImPACT and the PAIRS and make improvements that will help other parents and children with autism.

Your rights

It is up to you to decide whether you would like to take part. If you decide that you would like to take part, please follow the link sent to you by your Project ImPACT coach during your first session to complete the consent form.

Participation is voluntary. You are free to withdraw at any time and without giving a reason. If you wish to withdraw consent at any stage through the end of the Project ImPACT program, any data we have received will be destroyed if you so wish. After the end of the program, once your data has been combined with other participants' data (analyzed) and submitted for publication, it will not be possible to remove your individual data points from the analysis.

Confidentiality and anonymity

All information concerning your participation in this study is private, confidential, and anonymous. All data collected will be stored under each individual participant's assigned participant number, i.e., no real names will be used within the research.

The interview will be audio recorded. The recording will be transcribed and then immediately destroyed. Anything you say during the interview will be private, confidential, and anonymous. Some quotes from your interview may be used in the study. All identifying information will be removed so that they cannot be connected to you or your child in any way.

All data will be stored on my password-protected computer and on NUI Galway's OneDrive server until the data have been analysed, then they will be deleted from my computer. All anonymized data will be held on NUI Galway's OneDrive server for seven years, after which they will be destroyed.

Further information and queries

When the study is complete, the results will be written up as a paper which I will submit to the University as part of my PhD. I would also aim to publish and present the results within the research field of applied behaviour analysis. No participant will be identified in any publication or presentation.

You are invited to provide your email address if you would like to receive a summary of the findings at the end of the study.

I would like to remind you that you are entitled to change your mind about your participation in this study at any time during the course of the study without disadvantage or penalty to you. If you have any queries at any point during or after the study, the researchers will be at hand to address the issue.

If you would like any further information, please do not hesitate to contact the principal researcher, Cressida Pacia, at any time. If you have any questions about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie. You may also contact [Agency A - redacted]'s Research Ethics Committee, [email address - redacted].

Please contact the principal researcher or research supervisor to clarify any points on which you remain unclear.

Principal researcher: Cressida Pacia, BCBA Email: c.pacia1@nuigalway.ie
Phone: 905 320 9044

Research Supervisor: Dr. Ciara Gunning, BCBA Email: ciara.gunning@nuigalway.ie
Phone: 00 353 91 495773

Head of School of Psychology: Prof. Brian McGuire Email: brian.mcguire@nuigalway.ie
Phone: 00 353 91 492954

Thank you kindly for your time and your consideration to participate in this study.

NUI Galway
OÉ Gaillimh

Consent Form

Participant Identification No.: ___________________________

Title of Project: A preliminary evaluation of the *Parent-coaching Assessment, Individualization, and Responding to Stressors (PAIRS)* tool when used to complement a family-mediated intervention

Name of Researcher: Cressida Pacia

Please tick each box and sign below.

1. I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions if I have any. I am satisfied that I understand the information provided and have had enough time to consider the information. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected. ☐

3. I understand that my Project ImPACT data and additional questionnaire data will be de-identified and analyzed as part of the study. ☐

4. I understand that the final interview will be audio recorded. The recording will be transcribed using only anonymous participant numbers and then immediately destroyed. ☐

5. I understand that the results of this study will be written up as a paper as part of the Researcher's PhD. The results will also be published and presented within the research field of applied behaviour analysis. ☐

6. I agree to take part in the above study. ☐

______________________	_______________	______________________
Participant Name	Date	Signature
______________________	_______________	______________________
Researcher	Date	Signature

NUI Galway
OÉ Gaillimh

Participant Information Sheet – Agency B

My name is Cressida Pacia and I am a PhD candidate at the National University of Ireland Galway (NUI Galway). NUI Galway is a public research university located in the city of Galway, Ireland, where I am completing my PhD remotely from Canada. While completing my PhD at NUI Galway, I am also working at [Agency A – redacted] in [City, Province – redacted]. I am carrying out my research under the supervision of Dr. Ciara Gunning, BCBA, Dr. Aoife McTiernan, BCBA-D, and Dr. Jennifer Holloway, BCBA-D.

For this research, we are inviting parents enrolled in the Project ImPACT program to take part. You will receive the same Project ImPACT service if you decline to participate in the study. This Participant Information Sheet will explain more about the research and what it will involve as well as the benefits of taking part to help you to decide if you would like to participate.

If there is anything that you are not clear about or any questions you have, I will be happy to discuss these with you. Please take as much time as you need to review this information. This research has been fully approved by the Research Ethics Committee in National University of Ireland, Galway (NUIG) as well as the Research Ethics Committee at [Agency A – redacted].

<u>Participation: What does it involve?</u>

Participation involves attending Project ImPACT sessions and implementing the strategies you learn with your child. This expectation is the same regardless of your participation in the study. There are two additional components to participating in the study:

1. **Questionnaires:** You will be asked to complete an additional questionnaire at the beginning and end of the 12-week program. You will be given time during your first and last Project ImPACT session to complete the questionnaires (approximately 10 minutes) so that you will not have to take extra time out of your day.

2. **Project ImPACT data:** Data will be taken for program purposes as part of the Project ImPACT program. If you agree to participate in the study, some of your data for the Project ImPACT program will be used in the study. Any data used in the study will be de-identified. This means that your data will always be private, confidential, and anonymous.

If you decline to participate in the study, you will receive the <u>same</u> Project ImPACT services as parents who agree to participate. Data will be taken for program purposes as normal. Your program data will not be used in the study, and you will not be asked to complete any additional questionnaires.

<u>Potential benefits</u>

There are no foreseeable risks or side effects involved in taking part in this study. Some inconvenience may be involved (i.e., taking part in short questionnaires), and care has been taken to minimize the inconvenience (i.e., setting aside time during Project ImPACT sessions to complete it). If you choose to take part, your participation will help us understand the effects of Project ImPACT and the PAIRS and make improvements that will help other parents and children with autism.

Your rights

It is up to you to decide whether you would like to take part. If you decide that you would like to take part, please complete the online consent form using the link provided to you by your Project ImPACT coach during your first session.

Participation is voluntary. You are free to withdraw at any time and without giving a reason. If you wish to withdraw consent at any stage, any data we have received will be destroyed if you so wish. After the end of the program, once your data has been combined with other participants' data (analyzed) and submitted for publication, it will not be possible to remove your individual data points from the analysis.

Confidentiality and anonymity

All information concerning your participation in this study is private, confidential, and anonymous. All data collected will be stored under each individual participant's assigned participant number, i.e., no real names will be used within the research.

All data will be stored on my password-protected computer and on NUI Galway's OneDrive server until the data have been analysed, then they will be deleted from my computer. All anonymized data will be held on NUI Galway's OneDrive server for seven years, after which they will be destroyed.

Further information and queries

When the study is complete, the results will be written up as a paper which I will submit to the University as part of my PhD. I would also aim to publish and present the results within the research field of applied behaviour analysis. No participant will be identified in any publication or presentation.

You are invited to provide your email address if you would like to receive a summary of the findings at the end of the study.

I would like to remind you that you are entitled to change your mind about your participation in this study at any time during the course of the study without disadvantage or penalty to you. If you have any queries at any point during or after the study, the researchers will be at hand to address the issue.

If you would like any further information, please do not hesitate to contact the principal researcher, Cressida Pacia, at any time. If you have any questions about this study and wish to contact someone independent and in confidence, you may contact the Chairperson of the NUI Galway Research Ethics Committee, c/o Office of the Vice President for Research, NUI Galway, ethics@nuigalway.ie. You may also contact [Agency A – redacted]'s Research Ethics Committee, [email address – redacted].

Please contact the principal researcher or research supervisor to clarify any points on which you remain unclear.

Principal researcher: Cressida Pacia, BCBA Email: c.pacia1@nuigalway.ie
Phone: 519-710-8572

Research Supervisor: Dr. Ciara Gunning, BCBA Email: ciara.gunning@nuigalway.ie
Phone: 00 353 91 495773

Head of School of Psychology: Prof. Brian McGuire Email: brian.mcguire@nuigalway.ie
Phone: 00 353 91 492954

Thank you kindly for your time and your consideration to participate in this study.

Consent Form

Project: Project ImPACT study

Name of Researcher: Cressida Pacia

Please tick each box and sign below.

1. I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions if I have any. I am satisfied that I understand the information provided and have had enough time to consider the information. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected. ☐

3. I understand that my Project ImPACT data and additional questionnaire data will be de-identified and analyzed as part of the study. ☐

4. I understand that the results of this study will be written up as a paper as part of the Researcher's PhD. The results will also be published and presented within the research field of applied behaviour analysis. ☐

5. I agree to take part in the above study. ☐

______________________	______________	______________________
Participant Name	Date	Signature
______________________	______________	______________________
Researcher	Date	Signature

Appendix J. Reflexivity Statement (Chapter 4)

Reflexivity refers to the practice of critiquing, appraising, and evaluating how a researcher's own subjectivity and context influences the research processes (Olmos-Vega et al., 2023). While the primary aim of this reflexivity statement is to contextualize the thematic analysis conducted in Chapter 4, this statement will also present a reflection of the researcher's positionality on the larger thesis. The remainder of this statement will be presented in the first person.

I am a Board Certified Behaviour Analyst (BCBA) conducting a PhD in Applied Behaviour Analysis (ABA) and thus interpret this research primarily through a radical behaviourist lens. My educational background is in Psychology, and therefore the theoretical background of this thesis is also influenced by psychological theories such as family systems theory. I had worked clinically in the field of ABA for nine years prior to starting this PhD and continued to work clinically in various capacities throughout my PhD. As such, my experiences working with autistic children and their families, and the successes and challenges I encountered, shaped the selection of my PhD research topic and the specific research questions and methods within it. In particular, the generation of potential solutions to common barriers during the development phase of the Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS) in Chapter 3 was strongly influenced by my clinical experience in conjunction with my review of the literature. Additionally, the process of developing the PAIRS influenced my analysis of the interview data in Chapter 4. For example, although I did not intend to evaluate specific barrier categories of the PAIRS, my knowledge of the categories led me to construct sub-themes in the thematic analysis that corresponded with them.

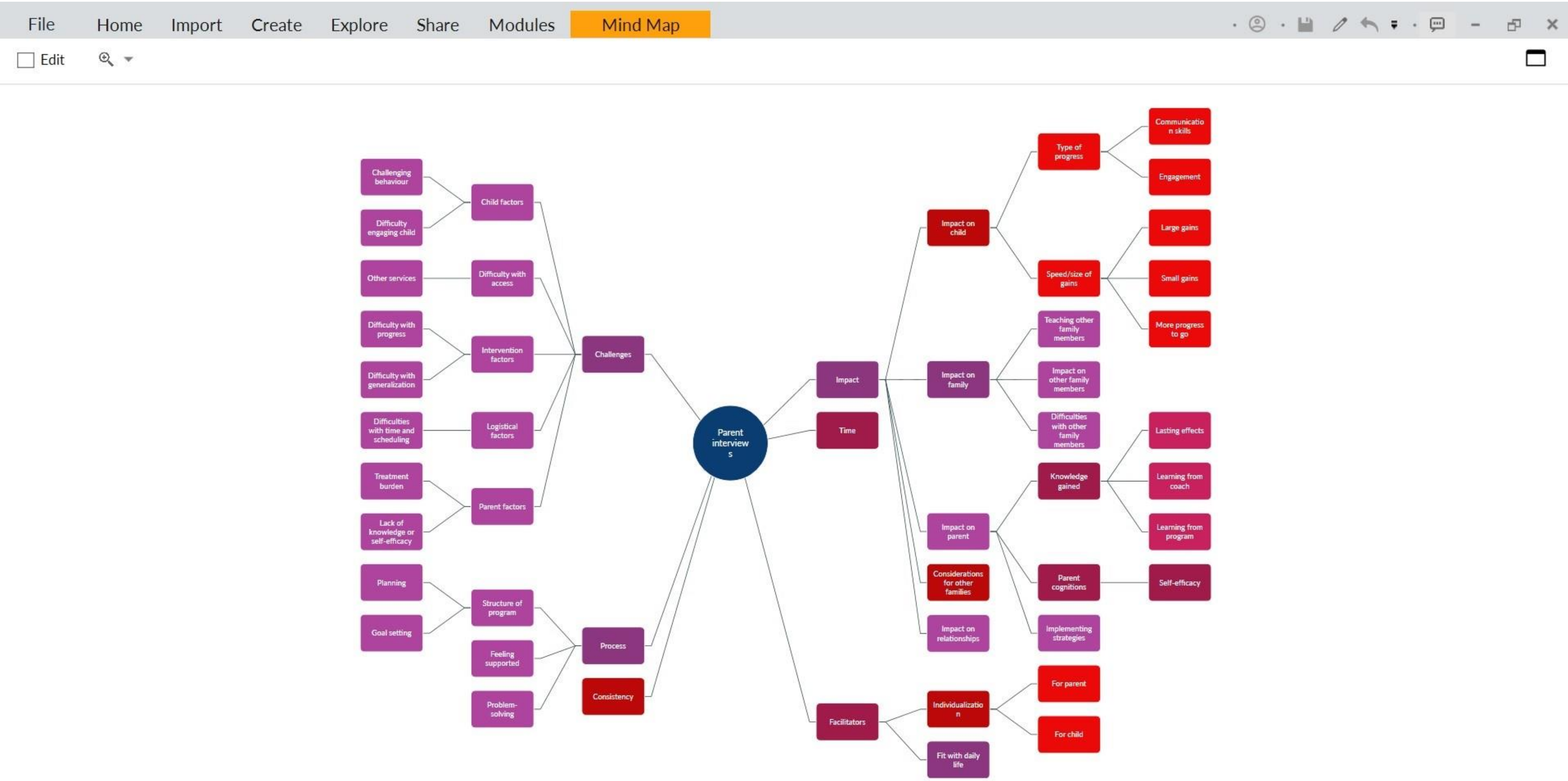
I conducted all the qualitative data collection and analysis in Chapter 4. Within the context of this community-based study, it was important to consider the ways in which my interactions with participants and the data might be influenced by my own personal and professional background, experiences, and prior assumptions. For my personal background, I am a first-generation Filipino immigrant, which may have influenced how participants and I related to each other, as most of the parent participants and one practitioner participant in this study also identified as non-White. This could also have influenced my interpretation of the data, such as the inclusion of cultural adaptation as a discussion point, which I may not have been attuned to if I had a different background.

I was residing in Ontario when the community-based study in Chapter 4 was conducted. I worked within the financial and structural framework of the Ontario Autism Program (OAP). At the time of the study, I was working full-time as a Clinical Supervisor at Agency A and had a collaborative relationship with colleagues at Agency B. My familiarity with the OAP and the two agencies influenced the research design of Chapter 4. For example, my knowledge of the partnership between the two agencies in their delivery of the Project ImPACT program influenced my decision to utilize an additive treatment design to evaluate the PAIRS. Although I was not supervising the Project ImPACT program or the practitioners who participated in the research, parent and practitioner responses may have been influenced by my position at the agency they were receiving services from (parents) or were employed by (practitioners). Several steps were taken to reduce any potential conflict of interest or perceived pressure on participants in accordance with recommendations from the Research Ethics Committees of the University of Galway and Agency A (e.g., clear communication that services received are not affected by participation or non-participation in the research). Still, my position could have impacted on participants' willingness to talk openly about their experience and satisfaction with the PAIRS and the Project ImPACT program, and might have shaped what they chose to share.

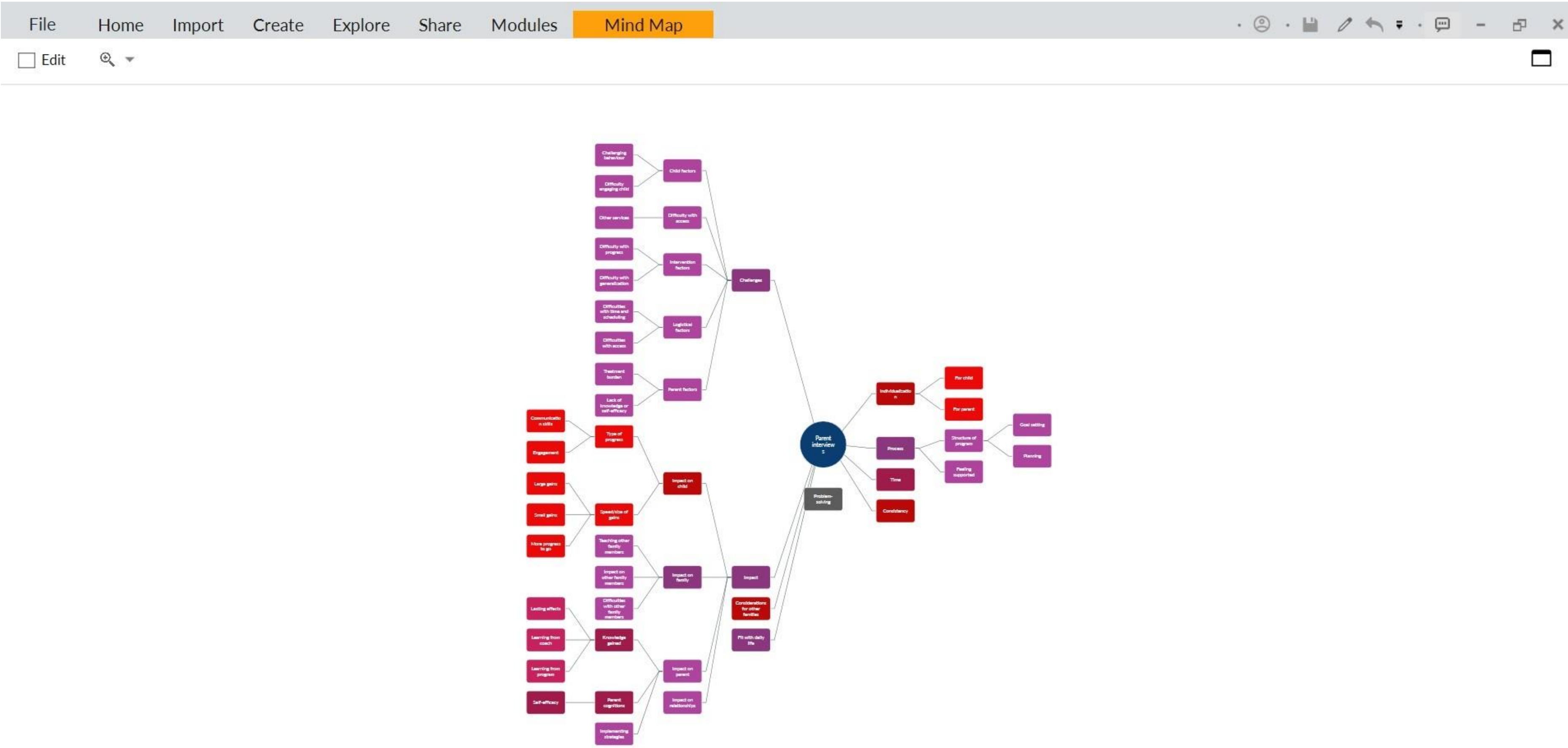
Thus, the overall research method, and especially my analysis of the qualitative data, was influenced by my personal background, my knowledge of existing research on barriers and facilitators to engagement, my role in developing the PAIRS, my knowledge of the OAP, my familiarity and relationships with Agencies A and B, and my clinical experiences and theoretical orientation as a BCBA.

Appendix K. Initial Mind Map – Parent Data (Chapter 4)

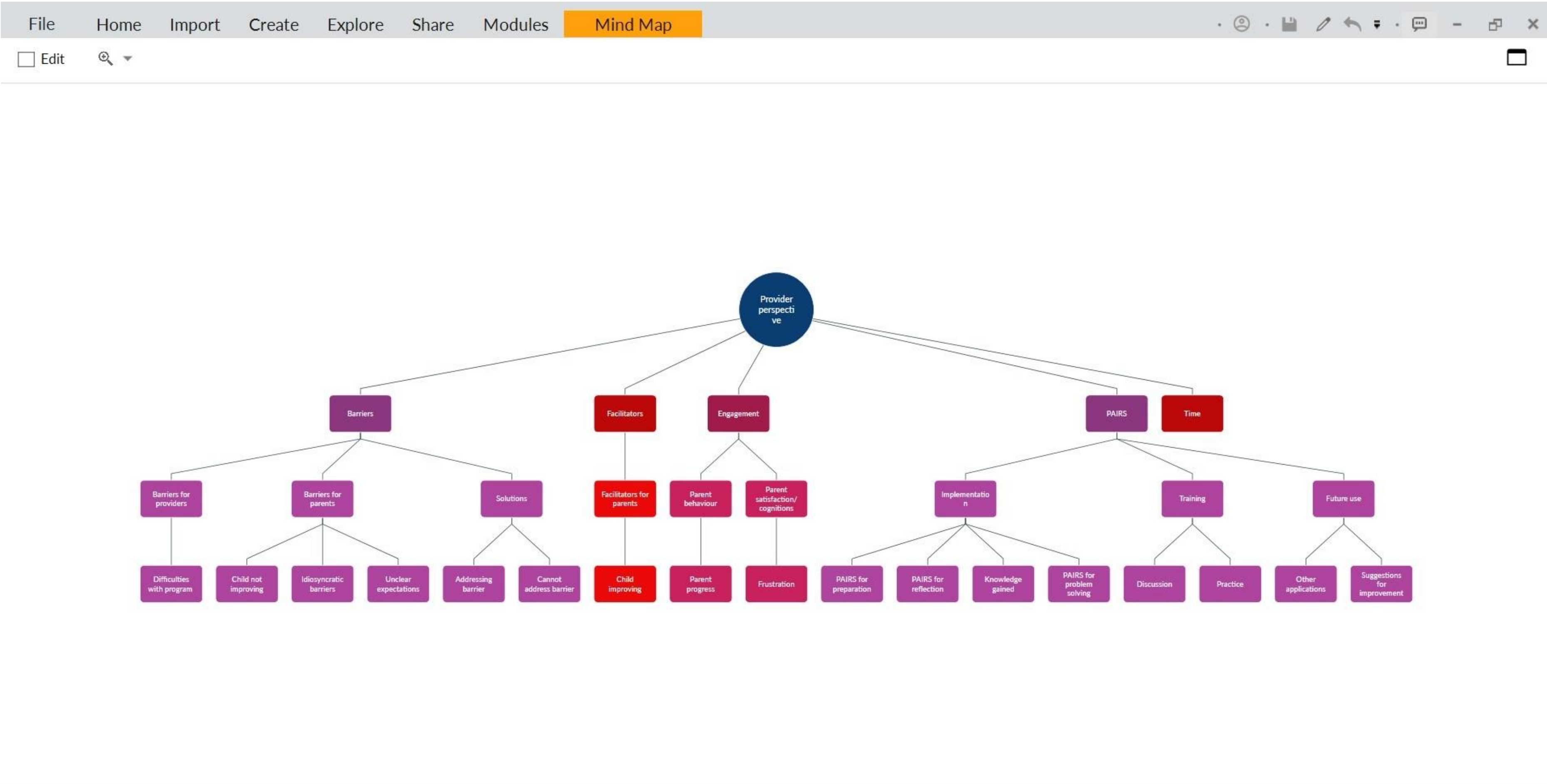
Appendix L. Second Mind Map – Parent Data (Chapter 4)



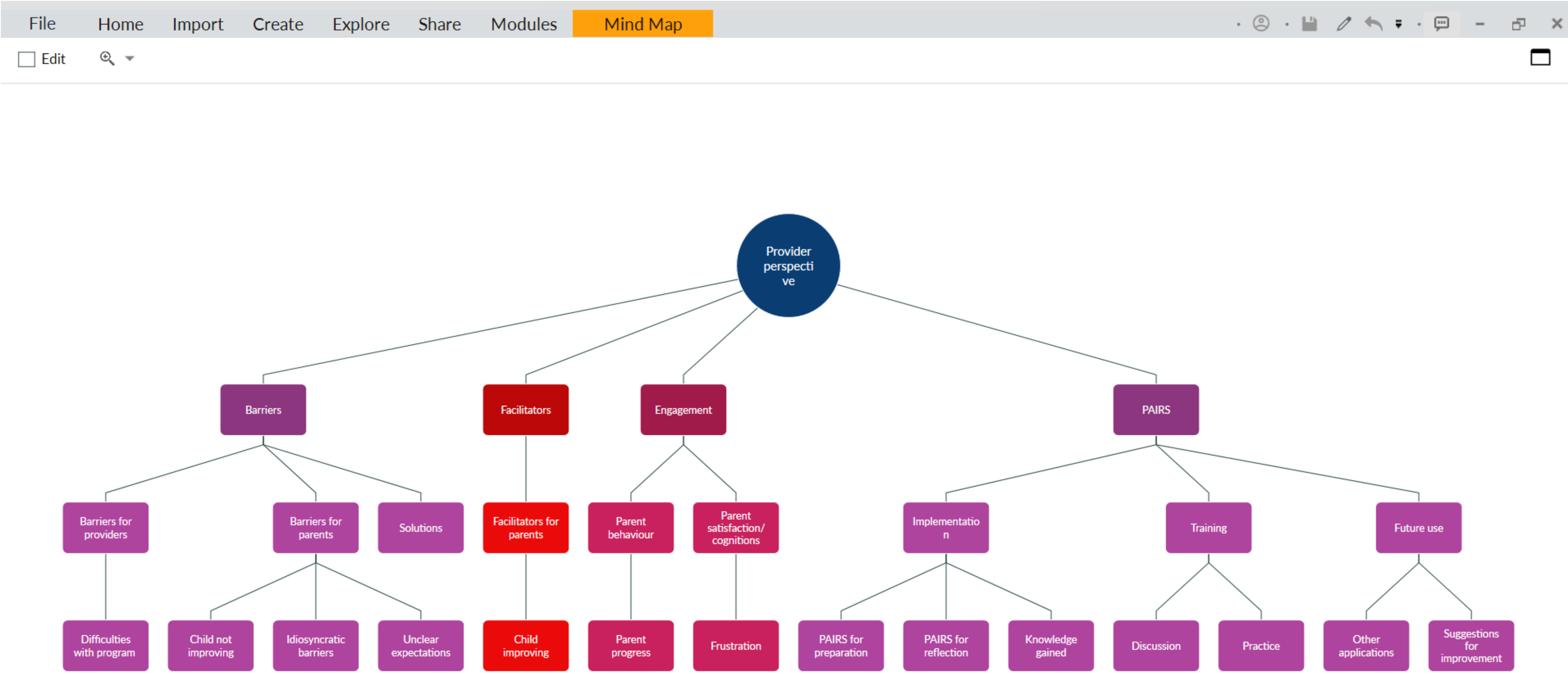
Appendix M. Third Mind Map – Parent Data (Chapter 4)



Appendix N. Initial Mind Map – Practitioner Data (Chapter 4)



Appendix O. Second Mind Map – Practitioner Data (Chapter 4)



Appendix K: Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS)

Parent-coaching Assessment, Individualization, and Response to Stressors (PAIRS)

June 2023

Table of Contents

Part 1: Introduction to the PAIRS

What is the PAIRS?

The *Parent-coaching Assessment, Individualization, and Response to Stressors* (PAIRS) is a systematic, practical tool designed to help practitioners:

- **Assess** family strengths, needs, and barriers,
- **Individualize** their parent coaching intervention based on the assessment, and
- **Respond** to challenges using a contextual, functional approach.

The PAIRS is intended to be **complementary** (to be used alongside any parent coaching intervention) and **collaborative** (to be used as an aid for collaboration with families).

The PAIRS is built on two core assumptions:

1. The child with ASD (**focal learner**) does not exist in isolation. They are part of a dynamic and interconnected family system that must be considered when designing, implementing, and evaluating an intervention.

2. When involving family members in intervention, they should be approached not simply as behaviour change agents but as learners themselves (**mediator learners**). Their preferences, strengths, and challenges should be collaboratively identified and built upon using the contextual, functional approach, analogous to the care taken when working directly with the focal learner.

What is a contextual, functional approach?

A contextual, functional approach applies the same behaviour analytic lens typically used with focal learners to mediator learners. For example, behavioural practitioners could consider family factors such as establishing operations, stimulus generalization, response acquisition, competing contingencies, and contextual setting factors when implementing a parent coaching intervention. These would allow practitioners to adapt their own behaviour to promote engagement and meaningful intervention outcomes.

What is parent engagement?

Parent engagement is composed of three categories: attendance, adherence, and cognitions.

- **Attendance** refers to enrolment, session attendance, and completion of the program.
- **Adherence** refers to active participation during sessions and application of strategies between sessions. The PAIRS' preferred term is concordance. **Concordance** refers to a collaborative relationship that emphasizes goodness-of-fit between the intervention and the family.
- **Cognitions** refers to private events such as expectations about roles or treatment outcomes, attitudes toward therapy, attributions of causality, motivation for change, and perceptions of personal stress and resources.

How was the PAIRS developed?

The PAIRS was first developed by conducting a literature review on the barriers and facilitators to parent engagement in parent training interventions. Suggested solutions to these barriers were proposed. A content validity study was conducted to evaluate the relevance, likely effectiveness, and appropriateness of the suggested solutions by an expert panel of Board Certified Behaviour Analysts (BCBAs). Solutions were revised based on their contributions. A secondary evaluation was conducted with a subset of the expert panel to evaluate the benefits of the tool for decision-making and day-to-day work with families. Finally, a preliminary evaluation of the PAIRS was conducted in a community setting in conjunction with an evidence-based parent coaching intervention.

What are the components of the PAIRS?

1. PAIRS Good Practice Checklist for Practitioners
2. PAIRS Table of Function-Based Solutions
3. PAIRS Assessment and Individualization Plan

1. **PAIRS Good Practice Checklist for Practitioners**

The PAIRS Good Practice Checklist for Practitioners is useful for practitioners when they are in the process of developing or improving their parent coaching intervention. The purpose of the Checklist is to provide practitioners with strategies to develop an intervention and skill set that builds on common facilitators and prevents negative effects of common barriers.

2. **PAIRS Table of Function-Based Solutions**

The PAIRS Table of Function-Based Solutions is useful for practitioners when they are developing their individualization plan. The purpose of the Table is to provide potential solutions as a starting – not ending – point for collaborative problem-solving with the family in response to identified barriers. The Table includes a section for practitioners to proactively brainstorm potential solutions that are specific to their program and/or organization.

3. **PAIRS Assessment and Individualization Plan (Checklist or Open-Ended Interview)**

The PAIRS Assessment and Individualization Plan is useful for practitioners when they are implementing a parent coaching intervention. The purpose of the Assessment and Individualization Plan is to learn about a family's unique strengths and needs, and to adapt the intervention to build on these identified strengths and address the identified needs. This is done by developing the Plan in collaboration with the family using the PAIRS Table of Function-Based Solutions as a guide. We suggest administering the Assessment and Individualization Plan a) at the beginning of a parent coaching intervention to *proactively* adapt intervention, and b) as needed over the course of the intervention to *responsively* adapt intervention.

Part 2: Definitions

Definitions of facilitators as listed in the PAIRS

The below facilitators were derived from the literature on facilitators to parent engagement in interventions. These facilitators are found in the PAIRS Good Practice Checklist for Practitioners and the PAIRS Assessment and Individualization Plan. They are also incorporated into the solutions in the PAIRS Table of Function-Based Solutions.

Effective intervention (A-C)	Parent and child gain knowledge and skills, and family interactions improve. Effective adult learning strategies are used.
Parent self-efficacy and empowerment (D)	Parent has the confidence to carry out intervention strategies, persistence, self-advocacy, and personal agency. Parents are empowered to understand their child's development and how they could facilitate their child's developmental successes.
Family, peer, and community support (E-F)	Spousal agreement (i.e., both parents are in agreement on intervention goals and strategies). Support and acceptance from extended family (e.g., grandparents) and wider community (e.g., school, church). Peer support (e.g., as in group parent training) can be helpful, given a positive group dynamic is fostered.
Child- and family-centred goals (G-H)	Contextualization and compatibility with values and lifestyle, i.e., treatment focus matches family needs and the approach fits with their available resources and caregiving style. Intervention is specific to the needs of the child and provided in a flexible, responsive manner.
Positive relationship with practitioner (I-J)	Mutual respect, trust, and the practitioner's unconditional positive regard. Parent is confident in the practitioner's knowledge and skills and feels understood and supported. Practitioner uses a non-directive collaborative and strengths-based approach.
Additional supports and partnerships (K-L)	Additional supports are provided where necessary (e.g., providing childcare during sessions), or linking family with other community supports (e.g., respite). Collaboration between different service providers (e.g., schools, speech therapists, occupational therapists) is positive and coordinated.

Definitions of barriers as listed in the PAIRS

The below barriers were derived from the literature on barriers to parent engagement in interventions. These barriers are found in the PAIRS Good Practice Checklist for Practitioners, the PAIRS Assessment and Individualization Plan, and the PAIRS Table of Function-Based Solutions.

1. Logistical factors

Difficulties with access (1.1-1.4)	Issues such as affordability (i.e., paying for the intervention and any associated costs), availability (i.e., long distance, lack of access to transport, limited services in rural communities), and scheduling (i.e., scheduling conflicts, lack of childcare).
Administrative difficulties (1.5-1.6)	Issues such as difficulties with therapists (e.g., recruitment, unreliability, presence in the home), difficulties with equipment (e.g., laptops for Telehealth, unfamiliar apps or software), or difficulties with materials (e.g., assisting with making PECS, buying new toys).

2. Child factors

Complex child profile (2.1-2.2)	Child factors that may impact their ability to benefit from intervention such as challenges with verbal skills, levels of autism symptomology difficulties, and problem behaviour.

3. Sibling factors

Difficulties for siblings (3.1-3.3)	Challenges for siblings such as lack of attention, having to stay out of the way during therapy, or exhibiting increased problem behaviour.

4. Parent factors

Individual or cultural concerns (4.1)	Mismatch between the intervention and individual needs, values, and preferences of families (e.g., core beliefs regarding play, praise, discipline methods), as well as cultural factors (e.g., language barriers, concerns regarding maintenance of cultural identity, gender roles, the role of elders and extended families, disapproval from the family's community).
Difficult living circumstances (4.2)	Circumstances which can be considered challenging for the family unit, such as socio-economic disadvantage, parent mental health or learning challenges, family dysfunction, or parenting without support. This can also include acute stressors such as death or illness in the family, relocation, etc.
Treatment burden and stress (4.3)	Demands placed on the child and family during intervention are too high (e.g., substantial amount of time required to implement the intervention, treatment is too demanding for child, parents experience increased stress).
Training not the right fit (4.4)	Mismatch between parent needs/preferences and intervention characteristics such as training model (e.g., individual, group, Telehealth, in-home), adult learning strategies (e.g., in-vivo coaching, video feedback), or treatment complexity (e.g., reading level of material, complexity of intervention strategies).
Low motivation or belief in effectiveness (4.5)	Low or fluctuating motivation to engage in intervention and/or low belief that the intervention will be effective.

5. Intervention factors

Variations in treatment efficacy (5.1)	Child not progressing as expected, slow progress, or regression in target skills during intervention that impact parent engagement and motivation.
Difficulties with generalization (5.2)	Difficulties with generalization or maintenance of skills learned in intervention.

Professional competencies and further reading

Some of the terminology and/or concepts in the PAIRS may be less familiar to behavioural practitioners depending on their training and experience. Thorough descriptions of these concepts are beyond the scope of this tool. Please find summaries and recommendations for further reading below. Some of these concepts overlap (e.g., therapeutic relationship skills include strengths-based approaches, which include cultural humility). Practitioners who provide parent coaching services are encouraged to seek out professional development opportunities in these areas, within and outside of the field of behaviour analysis.

Acceptance and Commitment Training (ACT)	Acceptance and commitment training (ACT) is a behaviour analytic approach to increasing adaptive, flexible repertoires of behavior. This is done through reducing control by problematic rule-deriving and rule-following. ACT has been incorporated into behavioural interventions to enhance their effectiveness. Key behavioural repertoires targeted with parents include: (a) Values identification; (b) Mindfulness; (c) Defusion; (d) Acceptance; (e) Committed Action. **Further reading:** Dixon, M. R., Hayes, S. C., Stanley, C., Law, S., & al-Nasser, T. (2020). Is Acceptance and Commitment Training or Therapy (ACT) a method that applied behavior analysts can and should use? *The Psychological Record, 70*(4), 559-579. Gould, E. R., Tarbox, J., & Coyne, L. (2018). Evaluating the effects of Acceptance and Commitment Training on the overt behavior of parents of children with autism. *Journal of Contextual Behavioral Science, 7*, 81-88. Juvin, J., Sadeg, S., Julien-Sweerts, S., & Zebdi, R. (2021). A systematic review: Acceptance and Commitment Therapy for the parents of children and adolescents with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders,* 1-18. Tarbox, J., Szabo, T. G., & Aclan, M. (2020). Acceptance and Commitment Training within the scope of practice of Applied Behavior Analysis. *Behavior Analysis in Practice*, 1-22. Whittingham, K., & Coyne, L. (2019). *Acceptance and Commitment Therapy: The clinician's guide for supporting parents.* Elsevier Science.
Adult learning theory	Research on adult learning began as a reaction to child-based models and aimed to sketch out the distinctiveness of adult learning (adrogogy). The central tenets of androgogy are (a) the learner's need to know; (b) self-concept of the learner; (c) prior experience of the learner; (d) readiness to learn; (e) orientation to learning; and (f) motivation to learn. Thus, adult learners benefit most from learning experiences that are practical and goal-focused, allow for choice and self-direction, capitalize on their experience, and are internally motivating. In the context of parent training, coaching strategies based on these principles include parent-selected goals, sequenced systematic instruction, practice and feedback, and ongoing support and problem-solving. **Further reading:** Ingersoll, B., & Dvortcsak, A. (2019). *Teaching social communication to children with autism and other developmental delays*. Guilford Publications. Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2014). *The adult learner: The definitive classic in adult education and human resource development.* Routledge. Merriam, S. B., & Bierema, L. L. (2013). *Adult learning: Linking theory and practice.* John Wiley & Sons.

Cultural humility	Cultural humility refers to the process of self-reflection and understanding one's own implicit and explicit biases and how these biases may influence treatment planning and implementation. This entails seeking to increase awareness, understanding, and respect about different cultural practices, without relying on stereotypical beliefs about a culture or broad cultural differences, to understand the experiences of a family. **Further reading:** Dennison, A., Lund, E. M., Brodhead, M. T., Mejia, L., Armenta, A., & Leal, J. (2019). Delivering home-supported applied behavior analysis therapies to culturally and linguistically diverse families. *Behavior Analysis in Practice, 12*(4), 887-898. Fong, E. H., Catagnus, R. M., Brodhead, M. T., Quigley, S., & Field, S. (2016). Developing the cultural awareness skills of behavior analysts. *Behavior Analysis in Practice, 9*(1), 84-94. Wright, P. I. (2019). Cultural humility in the practice of applied behavior analysis. *Behavior Analysis in Practice, 12*(4), 805-809.
Family systems theory (FST)	Family systems theory (FST) places the caregiver and child within the larger family system in which individual family members are interdependent. All subsystems within the family are systems of their own, but are also interdependent, exerting continuous and reciprocal influences on one another. Thus, the family should always be at the centre of an intervention plan. An example of incorporating FST in practice is by collaboratively deciding in which family subsystem(s) practitioners should intervene, with what intensity, in which order, and with what type of intervention. **Further reading:** Scott, S., & Dadds, M. R. (2009). Practitioner review: When parent training doesn't work: Theory-driven clinical strategies. *Journal of Child Psychology and Psychiatry, 50*(12), 1441-1450. Weeland, J., Helmerhorst, K. O., & Lucassen, N. (2021). Understanding differential effectiveness of behavioral parent training from a family systems perspective: Families are greater than "some of their parts". *Journal of Family Theory & Review, 13*(1), 34-57. Wright, B. M., & Benigno, J. P. (2019). Autism spectrum disorder and sibling relationships: exploring implications for intervention using a family systems framework. *American Journal of Speech-Language Pathology, 28*(2), 759-767.
Interprofessional collaboration	The Interprofessional Education Collaboration (IPEC) Framework consists of four interprofessional core competency domains: (a) values and ethics; (b) roles and responsibilities; (c) interprofessional communication; and (d) teams and teamwork. **Further reading:** Slim, L., & Reuter-Yuill, L.M. (2021) A behavior-analytic perspective on interprofessional collaboration. *Behaviour Analysis in Practice,* 1-11.

Motivational Interviewing (MI)	Motivational Interviewing (MI) is an empirically supported treatment which can be conceptualized through stimulus equivalence and transformation of functions. Critical components of therapist behaviour in MI include collaboration, evocation, and autonomy. Specific MI strategies include: (a) client-centred counselling skills (i.e., open questions, affirmations, reflections, and summaries); (b) recognizing change talk and sustain talk; (c) evoking and responding to change talk; (d) responding to sustain talk and resistance; (e) negotiating a change plan; and (f) consolidating commitment to change. **Further reading:** Christopher, P. J., & Dougher, M. J. (2009). A behavior-analytic account of Motivational Interviewing. *The Behavior Analyst, 32*(1), 149-161. Gilbert, M. (2020). *How to stop talking and start communicating with motivational interviewing: A behaviour therapist's guide on how to effectively collaborate with caregivers.* Crystal Minds Psychological Services.
Strengths-based approach	A strengths perspective assumes that every individual has resources that can be mobilized toward success in many areas of life and is characterized by "efforts to label what is right" within people and organizations. Focus on individual and/or community strengths that place emphasis on meaningful relationships and activities. A strengths-based approach expands the focus from exclusive emphasis on areas of need to viewing positive aspects of the child's behaviour, highlighting areas of competence, and identifying areas that facilitate development. The Strengths-Based Practice Inventory lists 16 items across four subscales: (a) empowerment approach; (b) cultural competency; (c) staff sensitivity-knowledge; and (d) relationship-supportive. **Further reading:** Cosden, M., Koegel, L. K., Koegel, R. L., Greenwell, A., & Klein, E. (2006). Strength-based assessment for children with autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities, 31*(2), 134–143. Green, B. L., McAllister, C. L., & Tarte, J. M. (2004). The strengths-based practices inventory: A tool for measuring strengths-based service delivery in early childhood and family support programs. *Families in Society, 85*(3), 326-334. Steiner, A.M. & Gengoux, G.W. (2018) Strength-Based Approaches to Working with Families of Children with ASD. In: Siller M., Morgan L. (eds) *Handbook of Parent-Implemented Interventions for Very Young Children with Autism*. Autism and Child Psychopathology Series. Springer, Cham.
Therapeutic relationship skills	10 evidence-informed strategies to build Alliance, Collaboration, and Empowerment (ACEs): (a) Reflectively listen; (b) Convey parent–therapist partnership; (c) Communicate positive regard; (d) Give suggestions, not directions; (e) Ask for input on intervention strategies; (f) Incorporate input into sessions; (g) Involve parent in session activities; (h) Collaboratively plan homework; (i) Focus on strengths and effort; (j) Jointly identify and problem solve barriers. **Further reading:** Haine-Schlagel, R., & Bustos, C. (2013). *Parent And Caregiver Active Participation Toolkit (PACT): Therapist manual.* San Diego State University. Rohrer, J. L., Marshall, K. B., Suzio, C., & Weiss, M. J. (2021). Soft Skills: The Case for Compassionate Approaches or How Behavior Analysis Keeps Finding Its Heart. *Behavior Analysis in Practice,* 1-9. Taylor, B. A., LeBlanc, L. A., & Nosik, M. R. (2019). Compassionate care in behavior analytic treatment: Can outcomes be enhanced by attending to relationships with caregivers? *Behavior Analysis in Practice, 12*(3), 654-666.

Part 3: Directions for using the PAIRS

When developing your parent coaching intervention…

Complete the **Good Practice Checklist for Practitioners**

The PAIRS Good Practice Checklist for Practitioners is designed to be used by practitioners while they are developing their parent coaching intervention. The purpose of the Checklist is to provide practitioners with strategies to develop an intervention and practitioner skill set that builds on common facilitators and avoids negative effects of common barriers.

1. Review items on checklist and identify missing good practice items. Some items refer to potential intervention adjustments, while others refer to suggested practitioner behaviours and skills.
2. Refer to Professional Competencies and Further Reading section for definitions of unfamiliar concepts or skills
3. In the "Priorities and Development Plan" section, create a list of priorities for appropriate and feasible changes to your intervention
4. In the "Priorities and Development Plan" section, develop a plan for building critical parent coaching skills (e.g., through continuing education events, workshops, mentorship)
5. Carry out plan (plan does not have to be complete prior to starting intervention)

Complete the ***Program-specific Solutions*** section in the **PAIRS Table of Function-Based Solutions**

The PAIRS Table of Function-Based Solutions is designed to be used by practitioners when they are developing their parent coaching intervention, and again when collaboratively problem-solving with specific families. The purpose of the PAIRS Table of Function-Based Solutions is to provide suggested solutions to common barriers for practitioners who are conducting the PAIRS Assessment and Individualization Plan.

1. Review the common barriers and suggested solutions in the Table.
2. Refer to Definitions section for definitions and examples of each barrier as needed.
3. Note specific adaptations and/or additional services and referrals that are relevant and appropriate for your organization or program in the "Program-specific solutions" section.

When implementing your intervention with a family…

Use the **Assessment and Individualization Plan** in conjunction with the **Table of Function-based Solutions**

The purpose of the PAIRS Assessment and Individualization Plan is to learn about a family's unique strengths and needs, and tailor your intervention to build on family strengths and address family needs. The purpose of the PAIRS Table of Function-Based Solutions is to provide suggested solutions to common barriers for practitioners who are conducting the PAIRS Assessment and Individualization Plan.

1. Prior to implementing your intervention, decide on how you will use the assessment with a particular family (e.g., as checklist, interview, or a combination).
2. If conducting an interview, review checklist items on assessment and pre-fill (Yes/No/NA) based on intake and other information (depending on the context, you may choose to ask about all items on the assessment).
3. Decide which items to discuss with parents.
4. Review associated solutions from the Table of Function-Based Solutions, especially the Program-specific Solutions section you completed.
5. Schedule adequate time to discuss with parents.
6. Probe for more information when a barrier is identified and note information in the "Additional details/individualization" section of the relevant items.
7. Collaboratively identify specific solutions and note these in the "Additional details/individualization" section of the relevant items. Refer back to Table of Function-based Solutions as necessary.
8. If there are idiosyncratic challenges, complete problem-solving framework section.
9. Carry out intervention with these individualizations
10. If parent engagement is low or inconsistent (e.g., cancelling sessions, not implementing strategies), return to Step 1.
11. At the end of the program, complete the Reflection section.

NOTE: The PAIRS is not intended to be rigid or prescriptive. The PAIRS is intended to be used flexibly as a starting point for individualization and collaboration, with respect to the unique context of each practitioner and family. Adaptation of the PAIRS to meet individual needs is encouraged.

PAIRS Fidelity of Implementation Checklist

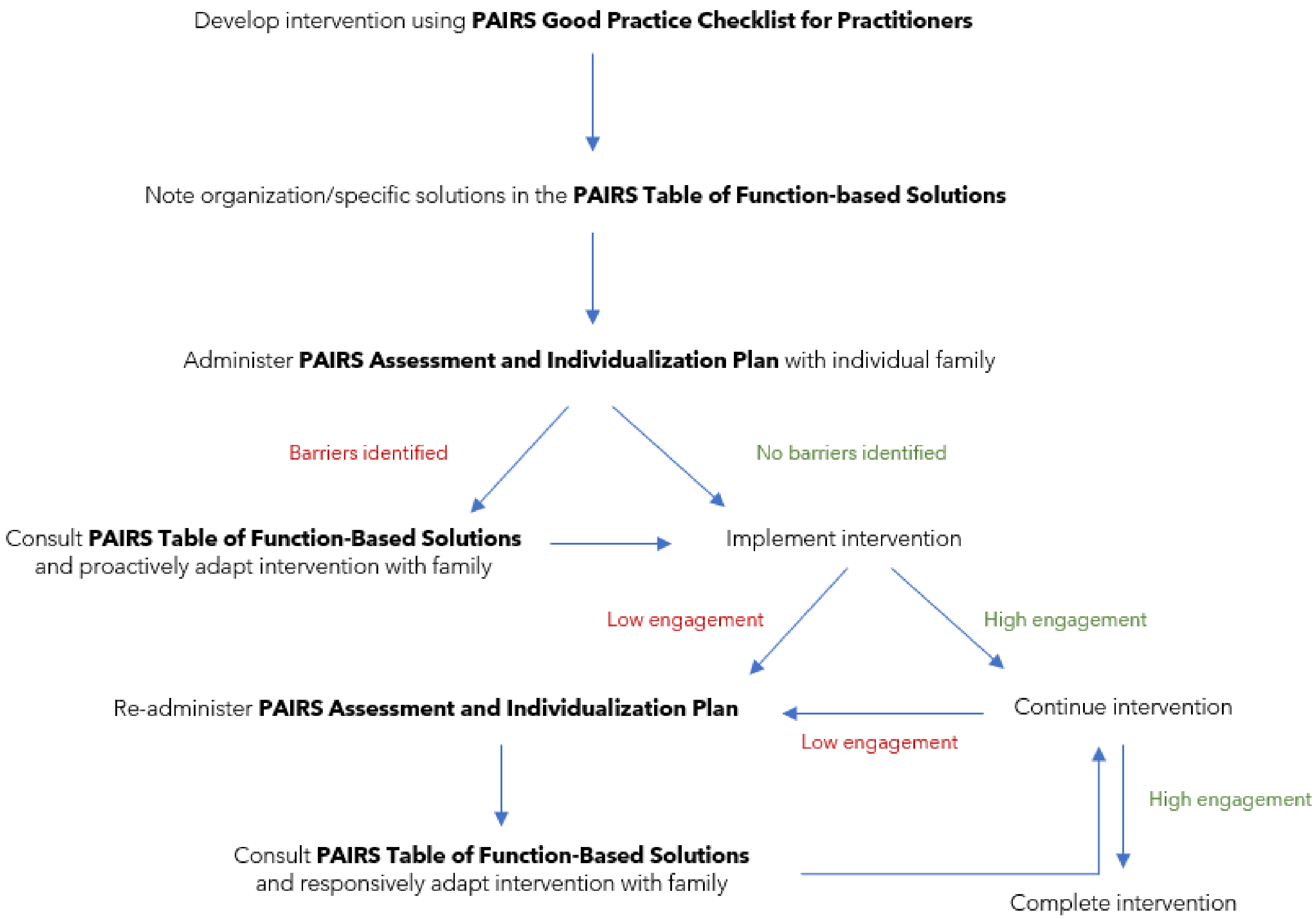
Practitioner:		Date:	
Assessor:		Program:	

Good Practice Checklist for Practitioners	
1. Reviews items on checklist and identifies missing good practices	Y/N/NA
2. Refers to Professional Competencies and Further Reading section for definitions of unfamiliar concepts or skills as needed	Y/N/NA
3. In the "Priorities and Development Plan" section, creates a list of priorities for appropriate and feasible changes to the intervention	Y/N/NA
4. In the "Priorities and Development Plan" section, develops a plan for building critical parent coaching skills (e.g., through continuing education events, workshops, mentorship)	Y/N/NA
5. Carries out plan (plan does not have to be complete prior to starting intervention)	Y/N/NA
Table of Function-based Solutions	
1. Reviews the common barriers and suggested solutions in the Table.	Y/N/NA
2. Refers to Definitions section for definitions and examples of each barrier as needed.	Y/N/NA
3. Notes specific adaptations and/or additional services and referrals that are relevant and appropriate for their organization or program in the "Program-specific solutions" section	Y/N/NA
Assessment and Individualization Plan	
1. Prior to implementing intervention, decides on how they will use the assessment with a particular family.	Y/N/NA
2. If conducting an interview, reviews checklist items on assessment and pre-fills (Yes/No/NA) based on intake and other information.	Y/N/NA
3. Decides which items to discuss with parents.	Y/N/NA
4. Reviews associated solutions from the Table of Function-Based Solutions, especially the Program-specific Solutions section.	Y/N/NA
5. Schedules adequate time to discuss with parents	Y/N/NA
6. Probes for more information when a barrier is identified and notes information in the "Additional details/individualization" section of the relevant items.	Y/N/NA
7. Collaboratively identifies specific solutions and notes these in the "Additional details/individualization" section of the relevant items.	Y/N/NA
8. If there are idiosyncratic challenges, completes problem-solving framework section.	Y/N/NA
9. Carries out intervention with these individualizations	Y/N/NA
10. If parent engagement is low or inconsistent (e.g., cancelling sessions, not implementing strategies between sessions), returns to Step 1.	Y/N/NA
11. At the end of the program, completes the Reflection section.	Y/N/NA

What practitioner is doing well

Suggestions for improvement

PAIRS Flowchart



Additional considerations and limitations

The PAIRS Process

Prior to using the PAIRS, you may wish to develop a process for how the tool will be used within your practice (e.g., how staff will be trained, when and how it will be administered, how the process will be documented). It is recommended that this process is clearly outlined and proactively adapted to the context of your practice or organization.

Privacy and confidentiality

Prior to using the PAIRS, practitioners should consider the privacy and confidentiality policies of their organization, and their own licensing and ethical requirements. This will inform the administration of the PAIRS (e.g., whether the assessment can be sent over email or must be conducted over the phone) and the organization and storage of information (e.g., whether PAIRS is stored in the client file or must be integrated into a report). This will also inform if and how information from the PAIRS is shared (e.g., within interdisciplinary teams).

Limitations of the PAIRS

- **The PAIRS is not a standalone tool.** The PAIRS is designed to complement an evidence-based intervention.
- **The PAIRS is not exhaustive.** Families may have idiosyncratic barriers and facilitators that are not outlined in the tool, and there may be solutions outside of what is suggested. The PAIRS provides a framework for considering each family's unique context and is designed to provide a starting – not ending – point for collaboration.
- **The PAIRS is not a quick fix.** Families with complex barriers may need multiple administrations of the PAIRS to guide continuous and careful tailoring of strategies and services, in conjunction with an interdisciplinary team. This may include delaying or discontinuing the intervention so other services can be prioritized.
- **The PAIRS is not a replacement for clinical judgment.** The PAIRS is designed to assist practitioners as they make data-based decisions with each individual family.
- **The PAIRS is not a replacement for continued professional development in critical parent coaching skills.** The PAIRS provides a brief overview of helpful concepts and practices and initial suggestions for further reading. Practitioners are highly encouraged to seek out opportunities for further learning and skill building

Part 4: The PAIRS Tool

PAIRS Good Practice Checklist for Practitioners

The PAIRS Good Practice Checklist for Practitioners is useful for practitioners who are developing their general parent coaching intervention. The purpose of the Checklist is to provide practitioners with strategies to develop an intervention builds on common facilitators and avoids negative effects of common barriers.

Relevant factors	**Good practice strategies to consider**	
Facilitators (A-L)	My intervention is evidence-based and follows best practice guidelines for children with autism, parents, and siblings (if applicable).	
	My intervention utilizes effective adult learning strategies.	
	My intervention supports parent self-efficacy and empowers parents to understand their child's development and how they could facilitate their child's learning.	
	My intervention is flexible, responsive, and can be tailored to meet individual needs.	
	I am confident in my therapeutic relationship skills.	
	I am confident in my ability to provide a non-directive collaborative and strengths-based approach.	
	I am familiar with relevant services in my area and can connect families with them when necessary and appropriate (e.g., respite).	
Logistical factors (1.1-1.6)	My intervention supports flexibility in service delivery models.	
	My intervention supports flexibility in days/times of contact.	
	My intervention considers the child in context of the family unit.	
	My intervention supports a coordinated approach with interdisciplinary teams, including concordance of strategies and scheduling of appointments.	
	I have a plan for supporting families with limited access to materials and equipment.	
Child factors (2.1-2.2)	I am clear on pre-requisite child skills required to successfully complete my intervention (e.g., verbal skills, attending skills).	
	I am clear on the level of child problem behaviour my intervention can support.	
Sibling factors (3.1-3.3)	I have a plan for occupying or involving siblings during sessions.	
	I have a plan for developing goals and developmentally appropriate teaching strategies for siblings if requested by the family.	
Parent factors (4.1-4.5)	I am confident in my ability to integrate complementary strategies into intervention within my scope of practice and competence (e.g., ACT, Motivational Interviewing).	
	I have outlined a clear rationale for all strategies taught in my intervention.	
	I am continuously developing cultural humility through formal and informal learning opportunities.	
Intervention factors (5.1-5.2)	I have a plan for establishing appropriate and shared expectations at the outset, including the possibility of setbacks.	
	My intervention is proactively programmed for generalization.	

Priorities & Development Plan

PAIRS Table of Function-Based Solutions

Start by reviewing the common barriers and suggested solutions. Then consider the barriers and solutions in context of your organization or specific intervention program. Note specific adaptations that are relevant and appropriate for your organization or program. Use this table to guide collaborative problem-solving with individual families.

Barrier	Suggested solutions	Program-specific solutions
1. Logistical factors		
1.1-1.4 Difficulties with access	Telehealth, self-directed learning, or home-based training	
	Flexible training days/times, including flexibility to reschedule or follow up with staff as needed	
	Approach family as a whole (e.g., plan for occupying or involving child and siblings)	
	Coordinate scheduling of appointments with interdisciplinary team	
	Connect with charities, insurance, funding supports, etc.	
	Provide or connect with resources such as childcare, meals, or other needs.	
1.5-1.6 Administrative difficulties	Flexible models of service delivery, including easy-to-access modes of contact (e.g., WhatsApp)	
	Provide (or reduce need for) additional therapy materials (e.g., apps and software, online portal to request materials, toy lending library)	
	Collaboratively problem-solve on setting up home environment or choosing appropriate community settings	
	Provide parent-friendly data sheets	
2. Child factors		
2.1-2.2 Complex child profile	Individualize child programming (e.g., adaptations for non-verbal children)	
	Interdisciplinary collaboration (e.g., with SLT, OT) using a coordinated, positive approach	
	Additional parent training in Positive Behaviour Support, including a basic understanding of PBS prior to intervention and clear mutual understanding of the function of behaviour	
	Connect with PBS services if you are not able to provide PBS as part of your intervention.	
	Refer out if your intervention is not the right fit.	
3. Sibling factors		
3.1-3.3 Difficulties for siblings	Identify and collaboratively problem-solve source of sibling difficulty	
	Explicit strategies for including siblings (e.g., sibling training)	
	Connect with sibling groups (e.g., SibShop) if appropriate.	
4. Parent factors		
4.1 Individual or cultural concerns	Clarify values and goals at the outset and on an ongoing basis (e.g., using ACT, MI)	
	Set clear and realistic expectations at the outset, including levels of involvement, a plan for collecting and reviewing data, and explicit acknowledgment that there may be setbacks	
	Collaborate with both parents on goal-setting and implementation strategies	
	Provide clear rationale for intervention strategies	
	Shape successive approximations and establish intermediate outcomes as reinforcers (e.g., when trying to transition away from discipline practices such as yelling)	

	Collaborate with professionals from the same culture where appropriate	
	Seek training in cultural competence and continue to develop cultural humility (e.g., on maintenance of cultural identities, upholding religious practices, role of extended family and community, gender roles, etc)	
	Connect with a translator if required.	
4.2 Difficult living circumstances	Interdisciplinary collaboration (e.g., with social worker)	
	Reduce treatment burden and/or complexity	
	Increase treatment relevance	
	Collaborative problem-solving (e.g., around structural barriers such as space to conduct intervention)	
	Connect with outreach or respite services, which may need to be prioritized over behavioural services	
4.3 Treatment burden and stress	Identify source of stress (e.g., demand for parent involvement too high, intervention too onerous on child)	
	Reduce treatment burden, intensity, and/or complexity	
	Regular check-ins with family	
	Flexible training days/times and models of delivery (e.g., blended models)	
	Proactively problem-solve for challenging situations	
	Incorporate ACT or MI strategies	
	Connect with outreach or respite services	
4.4 Training not the right fit	Provide different training options (e.g., self-directed, Telehealth, individual, group, etc) depending on parent needs/preferences	
	Adjust teaching strategies (e.g., video vs in vivo feedback) as needed	
	Adjust intervention complexity as needed	
	Incorporate ACT or MI strategies	
4.5 Fluctuating motivation/belief in effectiveness	Collaborate with both parents on goal-setting and implementation strategies	
	Establish intermediate outcomes as reinforcers	
	Establish treatment relevance through regular check-ins on priority family goals	
	Share parent-friendly graphs to show progress	
	Create behavioural momentum by setting smaller, achievable goals at the start and as needed throughout the intervention	
	Discuss previous interventions in detail, including why they were or were not effective	
	Incorporate ACT or MI strategies	
	Connect with peer support (e.g., other parents who completed the same training)	
5. Intervention factors		
5.1 Variations in treatment efficacy	Set clear and realistic expectations at the outset, including levels of involvement, a plan for collecting and reviewing data, and explicit acknowledgment that there may be setbacks	
	Promote shared understanding and collaborative problem-solving	
	Program for generalization	
	Share parent-friendly data sheets	
	Incorporate ACT or MI strategies	

5.2 Difficulties with generalization	Program for generalization	
	Discuss and problem-solve potential difficulties in advance (e.g., implementing strategies around disapproving family members)	
	Incorporate a self-management system	
	Establish an individualized check-in schedule (e.g., short check-ins between sessions, monthly check-ins after completion of training)	
	Incorporate ACT or MI strategies	
	Use general case instruction	

PAIRS Assessment and Individualization Plan

Client Name		Age	
Interviewer		Respondent	
Date			

Directions: Items can be administered as a checklist, interview, or a combination. Select relevant questions and adapt the wording to fit your context or incorporate these questions into your other assessments. These questions are a starting point. Probe for specifics to best problem-solve any barriers with the parent. Use the Table of Function-based Solutions to guide problem-solving.

Overview *I'd like to ask you a few questions about yourself and your family. The purpose of this interview is to learn more about you so that together we can tailor the program to best fit your strengths, preferences, and needs.*

Section I: Facilitators Check YES if item is a facilitator.

1. Facilitators

A. Parents are gaining knowledge and skills from the intervention. ☐ Yes ☐ No ☐ N/A

Prior to program start: *For parents, the main goal of [Program] is to coach parents in [target **parent** skills]. What skills in this area do you feel already do well? What would you most like to gain/improve?*

During program: *How are you feeling about the strategies we are working on? Are there any strategies you would like to work on/change?*

Additional details/individualization plan

B. Child is demonstrating meaningful improvements in target skills. ☐ Yes ☐ No ☐ N/A

Prior to program start: *For children, the main goal of [Program] is to teach children [target **child** skills]. What skills in this area do you feel your child already does well? What would you most like them to gain/improve?*

During program: *How are you feeling about your child's progress in [target skills]? Is there anything you would like to add/change to the program plan or teaching strategies?*

Additional details/individualization plan

C. Family interactions are positive and/or improving. ☐ Yes ☐ No ☐ N/A

How are your day-to-day interactions with your child? What routines go well? Which routines do you feel could be improved?

Additional details/individualization plan

D. Parents demonstrate self-efficacy, persistence, self-advocacy, and personal agency. ☐ Yes ☐ No ☐ N/A

No question – use clinical judgment

Additional details/individualization plan

E. Both parents are involved and agree on intervention goals and strategies. ☐ Yes ☐ No ☐ N/A

How does [child's other parent] feel about the goals and strategies we have discussed? What are some ways we can include [other parent] if they are interested in learning more?

Additional details/individualization plan

F. Parents have the necessary social supports (e.g., family, community, and/or peer support). ☐ Yes ☐ No ☐ N/A

Is there anyone else in the household or in your family that spends a lot of time with your child? Are they interested in learning more about this program?

Additional details/individualization plan

G. Intervention is contextualized and compatible with family's values and lifestyle. ☐ Yes ☐ No ☐ N/A *What does a typical day look like for you? Do the strategies we've discussed so far fit with your values and your day-to-day life?*
Additional details/individualization plan
H. Intervention is specific to the needs of the child and provided in a flexible, responsive manner. ☐ Yes ☐ No ☐ N/A *Do you feel that the program is in line with your child's needs? Is there anything that you would like to add/change about their goals or strategies?*
Additional details/individualization plan
I. Practitioner is fostering a positive relationship with parent. ☐ Yes ☐ No ☐ N/A *No question – use clinical judgment*
Additional details/individualization plan
J. Practitioner is using non-directive collaborative and strengths-based approaches. ☐ Yes ☐ No ☐ N/A *No question – use clinical judgment*
Additional details/individualization plan
K. Practitioner provides or connects family with additional services (e.g., respite) as required. ☐ Yes ☐ No ☐ N/A *Are there people/services in the community that you connect with for [specific supports]? [If practitioner is able] Would you like me to register/connect you with [specific supports]?*
Additional details/individualization plan
L. Collaboration between different service providers is positive and coordinated. ☐ Yes ☐ No ☐ N/A *Is your child receiving any other services? What is the focus of the service(s)? What is working/not working well?*
Additional details/individualization plan
Other facilitators to consider:
Additional details/individualization plan

Section II: Barriers Check YES if item presents a barrier.

1. Logistical factors
1.1 Transportation ☐ Yes ☐ No ☐ N/A Examples: No personal vehicle, unreliable public transport, long commute. *Our sessions take place at [location]. Does that location work for you? Are there any challenges with transportation?*
Additional details/individualization plan
1.2 Scheduling ☐ Yes ☐ No ☐ N/A Examples: Conflict with work or other services, difficult time of day for child *We have availability at [time] or [time]. Does this work with your schedule? (If no) What times work better for you/how can we help make this work for you?*
Additional details/individualization plan
1.3 Childcare ☐ Yes ☐ No ☐ N/A

Examples: Childcare needed for while parent is attending session, childcare needed for siblings. *Do you have any concerns around childcare while you are attending sessions or participating in this program?*
Additional details/individualization plan
1.4 Cost ☐ Yes ☐ No ☐ N/A Examples: Program fees, childcare fees, transportation cost (e.g., bus fare, gas), cost to take time off work to attend. *The program cost is [program cost]. Some other costs that might be involved include [additional costs associated with program]. Do you have any concerns around cost?*
Additional details/individualization plan
1.5 Materials and setting ☐ Yes ☐ No ☐ N/A Examples: Visual supports, toys and other reinforcers, a space that is conducive to learning *Some of the materials we might need to make/keep track of are [list materials]. Have you used these in the past? What went well/did not go well? Where in your home/community would work best for sessions/practice outside sessions?*
Additional details/individualization plan
1.6 Technology ☐ Yes ☐ No ☐ N/A Examples: iPad, Proloquo2Go, Zoom, Bluetooth headphones, ability to open encrypted emails or documents. *Some technology we will be using include [list technology requirements]. Do you have access to/know how to use [specific technology]?*
Additional details/individualization plan
Other logistical factors to consider:
Additional details/individualization plan

2. Child factors Note: These will likely already have been covered in more detail in relation to your child-focused assessments. The focus here will be on understanding parents' perceptions of their child's skills and how they fit with the intervention plan.
2.1 Pre-requisite skills ☐ Yes ☐ No ☐ N/A Examples: Verbal skills, attending skills, imitation skills not a fit with the program. *How are you feeling about how the program fits with your child's skills?*
Additional details/individualization plan
2.2 Problem behaviour ☐ Yes ☐ No ☐ N/A Examples: PB impacting progress, PB not adequately addressed within the intervention *Does your child engage in behaviour that results in harm to self or others? Can you describe what that looks like for you in a typical day? How are you feeling about the program/strategies and their behaviour?*
Additional details/individualization plan
2.3 Additional concerns or diagnoses ☐ Yes ☐ No ☐ N/A Examples: Dual diagnoses (e.g., Autism and anxiety, depression, OCD, ODD, etc), trauma *Does your child have any other diagnoses or concerns (e.g., medical, psychological)? In what ways does it affect your child/ family? Is there anything about the program we've discussed so far that might need to be adjusted?*
Additional details/individualization plan

Other child factors to consider:
Additional details/individualization plan

3. Sibling factors
3.1 Impact of program on sibling ☐ Yes ☐ No ☐ N/A Examples: Not enough time or attention for sibling, intervention strategies or effects impacts sibling (e.g., extinction burst), increased PB from sibling *Does [child] have any brothers or sisters? How do they get along with [child]? Do you have any concerns about them in relation to the program?*
Additional details/individualization plan
2.3 Sibling involvement ☐ Yes ☐ No ☐ N/A Examples: Sibling involvement desired but not planned for, strategies taught not developmentally appropriate *Are you interested in involving sibling in our sessions/in the program? What are some ways they could be involved?*
Additional details/individualization plan
2.3 Sibling during sessions ☐ Yes ☐ No ☐ N/A Examples: Unable to keep sibling occupied during sessions *[If not explicitly involved during sessions] Are there any difficulties with siblings during sessions or practice times? Are there any materials/activities I can bring for them?*
Additional details/individualization plan
Other sibling factors to consider:
Additional details/individualization plan

4. Parent factors
4.1 Individual or cultural concerns ☐ Yes ☐ No ☐ N/A Examples: Mismatch between intervention and needs, values, preferences (e.g., core beliefs regarding play, praise, discipline methods) or cultural factors (e.g., language barriers, cultural identity, gender roles, role of elders and extended families, stigma). *How are you feeling about what we've discussed/worked on so far? Does it fit with your parenting values/style? Is there anything that doesn't feel right?*
Additional details/individualization plan
4.2 External challenges ☐ Yes ☐ No ☐ N/A Examples: Socio-economic challenges, parent mental health or learning challenges, family dysfunction, or parenting without support, acute stressors *Are there any external challenges that might make it difficult to participate in the program? [Probe as needed]*
Additional details/individualization plan
4.3 Treatment burden and stress ☐ Yes ☐ No ☐ N/A Examples: Substantial amount of time required to implement the intervention, treatment is too demanding for child, parents experience increased stress *How are you feeling about the time/resources you've been putting into the program? Is there anything about the program so far that's feeling overwhelming?*

Additional details/individualization plan
4.4 Training not the right fit ☐ Yes ☐ No ☐ N/A Examples: Training model (e.g., individual, group, Telehealth, in-home), adult learning strategies (e.g., in-vivo coaching, video feedback), treatment complexity (e.g., reading level of material, complexity of intervention strategies) *Some options we have for how we deliver this program include [list modalities and typical strategies]. Are there aspects of our coaching that are working/not working? What would work best for you?*
Additional details/individualization plan
4.5 Fluctuating motivation/belief in effectiveness ☐ Yes ☐ No ☐ N/A Examples: Low or fluctuating motivation to engage in intervention and/or low belief that the intervention will be effective. *How are you feeling about the effectiveness of the program? Are there any aspects you would like to discuss in more detail?*
Additional details/individualization plan
Other parent factors to consider:
Additional details/individualization plan

5. Intervention factors
5.1 Variation in treatment efficacy ☐ Yes ☐ No ☐ N/A Examples: Child not progressing as expected, slow progress, regression in target skills *[Explain realistic expectations based on child profile] What are your expectations for [child] in this program? What are you hoping your child will be able to do in [length of time]?*
Additional details/individualization plan
5.2 Difficulties with generalization ☐ Yes ☐ No ☐ N/A Examples: Difficulty generalizing strategies in other settings or to other child behaviours *Are there particular routines or settings that would be most helpful to practice in? Are there any routines or settings that are more difficult than others?*
Additional details/individualization plan
Other intervention factors to consider:
Additional details/individualization plan

Section III: Problem-solving framework for idiosyncratic challenges

Idiosyncratic challenges:
Potential function/contextual factors:
Potential function-based solutions:

Section IV: Reflection

Barriers identified:
Successful solutions/individualizations tried:
Unsuccessful solutions/individualizations tried:
Lessons learned/Action plan for future families: