Developing the Evidence Base for Preschool Social Circles: An Intervention to Support Social Inclusion for Children with Autism Spectrum Disorder

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Table of Contents

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: _____

Ciara Gunning

Statement of Contribution

This thesis includes a number of 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 supervisor 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 Generalization and Maintenance Outcomes of Social Skills Intervention for Children with Autism Spectrum Disorder - Ciara Gunning, Jennifer Holloway, Bairbre Fee, Órfhlaith Breathnach, Ceara Marie Bergin, Irene Greene, & Ruth Ní Bheoláin.

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

Study 2: A Systematic Review of Peer-Mediated Interventions for Preschool Children with Autism Spectrum Disorder in Inclusive Settings – Ciara Gunning, Órfhlaith Breathnach, Jennifer Holloway, Aoife McTiernan, & Bevin Malone

CG had overall responsibility for this study including design and development of the systematic review methodology, data analysis and write-up. JH collaborated on the design of the study. ÓB, CG, and BM completed the searches and screening of studies for inclusion. AM assisted in the screening of studies for inclusion. ÓB, CG, BM, and AM contributed to the data extraction and coding process for included articles. CG completed data analysis. CG and JH reviewed and edited the manuscript for publication.

Study 3: An Evaluation of Parents as Behavior Change Agents in the Preschool Life Skills Program – Ciara Gunning and Jennifer Holloway

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

Study 4: An Evaluation of the Parent Preschool Life Skills Program with Children with Autism Spectrum Disorder – Ciara Gunning, Jennifer Holloway, & Leanne Grealish

CG had overall responsibility for the design of this study, data collection, and analysis. JH supported CG on the development of the design of the study CG and JH prepared and reviewed the manuscript for publication. LG completed inter-observer observations, and edited the manuscript.

Study 5. Descriptive Analysis of Preschool Social Interactions: Evaluating a Protocol for Identifying Preschool Social Behavior – Ciara Gunning & Jennifer Holloway

CG had overall responsibility for the design of this study and development of the coding system. JH supported CG on the development of the design of the study. CG was responsible for data collection, coding, and analysis. CG and JH prepared and edited the manuscript for publication.

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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Abstract

Background

Successful social inclusion in early childhood education is associated with positive outcomes for all children in later life, irrespective of disabilities or complexity of needs. Many children with additional needs experience significant difficulties with social skills. These challenges are particularly prevalent for children with autism spectrum disorders (ASD). These children generally need support to access the social learning opportunities and benefits afforded by social inclusion in the early childhood education. At present, there is a lack of research investigating and developing evidence-based supports to improve outcomes for children with additional needs within the inclusive early childhood education context.

Aim

The aim of this research was to evaluate evidence-based practices derived from the science of applied behavior analysis to inform the development of a systems-wide, context specific social skills intervention for children with ASD in preschool settings.

Methods

Two systematic reviews were conducted to explore the empirical base to provide pertinent information towards answering the research questions. Study 1 is a systematic review of the social skills intervention literature for children with ASD, to evaluate the status of this literature regarding generalization and maintenance, generalization-promotion strategies and factors influencing these outcomes. Study 2 is a systematic review of peer mediated interventions with preschool aged children with ASD and their peers, to evaluate the efficacy of peer mediated interventions with this age group and identify the most successful training and intervention formats within this context. A single case research design was employed to evaluate a parent training protocol and parent implemented intervention for typically developing preschool children in Study 3. This parent training protocol and parent implemented intervention was evaluated in Study 4 with preschool children with ASD. Studies 3 and 4 evaluated the practicalities of parent involvement in intervention and subsequent outcomes for parents and children. Furthermore, the intervention modifications required for children with additional needs were investigated. Study 5 employed in-situ observations and descriptive analysis of preschool children's social interactions to inform a greater understanding of the preschool social context in which social skills are learned. Findings from this study informed the empirical identification of social skills targets and

measurement. Furthermore, relevant contextual factors for social skills intervention likely to evoke and maintain preschool social behavior were identified through the development of a unique coding system and descriptive analysis. The observation protocol developed in Study 5 was preliminarily evaluated with children with additional needs in Part 2 of this study. Synthesis of the findings from each of the studies in the current thesis informed the development of Preschool Social Circles, an intervention to support social inclusion for children with ASD in preschool services. The development of the Preschool Social Circles, and a pilot study protocol are outlined in Chapter 7.

Findings

The systematic review of generalization and maintenance within the social skills intervention literature indicated that generalization promotion strategies, in general, support positive generalization outcomes. A number of generalization promotion strategies demonstrating higher levels of success were identified, along with contextual factors that influenced this success within social skills intervention for children with ASD. Within the review of peer-mediated interventions, it was found that peer-mediated interventions are a useful and successful intervention strategy for preschool children with ASD. Peer selection criteria and training protocols, as well as intervention formats associated with higher success rates were identified. The parent training protocol and parent implemented intervention evaluated in Studies 3 and 4 led to an increase in parent teaching skills and children's life skills for all participants, however individual results varied. In general, the intervention required adaptations for children with ASD, especially for those with deficits in listening and communication repertoires. For typically developing children and children with ASD with typical listening and communication skills, social skills represented the most problematic target skill group. Study 5 identified social skills that typically developing children frequently engaged in within the preschool environment. Specific social initiations, responses, and concurrent social behaviors were observed. Analyses of the contextual variables, perceived motivating operations, and consequences for social behavior indicated factors that are likely to influence preschool social behavior in the natural environment. As such, Preschool Social Circles, as outlined in Chapter 7, represents a contextually-informed, evidence-based social skills intervention, developed from existing research and empirically informed by direct observation within the natural environment.

Conclusion

Overall the series of studies in the current thesis demonstrate the positive impact of evidence based practices on improving social outcomes for typically developing children and those with additional complex needs. The current research also demonstrated the utility of a systematic, empirical approach to intervention development. Consideration of the existing issues within the social skills intervention literature, and efforts to systematically address these gaps, have informed the development of a comprehensive, context-specific, social skills intervention to support social inclusion within ECE. As such, the development of Preschool Social Circles is thoroughly grounded within the existing social skills literature, and informed by novel, empirical research. Findings from the current thesis also emphasised the importance of considering the natural environment, and contingencies and interaction partners therein, within the context of teaching social skills.

List of Tables

List of Figures

List of Appendices

List of Abbreviations

ABA	Applied Behavior Analysis
AIM	Access and Inclusion Model
APA	American Psychiatric Association
ASD	Autism spectrum disorder
BST	Behavioral skills training
CDC	Centers for Disease Control and Prevention
DA	Descriptive analysis
EBP	Evidence based practice
ECE	Early childhood education
ECFC	Exploit current functional contingencies
EU	European Union
FA	Functional assessment
GARS-3	Gilliam Autism Rating Scale Third Edition
GDP	Gross domestic product
IFM	Incorporate functional mediators
IISCA	Interview informed synthesized contingency analysis
IOA	Interobserver agreement
IRR	Interrater reliability
MO	Motivating operations
NAC	National Autism Center
NCSE	National Council for Special Education
NPDC	National Professional Development Center
PC	Problem of commission
PECS	Picture Exchange Communication System
PLS	Preschool Life Skills
PMI	Peer mediated intervention

PO	Problem of omission
RTI	Response to Intervention
SES	Social evocative situation
SGD	Speech generating device
SM	Sequential modification
SSIS	Social Skills Improvement System
SSRD	Single subject research design
TD	Train diversely
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN SDGs	United Nations Sustainable Development Goals
US	United States
WHO	World Health Organization

“But if those things described by subjective labels were the things that were most important to people, then those were the things, even though they might be complex, that we should become more concerned with. After all, as an applied science of human behavior, we supposedly were dedicated to helping people become better able to achieve their reinforcers.”

- Montrose. M. Wolf, 1978

“It seems clear that we can do what remains to be done. That we can is probably our most fundamental, most important, and most enduring dimension; that we will is simply logical.”

- Donald. M. Baer, Montrose. M. Wolf, & Todd. R. Risley, 1987

1. Introduction

Social Inclusion

In recent decades, the concept of social inclusion has garnered considerable, increasing interest in policy, practice, and research (Rogge & Konnttinen, 2018). Where social inclusion pertains to disability specifically, increasing prevalence of disabilities globally (World Health Organization (WHO), 2011), and the disability rights movement have warranted, and influenced progress in accessibility, education, and awareness toward improved social inclusion (Hall, 2009).

Defining social inclusion represents a complex challenge (Cobigo, Ouellette-Kuntz, Lysaght, & Martin, 2012; Odom, Buysse, & Soukakou, 2011). In the United Nations (UN) Convention on the Rights of Persons with Disabilities (United Nations, 2006), social inclusion refers to a general principle, a general obligation, and a human right (Cobigo et al., 2012). Cobigo and colleagues (2012) utilised a synthesised, narrative review to inform an understanding of social inclusion as increased opportunities for an individual to participate in and contribute to society, through complex interactions between personal and environmental factors.

In suggesting avenues for future progress toward social inclusion, Cobigo et al. (2012) suggested that there is a need for a perspective shift toward answering the question: “how does an individual become socially included?” and examining social inclusion developmentally, recognising that increased opportunities to engage with others and participate in activities, provide opportunities for learning across the lifespan, which supports social inclusion. As such, early childhood represents an important time in the lifespan within which to consider social inclusion. This period in childhood is recognized as a critical time for growth, development, and learning. Furthermore, it is often within this time that childrens’ first opportunities to be socially included themselves, and to learn to be socially inclusive of others, occur (Haslip & Gullo, 2018).

Theoretical Framework: Applied Behavior Analysis

The conceptual and scientific discipline of Applied Behavior Analysis (ABA) is characterized by efforts to improve socially significant behavior through the application of strategies derived from the principles of behavior, and the use of experimentation to identify

the variables responsible for such improvements (Baer, Wolf, & Risley, 1968). Central to work in this discipline are the tenets of being applied, behavioral, analytic, technological, conceptually systematic, effective, and demonstrating generality (Baer et al., 1968).

In considering the development of strategies to support social inclusion in early childhood, within a behavior analytic context, interventions are developed incorporating strategies based on the principles of behavior (Baer et al., 1968). The emphasis within the discipline on empirical, experimental evaluations of interventions has given rise to an extensive literature base in ABA. Increasingly, systematic review and meta-analytic methodologies have been employed within ABA to collate empirical findings and address research questions relating to existing evidence, in order to inform future research and practice (Smith & Iadarola, 2015; Vale et al., 2015). ABA has a longstanding tradition of evaluating intervention strategies through single-case research design studies, to inform later, larger scale trials. Critically, this approach enables the identification of strategies that are effective across different contexts, as well as modifications that may be required to support success. The hallmark of ABA is this science-based, progressive approach, simultaneously developing and evaluating behavior change procedures to support meaningful outcomes (Baer et al., 1968; Leaf et al., 2016).

A behavior analytic approach to supporting social inclusion also aligns with the suggestions for progression outlined previously through providing an objective means of analysing the factors that support social inclusion. Understanding social inclusion from a behavioral perspective recognizes that learning occurs across the lifespan and that the resulting learning history influences social behavior. This highlights the importance of early social interactions as the building blocks for social inclusion, and therefore underlines the importance of supporting successful, socially inclusive interactions at an early stage in development (Cobigo et al., 2012). When considering social inclusion in early childhood from a behavior analytic perspective, the focus for analysis is on the observable elements of social inclusion, that is, social interactions. Social interactions are the primary learning opportunities for social skills and social development (Boudreau, Corkum, Meko, & Smith, 2015; Watkins Kuhn, Ledbetter-Cho, Gevarter, & O'Reilly, 2017). Therefore, these are the opportunities for children to learn how to be included and, how to be inclusive. Behaviorally, social interactions can be analysed through examining children's social behavior and the environmental variables influencing these behaviors. This enables identification of behaviors that support social inclusion, and the environmental variables related to these behaviors (e.g.,

contextual factors, relevant reinforcers, interaction partner behavior). A behavior analytic approach to gaining an understanding of these relations relies on objective, observational measurement, and analysis.

Inclusive Education in Early Childhood

Early childhood education (ECE) is a broad term used to describe educational and care settings that children attend prior to primary education (e.g., preschool, kindergarten, nursery, childminders) often between ages three to five years (Haslip & Gullo, 2018). As this is recognized as a critical developmental period, the importance of ECE in fostering children's social, emotional, physical, and cognitive development for life is emphasized internationally (Marope & Kaga, 2015). Given that ECE is usually a child's first social system outside of the home, this often represents their first experiences of interactions with children who are different to themselves (e.g., different backgrounds, culture, language etc.), and this tends to be the first context within which children's social abilities are challenged (Haslip & Gullo, 2018).

Within the context of childhood education, inclusion of children with disabilities in the same educational context as their typically developing peers has been legislated and advocated for in the United States (US) for over 30 years (Barton & Smith, 2015; Odom et al., 2011; Vakil, Freeman, & Swim, 2003). On a global scale, the Education for All framework highlighted access to ECE for all children as a primary goal and this was further emphasized within the 2030 Agenda for Sustainable Development (UNESCO, 2015; UN SDGs, 2015; Haslip & Gullo, 2018). One of the primary goals of social inclusion in ECE is to foster social relationships and promote integration of children with disabilities into peer groups of their typically developing, socially competent peers (Odom et al., 2004).

Odom et al. (2004) outlined the distinct potential for differences in social inclusion between ECE and later educational settings. Within ECE settings there tends to be a higher teacher: child ratio, smaller class sizes and activities are often child-led (Odom et al., 2004). The ethos informing pedagogy and curricula also differ between ECE and later settings, with a focus in ECE on holistic development across developmental domains (e.g., motor, social, communication), and less emphasis on academic skills and achievement (Haslip & Gullo, 2018; Odom et al., 2004). Finally, the developmental stage of children in ECE differs from that of children in later education settings (Odom et al., 2004). Importantly, the skill discrepancy between typically developing children and peers with developmental disabilities

and delays can be less pronounced at this stage, and existing social relationships are less fixed and more amenable to change (Odom et al., 2004).

Importantly, one of the primary purposes of ECE is socialization for children (Vakil et al., 2003). The development of social competence is intrinsically embedded within the core professional principles of ECE which emphasize holistic child development and child engagement in learning and expression facilitated by pedagogy and curricula, with a central commitment to enhancing social justice through fostering a more inclusive, ethical, and equal society (Haslip & Gullo, 2018). Many critical social skills such as, skills for social interaction, sharing, communicating, and understanding social roles are learned during this developmental stage through social interactions and play with peers (Terpstra & Tamura, 2008). Therefore, research and development in social inclusion in ECE is distinct from social inclusion research across later educational settings (Odom et al., 2004).

Inclusive ECE and Autism Spectrum Disorder

Given variation in definitions and measurement of disabilities, global prevalence estimates vary for children (Black & Lawn, 2018; WHO, 2011). The Global Burden of Disease indicates that 52.9 million children under the age of 5 years (8.4%) have developmental disabilities (Olusanya et al., 2018). In 2017, 65% of ECE services in the Republic of Ireland reported having at least one child with a diagnosed disability in attendance, which represented an 8% increase from the previous year (Pobal, 2018).

With regard to developmental disabilities, autism spectrum disorders (ASD) in particular, have garnered much research attention in recent years. Central to the definition, characterization, and presentation of ASD are persistent deficits in social communication and social interaction, as well as restrictive and repetitive patterns of behavior (American Psychiatric Association (APA), 2013). Diagnosis of ASD typically occurs during childhood and presentation is heterogeneous, varying across individuals and with age, affecting numerous skill domains, and often requiring intervention to support success and remediate difficulties (DiGennaro Reed, Hyman, & Hirst, 2011; McCoy, Holloway, Healy, Rispoli, & Neely, 2016).

ASD have been identified as a priority public health issue with an estimated 1 in 59 children identified with ASD, and an estimated total cost per year for children with ASD in the US of between $11.9 billion and $60.9 billion in 2011 (CDC, Baio et al., 2018). The

prevalence rate for ASD in the Republic of Ireland has been estimated at between 1-1.5% (Department of Health, 2018). Recent research has highlighted that currently the majority of the economic costs associated with childhood ASD are borne by parents (Roddy & O'Neill, 2018). Within ECE in the Republic of Ireland, ASD were the most common disability reported in 2015 (Pobal, 2015). In more recent surveys the category of ASD was removed and encompassed within the umbrella term of learning/other disabilities thereby impeding the identification of current prevalence rates for ASD within ECE. However, learning/other disabilities remain the most prevalent disabilities for preschool children in the Republic of Ireland (Pobal, 2018).

In addition to children with diagnosed disabilities, children with additional needs are identified as children whose support needs exceed those which are provided for within general education and health services (Department for Education and Skills, 2006; Marrable, 2014). Increasingly, diversity within ECE populations in life circumstances and factors such as family, culture, and socio-economic status, is recognized as impacting upon child development and progress in ECE (Haslip & Gullo, 2018). The current proportions of ECE services in Ireland with children attending who have additional needs (75%), for whom English or Irish is not their first language (69%), from Irish Traveller and Roma backgrounds (16%, 7% respectively), and from deprived backgrounds (73%) reflects this global trend (Pobal, 2018). It is increasingly recognised that many young children transition to later school settings without the emotional, social, behavioral, and academic skills that they need to be successful in this new context (Doubet & Ostrosky, 2015). The increasingly diverse demographics of children within ECE are posited to represent a complex challenge in that, this provides a unique opportunity for social inclusion and progress, balanced with an obligation to ensure that all children experience equal opportunities to learn and develop (Haslip & Gullo, 2018).

Benefits of Successful Social Inclusion in ECE

Within ECE, social inclusion has numerous potential benefits for children with ASD and for their peers, particularly those with additional needs. Inclusive ECE settings offer increased environmental stimulation and provide the opportunity to observe and learn from behavioral models from peers (Camargo et al., 2014; Terpstra & Tamura, 2008). Within inclusive educational settings, teacher expectations for all children are increased which can support positive outcomes (Camargo et al., 2014). In terms of socialization and the

development of social skills through social interactions, inclusive education settings provide ample learning opportunities for social development, such as, increased social interactions, social communication, and play opportunities (Camargo et al., 2016; Odom et al., 2004). Success within these interactions, that is, positive interactions with peers, has been identified as an important predictor of positive long and short term outcomes, improved quality of life and real-world success (Boudreau et al., 2015; Camargo et al., 2016; Watkins et al., 2017).

As outlined, ASD is in part defined by a core deficit in social communication. These deficits are related to challenges in social, emotional, and cognitive development and the ability to achieve normal developmental milestones (Camargo et al., 2014; Rao, Beidel, & Murray, 2008). Deficits in social skills at early stages can impact negatively upon academic performance and vocational functioning leading to academic and occupational underachievement as well as increasing the likelihood of experiencing segregated placements, unemployment, and lack of independence (Camargo et al., 2014; DiGennaro Reed et al., 2011; Gresham, 2015; Rao et al., 2008; White, Keonig, & Scahill, 2007). Further detrimental outcomes of social skills deficits include behavioral problems, mood or anxiety issues, increased risk of stress, low self-esteem, alcoholism, and later interpersonal problems (Camargo et al., 2014; Chandler, Lubeck, & Fowler, 1992; Di Gennaro Reed et al 2011; Gresham, 2015; White et al., 2007). Social skills deficits are posited to become more complex with age, and, therefore, addressing these deficits at an early stage is critical (Gresham, 2015).

As outlined, there are many potential opportunities for children with ASD in inclusive ECE settings to socially interact, develop friendships, and participate as members of the group (Odom et al., 2004; Terpstra & Tamura, 2008). Social inclusion and positive peer interactions are repeatedly identified as the highest priorities for parents of children with developmental disabilities (Boudreau et al., 2015). It has also been posited that deficits in social skills, social interaction, and social communication arguably present the greatest challenge for children with ASD highlighting the need for effective interventions targeting these areas (Matson, Matson & Rivet, 2007; Peters & Thompson, 2015). Therefore, inclusive ECE represents an important opportunity to ameliorate social skills deficits and prevent detrimental outcomes (Boudreau et al., 2015; Watkins et al., 2017).

It is important to note that the benefits of social inclusion in ECE are not solely applicable to children with ASD. Within inclusive ECE settings, increases in language,

cognitive and literacy development have been demonstrated for all children, including typically developing peers (Hanline & Correa-Torres, 2012). Regarding the development of social competence, research suggests that typically developing peers actively engage in activities and develop friendships in inclusive ECE settings, supporting social development (Hanline & Correa-Torres, 2012; Odom et al., 2011). Evidence also suggests that isolation, stigma and prejudice may be decreased within inclusive settings when children experience increased opportunities to develop friendships with children who are different to themselves, leading to increased sensitivity to others, and improved attitudes toward differences (Aboud et al., 2012; Camargo et al., 2014; Odom et al., 2004; Odom et al., 2011). Social competence at an early stage has also repeatedly been correlated with later academic success (Doubet & Ostrosky, 2015).

Taken together with the increasing diversity of preschool populations, it is clear that ECE represents a uniquely suitable environment within which to consider social inclusion. However, it is important to consider the potential benefits and learning opportunities previously outlined from a behavioral perspective, and to recognise that these positive outcomes do not occur automatically. Increased social competence is likely to be influenced by positive social interactions reinforcing engaging with peers, which, in turn, increases engagement with peers in the future, providing further learning opportunities for social skills. Within inclusive ECE settings, social interactions are child-led with the availability of peers with different abilities and experiential backgrounds as models, early social interaction partners, and potential friends (Terpstra & Tamura, 2008). Therefore, children are more likely to engage with children who may be different to them, and positive interactions with these children will reinforce this behavior, which is likely to account for reported reductions in stigma and prejudice. However, accessing the social learning opportunities within inclusive ECE and having success within social interactions, requires social skills. For example, deficits in social skills may impede a child's access to social interactions, or may result in negative social interactions, thereby punishing or extinguishing the child and peers' social behavior. While the potential benefits of social inclusion are numerous, barriers to accessing these exist for many children.

Barriers to Success in Inclusive ECE

It is increasingly recognised that supporting social inclusion in ECE extends past simply placing children with disabilities in the same educational context as their typically

developing peers (Odom et al., 2011; Vakil et al., 2003). While most typically developing children benefit from social inclusion and learn social skills through the interaction opportunities within the inclusive ECE context, in general, solely providing opportunities for children with disabilities and their typically developing peers to interact without further teaching and support is not sufficient to foster meaningful, successful social interactions (Terpstra & Tamura, 2008). In fact, the increasing diversity in preschool populations represents a well-documented challenge for ECE educators in supporting every child to meet their full potential and access the learning within ECE (Barton & Smith, 2015; Haslip & Gullo, 2018; Muccio, Kidd, White, & Burns, 2014).

As previously outlined, social skill deficits are prevalent for children with ASD (Abenavoli, Greenberg, & Bierman, 2017). These deficits often act as a barrier to success in everyday social interactions and can hinder social relationships (Gresham, 2015; Rao et al., 2008). Children with ASD tend to engage in social initiations, social responses, and appropriate social skills at lower rates than their peers and consequently, may experience fewer social interactions within the learning opportunities in ECE (Terpstra & Tamura, 2008; Watkins et al., 2015). Furthermore, within social interactions, social skills deficits and problem behavior can impede upon the success of the interaction and influence peer behavior (Camargo et al., 2014; Watkins et al., 2015; Zeedyk, Cohen, Eisenhower, & Blacher, 2016). It has also been suggested that, within an inclusive educational context, the social deficits of children with ASD may be more apparent which may compromise long-term success and later inclusion opportunities (Camargo et al., 2014; Gresham, 2015).

Furthermore, without support, typically developing peers generally choose to interact with peers similar to themselves rather than children with disabilities (e.g., in play, communication opportunities, and proximity), and children with disabilities tend to experience higher risks of social rejection from peers (Odom et al., 2004; Terpstra & Tamura, 2008). Research employing social status and social network analyses has indicated that children with ASD tend to have less reciprocal friendships and peripheral social network status in comparison to their typically developing peers (Kasari, Locke, Gulsrud, Rotheram-Fuller, 2011; Zeedyk et al., 2016). Furthermore, research has suggested that the differences in social competence apparent in inclusive settings may place children and adolescents with ASD at increased risk for peer rejection, social isolation, loneliness and bullying (Chamberlain, Kasari, & Rotheram-Fuller, 2007; White et al., 2007; Zeedyk et al., 2016).

Supporting Successful Social Inclusion in ECE

As previously outlined, research has demonstrated that simply including children with different abilities and needs in the same educational context is not sufficient to foster successful social inclusion. In particular, deficits in social skills present a significant barrier to successful inclusion through reducing opportunities to learn through social interactions (Camargo et al., 2016; Terpstra & Tamura, 2008). The increasing trends in childhood disabilities and varying demographics of preschool populations highlight the necessity for development of ECE to adapt to these changing needs in order to provide the optimum, high quality support for every child to reach their full potential (Haslip & Gullo, 2018; Houtrow, Larson, Olson, Newacheck, & Halfon, 2014). Early intervention has repeatedly been identified as effective in supporting positive outcomes at later stages and reducing challenges which emphasizes the importance of the development of evidence-based supports to realize the potential benefits of socially inclusive ECE settings (Barton & Smith, 2015; Dawson-McClure et al., 2015; Muccio et al., 2014; Parish, 2013). In particular, UNESCO posits that ECE represents a critical investment for countries to combat the additional needs which arise from inequality and experiential differences, and reduce the cost of remedial programs at later stages in development (Marope & Kaga, 2015).

Throughout the literature, concerns are evident regarding the potential resource and cost requirements for the intensity of intervention required to demonstrate sufficient improvements in social inclusion and the capacity for this to occur within ECE (Odom et al., 2004). Odom et al. (2011) highlighted that such change would require support from the larger systems context (e.g., resources, professional development, ongoing coaching and planning provided for, time allocated for planning and communication). Unfortunately, such support is not currently evident within the Republic of Ireland which ranks lowest in the European Union (EU) in terms of expenditure on preschool education at approximately 0.1% of gross domestic product (GDP) (Early Childhood Ireland, 2017; Schraad-Tischer, Schiller, Heller, & Siemer, 2017). Within their sample of 2-18 year olds, Roddy and O'Neill (2018) identified that state expenditure on ASD educational services amounted to €12,837 per child whereas state expenditure on ASD health services totaled €1301 per child. Educational expenditure also largely funded special needs assistants rather than specific learning interventions or training for teachers (Roddy & O'Neill, 2018).

Within early childhood in the Republic of Ireland, the ECE options for children with a diagnosis of ASD include general ECE, early intervention classes and home tuition (National Council for Special Education (NCSE), 2016). Within general ECE in Ireland, the Access and Inclusion Model (AIM) is the developing model of support for inclusion for children with additional needs. This model is projected to include seven levels of progressive support (from universal inclusive supports to specific, individualized support) and is expected to take 3-5 years to realize. It is projected that the full impact of this model will be evaluated by 2021 with ongoing evaluations (AIM, 2019). Early intervention classes consist of small groups of children, almost all of whom have a developmental disability. There are no existing regulations regarding qualification requirements for individuals providing home tuition, bar being registered with the Teaching Council. An absence of specific educational guidelines within early intervention classes and home tuition has also been highlighted as problematic (NCSE, 2016). In contrast to the US, there is no state provision of behavior analytic services in Ireland, despite the significant evidence-base supporting these (Smith & Iadarola, 2015). Parents of children with ASD in Ireland have reported their frustration with the absence of information or guidance regarding the supports their children are entitled to, and available, qualified personnel who could provide such supports (NCSE, 2016). Thus, the development of evidence-based supports for social inclusion within the ECE context in the Republic of Ireland is timely.

In order to bridge the research-practice gap and inform the development of solutions that are feasible within the real-world context, researchers must acknowledge the barriers to implementation that exist and aim to address these within research. There has been much research within the area of inclusion aiming to identify barriers and facilitators to successful social inclusion, for example, resources, ECE environment, families, educator knowledge, skills and practice, and child characteristics (Muccio et al., 2014; Odom et al., 2011). Key components of high-quality inclusion necessary for supporting children's success are specialised interventions, teaching strategies and supports (Odom et al., 2011). It is increasingly recognized that a variety of these factors are required as facilitators for successful social inclusion (Muccio et al., 2014).

Social Skills Intervention

The extensive literature regarding social skills interventions represent a promising avenue for research in supporting social inclusion in ECE. Social skills interventions aim to

teach developmentally appropriate social skills to ameliorate social deficits and support successful social interactions (Camargo et al., 2014; Gresham, 2015). In particular, there is currently an abundance of literature evaluating social skills interventions for children with ASD given that social communication deficits represent a core characteristic of the disorder (Camargo et al., 2016; Gresham, 2014).

In the past 10-15 years, ABA has adopted the systematic review and meta-analysis methodologies for evidence synthesis considered the "gold standard" within the field of medicine (Bölte, 2015; Ledford et al., 2016; Smith & Iadarola, 2015; Vale et al., 2015). As such, there have been numerous systematic reviews published regarding social skills interventions for individuals with ASD (e.g., Bellini, Peters, Benner & Hopf, 2007; Boudreau et al., 2015; Camargo et al., 2014; McCoy et al., 2016; Rao et al., 2008; Reichow & Volkmar, 2010; Wang & Spillane, 2009; Watkins et al., 2015; White et al., 2007). In general, these systematic reviews and meta-analyses tend to encompass reviews of a specific type of social skills intervention, social skills interventions for a specific population or broad reviews of social skills interventions.

Within this extensive literature, a wide variety of social skills interventions have been evaluated (e.g., video modeling, peer mediated intervention, priming, self-management, natural environment teaching, computer based interventions, social stories, pivotal response training; Camargo et al., 2014; DiGennaro Reed et al., 2011; McCoy et al., 2016; White et al., 2007). Deficits in social competence span a wide range of categories of social skills, for example, nonverbal social behaviors, specific social skills, general social skills, social-emotional reciprocity skills, and social relationship skills (Ledford et al., 2016; Watkins et al., 2017). As such, the social skills interventions evaluated in the literature have been employed to teach a vast array of social skills. These include general social behaviors such as; initiating interactions, responding to initiations, managing interpersonal interactions, play, demonstrating conversational reciprocity, and maintaining social engagement as well as more specific skills such as; social comments, greetings, speech prosody, sharing (Camargo et al., 2014; McCoy et al., 2016; Rao et al., 2008; Watkins et al., 2015). More subtle and covert social skills are also targeted, for example, sustaining eye contact and orienting to social stimuli, as well as interpreting social situations and responding to social cues (Camargo et al., 2014; Rao et al., 2008; Watkins et al., 2015; White et al., 2007). Further complex social skill repertoires targeted include; responding to others' emotions, empathy, perspective-taking,

sharing affective experience, sarcasm, and metaphor (Camargo et al., 2014; Rao et al., 2008; White et al., 2007).

In general, across systematic reviews and meta-analyses, the support for social skills interventions is good and collation of this information has informed the identification of intervention strategies considered to be evidence-based practice for teaching social skills to children with ASD at different developmental phases (Watkins et al., 2017; Wong et al., 2015). However, to date there remain a number of areas requiring further research to refine and develop social skills interventions for preschool children within the ECE context, in particular, defining and selecting target social skills and supporting generalization of outcomes.

Generalization and Maintenance

Generalization and maintenance have been acknowledged as critical intervention outcomes since Baer et al. (1968, p.96) first defined the field of ABA: "Generality. A behavioral change may be said to have generality if it proves durable over time, if it appears in a wide variety of possible environments, or if it spreads to a wide variety of related behaviors". Generalization is defined as the repeated occurrence of a target skill or behavior across contexts (setting generalization) and individuals (person generalization), the extension of the intervention induced change to other behaviors or skills (response generalization) and the continued occurrence of the targeted change over time (maintenance) (Stokes & Baer, 1977). Such outcomes tend to be required in order for behavior change to be considered both effective and socially significant for an individual. Importantly, Stokes and Baer (1977) made the distinction that these outcomes are considered generalization only when they occur without the same teaching that occurred within the learning context occurring in the natural context.

In tandem with highlighting the importance of measuring these dimensions of generalization as an outcome of intervention, early research advocated for the conceptualization of generalization as an operant behavior to be actively programmed for (Baer et al., 1968; Stokes & Baer, 1977; Stokes & Osnes, 1989). To inform progress toward this goal, Stokes and Baer (1977) and Stokes and Osnes (1989) outlined and refined the generalization promotion strategies within ABA. These strategies are categorized into three groups: exploiting current functional contingencies, training diversely and incorporating functional mediators (Stokes & Baer, 1977; Stokes & Osnes, 1989).

Generalization of social skills is crucial in supporting success across the complex social contexts and relationships experienced across the lifespan and, therefore, a vital outcome for social skills intervention (Osnes & Lieblein 2003; Rao et al., 2008; Watkins et al., 2015; Zhang and Wheeler 2011). As previously outlined, a child's social skills defines the success of their social interactions and access to further social development opportunities (Camargo et al., 2014; Watkins et al., 2015; Zeedyk et al., 2016). The social skills that provide the foundation for these social interactions, therefore, must occur successfully across individuals (e.g., family, peers, carers etc.), and settings (e.g., home, school, community, play dates etc.). Social competence is recognized as a complex area of development which continues to adapt and develop across the lifespan and, as such, maintenance and response generalization are also important outcomes of social skills intervention (Chandler et al., 1992).

Within the systematic reviews of social skills interventions, a consistent finding concerns the lack of research assessing and/or programming for generalization of intervention outcomes (Bellini et al., 2007; Boudreau et al., 2015; Camargo et al., 2014; McCoy et al., 2016; Rao et al., 2008; Wang & Spillane, 2009; Watkins et al., 2015). Therefore, while it appears that social skills interventions have demonstrated success in increasing social skills, the extent to which these skills continue to occur across contexts, persist over time and influence other social competencies is less known. In addition to this, there is a lack of research systematically evaluating the use and efficacy of the generalization promotion strategies outlined over 40 years ago, and factors that may influence their success (Osnes & Lieblein, 2003; Swan, Carper, & Kendall, 2016).

Training for Natural Behavior Change Agents

Over 30 years ago, Baer, Wolf and Risley, advocated for dissemination and training in intervention techniques and asserted that researchers in ABA would need their "best social skills, because we shall require the cooperation of unusually many people, often in unusually exposed positions" to continue to inform progress within the field (1987, p.325). To date, however, there remains a higher demand for ABA than there are individuals qualified to provide it which has led to research and development in training for individuals within the natural environment in intervention strategies (Granpeesheh et al., 2010). Training behavior change agents in the natural environment builds the supportiveness of the natural

environment to facilitate the development, generalization, and maintenance of the skill or behavior targeted for change (Dogan, et al., 2017; Terpstra & Tamura, 2008).

Peer mediated intervention. Within the social skills intervention literature, peer mediated interventions (PMI) represent a promising avenue for research, particularly in relation to generalization and maintenance of social skills (Watkins et al., 2015). An intervention is defined as peer mediated when peers are directly involved in skills teaching, through strategies such as remaining in proximity to the target child, prompting and reinforcing target skills, modelling appropriate behaviors, and initiating interactions (Odom & Strain, 1984). PMI have been employed successfully across developmental phases to teach a range of skills across social, academic, communication, and play domains with children with developmental disabilities, while simultaneously supporting increased social interactions and social skill development (Bene, Banda, & Brown, 2014; Katz & Girolametto, 2013; Sperry, Neitzel, & Engelhardt-Wells, 2010; Trembath, Baladin, Togher, & Stancliffe, 2009; Watkins et al. 2015). Within systematic reviews and meta-analyses of the PMI literature, these intervention strategies have received support and are considered a robust social skills intervention and evidence-based practice for children with ASD (Chang & Locke 2016; McConnell, 2002; Watkins et al., 2015; Wong et al., 2015).

There are a number of unique benefits associated with PMI for both the target child and the peers involved. Given the promotion of social interactions within PMI, this creates opportunities for social skill development within intervention in addition to other targets (Watkins et al., 2015). Because PMI can involve a number of different peers, target children experience opportunities to interact with different social interaction partners which can support generalization and maintenance of intervention outcomes (Wang, Cui, & Parrila, 2011; Watkins et al. 2015). Peers involved in PMI have been found to experience increased positive interactions with peers with ASD, increased sensitivity to others, as well as improvements in behavioral regulation and academic success, realizing some of the potential benefits of social inclusion (Carter et al. 2008; Terpstra & Tamura, 2008). Furthermore, PMI have demonstrated strong social validity outcomes, indicating that taking part is a positive experience for peers (Carter, Cushing, & Kennedy, 2008; Odom, Hoyson, Jamieson, & Strain, 1985). An additional benefit of PMI is the reduction in resource and time requirements from educators or professionals in favour of natural social partners which can increase learning opportunities across contexts that the peers and target child are in together (Chan et al. 2009).

PMI align well with the ECE ethos and the structure of this educational context (Haslip & Gullo, 2018; Odom et al., 2004). Given the overlap between the benefits of PMI and the optimal outcomes of successful social inclusion, PMI represents an exciting opportunity to support social inclusion within ECE (Odom et al., 2004; Terpstra & Tamura, 2008). However, within the PMI literature, less research has evaluated PMI with preschool age children (Camargo et al., 2014; Watkins et al., 2015; Wong et al., 2015). In addition to this, some researchers have suggested that treatment integrity may be compromised with preschool peer implementation and that preschool peers may require more support and training than older children within PMI (Chan et al., 2009; Watkins et al., 2015). As such, the utility of PMI with preschool children and in inclusive settings has been identified as an important area for future research (NAC 2009; Watkins et al., 2015). Researchers have also highlighted peer training, implementation, and fidelity within PMI as a critical area for research (Camargo et al., 2016; Watkins et al., 2015)

Parent training. Another important group of social partners for preschool children are parents and the importance of parental involvement and training in intervention is increasingly recognized in research (Doubet & Ostrosky, 2015; Stocco & Thompson, 2015). There are a number of benefits associated with parent involvement in intervention. Increased learning opportunities provided by parents across contexts support acquisition as well as generalization and maintenance (Dogan et al., 2017). Given that barriers such as time, resource and cost constraints can impact upon access to intervention, providing parent training can surmount some of these issues and enable access to evidence-based support (Comer et al., 2017; Dogan et al., 2017). This is particularly relevant within an Irish context where parents of children with ASD experience a high economic burden in having to cover a significant proportion of costs (e.g., intervention, assessment) themselves without state support (Roddy & O'Neill, 2018). Furthermore, parental involvement in intervention can support parent self-efficacy and recognizes the role of the parent in their child's development (Boettcher–Minjarez, Mercier, Williams, & Hardan, 2012; Dogan et al., 2017; Doubet & Ostrosky, 2015).

While a number of parenting programs developed from social learning principles have empirically demonstrated positive outcomes for parents and children, variability in results poses questions regarding factors that impact upon these outcomes (Gardner & Leijten, 2017; Thomas et al., 2017; Sanders, Kirby, Tellegen & Day, 2014). An interesting avenue for this research is to evaluate parent training in programs that have demonstrated success within

inclusive ECE settings. Such research would inform the development of parent education and training to implement interventions at home and support children's skill development in everyday interactions. In addition, such findings could be employed to develop a model of intervention whereby parent intervention implementation complements the learning within inclusive ECE settings.

One such program is the Preschool Life Skills (PLS) program, a preventive intervention for problem behavior designed to increase important preschool life skills (Hanley, Heal, Tiger, & Ingvarsson., 2007). The PLS program represents a preventive application of the technology of functional assessment, through pre-teaching common functionally equivalent skills for preschool problem behavior. Teaching within the PLS program involves behavioral skills training ([BST] i.e., instructions, modeling, role-play, feedback) and arranging learning opportunities within situations likely to evoke the target preschool life skill or problem behavior (evocative situations; Hanley et al., 2007). Applications of the PLS program have consistently demonstrated increases in preschool life skills and decreases in problem behavior across ECE settings (including Head Start classrooms), and with children with disabilities (Fahmie & Luczynski, 2018; Falligant & Pence, 2017; Hanley et al., 2007; Luczynski & Hanley, 2013; Rodriguez, Levesque, Cohrs, & Niemeier, 2017).

In particular the PLS program may represent a useful avenue for parent training in interventions to support social inclusion as the final unit of the program targets preschool social skills (PLS Unit 4: Friendship Skills, Hanley et al., 2007). BST and naturalistic teaching strategies have also been posited as potentially suitable intervention strategies for parents and the PLS program incorporates these strategies (Dogan et al., 2017; Nefdt, Koegel, Singer, & Gerber, 2010). It has been posited that existing parent-child contingencies may be a factor contributing to variability in outcomes in parent training (Stocco & Thompson, 2015). The use of evocative situations and parent training within these within the PLS program, could alter these contingencies through providing learning opportunities for both parents and children.

ECE educator training. In general, traditional professional development and education for ECE educators does not prepare educators to meet the individual learning needs of children with disabilities (Lieberman-Betz et al., 2013; Odom et al., 2011). In the 2014 POBAL Annual Early Years Sector Survey, ECE educators highlighted that the lack of

specialized supports and training for staff to support children with additional needs was a significant challenge facing their ECE services. Therefore, it is critical to consider including training for educators in inclusive education settings within the development of intervention strategies (Camargo et al., 2016).

Behavioral skills training (BST) has also been employed to teach staff to implement a variety of behavior change procedures with success (Higgins, Luczynski, Carroll, Fisher, & Mudford, 2017). Research has also indicated that in-situ teaching may be required in addition to inservice or workshop style training to support positive educator and child outcomes (Fabiano et al., 2013; Granpeesheh et al., 2010). With regards to behavioral strategies, naturalistic instruction, embedded learning opportunities, activity-based intervention and peer-mediated interventions have demonstrated empirical support for supporting social inclusion in ECE and, therefore, represent useful avenues for ECE educator training research (Mrachko & Kaczmarek, 2017; Odom et al., 2011; Odom et al., 2004). In particular, strategies to support ECE educators in promoting and encouraging social interactions between children with disabilities and their typically developing peers have been highlighted as an important area for future research (Mrachko & Kaczmarek, 2017). The importance of directly measuring child and educator outcomes, including generalization and maintenance has also been emphasized (Mrachko & Kaczmarek, 2017).

Defining Social Skills.

Defining and selecting social skills for intervention is a daunting task, given the complexity and broad scope of the domain of social competence. Differences in defining social skills are well documented in the literature with one of the fundamental areas requiring development being the lack of consensus on or systematic process for defining social skills (Matson et al., 2007; Matson & Wilkins, 2009; Rao et al., 2008; Whalon, Conroy, Martinez & Werch, 2015; Wang et al., 2013). To an extent, meta-analyses have revealed a consistency in how the construct of social skills, have been defined for research in three categories: social interaction, prosocial behavior, and social-cognitive skills (Gresham, 2015). However, overarching terms such as social skills, prosocial behavior, social competence, and social interaction can encompass numerous complex skills and skill domains. For example, social interaction skills have been defined as: (a) initiating conversations/activities, sharing, turn-taking, maintaining interactions, social responses, social comments, joint attention and complimenting (Camargo et al., 2014; Camargo et al., 2016), (b) an initiation and/or response

between a child and at least one peer with further definition of topography (verbal or non-verbal behavior) and function (for the purpose of: beginning/maintaining a conversation, beginning/maintaining a joint activity, making conversation during a joint activity) (Watkins et al., 2015), and (c) communication (verbal and non-verbal) and joint activity between two or more individuals (Driscoll & Carter, 2010).

Therefore in selecting targets for social skills intervention, the scope within the literature is intimidating. Of particular concern, are findings that researchers rarely report the rationale for selecting a particular target social skill and social validity of target social skills is not always demonstrated (Gresham, 2015; Matson et al., 2009). Within this context, emphasis has been placed on identifying the social skills that are most commonly problematic and the social skills that are most likely to support typical development and social inclusion (Matson & Wilkins, 2009). It is also important to inform an understanding of a possible hierarchy or rank order of social skills in order to formally identify intervention priorities and progression (Matson & Goldin, 2014). Preference should be given to social skills that are likely to lead to access to new reinforcers, generalize, be socially valid and affect the most people (Matson & Wilkins, 2009).

It could be argued that, given the importance of the general repertoire of social competence, increasing any social skills is of therapeutic benefit. However, this may fail to recognize the importance of the natural context within which the social skill is required and the variations in these across developmental phases, settings, interaction partners etc. (Matson & Wilkins, 2009). Target skill selection could also impact on generalization and maintenance in that skills that are less relevant to the natural environment within which a child socially interacts are not likely to recruit reinforcement within those contexts, and therefore are less likely to generalize and maintain (Chandler et al., 1992).

Types of Social Skills Deficits

In a position that has garnered less attention within the social skills literature, Gresham conceptualized social skills problems as skills deficits, performance deficits, self-control skill deficits, and self-control performance deficits and outlined appropriate assessment and intervention strategies for each deficit type (Gresham, 1986; Boyd, Conroy, Asmus, & McKenney, 2011). Recently, social skill fluency deficits have also been discussed whereby a child can perform a social skill but does not engage in the skill with the fluency required (Camargo et al., 2016). Deficits are distinguished based on assessment to identify

why a child does not engage in a particular social skill (e.g., they are unable to do the skill, they are not motivated to use the skill). Depending on the type of deficit identified, intervention strategies are selected to match deficit type. For example, a self-control performance deficit is identified within assessment when a child can engage in the social skill but fails to do so consistently within social situations, and an emotional arousal response occurs (Gresham, 1986). An emotional arousal response tends to result in aversive social behavior which is often punished or extinguished within social interactions (Gresham, 1986). Interventions for self-control performance deficits involve teaching self-control strategies and antecedent/consequent control strategies (Gresham, 1986).

The importance of these distinctions and the potential to match intervention strategies to the type of social skill deficit has been highlighted in reviews of social skills interventions (Bellini et al. 2007; Camargo et al., 2014; Camargo et al., 2016; Gresham, 2015; Watkins et al., 2015). In particular, Camargo et al. (2016) posited that intervention effectiveness may not generalise from one type of deficit (e.g. fluency) to another (e.g. acquisition). However, in the intervening 30 years, the majority of studies within the social skills intervention literature do not attend to social skills deficit type, do not report data in this regard and, tend to assume a skill (acquisition) deficit on the part of the children within their studies (Boyd et al., 2011; Gresham, 2001; Matson et al., 2007). This represents an interesting avenue for research within social skills intervention.

Research evaluating social skills interventions that match intervention strategies to the type of deficit are warranted (Camargo et al., 2016; Gresham, 2015; Watkins et al., 2015). Watkins et al. (2015) also suggested the utility of matching an appropriate PMI strategy within intervention to the identified deficit type. When considering generalization and maintenance of social skills, the importance of addressing functional targets has been highlighted (Chandler et al., 1992). If the social skill target within intervention does not match the type of deficit, it is unlikely that this will be a functional behavior and therefore, generalization and maintenance are less likely. Chandler et al. (1992) also highlighted specifying fluency criteria (i.e., addressing or preventing fluency deficits) as a generalization promotion strategy. Furthermore, researchers have noted the need to establish evidence-based practices for classifying the types of social skill deficits (DiGennaro Reed et al., 2011; Gresham, 2015).

Descriptive Analysis and Social Skills

For over 50 years, researchers and practitioners in behavior analysis have experimentally manipulated environmental variables to analyze behavior-environment relations, identify behavioral functions, and inform interventions to decrease problem behavior within functional analyses (Beavers, Iwata & Lerman, 2013; McComas, Vollmer & Kennedy, 2009). More recently, researchers have begun to extend this methodology to explore the effects of social and environmental influences on behavior as it occurs within the natural environment through conducting descriptive analysis (DA) within this context (Camp, Iwata, Hammond, & Bloom, 2009; McComas et al., 2009; McKerchar & Thompson, 2004; Ndoro, Hanley, Tiger, & Heal, 2006; Pence, Roscoe, Bourret, & Ahearn, 2009; Thompson & Iwata, 2001). Increasingly, DA is being recognized as a means of evaluating complex human interactions within the natural environment (McKerchar & Thompson, 2004).

Importantly, DA provides descriptive information about behavior, as opposed to identifying functional relations (Camp et al., 2009; Lloyd, Kennedy, & Yoder, 2013). As such, it is possible to infer variables that may influence behavior through gaining an understanding of how antecedents and consequences interact with socially significant behaviors within the natural context (Ndoro et al., 2006). Such information can then be used to inform further functional analyses and the development of interventions to reduce problem behavior, increase skills and foster successful interactions (Ndoro et al., 2006).

Despite the demonstrated success in interventions for problem behavior informed by DA outcomes, to date, very limited research has applied this methodology to prosocial behaviors (Boyd et al., 2011). DA of preschooler prosocial behavior has exciting potential to inform progress within the social skills literature through empirically identifying the social skills that children engage in at this stage, and exploring the ECE context with regards to factors that promote and maintain these skills. In terms of developing a social skills intervention, specific to the inclusive ECE context, such information from the natural environment could supplement evidence-based practices, tailoring them to fit the context, and capitalise upon existing resources. This approach to intervention development is likely to address some of the existing concerns regarding social skills interventions through programming for generalization, social, and ecological validity by design.

Summary

It is clear that inclusive ECE, and the increasing diversity of preschool populations, offers a unique opportunity to foster social inclusion with some of society's youngest

members. Successful social inclusion at this stage sets all children up for later success and inclusivity, and reduces disparities between children with ASD or additional needs, and their peers. It is also evident, however, that this represents a multifaceted, complex challenge for ECE researchers and policy-makers to support children, parents, and ECE educators. An ABA approach to this challenge, would inform intervention development through careful synthesis and analysis of existing evidence, systematic evaluation of strategies to teach social skills, and consideration of the social skills to teach, as well as the contexts in which to teach them.

Overall Aim

The current research aims to develop and inform the evidence base for an intervention to improve social inclusion for children with additional needs within ECE in Ireland.

Research Questions and Thesis Outline

- What is the current status of the literature regarding generalization and maintenance of outcomes in social skills interventions for preschool children with ASD? What factors influence these outcomes?
    - **Gunning, C.**, Holloway, J., Fee, B., Breathnach, Ó., Bergin, C. M., Greene, I., & Ní Bheoláin, R. (2019). A systematic review of generalization and maintenance outcomes of social skills intervention for preschool children with autism spectrum disorder. *Review Journal of Autism and Developmental Disorders, 6*, 172-199. doi:10.1007/s40489-019-00162-1
- Are PMI efficacious for preschool children with ASD? What are the most effective arrangements for PMI at this stage?
    - **Gunning, C.**, Breathnach, Ó., Holloway, J., McTiernan, A., & Malone, B. (2019). A systematic review of peer-mediated interventions for preschool children with autism spectrum disorder in inclusive settings. *Review Journal of Autism and Developmental Disorders, 6*, 40-62. doi: https://doi.org/10.1007/s40489-018-0153-5
- Is a parent training protocol and parent-implemented intervention effective in supporting acquisition and generalization of typically developing preschool children's life skills?
    - **Gunning, C.**, & Holloway, J. (accepted). An evaluation of parents as behavior change agents in the preschool life skills program. *Journal of Applied Behavior Analysis*

- Is a parent training protocol and parent-implemented intervention effective in supporting life skill acquisition for children with ASD? What modifications to an intervention designed for typically developing children are required to support success for children with ASD?
    - **Gunning, C.**, Holloway, J., & Grealish, L. (submitted). An evaluation of the parent preschool life skills program with children with autism spectrum disorder. *Journal of Applied Behavior Analysis*
- What does typical preschool social behavior look like? What are the behavior-environment relations that exist within natural preschool social interactions?
    - **Gunning, C.**, & Holloway, J. (submitted). Descriptive analysis of preschool social interactions: evaluating a protocol for identifying preschool social behavior. *Journal of Behavioral Education*

Study 2 of Chapter 6 presents a preliminary evaluation of the application of the DA methodology with children with additional needs, and preliminarily investigate similarities and differences in social behavior-environment relations for these children in comparison to their typically developing peers. The penultimate chapter describes the development of Preschool Social Circles (PSC), a social skills intervention for children with ASD in inclusive ECE settings, designed and informed by the findings from Chapters 2 through 6. A protocol for an evaluation of this intervention is also described. The final chapter of this thesis provides a general discussion of the findings of the six studies, the development of PSC, strengths, limitations, and implications for research and practice.

2. A Systematic Review of Generalization and Maintenance Outcomes of Social Skills Intervention for Preschool Children with Autism Spectrum Disorder.

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Abstract

Generalization and maintenance of intervention outcomes are of paramount importance in achieving socially significant outcomes within applied behavior analysis. Social skills interventions for young children with autism spectrum disorders (ASD) are widely represented within the empirical literature, however generalization and maintenance outcomes are often under reported. While recognition of the importance of generalization and maintenance is increasing, there is a lack of research systematically evaluating these outcomes and the factors that support successful generalization and maintenance. The current review aimed to investigate the status of generalization and maintenance within the social skills intervention literature for preschool age children with ASD. A total of 57 studies which measured generalization and/or maintenance of social skills intervention outcomes were included in the current review and evaluated regarding generalization and maintenance data collection and assessment, generalization-promotion strategies employed, generalization and maintenance outcomes and factors posited to influence these outcomes.

Keywords: generalization, maintenance, social skills, autism spectrum disorder, preschool

Table 2.1
Table of Definitions (in order of appearance)

Keyword	Definition
Generalization	In interventions aimed at changing behavior, generalization is a possible outcome of intervention. Generalization is said to have occurred if the behavior change targeted in intervention occurs under conditions which are different to the intervention conditions without training occurring within these different conditions (Stokes & Baer, 1977).
Dimensions of Generalization	The dimensions of generalization are the conditions (different to intervention conditions) under which the target behavior change may occur. The dimensions predominantly discussed in the literature are: generalization across different people, different materials/different settings, response generalization where behavior change occurs in other behaviors and maintenance which refers to persistent behavior change over time after intervention has ceased.
Maintenance (also sustained outcomes)	The continued occurrence of the behavior change targeted in intervention after intervention has ceased. Within the literature, maintenance is both presented as an adjunct to generalization and as one of the dimensions of generalization. In the current review maintenance is conceptualised as a dimension of generalization for analysis and discussion.
Operant	An operant is a unit of behavior in behavior analysis (antecedent-behavior-consequence) which encompasses the relations between antecedent stimuli, behaviors and consequences. To consider generalization as an operant would be to consider generalization of behavior change as a behavior in its own right and, therefore, to identify antecedent stimuli which evoke generalization and consequent stimuli which increase/maintain generalization (i.e., the functional variables accounting for generalization).
Research Designs	
Multiple Baseline Design	Two or more behaviors are measured concurrently in a baseline phase. Subsequently, an intervention variable is introduced to one behavior while the other behavior(s) remain under baseline conditions. When maximum change has been demonstrated in the first behavior, the intervention variable is applied to the other behavior(s) sequentially. Experimental control is demonstrated if change is demonstrated for each behavior only when the intervention variable is applied.
Multiple Probe Design	A variation of a multiple baseline design where probes of behavior are intermittent in each phase.
Alternating Treatment Designs	Two or more intervention conditions are presented in rapidly alternating succession independent of levels of behavior change. This provides a demonstration of differences in behavior between conditions.
Reversal Design (also withdrawal design, ABAB design)	A baseline phase is conducted until stable responding is demonstrated. Following this, an intervention is introduced. When behavior change has been demonstrated and is at a stable rate, the baseline condition is reinstated (i.e., intervention is withdrawn) to observe if behavior "reverses" to the initial baseline levels. In the final phase of this design intervention is reintroduced to replicate the initial intervention effects.

Introduction

Generalization has been defined as the occurrence of relevant behavior under conditions which are different to the conditions under which the behavior was targeted (e.g., across subjects, people, settings, behaviors, time), without training occurring within these different conditions (Stokes & Baer, 1977). The dimensions of generalization refer to the different conditions under which the targeted behavior can occur, and include generalization across settings/materials, generalization across people/agents, response generalization, and maintenance (Chandler, Lubeck & Fowler, 1992; Stokes & Osnes, 1989). The concept of maintenance, defined as the persistence of behavior change over time after training has ceased, is encompassed as a dimension of generalization within this definition. However, within the behavior analytic literature, maintenance is often presented as a separate concept to generalization, that is, researchers tend to discuss the occurrence of the targeted behavior change across different settings or materials, people or responses as dimensions of generalization, and the persistent occurrence of the targeted behavior change over time as maintenance. Within the current review, maintenance is presented and discussed as one of the dimensions of generalization in line with the generalization literature (Chandler et al., 1992; Stokes & Osnes, 1989; Swan, Carper & Kendall, 2016).

Successful generalization outcomes demonstrate not only generality, but also ensure that outcomes are applied and effective (Baer, Wolf & Risley, 1968; 1987). Stokes and Baer (1977) and Stokes and Osnes (1989) instigated a departure from the traditional understanding of generalization as a "passive" outcome of behavior change toward the conception of generalization as an operant to be actively pursued and taught or programmed for, and highlighted the need for researchers to investigate the functional variables accounting for successful generalization. These authors also defined, and later refined, categories of effective procedures to produce generalization which have continued to inform the development of an understanding of generalization as an active process (Osnes & Lieblein, 2003; Swan et al., 2016). The generalization promotion strategies set out by Stokes and Osnes (1989) included three areas of general principles under which specific programming tactics were outlined. Exploit current functional contingencies refers to the principal of capturing the naturally occurring contingencies for the target behavior and employing these in intervention, for example, utilizing peer attention as reinforcement for social initiations. The principle of training diversely includes/endorses strategies to increase variation and decrease rigidity in teaching and behavior change interventions, for example, teaching multiple social

responses across various peers in different settings. Finally, Stokes and Osnes (1989) outlined the principle of incorporating functional mediators in teaching and intervention, that is, introducing stimuli to facilitate generalization such as including common toys from the natural environment (e.g., preschool/home) in the teaching environment (e.g., clinic).

Despite this critical early work regarding the understanding and conceptualization of generalization, there have been limited systematic reviews examining generalization or evaluating the evidence for generalization-promotion strategies (Osnes & Lieblein, 2003). Of those reviews published, findings related to assessment and reporting of generalization outcomes are mixed (Neely et al., 2015; Osnes & Lieblein, 2003; Peterson, 2009). There are also discrepancies in findings regarding factors posited to influence generalization of intervention outcomes. It has been suggested that sample characteristics e.g., age and diagnosis may impact on generalization outcomes (e.g., Chandler et al., 1992; Hughes et al., 2012). Certain methodological and design factors have also been posited to influence generalization outcomes, for example, generalization dimension and assessment design (Chandler et al., 1992; Peterson, 2009). Factors specific to intervention have also been identified as potentially influencing generalization outcomes, for example, target behavior, behavior change strategies, and intervention duration (Chandler et al., 1992). The small number of published reviews regarding generalization and the relatively scarce and inconsistent use of generalization-promotion strategies across studies (Hughes et al., 2012), impedes the further investigation of the influence of any of these factors and interactions between them on generalization outcomes.

Generalizing behavior change tends to be a challenge, in particular, for individuals with autism spectrum disorders (ASD) (Camargo et al., 2016; Neely et al., 2015). Given the nature of social impairments as a core deficit in ASD and increasing recognition of the importance of early intervention to address such impairments, there currently exists an abundance of literature regarding interventions to improve social skills for children with ASD (Gresham, 2014). While there have been numerous systematic reviews published regarding the effectiveness of such interventions (e.g., Bellini, Peters, Benner & Hopf, 2007; McCoy, Holloway, Healy, Rispoli & Neely, 2016), generalization of social skill intervention outcomes is repeatedly highlighted as a critical area for further research (e.g., Bellini et al., 2007; Boudreau, Corkum, Meko & Smith, 2015; Watkins et al., 2015), as reporting and evidence of successful generalization of outcomes is limited (e.g., Goldstein, Lackey & Schneider, 2014; Machalicek et al., 2008). Schmidt and Stichter (2012) described this lack of

data within the social competence literature as a multifaceted problem with a lack of reporting of generalization data, a lack of interventions explicitly programming for generalization, and a lack of measurement of generalization outcomes over time.

When considering social skills interventions for children with ASD, generalization of intervention outcomes is of particular importance for a number of reasons. Increasing social skills should improve social competence, a broad, complex skill repertoire which enables/empowers an individual to interact with other people, develop friendships and relationships, and navigate complex social environments (Rao, Beidel & Murray, 2008). To support social interactions and competence across a child's life, social skills that are targeted in intervention must occur across individuals e.g., preschool peers, siblings, cousins, or family friends. Furthermore, these skills must occur across settings to support successful navigation of social environments (Rao et al., 2008) e.g., home, preschool, parties, or playgrounds. With regards to social competence, maintenance and response generalization are of critical importance given the complexity of this skill domain and its development over the lifespan (Chandler et al., 1992). In order to foster social competence across the different stages of development, the social skills targeted in intervention must continue to occur after intervention has ceased and in a flexible manner, so the individual can adapt to his/her social environment. Furthermore, response generalization in social skills interventions contributes to the development of a complex social skill repertoire necessary for successful social interaction through the development of variations in responses to social stimuli. If generalization of social skills is not demonstrated within intervention, this raises concerns regarding the benefit and viability of these interventions (Osnes & Lieblein, 2003; Zhang & Wheeler, 2011).

In concluding their review of social skills interventions for preschool children, Chandler et al. (1992) suggested that the field was ready for generalization specific studies of social behavior investigating the variables that influence generalization and matching behavior change techniques with generalization-promotion strategies. The authors advocated for future research regarding the functional variables accounting for generalization through systematic evaluation and reporting of generalization success, efforts to convert partial generalization to complete generalization, and addressing failures to generalize (Chandler et al., 1992). On reviewing the literature a decade on, Osnes and Lieblein (2003) posited that progress toward this goal was mixed and suggested that the conceptualization of generalization remained stronger than the empirical base supporting it. The authors

highlighted a number of studies designed to demonstrate the functional relationship between the generalization promotion strategies and generalization outcomes as models for future research aimed at investigating the functional variables accounting for successful generalization (Osnes & Lieblein, 2003). More recently, Neely et al. (2015) advocated for the use of generalization-promotion strategies to support generalized and sustained outcomes and further supported the proposition that these strategies are not equivalent in efficacy (Chandler et al., 1992). Swan et al. (2016) further emphasized the importance of empirical research examining the extent to which the generalization-promotion strategies support generalization outcomes, identifying other factors that support generalization of outcomes (e.g., training and intervention methodologies), and the specific mechanisms through which generalization occurs. Although 40 years have now passed since Stokes and Baer originally set out the strategies to promote generalization as a critical area for future development and research, the evidence-base supporting the efficacy of these strategies in promoting generalization of intervention outcomes remains unclear (McLay, Sutherland, Church & Tyler-Merrick, 2013).

Increasingly, researchers recognize the importance of addressing the issue of generalization within the social skills intervention literature given that skill acquisition in this context should enable children to navigate their social environment, make friends and interact with others (Rao, Beidel & Murray, 2008). Given the continued scarcity of systematic reviews examining generalization and the importance of generalization outcomes within social skills interventions for children with ASD, the current review aims to evaluate this extant literature with regards to generalization of outcomes. In particular the status of the literature regarding generalization data collection and assessment (including maintenance data), use of generalization-promotion strategies (Neely et al., 2015), and generalization outcomes (Chandler et al., 1992) will be investigated. Furthermore, factors posited to influence successful generalization will also be examined.

Method

Systematic search procedures. A summary flow chart of the number of articles included and excluded at each stage of the current systematic review is presented in Figure 2.1. Systematic searches were conducted using the following databases; PsycINFO, Education Resources Information Center (ERIC), Scopus, Web of Science and Psychology and Behavioral Sciences Collection. Searches were carried out by inputting the terms: “autis*” or “Asperger” or “ASD” or “PDD” or “pervasive developmental disorder” in

combination with the keywords: “social*” or “communication” or “play” plus “child*” or “preschool*” or “school*” or “elementary” or “kindergarten” and “early intervention” or “training” or “education” or “intervention” or “teach*” or “treatment” or “therapy” (e.g. “autis*” AND “social*” AND “school” AND “intervention”). There were no restrictions on publication year. The searches were conducted up to 1st August 2017. The initial keyword searches returned 24, 927 articles. When duplicates had been removed 11,662 articles remained. The titles and abstracts of these studies were reviewed to identify potential studies for inclusion. A manual review of the reference lists of relevant previous reviews was also conducted.

Interrater reliability (IRR). The seventh author (RN) served as a second rater for the title and abstract screening. The second rater blindly and independently screened the titles and abstracts of a subset of the search results against the inclusion criteria (Gianoumis & Sturmey, 2012). A total of 3031 initial search results (26%) were screened and IRR was 88%. Throughout the current review IRR was calculated using point-to-point agreement and any instances of disagreement were resolved through a collaborative decision between the first and second raters with the second author (JH) serving as a third rater if necessary.

Inclusion criteria. Following the initial searches and title and abstract screening, the authors determined that the large number of search returns for social skills interventions with children aged 0 to 12 years with ASD would impede comprehensive review and analysis. Therefore, the decision was made to restrict the current review to social skills interventions for preschool age children with ASD. The age range for preschool age children was defined based upon the age categories outlined by Reichow and Volkmar (2010). Studies were therefore included in the current review if the majority of participants had not entered elementary school and/or were 6 years old or younger (i.e., if more children in the study were aged 6 years or under and/or had not yet entered elementary school than were older than 6 years and/or had begun elementary school, the study was included in the current review).

To be included in the current review, articles had to meet the following inclusion criteria: (a) the majority of participants had to be preschool age children (as previously outlined); (b) at least one participant in the study had to have a diagnosis of ASD; (c) the evaluation had to employ an experimental design, i.e., either a single subject research design (e.g., reversal, multiple baseline) or a group research design; (d) the article had to be published in a peer-reviewed journal; (e) the article had to be published in English, and (f) the

article had to report the evaluation of an intervention to improve one or more peer-related social skills for the individual(s) with ASD. Targeting peer-related social skills was defined as in Watkins et al. (2015) as including a direct measure of social interaction between a participant with ASD and at least one peer without ASD. A social interaction could include an initiation and/or a response. An initiation could include verbal or nonverbal participant behaviors directed toward a peer in order to begin or maintain a conversation or an activity. A response could include verbal or nonverbal participant behaviors in response to a peer initiation or continuing an activity. Within the current review, there was no restriction applied for publication year in order to facilitate an analysis of trends regarding generalization data in social skills interventions for preschool age children with ASD over time. After applying the inclusion criteria, 502 articles were identified for potential inclusion.

Screening for maintenance and generalization data. The full texts of the 502 articles identified were then screened to assess whether data were collected on the maintenance and/or generalization of the target social skill(s) for the individual(s) with ASD. A study was included in the current review if probes for the target social skill(s) for the individual(s) with ASD were carried out under different conditions to teaching (e.g., with another person, in another setting), if generalization to other responses in the same response class was measured and/or if any additional probes of skill performance were carried out after the post-test probes (maintenance). If these data were present but the individual data for the participants with ASD could not be disaggregated from other participants' data, these studies were excluded (Neely et al., 2015). Of the 502 studies, 75 met the inclusion criteria and collected generalization and/or maintenance data.

Interrater reliability (IRR). The third author (BF) served as second rater for screening for generalization and/or maintenance data. The third author screened 126 full texts (25%) resulting in 83% IRR.

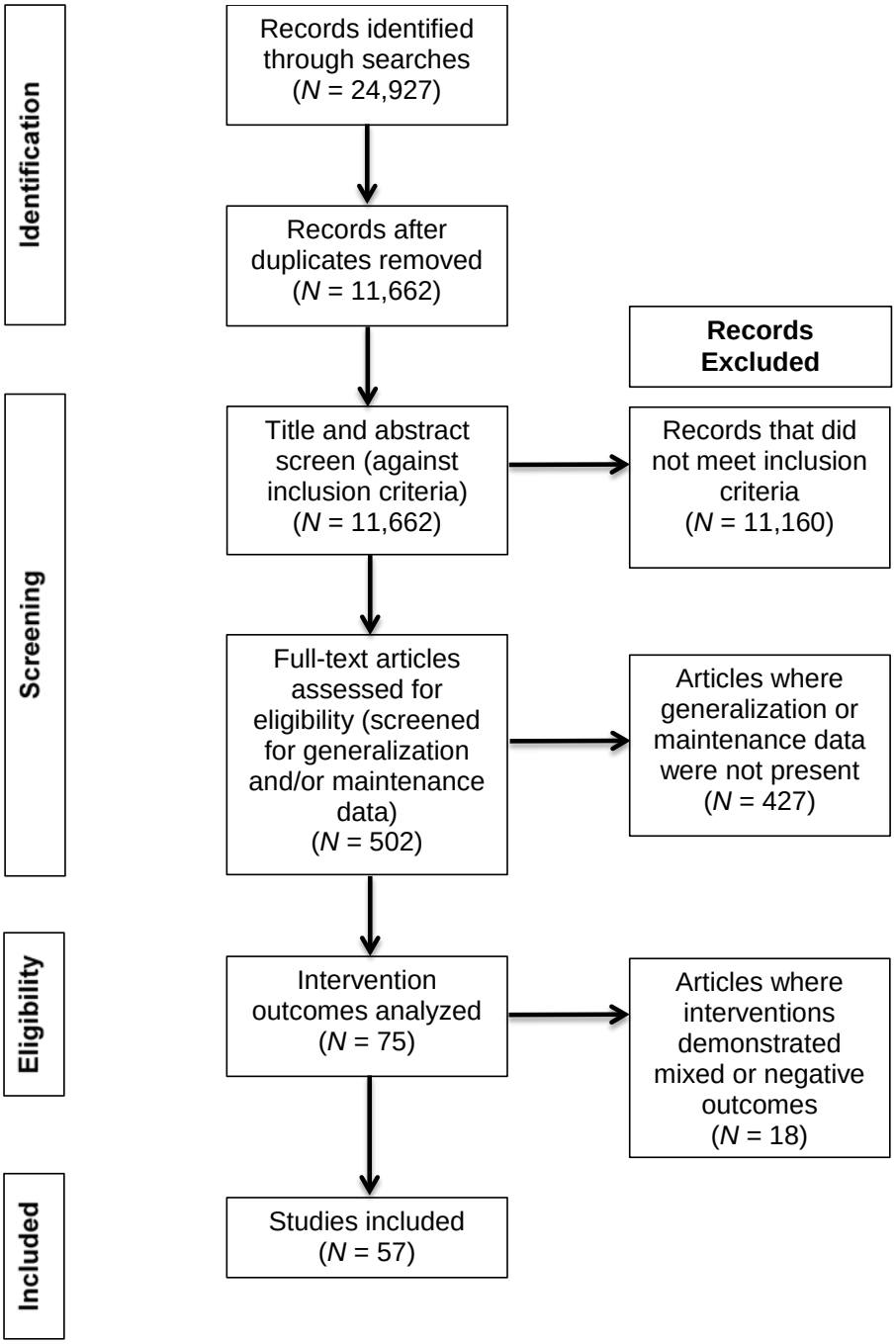

Figure 2.1. Flow chart diagram illustrating the number of articles at each stage of the search and screening processes.

Analysis of intervention outcomes. Intervention outcomes for the target social skills were identified as positive, mixed or negative (as in Lang et al., 2012; Machalicek et al., 2008; Palmen, Didden & Lang, 2012; Verschuur, Didden, Lang, Sigafoos & Huskens, 2014). Given that all of the studies identified within the current review employed single case research designs, evaluation of intervention results was based on visual analysis of graphed

data. Results were classified as positive if all of the participants with ASD improved across all of the target social skills. If some but not all of the participants with ASD improved or if results improved on some but not all of the target social skills, results were classified as mixed. If none of the target social skills demonstrated improvements for any of the participants with ASD, results were classified as negative.

This analysis was not applied to any other target skills or to data for participants who did not have a diagnosis of ASD or for whom social skills were not a target. If intervention outcomes were classified as mixed or negative, studies were excluded from further analysis. This relatively stringent criterion was imposed because success of generalization of intervention outcomes is dependent on success of intervention outcome, that is, if a participant did not acquire the target social skill to criterion during intervention then the skill was not likely to generalize. If a study evaluated two interventions with different outcomes (e.g., Leaf et al., 2012; Ledford & Wehby, 2015; Plavnick, MacFarland & Ferreri, 2015) the study was included provided one of the interventions had positive outcomes. Based on this, 18 studies were excluded from further analysis at this point.

Interrater reliability (IRR). The fifth author (CB) served as second rater for the classification of intervention outcomes as positive, negative or mixed for 41 articles (55%) resulting in 90% IRR.

Descriptive synthesis. The 57 studies included in the review were summarized in terms of: (a) participant characteristics, including age, gender, number of participants, diagnostic information; (b) research design; (c) dependent variables (target social skill) and outcome measures; and, (d) intervention characteristics, including evidence-based practices employed in the intervention, dosage, setting, delivery agent and other individuals involved during the intervention.

As in Neely et al. (2015) and Chandler et al. (1992), studies included in the current review were summarized according to: (a) maintenance and/or generalization dimension assessed; (b) maintenance and/or generalization assessment design; (c) latency to maintenance probes; (d) generalization standards for comparison (i.e., baseline, treatment or normative data, Chandler et al., 1992); (e) maintenance and/or generalization outcomes (i.e., complete, partial or failure, Chandler et al., 1992); and (f) generalization-promotion strategies employed.

Interrater reliability (IRR). The fifth author (CB) served as second rater for identifying generalization outcomes as complete, partial or failure for 31 articles (54%) resulting in 85% IRR.

Coding of target social skills and intervention information. The target social skills were identified as either general or specific as in Ledford, King, Harbin and Zimmerman (2016). General behavior was coded if the target social skills included various responses within or across response classes (e.g., initiations, responses, engagement) (Ledford et al., 2016). Specific behavior was coded if the target social skill had a single topography (e.g., giving a compliment, eye contact) (Ledford et al., 2016).

Intervention practices employed to increase the target social skills were coded using the focused intervention practices which meet the criteria for evidence-based practice (Wong et al., 2015) for improving social communication skills for preschool age children (see Watkins, Kuhn, Ledbetter-Cho, Gevarter & O'Reilly, 2017, for codes employed and definitions). If a study targeted other skills, only the practices employed to target the social skills were coded. Multiple evidence-based practices could be coded for one study. If a study employed a practice that was not included in the previously mentioned codes, Other (O) was coded along with a description of the practice employed.

Coding of generalization information.

Generalization dimension. The dimension of generalization assessed in each study was coded according to the generalization dimension categories adapted from Chandler et al. (1992) and Stokes and Osnes (1989). Setting or material generalization was coded if generalization of effects was assessed across settings or materials which were different to the settings or materials during teaching. Generalization across persons and/or agents was recorded if generalization was assessed across persons/agents who were not involved in teaching. Response generalization was coded if the study assessed generalization of responses to the same stimulus. Maintenance was coded if the target social skill was assessed when the intervention was no longer in place. Studies could be coded as assessing more than one dimension of generalization.

Generalization assessment design and standards for comparison. The categories of generalization assessment design adapted in Neely et al. (2015) from Chandler et al. (1992) and Schlosser and Lee (2000) were utilized in the current review. Single probe was coded if only one generalization probe was collected. Multiple probe was coded if more than one

generalization probe was collected during the study. Within this category, pre-post was a subcategory for studies within which generalization probes were collected prior to or during baseline as well as post-intervention. Continuous probe was coded if a study collected generalization probes during baseline, intervention, and post-intervention. The standards for comparison employed to assess generalization in each study were coded as in Chandler et al. (1992). If baseline data was the comparison standard employed, the study was coded as baseline. If treatment data was the comparison standard employed, the study was coded as treatment. If normative data (e.g. normative sample, control group, socially skilled peer) was the comparison standard employed, the study was coded as normative. For each study, all generalization assessment designs and standards for comparison that applied were coded.

Some elements of the coding for maintenance assessment and design differed to the coding of the other dimensions of generalization. In addition to coding the number of maintenance probes (single/multiple), sequential withdrawal was coded if the intervention components were sequentially withdrawn in consecutive experimental phases. As in Osnes and Lieblein (2003) studies which assessed maintenance were also assigned to one of the following categories: studies that assessed the presence or absence of maintenance post-intervention (post-test), studies which included follow-up conditions to assess the durability of intervention effects (follow up), and studies which employed a reversal design thereby providing an assessment of the durability of intervention effects when intervention was withdrawn (reversal). Latency to the collection of the maintenance data was also recorded.

Generalization outcomes. As in Chandler et al. (1992), each comparison made within the studies was coded as complete generalization, partial generalization, or failure to generalize. Complete generalization was coded if the generalization results (a) exceeded or were equal to the treatment or normative data or, (b) exceeded the baseline data. Partial generalization was coded if complete generalization was demonstrated for some participants, settings or responses but not others. Failure to generalize was coded if generalization results were (a) less than or equal to baseline data or, (b) less than normative or treatment data.

Generalization promotion strategies. In developing the coding system for maintenance and generalization promotion strategies, careful consideration was given to previous reviews of generalization. Neely et al. (2015) coded maintenance and generalization promotion strategies according to the categories outlined by Stokes and Baer (1977) and adopted by Schlosser and Lee (2000). Osnes and Lieblein (2003) utilized the refined

generalization promotion principles set out by Stokes and Osnes (1989) in their review. Furthermore, Chandler et al. (1992) coded several additional generalization promotion strategies in their review of the generalization and maintenance of preschool children's social skills. Therefore, within the current review, a coding system was developed for generalization promotion strategies based primarily on the strategies set out by Stokes and Osnes (1989), with any additional codes included in Chandler et al. (1992) and Neely et al. (2015) included also. Details of this coding system are presented in Table 2.2.

Interrater reliability (IRR). The fourth author (ÓB) served as second rater for the coding of evidence-based practices and generalization-promotion strategies. The fourth author coded evidence-based practices for 26 articles (46%) resulting in 75% IRR and generalization-promotion strategies for 26 articles (46%) resulting in 72% IRR.

Analysis. The current review provides a descriptive summary and critical review of the social skills literature for preschool age children with ASD with regard to generalization and maintenance. Analysis or synthesis of results using effect size calculations and a statistical meta-analytic technique was not employed in the current review given that all of the included studies employed single case research designs and there is currently a lack of consensus on effect size calculation and meta-analytic techniques for such studies (Kratochwill et al. 2012; Watkins et al., 2015; Wong et al., 2015).

Therefore, the 57 included articles were analyzed as in Chandler et al. (1992) to identify the studies that were most successful in producing generalization and the studies that were least successful in producing generalization. To investigate the influence of the methodological factors posited to influence generalization outcomes in previous reviews, comparisons of factors related to study methodology and design and assessment of generalization were made between the studies in the most successful and less successful groups.

Table 2.2

Coding System for Generalization Promotion Strategies[a]

Exploit Current Functional Contingencies (ECFC)	Coded where efforts were made to increase opportunities for naturally occurring consequences that reinforce the target behavior to occur or to alter existing contingencies that reinforce problem behavior • Address functional behaviors (FB): target behavior(s) were functional with respect to the natural environment and members of a large response class • Contact natural consequences (CNC): efforts were made to specifically transfer behavioral contingencies from contrived reinforcement to natural reinforcement (e.g., fading reinforcement, no contrived reinforcement employed) • Recruit natural consequences (RNC): intervention involved either: (a) training to solicit reinforcement or, (b) training natural change agents to use contingencies • Modify maladaptive consequences (MMC): intervention reduced support for maladaptive or incompatible behaviors • Reinforce occurrences of generalization (RG): (a) reinforcement was provided for unprompted generalization occurrences or, (b) instruction to generalize was provided
Train Diversely (TD)	Target skill(s) were taught across stimuli, settings, responses and persons • Sufficient stimuli (SS): multiple stimulus exemplars were utilized • Sufficient responses (SR): multiple response exemplars were employed • Less discriminable (LD): efforts were made to make contingencies, antecedents and/or consequences less discriminable (e.g., fading prompts, fading reinforcement) • Multiple or natural settings (S): intervention occurred across settings or in the natural environment • Multiple agent (MA): skill teaching occurred across individuals
Incorporate Functional Mediators (IFM)	Coded if stimuli were introduced between training and generalization to promote generalization of intervention effects to novel situations. • Program common salient stimuli (PCS): common social or physical stimuli from the natural setting were programmed within the training setting e.g., peers, preferred items • Incorporate self-mediated stimuli (SMS): mediation strategies were taught (e.g., problem-solving, correspondence training) or priming or self-mediated physical, verbal and/or covert stimuli were incorporated
Sequential Modification (SM)	Further strategies were employed to promote generalization after generalization results were not satisfactory

Note. See Chandler et al. (1992), Neely et al. (2015), Stokes and Osnes (1989) and Swan et al., (2015) for coding of generalization-promotion strategies.

[a]Across these categories, multiple codes could be applied to each study if applicable.

To provide an indicator of the success rate of each generalization promotion strategy the following calculation was employed. First, the total number of studies which employed each generalization promotion strategy was calculated. Then, of each total, the number of studies which met the criteria for the most successful group was identified and expressed as a fraction of the total number of studies employing the generalization promotion strategy. This was then multiplied by 100 to give a percentage.

To provide an analysis of the influence of the intervention factors posited to influence generalization outcomes in previous reviews, differential success rates were calculated (Ledford et al., 2016). This analysis was employed to identify differential success rates of generalization promotion strategies when employed with specific evidence-based intervention components. Differential success rates were also calculated for generalization promotion strategies across other intervention variables posited to influence generalization outcomes (e.g., dependent variable, dosage, setting). Continuous variables were collapsed into categorical variables (Ledford et al., 2016) and overall success rates were then calculated based on the percentage of studies demonstrating complete generalization. As in Ledford et al. (2016), success rates were not calculated for instances with fewer than 5 studies. Studies could be included in more than one category for each variable.

Results

A total of 57 articles (59 experiments) that aimed to increase social skills for preschool age children with ASD and measured either generalization or maintenance of intervention effects or both were included in the current review. The earliest study included in the review was published in 1977 and the most recent studies included were published in 2017. Therefore, the review covered a publication period of 40 years of social skills intervention research.

Descriptive summary. Table 2.3 displays the descriptive data regarding participants, target social skills, intervention components and research design extracted from the included studies. Information regarding generalization and maintenance assessment and data collection, generalization and maintenance outcomes and the use of generalization-promotion strategies are also presented. A descriptive summary of this data is also presented in Table 2.3.

Table 2.3
Descriptive Summary of Included Studies

Reference	Dependent Variable (G/S)	Participants • Gender (N) • Age • Diagnosis • Others	Study Design and Generalization Assessment	Intervention • Dosage • Setting • Delivery Agent • EBP Components	Generalization-Promotion Strategies	Generalization Dimension and Outcome
Apple, Billingsley & Schwartz (2005)	Exp. 1 and 2 Compliment-giving G	Exp. 1 M (1) 5y 1m ASD Exp. 2 F (1) 4y 1m ASD Peers and teachers	Exp. 1 and 2 MB across participants Exp. 1 M: MP, SW/PT Exp.2 G: MP, T	Exp. 1 and 2 Approx. 2 minute videos for approx. 3 sessions per week Integrated preschool classrooms Video/Adult Exp.1 SST; VM; PMII; R; O (contract, preference) Exp.2 SST; VM; PMII; R; SM; MD; TD; PP; O (contract, preference)	Exp.1 FB; CNC; SS; SR; LD; S; MA; PCS Exp.2 FB; CNC; SS; SR; LD; S; MA; PCS; SMS Sequential modification (Exp. 2)	Exp.1 M: P Exp. 2 S/M: C
Au et al., (2016)	Initiating play Commenting on toys Gaining peer attention G	2 (M) 3y; 6y ASD Peers	MP across skills and participants G: SP, T M: MP, PT, 1-54 days	30 min sessions, 5 days per week Behavioral intervention clinic Researcher SST; MD; R; DRA/I/O; O (direct instruction cool versus not cool, corrective feedback, roleplay)	FB: PCS; SS; SR	P/A: C M: C
Baker (2000)	Social play G	2 (M) 1 (F) 5y 8m; 5y 5m; 6y 10m ASD Siblings	MB across participants G: MP p-p, B M: PT, MP and FU, MP, 1 and 3 months	University playrooms Undergraduate and graduate students SST; NI; PP; PMII; R; O (structured play group, preference)	FB; CNC; MMC; SR; LD; PCS	S/M: C R: C M: C
Barton (2015)	Social interactions G	1 (M) 3y 11m ASD Teachers	MP across behaviors and participants G: MP p-p, B M: MP, PT	5 minute sessions Preschool classroom Preschool teacher SST; PP; TD; MD; R; O (contingent imitation)	FB; CNC; SS; SR; LD; S; PCS	S/M: C P/A: C M: C
Belchic & Harris (1994)	Social initiations G	3 (M) 4y 3m; 5y 4m; 5y 8m ASD Peers and siblings	MB with MP across participants G: CP, B M: MP, SW/PT	5 minute sessions University-based preschool Researcher SST; R; PP; MD; TD; PMII; O (preference)	FB; CNC; RNC; RG; SS; LD; S; MA; PCS	S/M: P P/A: P M: P

Bellini, Akullian & Hopf (2007)	Unprompted social engagement G	1 (M) 5y 1m ASD Preschool staff members	MB across participants M: MP, PT for 2 weeks	2 minute video for 17 school days across 4 school weeks Preschool classroom Video and teacher SST; VM; PP	FB; CNC; SS; SR; LD; PCS; MA	M: C
Betz, Higbee & Reagon (2008)	Peer engagement G	5 (M) 1 (F) 4-5y ASD	Nonconcurrent MB across dyads G: MP, T M: R (for 2 - SP and MP) and SW, MP	Approx. 20 mins or length of game play Preschool classroom Adult instructors SST; VS; SC; PP; TD; PMII; O (structured play group, preference)	FB; SS; SR; LD; S; MA; PCS	S/M: C M (R): F M (SW): C
Boudreau & Harvey (2013)	Social initiations G	3 (M) 4-7y ASD Peers (TD and ASD)	MB across participants M: SP, FU, 2 weeks	6/7 minute video School Video and researcher SST; PP; VM; O (preference)	FB; SS; SR; LD; PCS	M: C
Celiberti & Harris (1993)	Social play responses G	2 (M) 1 (F) 4y 11m; 4y 3m; 4y 10m ASD Siblings	MB across dyads M: MP, FU at 3, 6 and 16 weeks	15 minute sessions Home Siblings and researcher SST; PMII; R; PP; TD; O (instructions, corrective feedback)	FB; CNC; RNC; MMC; SS; SR; LD; S; PCS	M: C
Chan & O'Reilly (2008)	Social interactions G	1 (M) 5y ASD	MP across behaviors M: SP, FU, 2 months	10-20 minute sessions, 1-4 sessions per week for 18 sessions over 10 weeks School Instructor SST; SN; PP; R; O (roleplay)	FB; SR; LD	M: C
Crozier & Tincani (2007)	Talking to peers during snack time Appropriate play with peers G	2 (M) 3y 9m; 5y 1m ASD	Multicomponent reversal M: MP, R and MP, FU, 2 and 3 weeks	5 minute sessions, average 3 times per week for 27 and 28 sessions University preschool Researcher SST; SN; PP	FB; MMC; LD; S	M (R): P M (FU): P
Davis, Brady, Hamilton, McEvoy & Williams (1994)	Low- and high-probability social requests Social initiations Social responses Social interactions G	3 (M) 5y; 6y; 6y ASD (with mental retardation and speech handicaps) Peers and teachers	MB across participants G: CP, B&T M: MP, FU, 1 and 2 weeks	Integrated play settings Researcher, teachers and graduate student SST; PMII; PP; R; O (high probability request sequence)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	S/M: C P/A: C R: C M: C

Gena (2006)	Initiations to peers Replies to peers G	2 (M) 2 (F) 4y; 4y 5m; 4y; 4y 2m ASD Peers (for comparison normative data) and shadow teachers	MB across subjects G: MP(1)/SP(1), B&T	Inclusive preschool settings Shadow teachers SST; PP; R; O (“instruction following”)	FB; SR; S	P/A: C
Gilley & Ringdahl (2014) Study 2	Sharing S	1 (F) 3y ASD Peer	ABAB withdrawal M: MP, R	ASD service Researcher (peer and individual therapist present) SST; PP; R; PMII; DRO/A/I; TD; DTT; VS; O (structured play group, preference)	FB; RNC; LD; PCS	M: C
Haring & Lovinger (1989)	Exp. 1 and 2 Social initiations G	Exp. 1 1 (M) 4y 8m ASD and DD Peers Exp. 2 1 (F) 4y 8m ASD Peers	Exp. 1 MB across play sequences G: CP and R, B Exp. 2 MB across play sequences G: CP, B	Exp. 1 and 2 3-13 minute sessions (M = 7 minutes) School Researcher and confederate peers SST; R; PP; PMII; TD; TA; O (structured play group, corrective feedback, preference)	Exp. 1 and 2 FB; CNC; RNC; MMC; SS; SR; LD; S; MA; PCS	Exp. 1 S/M: C M (of G): C Exp. 2 S/M: C P/A: C R: C
Hundert, Rowe & Harrison (2014)	Interactive play G	2 (F) 1 (M) 4y 8m; 5y 10m; 5y 11m ASD Peers and teachers	MB across participants G: CP, B&T	20 minute sessions Classroom Teacher and undergraduate university student SST and PB: SST; VM; PP; PMII; TD; R; MD; SC; VS; O (preference)	FB; RNC; SR; LD; S; MA; PCS Sequential modification	S/M: C
Johnston, Nelson, Evans & Palazolo (2003)	Social initiations (entering play activities) S	2 (M) 4y 3m; 5y 1m ASD, cognitive delays and dysmorphic features ASD, cognitive delays, Klinefelter Syndrome and	MP across participants M: MP, PT from 1 week post-criteria G: MP, B&T	Preschool classroom Researcher and teacher and peers SST; ABI; MD; PMII; PP; R; TD; PECS; VS; FCT; NI	FB; CNC; RNC; LD; S; MA; PCS; SMS	S/M: C M: C

		Pierre Robin Syndrome Peers and classroom staff				
Jull & Mirenda (2011)	Synchronous reciprocal interactions G	2 (M) 4y 11m; 5y 5m ASD Mothers and play partners (sibling and cousin)	ABAB reversal M: SP, R	Three 6-10 minute activities during each play date Home Mother SST; PII; PP; PMII; O (structured play group, instructions, preference)	FB; RNC; SS; SR; LD; S; MA; PCS	M: P
Jung & Sainato (2015)	Social engagement G	2 (M) 6y 9m; 6y 5m ASD Peers	MP across participants G: MP p-p, B&T M: MP, PT and FU	Classroom Researcher SST; VM; PP; O (preference)	FB; CNC; RNC; SR; LD; S; PCS; MA	S/M: C M: C
Jung, Sainato & Davis (2008)	Social interactions Responses to social requests G	1 (M) 6y 5m ASD Peers	MB across participants G: CP, B&T M: MP, PT and W	10 minute session per day Classroom Researcher and peer SST; MD; PMII; R; O (preference, high-probability request sequence)	FB; RNC; SS; SR; S; PCS; MA	S/M: C P/A: C M: C
Kassardijan, Leaf, Ravid, Leaf, Alcalay, Dale, Tsuji, Taubman, Leaf, McEachin & Oppenheim-Leaf (2014)	Changing the game when a peer is bored S	2 (M) 1 (F) 5y; 5y; 5y ASD Confederate peers	Adapted alternating treatment design M: MP, FU, between 47-109 days	Approx. 45 minute sessions 3 days per week Social skills group in a summer school program Researcher TI: SST; TA; MD; PP; R; PMII; O (roleplay, skill introduction and rationale, corrective feedback)	TI: FB; RNC; SS; LD; PCS	M: C
Kassardijan, Rudrud, Taubman, Leaf, Edwards, Schulze, McEachin & Leaf (2013)	Expanding conversation Sportsmanship skills Social responses G	3 (M) 4y; 6y; 6y ASD Peers/siblings, teachers and behavioral therapy coordinators	MB across subjects (with no treatment control) G: CP, T M: MP, FU, up to 3 months	Home (2) and clinic (1) and naturalistic settings for social interaction e.g., school, play dates Teachers SST; TA; R; MD; O (roleplay, preference, skill introduction and rationale, corrective feedback)	FB; RNC; SS; SR; LD; PCS Sequential modification (generalization training): CNC; RNC; RG; SS; SR; LD; S; PCS; SMS	S/M: C P/A: C R: C M: C

Katz & Giromaletto (2013)	Social interactions G	2 (M) 1 (F) 4y 8m; 4y 1m; 5y 1m ASD Peers and teachers	MB across participants M: MP, FU, 4-5 weeks	Five 30 minute social skills training sessions Twelve 20 minute play sessions 3 times a week for 4 weeks Childcare centers Researcher and teachers SST; SN; VS; R; PP; TD; PMII; O (structured play group, roleplay)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M: C
Katz & Giromaletto (2015)	Responses and initiations G	2 (M) 1 (F) 4y 8m; 4y 1m; 5y 1m ASD Peers and teachers	MB across participants M: MP, FU, 4 weeks G: SP, B	Five 30 minute social skills training sessions Twelve 20 minute play sessions 3 times a week for 4 weeks Childcare centers Researcher and teachers SST; SN; VS; R; PP; TD; PMII; O (structured play group, roleplay)	FB; RNC; SS; SR; LD; S; MA; PCS	M: C P/A: C
Koegel, Kuriakose, Singh & Koegel (2012)	Social engagement Social initiations G	1 (M) 1 (F) 5y; 6y ASD Peers	MB across participants G: CP, T M: SP, FU, 3 months	10 minute sessions Playground of elementary schools Graduate and undergraduate university students FSP with initiations training: SST; PRT; PP	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	R: C M: C
Kohler, Anthony, Steighner & Hoyson (2001)	Social interaction G	1 (M) 4y 4m ASD and PDD Teachers, classroom aides, peers	MB across subjects M: MP, FU, 4-5 weeks	10 minute sessions 2-3 times per week Preschool Teachers SST; ABI; NI	FB; RNC; SS; SR; LD; S; PCS	M: C
Kohler, Greteman, Raschke & Highnam (2007)	Social overtures Social interactions G	1 (F) 4y 9m ASD Peers and teacher	MB across subjects M: MP, SW/PT	15 minute sessions for 8 consecutive days Then 10 min sessions 3 days per week for 33 sessions Preschool Teacher and peers SST; PMII; MD; R; PP; VS; O (skill introduction, roleplay)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M: C
Kohler, Strain, Hoyson & Jamieson (1997)	Peer interaction (initiations, responses, concurrents) G	10 3y 7m; 3y 8m; 4y 6m; 5y 10m; 4y 10m; 3y 11m; 5y 4m; 3y 2m; 3y 3m; 3y 10m ASD	MB across classrooms M: SW, FU, 6-8 weeks	15-40 minute sessions Preschool Teacher and peers SST; NI; PMII; O (teacher training)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M: C

		Peers and teachers				
Kohler, Strain, Maretsky & DeCesare (1990)	Social interactions (initiations, responses, concurrents) G	2 (M) 4y; 4y ASD Peers and teachers	Alternating treatment design and reversal G: CP, B M: MP, R	15 minute sessions 5 days per week Preschool Teachers SST; MD; PP; R; PMII; VS; O (structured play group, instructions, roleplay, feedback)	FB; RNC; SS; SR; S; MA; PCS	S/M: C M: P
Kohler et al., (1995)	Social interactions (Initiations, responses, concurrents) G	3 (M) 4y; 4y; 4y ASD Peers and teachers	Withdrawal design M: MP, R	15 minute sessions 5 days per week Preschool Teachers SST; PMII; MD; PP; R; O (structured play group, instructions, roleplay)	FB; RNC; SS; SR; LD; S; MA; PCS	M: F
Laushey & Heflin (2000)	Asking for an object and responding appropriately to response Gaining attention appropriately Waiting for a turn Orienting toward a speaker G and S	1 (M) 5y 8m ASD Peers, paraprofessionals and teachers	Reversal M: MP, R and MP, FU at first 6 weeks of following school year	Kindergarten classrooms Researcher, teacher and peers SST; NI; PMII; R; VS	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M (R): F M (FU): C
Leaf, Dotson, Oppenheim, Sheldon & Sherman (2010)	Giving a compliment G	3 (M) 5y; 6y; 5y ASD (3) Peers	MP across skills and participants G: MP p-p, B&T M: MP, PT	1.5 hour session twice a week for 5-7 months Social skills group in afterschool program in university preschool Lead teacher (researcher), support teachers, peers SST; TA; MD; R; PP; DRA/I/O; PMII; O (preference, rationale, roleplay)	FB; CNC; RNC; SS: SR; LD; S; PCS Sequential modification: RG; MA; SMS	P/A: C M: C
Leaf et al., (2009)	Individualized social skill targets Initiation Conversation skills Following a peer from activity to activity	2 (M) 6y; 5y ASD Peers	MB across skills and participants G: MP p-p, B Corollary behavior: SP, B M: MP, PT	30 minute sessions 3 days per week for 8 weeks Summer school program in private behavioral intervention agency Teacher SST; TA; R; MD; PP; DRA/I/O; O (rationale, roleplay, priming)	FB; RNC; SS; SR; PCS; SMS	S/M: C P/A: C R: C M: C Corollary behavior: C

	Including a peer in a game or activity Choosing the same peer during the day Playing what a friend wants to play Giving a compliment Sharing G and S					
Ledford & Wehby (2015)	Prosocial behaviors: Share tokens received for correct responding Provide social feedback for academic responses Initiate comments to peers G and S	4 (M) 5y 7m; 5y 5m; 5y 10m; 5y 11m 4 ASD Peers	MB across groups G: MP p-p, B	Special education classroom Graduate students (trained) Typical instruction and observational learning: SST; PP; MD; VS; PMII; R; O (structured play group) Planned modifications: (PP)	FB; RNC; SS; SR; MA; S; PCS Sequential modification: SS; SR; MA; S; PCS; RG	S/M: P
Lee & Lee (2015)	Initiations Responses Reciprocal social interaction G	1 (M) 1 (F) 3y 9m; 3y 10m ASD (1) ASD and DD (1) Peers and teachers	MB across groups M: MP, W and MP, PT for 6-14 days	Approx. 15 minute sessions 5 days per week for 2/3 weeks Preschool Researcher, teachers and peers SST; PMII; VS; PP; ABI	FB; RNC; SS; SR; LD; S; MA; PCS	M (W): C M (PT): C
Lefebvre & Strain (1989)	Social interactions (initiations, responses) G	2 (M) 1 (F) 4y 5m; 6y 10m; 6y ASD Peers and teacher	Sequential withdrawal M: MP, R and MP, W	Nine 10-15 minute training sessions 7 minute sessions per day 5 days per week Preschool Teacher SST; MD; PP; TD; R; PMII; O (structured play group, introduction, roleplay, feedback,	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M (W): C M (R): P
Mancil, Lorah &	Peer social interaction	2 (M) 1 (F) 5y; 4y; 5y	Alternating treatments design	Twice a week for 11 sessions (iPod Touch) Three days a week for 12 sessions (Dynavox)	FB; MMC; SR; S; SMS	M: C P/A: C

Schaefer Whitby (2016)	G	ASD Peers and teachers	M: MP, FU, 2 weeks G: MP, B&T	Schools and playground Researcher and teacher SST; FCT; MD; TD; TAII; O (functional analysis, milieu training)		S/M: C
McGee, Almeida, Sulzer-Azaroff & Feldman (1992)	Reciprocal interactions (social behavior and initiations and responses) G	3 (M) 3y 7m; 4y 1m; 5y 11m ASD Peers	MB across participants G: MP p-p, B M: MP, PT/W	5 minute sessions Preschool Researcher and teacher SST; PMII; PP; R; TD; O (preference)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	S/M: P P/A: P R: P M: C
Nelson, McDonnell, Johnston, Crompton & Nelson (2007)	Social interaction initiations: Using Keys-to-Play or other appropriate method to enter playgroup Engaged time with peers G	4 (M) 4y 5m; 4y 1m; 3y 9m; 4y 3m 4 ASD Peers	MP across participants and settings M: MP, SW, PT, for 4 weeks	30 mins per day, 2-4 days per week Preschool classroom Research assistant SST; PMII; PP; MD; R; NI; VS; TD; O (incidental teaching)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS; SMS	M (2): C
Nelson, Paul, Johnston & Kidder (2017)	Social play G	1 (F) 2 (M) 4y; 3y; 4y ASD & DD	MP across participants M: MP, FU, 1-4 weeks	10 minute sessions three/four days a week Preschool Researcher SST; PP; TD; MD; O (preference, dance activity, priming)	FB; SS; SR; LD; S; PCS; SMS	M: P
Odom & Watts (1991)	Social interactions Initiations and responses G	3 (M) 3y 6m; 5y; 5y ASD Peers and teacher	Multielement MB design M: MP, R	10 minute sessions twice per day Classroom Peers and researcher SST; PMII; O (structured play group)	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M: C
Oke & Schreibman (1990)	Social interaction (initiations and responses) G	1 (M) 5y 7m ASD Peers	Multiple treatment with reversal G: SP, B&T and MP p-p, B&T M: MP, R	10 minute sessions approx. once a week One 20 minute session Clinic Peers and researcher SST; PMII; PP; R; O (instructions, roleplay, review sessions, feedback)	FB; RNC; MMC; SS; SR; MA; PCS; SMS	P/A: C S/M: F M: C
Ozdemir, Egitim, Ozel & Bolumu (2008)	Social engagement G	3 (M) 6y 2m; 6y 4m; 5y 6m ASD	MB across participants G: MP p-p, B&T	10 minute sessions three days a week School Researcher and peers	FB; RNC; LD; MA; PCS; S	P/A: P S/M: P M: C

		Peers	M: MP, SW and MP, PT	SST; MD; SN; TAII; PMII; VM; O (preference, comprehension questions)		
Özen (2015)	Turn-taking Play responses S	2 (F) 1 (M) 6y; 5y; 5y ASD Siblings	MP across participants M: MP, FU, 1 and 2 weeks	Home Researcher and sibling SST; PP; R; PMII; DRA/I/O; O (preference)	FB; RNC; SR; PCS	M: C
Plavnick et al., (2015)	Peer initiations G	3 (M) 5y; 6y; 5y ASD Speech and language pathologist	Reversal M: MP, R	15 minute social skills group twice a week Early childhood center Speech and language pathologist Joining: SST; VM; R; PP; TAII; O (structured play group, preference, corrective feedback)	FB; RNC; SS: SR; PCS	M: P
Radley, Dart, Moore, Lum & Pasqua (2017)	Participating/ Joining in with others G	1 (M) 1 (F) 5y 1m; 5y 6m ASD Peers and psychology doctoral student	MP across behaviors and participants M: MP, PT, 5 days+	2 hour sessions twice a week for 8 weeks University based clinic Research assistants SST; SN; R; VM; TAII; PP; VS; O (Superheroes Social Skills program, rules, schedule, didactic instruction, roleplay, corrective feedback)	FB; CNC; SS; SR; LD; MA	M: P
Radley, Hanglein & Arak (2016)	Introducing self Participate/Join in with others Body basics G and S	1 (M) 4y 3m ASD Peers	MP across skills and participants M: MP, PT and MP, FU, 6 weeks	1 hour session once a week for approx. 11 weeks School School psychologist SST; VM; TAII; MD; VS; R; SN; TA; O (Superheroes Social Skills program, instructions, corrective feedback, behavioral rehearsal)	FB; SS; SR; MA	M: C
Reamer, Brady & Hawkins (1998)	Reciprocal play interactions with siblings G	1 (M) 1 (F) 6y 8m; 4y 11m ASD Parents and siblings	MB across families M: MP, FU, up to 4 weeks G: MP p-p, B&T	Home Parents SST; TA; PP; PII; O (corrective feedback, choice)	FB; RNC; LD; PCS	P/A (1): C S/M (1): C M: C
Reinecke, Newman & Meinberg (1999)	Sharing S	3 (M) 4y; 4y; 4 ASD Siblings	Reversal M: MP, R	Approx. 2.5 minute sessions Preschool and home Researcher SST; PP; R; SM; TD; DTT; O (instructions, corrective feedback)	FB; SS; S; PCS; SMS	M: P

Russo & Koegel (1977)	Social behavior G	1 (F) 5y ASD Teachers	MB across behaviors Exp. 1 M: MP, R Exp. 2 (baseline) G: MP, B&T M: MP, FU, approx. 12 weeks	Intervention occurred during school day (9am-2.30pm) five days per week for 16 weeks School Researcher and teachers SST; R; O (teacher training)	FB; CNC; RNC; SS; SR; LD; S; MA Sequential modification (Exp. 2): CNC; RNC; SS; SR; LD; S; MA	S/M: C P/A: C M (R): C M (FU): C
Sainato, Goldstein & Strain (1992)	Social behavior G	1 (M) 4y 2m ASD Peers and teachers	MB across participants G: MP, B&T	5 minute session each day Preschool Peers and teacher SST; PMII; PP; R	FB; RNC; SS; SR; LD; PCS	S/M: C P/A: C
Sawyer, Luiselli, Ricciardi & Gower (2005)	Sharing G	1 (M) 4y ASD Peers, teacher and assistant	ABCB design M: MP, W and MP, FU	30 minute session each day Preschool Teacher and assistant SST; MD; PP; R; TD; PMII; O (introduction, roleplay)	FB; RNC; SS; SR; LD; S; MA; PCS	M (SW): C M (FU): C
Shabani et al., (2002)	Initiations Responses G	2 (M) 6y; 7y ASD Peers	ABAB design M: MP, R	Classroom Researcher SST; PP; MD; R; TD	FB; CNC; SR; LD; S; PCS; SMS	M: P
Shafer, Egel & Neef (1984)	Social behavior G	3 (M) 1 (F) 5y 6m – 6y 8m (M = 5y 11m) ASD Peers	MB across participants G: CP, B&T	20 minute sessions School Peer and researcher SST; PMII; MD; O (preference)	FB; RNC; SS; SR; LD; S; PCS Sequential modification: RG; RNC; SS; SR; LD; S; PCS	P/A: P P/A: C S/M: C
Shearer, Kohler, Buchan & McCullough (1996)	Peer engagement G	3 (M) 5y; 5y; 5y ASD Peers	AT and MB design M: MP, W	Six 10-15 minute sessions 8 minute sessions Preschool Researchers SST; SM; PP; PMII; R; O (introduction)	FB; RNC; SS; SR; LD; S; MA; PCS; SMS	M: C
Strain & Danko (1995)	Social interactions (initiations, responses, concurrents) G	2 (M) 4y; 3y ASD Siblings, parents and sitter	Withdrawal M: MP, R	6 minute sessions for 40 sessions Homes Parents and sitter SST; PII; PP; R; PMII	FB; CNC; RNC; SS; SR; LD; S; PCS	M: P
Strain, Danko &	Social interactions (initiations,	5 (M) 6y; 5y; 5y; 4y; 4y	Reversal M: MP, R	45 minute daily free play session Preschool	FB; CNC; RNC; SS; SR; LD; S; MA; PCS	M: P

Kohler (1995)	responses, concurrents) G	ASD Peers and teachers	Teachers SST; NI

Descriptive Information Summary: % (*N* of studies)

Dependent Variable	Participant Information	Study Design	Intervention Information
General social skills: 85% (50) Specific social skills: 8% (5) Both: 7% (4)	Total *N*: 152 Male: 76% (116) Female: 17% (26) Absolute age range: 3y-7y Diagnoses: ASD (100%) Comorbid diagnoses: 7% (11) Reported other individuals involved in intervention: 90% (53)	Multiple baseline: 56% (33) Multiple probe: 20% (12) Reversal: 14% (8) Alternating treatments: 8% (5) Withdrawal: 7% (4)	EBP components (*N* of studies; %): SST (59; 100%); PP (44; 75%); R (41; 69%); PMII (36; 61%); MD (24; 41%); TD (19; 32%); VS (14; 24%); VM (10; 17%); SN (7; 12%); TA (7; 12%); NI (7; 12%); DRA/I/O (5; 8%); TAII (5; 8%); PII (3; 5%); ABI (3; 5%); SM (3; 5%); SC (2; 3%); DTT (2; 3%); FCT (2; 3%); PRT (1; 2%); PECS (1; 2%) Other practices incorporated: 80% (47) Setting: School: 78% (46) Clinic/University: 14% (8) Home: 12% (7) Delivery Agent: Researcher: 61% (36) Teacher: 42% (25) Peer/Sibling: 29% (17) Other: 5% (3) Parent: 3% (2)

Note. G denotes a general dependent variable and S denotes a specific dependent variable as in (Ledford et al., 2016). EBP denotes evidence-based strategies incorporated in intervention and these are presented as ABI (antecedent based intervention), DRA/I/O (differential reinforcement of alternative, incompatible, or other behavior), DTT (discrete trial training), FCT (functional communication training), MD (modeling), NI (naturalistic intervention), PII (parent-implemented intervention), PMII (peer-mediated instruction and intervention), PECS (picture exchange communication system), PRT (pivotal response training), PP (prompting), R (reinforcement), RI/R (response interruption/redirection), SC (scripting), SM (self-management), SN (social narratives), SST (social skills training), TA (task analysis), TAII (technology-aided instruction and intervention), TD (time delay), VM (video modeling), and VS (visual supports). Information regarding generalization and maintenance is presented as G: and M: respectively and abbreviated as MP (multiple probe), SP (single probe), MP p-p (multiple probe pre-post), CP (continuous probe), R (reversal), PT (post-test), FU (follow up), W (withdrawal), B (baseline comparison), T (treatment comparison), B&T (baseline and treatment comparison) and C (complete), P (partial) and F (failure) for outcomes. Generalization-promotion strategy codes are presented as outlined in Table 2.1.

Trends. Figure 2.2 displays the publication trends by decade for studies evaluating social skills interventions for children with ASD and measuring generalization and/or maintenance of intervention outcomes. Across the period covered by the current review the number of studies published each decade including measurement of generalization and/or maintenance has increased. Within this trend, the number of studies measuring maintenance of intervention outcomes alone or maintenance and generalization of intervention outcomes has also increased but has remained relatively stable for the past 17 years. Interestingly, the number of studies measuring generalization of intervention outcomes alone has remained relatively low and variable across the decades. Across the current review period, the number of studies meeting the criteria for the most successful group (as in Chandler et al., 1992) has increased.

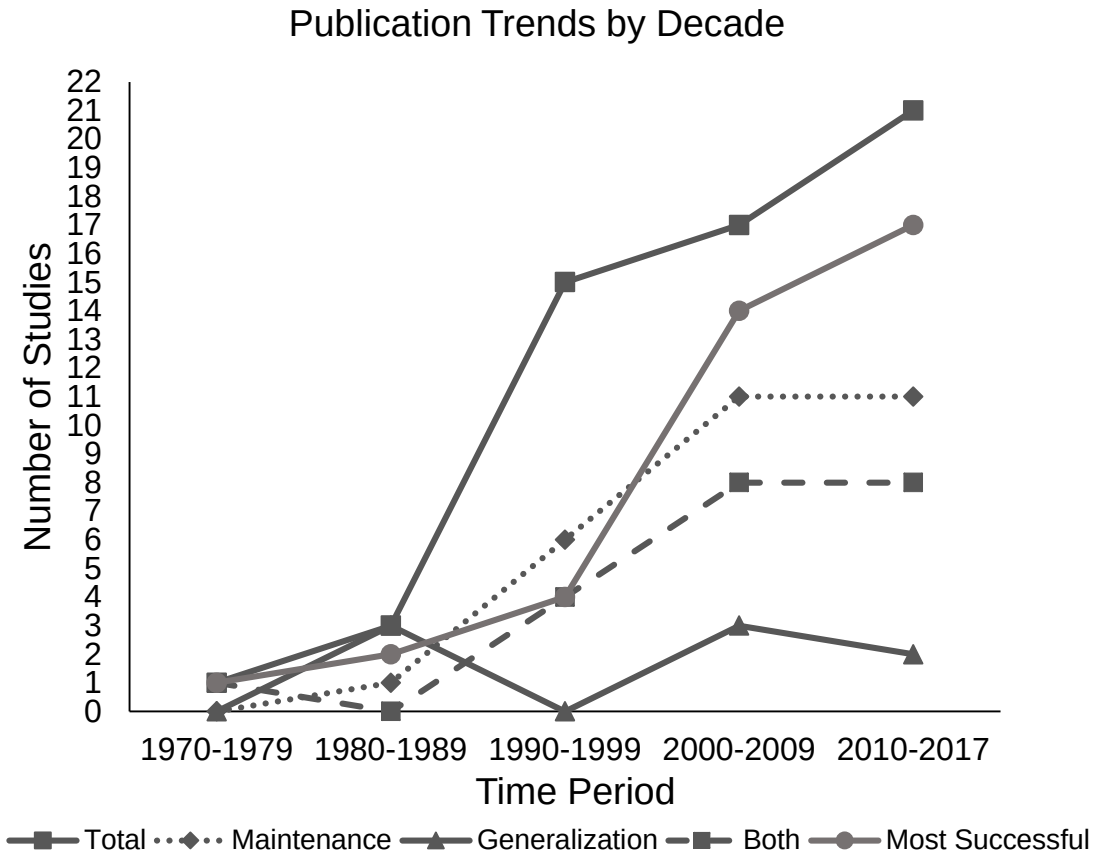

Figure 2.2. Number of studies measuring generalization and/or maintenance of intervention outcomes and number of studies in the most successful group per decade.

Most successful and least successful group comparisons. Regarding generalization and maintenance outcomes, 38 of the 59 included experiments (64%) met the inclusion criteria for the most successful group as set out by Chandler et al. (1992). Studies were

included in this group if complete or complete and partial generalization was achieved across individual or multiple comparative measures and one or more dimensions of generalization (Chandler et al., 1992). One study (2%) failed to produce complete or partial generalization across all comparisons, meeting the criteria for the least successful group as in Chandler et al., 1992 (Kohler et al., 1995). The remaining twenty studies (34%) produced partial generalization across all comparisons or produced a combination of complete, partial, and failed generalization across all comparisons.

In their analysis, Chandler et al. (1992) included studies meeting the criteria for the most and least successful groups and excluded studies which produced partial generalization across all comparisons or produced a combination of complete, partial, and failed generalization across all comparisons. Given that only one study identified met the criteria for the least successful group as set out by Chandler et al. (1992), and in order to increase the number of studies in this group to allow for comparative analysis in the current review, the group criteria was modified to form a less successful group. Studies were included in the less successful group if results: (a) failed to demonstrate generalization across all comparative measures or dimensions of generalization (Chandler et al., 1992), (b) produced partial generalization across all comparisons or, (c) produced a combination of complete, partial, and failed generalization across all comparisons. Therefore, a total of 21 studies were included in the less successful group. The lists of studies meeting the criteria for each group are presented in Table 2.4.

The analysis of methodological and study design factors and aspects of generalization and maintenance assessment and data collection posited to influence generalization and maintenance outcomes by Chandler et al. (1992) is presented in Table 2.5. Analysis of these variables with regard to generalization and maintenance outcomes is displayed as comparisons between the most successful group and the less successful group on these variables.

Table 2.4

Table of Studies Meeting the Criteria for the Most Successful and Less Successful Groups Based on Generalization and Maintenance Outcomes.

Most Successful		Less Successful
Apple et al., 2005, Experiment 2	Leaf et al., 2009	Apple et al., 2005,
Au et al., 2016	Lee & Lee, 2015	Experiment 1
Baker, 2000	Mancil et al., 2016	Belchic & Harris, 1994
Barton, 2015	Nelson et al., 2007	Betz et al., 2008
Bellini et al., 2007	Odom & Watts,	Crozier & Tincani, 2007
Boudreau & Harvey, 2013	1991	Jull & Mirenda, 2011
Celiberti & Harris, 1993	Özen, 2015	Kohler et al., 1990
Chan & O'Reilly, 2008	Radley et al., 2016	Kohler et al., 1995[a]
Davis et al., 1994	Reamer et al., 1998	Laushey & Heflin, 2000
Gena, 2006	Russo & Koegel,	Ledford & Wehby, 2015
Gilley & Ringdahl, 2014	1977	Lefebvre & Strain, 1989
Haring & Lovinger, 1989,	Sainato et al., 1992	McGee et al., 1992
Experiment 1 and 2	Sawyer et al., 2005	Nelson et al., 2017
Hundert et al., 2014	Shearer et al., 1996	Oke & Schreibman, 1990
Johnston et al., 2003		Ozdemir et al., 2008
Jung & Sainato, 2015		Plavnick et al., 2015
Jung et al., 2008		Radley et al., 2017
Kassardijan et al 2014		Reinecke et al., 1999
Kassardijan et al, 2013		Shabani et al., 2002
Katz & Giromaletto, 2013		Shafer et al., 1984
Katz & Giromaletto, 2015		Strain & Danko, 1995
Koegel et al., 2012		Strain et al., 1995
Kohler et al., 2001		
Kohler et al., 2007		
Kohler et al., 1997		
Leaf et al., 2010		

[a]Study meeting the criteria for the least successful group as outlined by Chandler et al. (1992)

Across the majority of the factors presented in Table 2.5, there were relatively few significant differences between the most and less successful group. There were notable differences across the two groups in the use of multiple baseline designs and reversal designs. While maintenance alone was the most commonly assessed outcome across both groups, a larger proportion of studies in the less successful group (*N*=13; 62%) assessed maintenance of intervention outcomes than in the most successful group (*N*=17; 45%). There were some notable differences between the two groups with regard to generalization assessment with a higher proportion of studies in the less successful group carrying out multiple probes for generalization at baseline and post-test (*N*=4; 50%).

Table 2.5
Summary of Generalization and Maintenance Descriptive Information and Between Groups Comparison

	All	Most Successful	Less Successful
Dimension			
Person/Agent	2%	3%	-
Setting/Material	7%	8%	5%
Maintenance	51%	45%	62%
Multiple Dimensions	41%	45%	33%
Measurement	100%	100%	100%
Study Design			
Multiple baseline	58%	71%	33%
Multiple probe	19%	21%	14%
Reversal	17%	3%	43%
Alternating treatment	8%	11%	5%
Withdrawal	14%	11%	19%
Generalization Assessment			
Multiple probe	14%	33%	13%
Multiple probe pre/post	17%	29%	50%
Single probe	7%	14%	13%
Continuous probe	17%	33%	38%
Generalization Standards for Comparison			
Baseline	17%	29%	50%
Treatment	8%	19%	13%
Baseline and Treatment	24%	52%	38%
Maintenance Assessment			
Multiple probe	83%	97%	95%
Single probe	8%	9%	11%
Maintenance Design			
Follow up	39%	63%	16%
Post-test	31%	41%	26%
Reversal	27%	9%	68%
Withdrawal	22%	22%	32%
Latency			
<1 month	15%	25%	5%
≥1 month	31%	50%	11%

Note. Some studies utilized other measurement such as standardized assessments and social validity measures which are not reported in the current review.

Generalization promotion strategy success rates. Figure 2.3 displays the number of studies in which each generalization promotion strategy was employed and the success rate indicator for each generalization promotion strategy. Addressing functional behaviors was the most commonly employed generalization promotion strategy as this was employed in all 59 experiments included in the current review. This was followed by programming common stimuli (*N*=52) and targeting sufficient responses (*N*=51). The least commonly employed strategy was reinforcing generalization (*N*=1), and this was followed by modifying maladaptive consequences (*N*=7), and sequential modification (*N*=7).

On the indicator of success calculated as outlined previously, sequential modification and modifying maladaptive consequences demonstrated the highest success rates with 71% of studies employing these strategies meeting the criteria for the most successful group. It is worthy of note, however, that these strategies were employed in a small number of studies (*N*=7). Several strategies demonstrated a 66% success rate across a larger number of studies: contacting natural consequences (*N*=27), recruiting natural consequences (*N*=42), targeting sufficient responses (*N*=51), and making contingencies less discriminable (*N*=47). Reinforcing generalization was employed in one study which met the criteria for the less successful group and therefore this strategy demonstrated a success rate of 0%. However, no other generalization promotion strategy demonstrated a success rate of less than 50%. The lowest success rate was indicated for training across multiple settings and/or in the natural setting, with 58% of studies utilizing this generalization promotion strategy meeting the criteria for the most successful group (*N*=43).

Differential generalization success rates by treatment factors. The analyses of the use of the generalization promotion strategies and the treatment factors posited to influence generalization and maintenance outcomes (Chandler et al., 1992) are presented in Table 2.6 and Table 2.7 as differential generalization outcome success rates.

The differential success rate for each generalization promotion strategy across evidence-based practice intervention components is presented in Table 2.6. Several intervention component and generalization promotion strategy combinations resulted in high success rates for generalization outcomes. These included incorporating self-mediated stimuli with peer-mediated intervention or instruction strategies, employing visual supports and making intervention contingencies less discriminable, utilizing prompting and strategies to support both contacting and recruiting natural consequences, and making intervention

contingencies less discriminable when using reinforcement. Where naturalistic intervention strategies were employed, addressing functional behaviors, making intervention contingencies less discriminable, and programming common stimuli were associated with high success rates for generalization outcomes.

A number of evidence-based intervention components are not presented in Table 2.6 as they were employed in a small number of studies and thus, differential success rates could only be calculated for a limited number of the generalization promotion strategies. However, a number of these combinations demonstrated high success rates and warrant mention. The use of task analysis resulted in 100% success rates when functional behaviors were addressed (N = 8 studies), recruiting natural consequences was employed (N = 7 studies), sufficient stimuli were utilized in intervention (N = 7 studies), sufficient responses were targeted (N = 6 studies), intervention contingencies were less discriminable (N = 6 studies), and common stimuli were programmed in intervention (N = 6 studies). Utilizing differential reinforcement of alternative, incompatible or other behaviors and addressing functional behaviors or programing common stimuli in intervention demonstrated a success rate of 100% across 5 studies. Across five studies, social narratives demonstrated an 80% success rate for generalization outcomes when sufficient responses were targeted. The use of modifying maladaptive consequences with peer-mediated intervention or instruction or reinforcement demonstrated an 80% success rate across five studies respectively. When sequential modification was employed with reinforcement, a 100% success rate was demonstrated across five studies.

Further analysis of the impact of treatment factors on generalization outcomes is presented in Table 2.7. Across generalization-promotion strategies, the highest average success rates for treatment factors were seen for studies where intervention occurred in a clinic or university setting. Average success rates were also high where five or more evidence-based practices were incorporated into intervention and where others were involved in intervention. Average success rates were lower where intervention sessions were 10 minutes or less in duration, intervention occurred on 3 or more days per week and where intervention occurred in the home. It is worthy of note that intervention occurred in a clinic or university setting or in a home setting in a small number of studies.

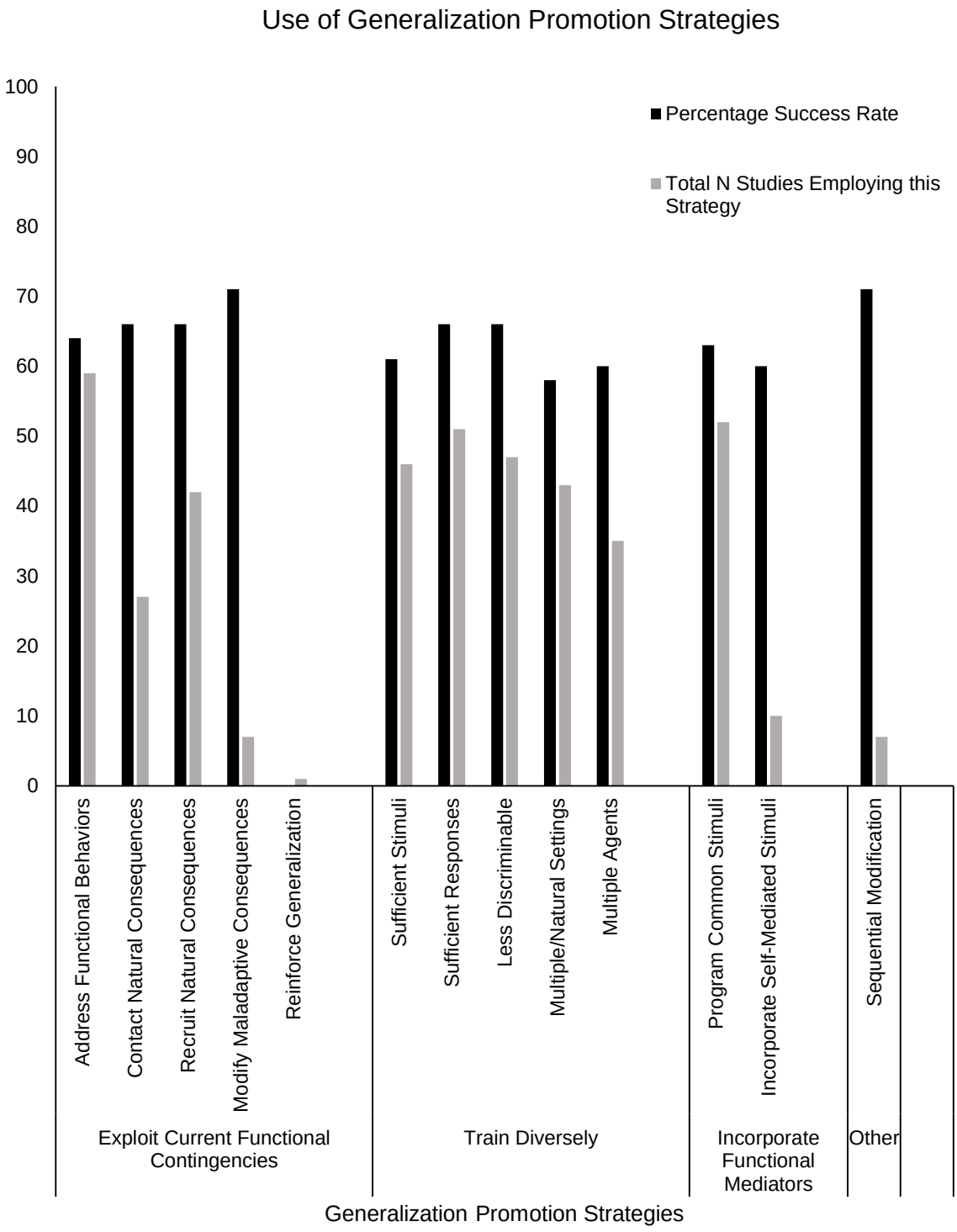

Figure 2.3. Use of the generalization promotion strategies and success rates across studies (total *N*=59).

Table 2.6

Percentage Generalization Success Rates (N) for Generalization Promotion Strategies and Evidence-Based Intervention Components.

		Evidence-Based Intervention Components								
		MD	NI	PMII	PP	R	SST	TD	VM	VS
Generalization Promotion Strategies										
Exploit Current Functional Contingencies	Address Functional Behaviors	63% (24)	71% (7)	62% (37)	64% (45)	66% (42)	64% (59)	65% (20)	60% (10)	64% (14)
	Contact Natural Consequences	66% (9)	66% (6)	68% (19)	71% (21)	62% (21)	66% (27)	66% (12)	60% (5)	66% (6)
	Recruit Natural Consequences	59% (17)	66% (6)	64% (33)	71% (31)	68% (31)	66% (42)	77% (13)	<5	73% (11)
Train Diversely	Sufficient Stimuli	63% (19)	60% (5)	58% (31)	59% (34)	62% (34)	61% (44)	60% (15)	57% (7)	55% (11)
	Sufficient Responses	65% (20)	66% (6)	63% (32)	64% (39)	68% (37)	66% (51)	69% (16)	66% (9)	58% (12)
	Less Discriminable	53% (17)	71% (7)	66% (32)	70% (37)	71% (31)	66% (47)	66% (18)	63% (8)	73% (11)
	Multiple/Natural Settings	53% (19)	66% (6)	58% (31)	59% (32)	62% (29)	57% (42)	63% (19)	60% (5)	64% (11)
	Multiple Agents	57% (14)	60% (5)	57% (28)	62% (26)	60% (25)	60% (35)	69% (13)	63% (8)	62% (13)
Incorporate Functional Mediators	Program Common Stimuli	59% (22)	71% (7)	62% (37)	66% (41)	65% (37)	63% (51)	63% (19)	63% (8)	66% (12)
	Incorporate Self-Mediated Stimuli	71% (7)	<5	80% (5)	55% (9)	63% (8)	60% (10)	57% (7)	<5	<5

Note. N denotes the total number of studies included in the success rate calculation. A number of the evidence-based practices coded in the current review are not presented in this table due to a lack of studies employing these practices (ABI, DTT, FCT, PII, PECS, PRT, RIR, SC, SM, TAII).

Table 2.7

Percentage Generalization Success Rates (N) by Treatment Variables and Generalization Promotion Strategies.

Generalization Promotion Strategy	Rate by Dependent Variable Type		Rate by EBP Components in Intervention		Rate by Others Involved	Rate by Dosage (Session Duration)		Rate by Dosage (Sessions per Week)		Rate by Setting		
	G	S	<5	≥5	Y	≤10 min	10 min+	≤3 P/W	3+ P/W	S	H	C/U
ECFC												
CNC	65% (26)	<5	63% (16)	73% (11)	65% (26)	62% (13)	70% (10)	71% (7)	60% (5)	67% (21)	<5	<5
RNC	63% (38)	71% (7)	63% (24)	72% (18)	67% (42)	56% (16)	67% (21)	70% (10)	60% (10)	65% (31)	67% (6)	83% (6)
MMC	71% (7)	-	60% (5)	<5	83% (6)	<5	<5	<5	-	<5	<5	<5
TD												
SS	61% (44)	50% (6)	59% (27)	63% (19)	63% (43)	59% (22)	63% (24)	64% (14)	58% (12)	60% (35)	40% (5)	71% (7)
SR	66% (50)	60% (5)	65% (34)	71% (17)	68% (47)	65% (20)	64% (25)	64% (14)	58% (12)	67% (39)	60% (5)	71% (7)
LD	64% (44)	<5	62% (29)	72% (18)	69% (42)	62% (21)	70% (20)	58% (12)	60% (10)	64% (36)	60% (5)	83% (6)
S	59% (41)	<5	56% (25)	61% (18)	63% (40)	50% (20)	67% (18)	64% (11)	50% (10)	58% (38)	<5	<5
MA	57% (35)	<5	59% (17)	61% (18)	61% (33)	56% (16)	61% (18)	60% (10)	56% (9)	63% (30)	<5	<5
IFM												
PCS	63% (46)	63% (8)	61% (31)	67% (21)	65% (49)	57% (23)	64% (22)	62% (13)	55% (11)	58% (37)	57% (7)	88% (8)
SMS	63% (8)	<5	40% (5)	80% (5)	67% (9)	40% (5)	<5	67% (6)	<5	57% (7)	<5	<5

Note. N denotes the total number of studies included in the success rate calculation. The dependent variable has been categorized as general (G) and specific (S). EBP denotes evidence-based practice. Generalization-promotion strategies codes are presented as outlined previously. P/W denotes per week. Setting is categorized as school (S), home (H) and clinic or university (C/U).

A number of combinations of generalization-promotion strategies and treatment factors demonstrated high success rates. The highest success rate was evident for programming common stimuli with a clinic or university intervention setting which demonstrated success in 88% of 8 studies. The respective combinations of making intervention less discriminable and employing strategies to recruit natural consequences with clinic or university intervention settings also demonstrated high success rates at 83% across 6 studies. Combining the strategy of modifying maladaptive consequences with involving others in intervention also demonstrated an 83% success rate in 6 studies.

Discussion

The current review aimed to systematically evaluate generalization and maintenance of peer-related social skills for preschool age children with ASD. The main objectives were to investigate the status of this literature regarding generalization and maintenance data collection and assessment, the use of generalization-promotion strategies, and generalization and maintenance outcomes. Furthermore, analyses of factors posited to influence successful generalization outcomes were carried out.

As outlined previously, the current review covered the publication period from 1977 to 2017. Prior to exclusion of studies based on intervention outcomes, a total of 75 studies were identified which provided generalization and/or maintenance data. With regards to generalization and maintenance data collection, assessment and outcomes, this is encouraging when taken together with the data displayed in Figure 2.2, which demonstrate increasing trends in the measurement of generalization and/or maintenance, as well as an increasing number of studies meeting the criteria for the most successful group (as in Chandler et al., 1992). Furthermore, the majority of studies included in the current review met the criteria for the most successful group as outlined by Chandler et al. (1992) and only one study met the original criteria for the less successful group. As outlined previously, generalization of intervention outcomes remains a persistent challenge for individuals with ASD (Camargo et al., 2016). Within the context of targeting social skills in particular, failure to demonstrate generalization to other contexts or maintenance across time calls into question the sustainability, feasibility, and utility of interventions (Osnes & Lieblein, 2003; Zhang & Wheeler, 2011). Therefore, these findings which suggest that peer-related social skills interventions for preschool age children with ASD are increasingly resulting in successful generalization and maintenance outcomes are promising.

Previous reviews regarding generalization and maintenance have repeatedly highlighted the importance of progression toward an empirical technology of generalization-promotion (Osnes & Lieblein, 2003; Stokes & Baer, 1977; Stokes & Osnes, 1989; Swan et al., 2016) through systematic evaluation of the functional variables accounting for successful generalization including generalization-promotion strategies and factors influencing their efficacy (Chandler et al.,1992; Osnes & Lieblein, 2003; Swan et al., 2016). The current review aimed to investigate progression toward this goal within the literature regarding peer-related social skills interventions for preschool age children with ASD.

All of the studies included in the current review have contributed to the development of the understanding of the concept of generalization through measuring and reporting generalization and/or maintenance outcomes and employing multiple generalization-promotion strategies. The majority of the studies included in the current review successfully taught various developmentally appropriate social skills within and across response classes which were likely to recruit reinforcement in the natural environment (e.g., peer-directed initiations, responses and play), thereby supporting generalization and maintenance of these skills. Furthermore, as evident in Table 2.3, the majority of the included studies utilized a number of the generalization-promotion strategies outlined by Stokes and Baer (1977) and Stokes and Osnes (1989) through, for example, involving familiar individuals in intervention (e.g., Haring & Lovinger, 1989) and having various individuals deliver intervention (e.g., Johnston et al., 2003), incorporating children's interests or salient, common stimuli into intervention (e.g., Baker, 2000), carrying out intervention in the natural setting (e.g., Lee & Lee, 2015), and teaching across various stimuli and responses (e.g., Nelson et al., 2017).

It is therefore evident that, in addition to reporting generalization and maintenance outcomes, the majority of the studies included in the current review employed some combination of generalization-promotion strategies. A number of studies further emphasized generalization, for example, through including generalization as a dependent variable (e.g., Kassardijan et al., 2013) or comprehensively assessing generalization across dimensions (e.g., Leaf et al., 2009). However, studies were not designed to control for generalization-promotion variables or to systematically evaluate their effect which reiterates findings from Osnes and Lieblein (2003).

Across studies, the generalization-promotion strategies demonstrated relatively high success rates as presented in Figure 2.3. This finding is promising as it suggests that

employing any generalization promotion strategy should support successful generalization outcomes to some extent. However, most success rates ranged between 60% and 70% which indicates that generalization outcomes were less successful for the remaining 30-40% of studies employing these strategies. Within the current review, a number of analyses were carried out to explore the factors posited to influence generalization outcomes and the success of generalization promotion strategies in previous research.

Chandler et al. (1992) posited that further research was warranted regarding the relationship between generalization assessment designs and generalization outcomes. In the current review, several study factors relating to design, assessment and methodology which have been suggested to influence generalization outcomes (Chandler et al., 1992; Peterson, 2009) were investigated through comparisons between the most successful and less successful groups (Table 2.5). The majority of the differentiated results in the comparisons between the two groups (study design, maintenance assessment, and design) can likely be attributed to the inclusion of studies that employed a reversal design within the category of studies that evaluated maintenance as in Osnes and Lieblein (2003). As in Osnes and Lieblein (2003), the majority of these studies demonstrated experimental control, thereby failing to demonstrate durability of intervention effects when the intervention was withdrawn.

Interestingly, where findings from Chandler et al. (1992) indicated that the use of withdrawal designs may support generalization outcomes, there was little difference between the two groups in the current review on the use of this design. The large difference in the current review in the proportion of studies employing multiple probes for generalization at baseline and post-test between the two groups is interesting to consider with regards to generalization assessment. Where generalization data are provided at baseline and post-test, or on a continuous basis through all phases of a study, this provides comprehensive standards for comparison (baseline and treatment) and controls for the possibility that higher levels of behavior may have been occurring within the generalization context at baseline. This, in turn, sets a “higher standard” of sorts for generalization data and this may explain the greater proportion of studies employing this measurement in the less successful group. In line with this, perhaps it is pertinent to consider establishing a hierarchy for generalization assessment and evidence. For example, several studies in the current review employed designs which allowed for the systematic analysis of generalization promotion strategies on generalization outcomes, as in Osnes and Lieblein (2003) (e.g., Hundert et al., 2014). A number of studies included generalization phases and/or sequential modification with different generalization

promotion strategies in order to ensure satisfactory generalization results and such studies provide an empirical demonstration of the effectiveness of such strategies (e.g., Leaf et al., 2010; Kassardijan et al., 2013). In terms of contributing to the development of an empirical technology of generalization, such studies likely represent the current "gold standard". As outlined previously, in comparison to post-test data alone, providing baseline and post-test or continuous generalization data allows for a more comprehensive appraisal of generalization results. For example, where an intervention package is employed, baseline and post-test generalization data allow for some analysis of the effectiveness of the combination of generalization promotion strategies within that package (albeit limiting analysis of individual strategy effects). In contrast, where researchers provide 1-2 probes of generalization only at post-test, even if intervention components have been introduced in a staggered manner, this provides limited information about the effectiveness of the intervention in producing successful generalization outcomes. This may reflect a difficulty with the implication of Stokes and Baer's (1977) definition of generalization highlighted by Osnes and Lieblein (2003) suggesting that this definition could imply that the occurrence of generalization is sufficient, without warranting empirical demonstration of the functional variables accounting for it. However, it is promising that, overall, a higher proportion of studies in the current review employed continuous probe or multiple probe pre-post generalization assessment designs.

The differential success rate analyses displayed Table 2.6 and Table 2.7 reflect efforts to systematically evaluate the influence of treatment factors posited to influence generalization outcomes and the generalization-promotion strategies. Results from these analyses have particularly significant clinical and research implications. As previously outlined, a number of combinations of evidence-based intervention strategies and generalization promotion strategies demonstrated high success rates for generalization outcomes (Table 2.6). Differentiated success rate results were also evident across the treatment factors presented in Table 2.7. While these results are preliminary, given the variation in the number of studies included in each success rate calculation and the absence of studies precluding analysis in some categories, they are a useful point of reference for clinicians and researchers aiming to target social skills with preschool age children with ASD. Within such program planning, researchers, and clinicians can consult Table 2.6 for suggestions regarding combinations of intervention strategies and generalization promotion strategies that are most likely to support successful generalization outcomes. Furthermore, the

findings presented in Table 2.7 could be consulted in order to identify the generalization promotion strategy that is most likely to promote successful generalization dependent on specific intervention factors such as duration and setting. Systematic evaluations of generalization outcomes from such applications will inform the development of a technology of generalization promotion within social skills interventions for preschool children with ASD.

The findings from the current review provide a descriptive analysis and summary of the status of the literature regarding generalization and maintenance in interventions to improve peer-related social skills for preschool age children with ASD. In addition to the contributions to the literature outlined previously, the current findings also highlight several areas for future research. Firstly, these findings reflect those of previous reviews regarding generalization and maintenance (Chandler et al., 1992, Osnes & Lieblein, 2003; Neely et al., 2015; Swan et al., 2016) highlighting further the need for thoughtfully designed studies systematically evaluating the functional variables accounting for successful generalization and incorporating generalization-promotion at each stage of intervention and research design and analysis (Osnes & Lieblein, 2003). As previously outlined, the current review has provided a starting point for such research within the field of social skills interventions for preschool children with ASD. In addition to this, a number of studies included in the current review employed sequential modification in an effort to address a lack of successful generalization outcomes (e.g., Apple et al., 2005; Shafer et al., 1984). Future research should continue to employ such strategies in order to account for the functional variables responsible for improving generalization outcomes which are initially unsatisfactory.

With regards to maintenance data collection, across all of the included studies in the current review, the longest reported latency to follow up probes was approximately 4 months. This finding is similar to that of Matson and Konst (2013) and lends little to an analysis of the long-term maintenance of peer-related social skills intervention outcomes for preschool age children with ASD. Given the potential for early intervention to ameliorate challenges later in life (Dawson-McClure et al., 2015) and the importance of proficient social skills across the lifespan, long-term maintenance of social skill intervention outcomes is a critical area for future research.

Within the social skills literature, the identification and assessment of deficits warrants further research. There is a tendency for researchers to assume acquisition deficits

(Matson, Matson & Rivet, 2007) and design interventions based on this assumption. However, several researchers have highlighted the differences between acquisition, performance and fluency deficits (Camargo et al., 2016; Gresham, 2014; Gresham, Sugai & Horner, 2001) and the importance of identifying the correct deficit in order to match intervention strategies and ensure success (Bellini et al., 2007; Camargo et al., 2016; Gresham, 2014; Rao et al., 2008; Whalon, Conroy, Martinez & Werch, 2015; Wang, Parrila & Cui, 2013). No study in the current review explicitly and systematically assessed the type of deficit for participants and matched intervention to this deficit. A mismatch between deficit and intervention strategies is likely to impede both intervention success and generalization and maintenance of outcomes (Camargo et al., 2016) and therefore, this is a critical area for future research.

It is pertinent to acknowledge a number of limitations within the current review. Firstly, the inclusion criteria regarding ASD diagnosis was stringent and likely led to the exclusion of older studies and studies with younger participants or participants from lower socio-economic backgrounds. However, the application of this criteria provided a relatively homogenous sample for analysis across studies. Secondly, certain skills which could be considered social skills were excluded from the current review (e.g., early social skills such as joint attention, specific play skills, and communication targets).

In conclusion, the findings from the current review suggest increasing success in generalization and maintenance outcomes in peer-related social skills interventions for preschool age children with ASD. The current findings also suggest progress past the train and hope stage of development of a technology of generalization-promotion (Osnes & Lieblein, 2003). However, increasing application of the generalization-promotion strategies coupled with a continuing paucity of studies systematically programming for generalization and empirically evaluating the strategies and factors which support successful generalization has halted progress at what could be described as a “Train with Strategies and Hope” phase. It is imperative that researchers and practitioners in applied behavior analysis continue to strive toward the development of an empirical technology of generalization-promotion through systematically evaluating the generalization-promotion strategies and factors which influence their effectiveness. Future research in this area is imperative in informing progress toward generality and applied and effective outcomes in applied behavior analysis (Baer, Wolf & Risley, 1968) and the current review highlights several avenues for such research.

3. A Systematic Review of Peer-Mediated Interventions for Preschool Children with Autism Spectrum Disorder in Inclusive Settings

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Abstract

Peer-mediated interventions (PMI) represent a promising intervention for skills teaching for children with Autism Spectrum Disorder (ASD), particularly within the context of early learning environments. PMI have several potential advantages in comparison to adult-led intervention, however, there is a lack of research evaluating the use of PMI with younger populations. This review aims to synthesize the literature regarding the use of PMI in skills teaching for children with ASD in preschool settings. A systematic search of the literature spanning 1980-2018 was conducted, and 31 articles were identified for inclusion. Results are discussed in relation to participant and peer characteristics, PMI procedures, target skills, intervention outcomes and research strength. The effectiveness of PMI is discussed along with directions for future research.

Keywords: autism spectrum disorder, peer-mediated interventions, preschool, skills teaching, inclusion

Introduction

One of the core diagnostic characteristics of autism spectrum disorders (ASD) is the presence of deficits in social and communication skill repertoires (American Psychological

Association, 2013). Inclusion within mainstream preschool settings has many benefits for children with ASD including providing peer models of developmentally appropriate skills and establishing opportunities to interact and develop skills with a variety of communication partners (Kohler & Strain, 1990; Wang, Cui & Parrila, 2011). High-quality early intervention has repeatedly been identified as important and effective in producing positive outcomes for children with ASD (Boyd, Odom, Humphreys & Sam, 2010), and preschool inclusion is widely recognized as promoting positive outcomes for all children in the preschool classroom (Barton & Smith, 2015). Given these findings, preschool inclusion for children with developmental disabilities has been advocated for in federal law and policy worldwide, in turn leading to an increase in the numbers of children with ASD attending preschool settings (Camargo et al., 2014).

With the increasing inclusion of children with ASD in mainstream preschool settings, there is growing concern regarding the potential for the social and communication deficits commonly observed in children with ASD to compromise successful integration (Camargo et al., 2014). Such skill deficits may negatively impact upon the development of peer relationships and act as barriers to learning and successful social inclusion for preschool children with ASD in inclusive settings (Dunlap et al., 2006; Lorah, Gilroy & Hineline, 2014; Vo, Sutherland & Conroy, 2012). Furthermore, the skill impairments experienced by children with ASD often hinder their ability to learn incidentally through exposure to their typical peers without specific supports in place (Camargo et al., 2014). It is increasingly recognized that such barriers exist and, therefore, evidence-based interventions and strategies are necessary to support children with ASD to access the benefits of inclusive settings through supporting learning, skill acquisition, and successful inclusion (Shafer, 1994; Wang et al, 2011). There is currently a lack of research investigating evidence-based interventions and implementation practices to support skill development for children with ASD within the inclusive preschool context (Barton & Smith, 2015)

Peer-mediated interventions (PMI) represent a suite of skills teaching strategies, which also promote social interactions and social skill development (Watkins et al., 2015). Within PMI, typically developing peers are involved in skills teaching and such interventions have demonstrated success in teaching a wide range of skills to children with ASD and developmental disabilities (e.g., Hundert, Rowe, & Harrison, 2014; Katz & Girolametto, 2013; Mason, Kamps, Turcotte, Cox, Feldmiller, & Miller, 2014; Trembath, Balandin, Togher, & Stancliffe, 2009). Peers may take on a number of roles within PMI including

providing models of appropriate behavior, initiating interactions, and prompting and reinforcing target behaviors (Odom & Strain, 1984). Within the literature, PMI have demonstrated improvements in social, communication, academic, and play skills (Bene, Banda, & Brown, 2014; Shivers & Plavnick, 2015; Sperry, Neitzel, & Engelhardt-Wells, 2010), and are associated with a number of unique benefits. PMI provide opportunities for students with ASD to interact with and practice skills with a variety of communication partners, increasing the possibility of skill generalization and maintenance (Wang et al., 2011; Watkins et al., 2015). This also affords increased opportunities for social interactions and development of social skills within intervention (Watkins et al., 2015). Benefits for peers participating in PMI include increased positive interactions with peers with ASD, positive social validity outcomes, increased sensitivity to others, and academic gains (Carter, Cushing, & Kennedy, 2008; Odom, Hoyson, Jamieson, & Strain, 1985). Furthermore, the involvement of peers in interventions can increase learning opportunities across contexts and potentially place fewer demands on therapists or teachers to serve as the sole interventionist (Chan et al., 2009).

PMI have been employed with populations across the lifespan including; early childhood, school-age children, adolescents, and adults (e.g., Farmer-Dougan, 1994; Harper, Symon, & Frea, 2008; Mason et al., 2014). A number of systematic reviews and meta-analyses have been conducted with this literature and discuss the efficacy of PMI for children with ASD (Chan et al., 2009; Chang & Locke, 2016; Watkins et al., 2015; Whalon et al., 2015; Zhang & Wheeler, 2011). In terms of the development of social skills, PMI represent a robust treatment approach for targeting social deficits among children with ASD (McConnell, 2002). Furthermore, within the National Autism Center's (NAC) National Standards Project Reports (Phase 1, 2009; Phase 2, 2015), and the National Professional Development Center's (NPDC) systematic literature reviews of evidence based practices for children with ASD (2010; 2014), PMI were identified as an established evidence based practice for children with ASD aged 0-22 years.

Despite these positive findings, there remains several pertinent gaps in the literature regarding PMI with preschool age children in inclusive settings. Within the broad review of the literature carried out in Phase 1 of the National Standards Project Report (NAC, 2009), 33 studies supporting the evidence base for PMI were identified. Of these 33 studies, only 10 involved preschool age children with ASD (total *N* across studies = 31 children) and their peers in inclusive settings. In the NPDC updated report, Wong et al. (2014) identified 15 PMI

studies, of which 8 involved preschool age children with ASD and their peers in inclusive settings. However, only 4 of these studies had not previously been included in the National Standards Project Report (NAC; 2009). Therefore, across the 54 years covered by these broad evidence based practice reviews, a total of 14 studies (total *N*=40 children with ASD) investigating PMI with preschool age children in inclusive settings were identified. Given the comprehensive and broad nature of these reviews, the authors suggest that future research should extend to more detailed analyses of treatments identified as established with specific populations (age, diagnosis etc.) and in different settings (NAC, 2009).

In their broad review and meta-analysis of behaviorally based interventions to improve social interaction skills for children with ASD, Camargo and colleagues (2014; 2016) identified five studies utilising PMI, with three of these occurring with preschool children within inclusive settings. While preschool age children with ASD were the largest cohort included in these reviews (*N*=35), only nine of these children experienced PMI. The authors highlighted further the importance of identifying intervention components that are most effective for varying age groups and within different contexts. Furthermore, Camargo et al. (2016) identified peer training and peer implementation of intervention strategies as important areas for future research. Additionally, most focused systematic reviews of PMI published to date have focused on school-aged and adolescent populations, with little attention given to PMI involving preschool age participants. In a review of 42 studies involving preschoolers to adolescents (mean age 8.6 years old), Chan et al., (2009) found PMI to be a potentially versatile and effective intervention for children with ASD. However, of the included studies only eight (19%) included preschool age children, thus limiting the generalization of overall study findings to this population. Similarly, in their review of PMI within inclusive settings, Watkins and colleagues (2015) reported positive results overall, however, only three studies (21%) involved preschool age participants. Given the vast body of research supporting the effects of early intervention, the unique benefits associated with PMI, and the suitability of PMI to the preschool environment (which is specifically designed to support social interactions and development), and the relative underrepresentation of such studies in previous reviews, a focused systematic review of the existing studies evaluating the application of PMI with preschool age children is warranted.

Watkins and colleagues (2015) suggested that future investigations should examine the most effective strategies to develop peer networks, which would support maximisation of the potential benefits of PMI. Their review of PMI demonstrated higher success when utilized

with younger children than in adolescent populations (Wang et al., 2011; Zhang & Wheeler, 2011), and highlighted that specific intervention characteristics related to efficacy warrant further research to identify the participant and intervention factors that support positive outcomes in PMI. Furthermore, despite the potential advantages of PMI for preschool age children, there exist a number of questions that warrant a synthesis of PMI research for preschool children. Concerns over treatment integrity have been raised as a potential limitation associated with PMI (Chan et al., 2009). Additionally, Watkins et al. (2015) posited that higher levels of support, training, and resources may be required in PMI with preschool age participants to safeguard treatment fidelity and efficacy in comparison to PMI with older participants. Previous research has also highlighted concerns regarding the potential for stigmatisation of children with ASD to occur within PMI (Chan et al., 2009) and, as such, a synthesis of the measurement of social validity within PMI is warranted. Given the importance of generalization and maintenance of intervention outcomes, particularly for individuals with ASD (Camargo et al., 2016; Neely et al., 2015) and the suggested efficacy of PMI to support these outcomes (Wang et al., 2011; Watkins et al., 2015), an analysis of such findings with preschool age children with ASD is warranted.

The current review aims to evaluate the use of PMI with preschool children with ASD within inclusive educational settings. The effectiveness of PMI in skills teaching for preschool children with ASD will be evaluated through examination of intervention outcomes and the strength of the research studies included. Characteristics of PMI will be examined in terms of participant and peer characteristics, skills targeted with PMI within this educational context, PMI strategies and training employed, and measures of generalization, maintenance, treatment integrity, and social validity employed within PMI.

Method

Systematic search procedures. Systematic searches were conducted for this review using the following five databases; Education Resources Information Center (ERIC), PsycINFO, Scopus, Web of Science and Psychology and Behavioral Sciences Collection (EBSCO). Combinations of the following terms were inputted into each database: (1) “autis*” or “asperger*”, (2) “communication skills” or “social skills” or “play” or “skills teaching”, (3) “peer-mediation” or “peer training” or “peer tutoring” or “peer modeling” or “buddy system”, (4) “preschool” or “kindergarten” (i.e., “autis*” AND “communication skills” AND “peer modeling” AND “preschool”). Initial online searches yielded 2,361

articles for potential inclusion. In order to identify relevant studies, which may have been undetected during electronic searches, the reference sections of studies identified as meeting the inclusion criteria were also examined.

Inclusion criteria. To be included in the current review, studies must have described the use of a peer-mediated intervention. Studies were excluded if peer behavior and/or involvement in intervention was not explicitly stated (Caballero & Connell, 2010). Studies were also excluded if the intervention involved a treatment package including peer-mediated components, but the effects of the peer-mediated component on outcomes could not be extracted for analysis (e.g., Kohler, Anthony, Steighner, & Hoyson, 2001).

In addition to this, articles were required to meet a number of inclusion criteria: (a) the study had to evaluate a skills teaching intervention for a child/children with a diagnosis of ASD (if a study included data for individuals with disabilities other than ASD, only data for individuals with ASD were examined); (b) all participants in the included studies with ASD had to be under 6 years old and in attendance in a pre-school service (group-based childcare setting); (c) the intervention must have occurred in an inclusive setting; a mainstream classroom, an integrated classroom, or a special educational setting, which incorporated integration with typically developing peers; (d) studies had to employ an experimental research design (i.e., group or single subject research designs) that demonstrated experimental control, allowing for direct analysis of the impact of intervention on behavior; and (e) the study must have been published in a peer-reviewed journal. Only studies published in English between 1980 and 2018 were included.

Previous reviews and meta-analyses have primarily focused on the application of PMI in targeting social skills (McConnell, 2002; Wang et al., 2011; Watkins et al., 2015; Whalon et al., 2015). A review by Chan and colleagues (2009) included a wide range of skills and found that the most common dependent variable assessed was social interaction (88% of studies). However, given the potential benefits of PMI for skill acquisition across skill domains and the limited numbers of studies employing PMI with preschool children identified in previous reviews which focused on specific skill repertoires (Watkins et al., 2015), there was no restriction by target skill in the current review.

Titles and abstracts were screened against the inclusion and exclusion criteria, which resulted in the identification of 46 articles for inclusion. The full text of each article was then

screened against the inclusion criteria which resulted in the identification of 31 articles which met the inclusion criteria and were included in the current review.

Interrater reliability (IRR). A second rater independently completed the searches across three of the databases (ERIC, Scopus and Web of Science) and independently screened the titles and abstracts of the search results against the inclusion criteria to provide IRR for the initial title and abstract screen. IRR was calculated at this stage by comparing the articles identified for inclusion from these searches by the first rater to those identified by the second rater and dividing the number of agreements (articles identified for inclusion by both raters) by the total number of articles identified for inclusion. Interrater agreement across the total of 33 articles identified by the two raters was 82%. The full texts of these articles were then screened against the inclusion criteria and the first and second raters discussed any disagreements with the third and fourth rater which resulted in 100% agreement on the inclusion of 17 articles.

Throughout the current review, the second author completed the data extraction with the first author acting as second rater. The first author independently extracted the relevant information and applied the coding systems for a proportion of the included studies. After this was completed, IRR agreement was calculated between the first and second rater and any disagreements were discussed with the third and fourth authors (as third and fourth raters) until 100% agreement was reached.

Data extraction. Each study included in the review was summarized in terms of: (a) participant characteristics; (b) type of preschool setting; (c) target skill(s) for participant(s) with ASD; (d) intervention results for target skills for children with ASD; (e) peer characteristics (*N*, age and gender) and peer selection criteria; (f) peer training procedures; (g) PMI procedure; (h) peer outcome variables and results; (i) research strength and design, and (j) measures of generalization, maintenance, treatment integrity, and social validity.

IRR. The second rater independently extracted the information regarding skills targeted in intervention for 24 of the included studies (75%). IRR was calculated by dividing the number of agreements between the first and second raters by the total number of agreements and disagreements resulting in interrater agreement of 100%.

Participant characteristics. The number, gender and age of participants with ASD were noted. Any co-occurring disorders were also noted. Where functioning level was reported for participants based on an assessment (e.g., the Childhood Autism Rating Scale

(CARS); Schopler, Reichler & Renner, 1986), this was noted. If information from such an assessment was not included, functioning level was reported based on the scale developed by Reichow and Volkmar (2010) where these data were available. Participants categorized as lower functioning had limited or no verbal language skills and had an IQ < 55. Those categorized as moderate functioning had an IQ of 55-85 and basic verbal communication skills. Those categorized as higher functioning had IQ > 85 and typically verbal communication. Where provided, specific selection criteria (further than participants being in attendance in preschool and having a diagnosis of ASD) including prerequisite skills required for participants to be able to access intervention or specific skill deficits for target within intervention were recorded.

Type of preschool setting. The description of the preschool setting of each included study was noted. Mainstream preschools referred to those in which the majority of children were typically developing. Integrated or inclusive preschools included those in which there were equitable numbers of children with ASD or disabilities and typically developing children. Special education preschools included those which catered primarily for children with disabilities and or developmental delays.

Intervention outcome. The participant and peer outcomes of each study were coded using the coding system developed by Bennett and Dukes (2014). Results were coded as positive if all skills increased for all participants over baseline. Results were coded as negative if all skills for all participants remained unchanged from baseline or declined. Results were coded as mixed if some of the participant's target skills improved, while others remained unchanged from baseline or declined. It is important to note that this analysis did not indicate the magnitude of change demonstrated following intervention.

IRR. The second rater independently coded the intervention outcomes for children with ASD for 19 of the included studies (59%). IRR was calculated by dividing the number of agreements between the two raters by the total number of agreements and disagreements resulting in interrater agreement of 84%. The second rater independently coded the outcome of the intervention for peer outcomes for 24 of the included studies (75%). IRR was calculated as previously described resulting in 88% agreement between the two raters.

Peer training procedure. The procedure used in each study to teach peers to implement PMI was examined. The specific behavioral skills training (BST) components utilized (e.g., instructions, modeling, role-play, prompting, corrective feedback) were noted

as well as the number of components used in combination. Furthermore studies were examined in relation to whether peer training occurred only prior to PMI sessions with children with ASD present, or if continuous training and/or support was provided in-vivo during PMI sessions.

IRR. The second rater independently extracted the peer training information for 19 of the included studies (59%). Within this code, there were 14 training procedures that the raters identified as either absent or present for each study. Across 266 possible agreements, IRR was calculated by dividing the number of agreements between the two raters by the total number of agreements and disagreements resulting in interrater agreement of 82%.

Peer-mediated intervention procedure. Each study was coded using the categorisation of PMI utilized by Watkins et al., (2015), and based on Odom and Strain (1984). A study was coded as proximity if peer involvement was limited to being placed in proximity to participants with ASD in order to provide a model of target behaviors, without any specific prompts to interact. A study was coded as prompting and reinforcing if peers were specifically trained to prompt a target behavior and/or to deliver reinforcement contingent on the occurrence of a target behavior. A study was coded as initiation if peers were trained to make an initiation towards participants with ASD, for example, invitations to play.

IRR. The second rater independently coded the PMI procedure for 18 of the included studies (56%). IRR was calculated by dividing the number of agreements between the two raters by the total number of agreements and disagreements resulting in interrater agreement of 72%.

Strength of the research and research design. The strength of research was determined in accordance with guidelines set out by Reichow, Volkmar and Cicchetti (2008) on evaluating evidence-based practice. The strength of studies utilising single subject research designs were assessed on a number of primary quality indicators: participant characteristics, independent and dependent variables, baseline condition, visual analysis, and demonstration of experimental control. Secondary quality indicators for single subject research included evidence of interobserver agreement, kappa, fidelity, blind raters, generalization, maintenance, and social validity. No study included in the current review used a group research design.

Strength of research was determined based on the presence of quality indicators, resulting in ratings of strong, adequate, or weak. Studies rated as strong received high quality ratings on all primary indicators, and showed evidence of at least three secondary indicators. Studies that received ratings of adequate received high quality ratings on at least four primary indicators with no unacceptable ratings and presented results of at least two secondary quality ratings. Finally, studies rated as weak showed evidence of high quality ratings on fewer than four primary quality indicators and less than two secondary indicators. Research design was also noted.

IRR. The second rater independently evaluated the strength of research in accordance with the Reichow et al. (2008) guidelines for 19 of the included studies (59%). For each study, there were 11 potential agreements/disagreements. Across 209 items, IRR was calculated by dividing the number of agreements between the first and second raters by the total number of agreements and disagreements resulting in interrater agreement of 93%.

Generalization, maintenance, treatment integrity and social validity. The presence or absence of measures of generalization and maintenance of intervention outcomes, treatment integrity and social validity was recorded for each study.

The presence of a measure of generalization was coded if the target skill was measured in a context that was different to the intervention context (e.g., a different setting or with different peers). Strategies employed within intervention to program for generalization were also coded according to the presence of Stokes and Baer's (1977) nine technologies of generalization: (a) train and hope (TH); (b) sequential modification (SM); (c) introduce natural maintaining contingencies (NC); (d) train sufficient exemplars (SE); (e) train loosely (TL); (f) use of indiscriminable contingencies (IC); (g) program common stimuli (PCS); (h) mediate generalization (MG); and (i) train "to generalize" (TG). The presence of a measure of maintenance of intervention results was coded if the intervention outcomes were measured after the intervention had concluded. Where studies reported maintenance outcomes, the number of maintenance probes and length of time since termination of intervention condition was also recorded.

If measures of treatment integrity were taken within a study this was coded. Methods used to monitor treatment integrity included; (a) criterion-based pre-intervention training of peers, (b) direct observation, with or without feedback and/or interobserver agreement on occurrence of target behaviors, and (c) intervention fidelity checklists measuring strategy use

or steps completed correctly, completed during intervention by peer interventionists or other independent observers. This coding system is based on a system employed by McCoy, Holloway, Healy, Rispoli, and Neely (2016). Each study was also coded for the presence or absence of a measure to monitor intervention satisfaction or social validity. The stakeholders involved who completed measures of social validity were also noted.

IRR. The generalization promotion strategies employed were independently coded by the second rater for 19 of the included studies (59%). Within this code there were nine items for potential agreement/disagreement for each study. Across a possible 171 agreements, IRR was calculated by dividing the number of agreements between the first and second raters by the total number of agreements and disagreements resulting in interrater agreement of 98%.

Results

A total of 31 articles (32 experiments) evaluating PMI with preschool children with ASD in inclusive settings were included in the current review. The current review spans 31 years of PMI research with the earliest study included in the current review published in 1986 (Odom & Strain, 1986) and the most recent study published in 2017 (Thiemann-Bourque, McGuff & Goldstein, 2017). Figure 3.1 displays the number of articles employing PMI to teach skills for preschool children with ASD published per decade between 1980 and 2018. The number of articles published utilising PMI with preschool children with ASD increased between the 1980s and the 1990s, with a further slight increase in the 2000s. Interestingly, the current figure for 2010-2018 represents a decrease in the number of articles published in this area in comparison to the previous decades. It is important to note that searches for the current review were completed up to March 2018.

Table 3.1 displays the descriptive information for each study included in the current review regarding the participants with ASD, intervention setting, target skills and intervention outcomes.

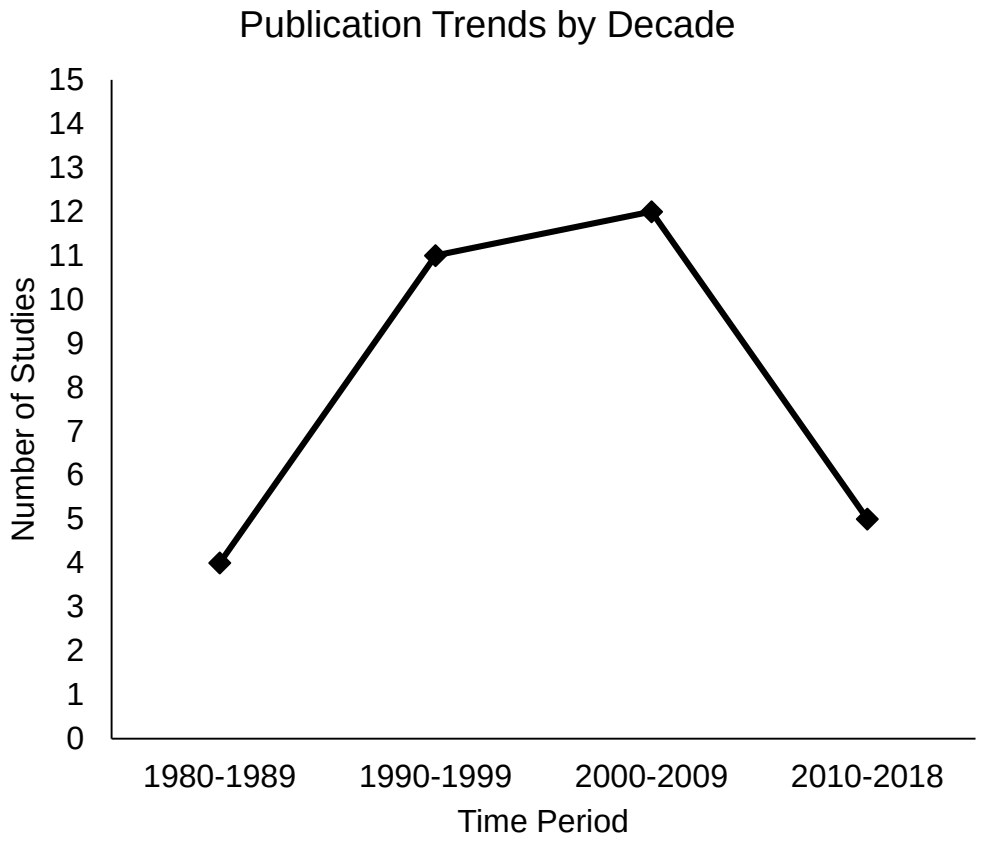

Figure 3.1. Number of studies per decade employing PMI to teach skills for preschool children with ASD.

Table 3.1
Descriptive Summary of Included Studies

References	Participants	Target Skills and Setting	Results
Belchic and Harris (1994)	3 M 4:3, 5:4, 5:8 years old Autistic disorder Mild-moderate (CARS)	Social interactions (initiation, response, extended interaction) Integrated preschool	Positive
Bellini, Gardner, Hudock & Kashima-Ellingson (2016)	3 M 4;9, 5;2, 5;8 years old Autism Lower-high functioning	Social engagement, social initiations, social responses Public preschool setting (predominantly children with disabilities with some typically developing peers)	Positive
Carr and Darcy (1990)	3 M 4 years old Autism Lower-moderate functioning	Motor imitation Day school program for children with developmental disabilities	Positive
Ganz and Flores (2008)	2 M 4:5, 4:6 years old Moderate-high (GARS)	Play related conversation (Scripted phrases, unscripted phrases, context-related comments, responses) Spare classroom in mainstream preschool setting	Mixed
Garfinkle and Schwartz (2002)	3 M 3:7, 4:10, 5:5 years old Autism Lower functioning	Peer imitation; initiations, responses, non-social engagement, proximity to peers Integrated university affiliated preschool	Mixed
Goldstein, Kaczmarek, Pennington, and Shafer (1992)	3 M 2:9, 3:7, 3:9 years old Autism Mild-moderate, severe (CARS)	Social interaction, social behaviors and communicative acts Spare room in two integrated preschool classrooms	Mixed
Haring and Lovinger, 1989; Experiment 1	1 M 4:8 years old Autism and developmental delays Lower-moderate functioning	Initiations towards peers and play responses Special education preschool and general education preschool	Positive

Haring and Lovinger, 1989; Experiment 2	1 F 4:8 years old Autism Lower-moderate functioning	Initiations towards peers, duration of interactions and play responses Self-contained special education classroom and general education kindergarten	Positive
Hundert, Rowe and Harrison (2014)	1 M 2 F 4:8, 5:10, 5:11 years old ASD Lower-moderate functioning	Interactive play, peer interactions General education preschool or kindergarten classrooms	Positive
Jones and Schwartz (2004)	1 M and 2 F 3:9, 3:11, 5:2 years old ASD Functioning NR	Language (labelling stimulus sets) Integrated, urban, university-based early childhood education preschool and kindergarten	Positive
Katz and Girolametto (2013)	2 M 1 F 4:1, 4:9, 5:1 years old ASD Mild-moderate (CARS)	Extended social interactions Three early childcare centre integration classrooms	Positive
Kern and Aldridge (2006)	4 M 3:9, 3:4, 4, 4:9 years old Autistic disorder Mild-moderate, severe (CARS)	Positive interactions, play and engagement Community-based inclusive childcare setting	Mixed
Kohler, Greteman, Raschke, and Highnam (2007)	1 F 4:9 years old Autism Functioning NR	Social interactions (initiations and responses) Half-day inclusive preschool for children with special needs and typical developing children	Positive
Kohler, Strain, Hoyson, Davis, Donina and Rapp (1995)	3 M 4 years old Autism Lower functioning	Social interactions (initiations and responses) Two classrooms within a half-day integrated preschool	Positive
Kohler, Strain, Hoyson and Jamieson (1997)	10 (gender NR)	Social interactions and IEP objectives Half-day integrated preschool	Positive

	3y 7m; 3y 8m; 4y 6m; 5y 10m; 4y 10m; 3y 11m; 5y 4m; 3y 2m; 3y 3m; 3y 10m Autism Mild-severe (CARS)		
Kohler, Strain, Maretsky and DeCesare (1990)	2 M 4 years old Autism Lower-moderate functioning	Social interactions (initiations and responses) Half-day integrated preschool	Mixed
Laushey and Heflin (2000)	1 M 5:8 years old Autism Severe (CARS)	Social skills (asking for object and responding according to answer, getting attention appropriately, waiting for a turn, orienting toward a speaker) Mainstream kindergarten classes with one child with autism	Positive
Lee and Lee (2015)	1 M 1 F 3:9- 3:10 years old 1 autism 1 mild autism with global developmental delay and microtia Functioning NR	Reciprocal social interactions and verbal interactions Mainstream Montessori preschool	Positive
Lefebvre and Strain (1989)	1 M 4:5 years old ASD Moderate functioning	Social interaction skills (initiations, responses and play organising statements) Integrated mainstream preschool classroom	Positive
McGee, Almeida, Sulzer-Azaroff, and Feldman (1992)	3 M 3:7, 4:1, 5:11 years old Autism Functioning NR	Reciprocal interactions (social behavior: motor/gestural or verbal/vocal and positive/negative) Integrated preschool (composed of 6 typically developing children, 2 with ADHD and 3 with Autism)	Positive
McGrath, Bosch, Sullivan, and Fuqua (2003)	1 M 4:11 years old Autistic disorder Functioning NR	Reciprocal social interactions (initiation, response) and play Mainstream preschool	Positive

Nelson, McDonnell, Johnston, Crompton, and Nelson (2007)	4 M 3:9, 4:1, 4:3, 4:5 years old Autism Mild-moderate, severe (CARS)	Play initiations (Keys to Play or other strategy) Preschool settings: Two Head Start classes, a community preschool class and an integrated special education class with majority of children typically developing	Positive
Odom and Strain (1986)	3 M 4 years old Autism Severe (CARS)	Reciprocal social interaction (Play organizer, share/request, assist/request, compliment, affection) Preschool centre for emotionally disturbed children	Positive
Odom and Watts (1991)	3 M 3:6, 5:0, 5:0 years old Autism Lower-moderate functioning	Reciprocal social interaction (Play organizer, share/request, assist/request, compliment, affection) Integrated special education classroom with 6 children with disabilities and 4 typically developing children	Positive
Petursdottir, McComas, McMaster, and Horner (2007)	1 M 5 years old Autism and developmental delay High functioning	Social interactions Special education class in integrated Kindergarten	Mixed
Sainato, Goldstein, and Strain (1992)	3 M 3:7, 4:2, 4:8 years old Autism Moderate (CARS)	Social behavior (attention getter, play organizer, share, responses, other) Integrated preschool, in a large urban elementary school	Positive
Sainato, Strain, Lefebvre and Rapp (1987)	3 M 3:7, 4:0, 4:1 years old Autism Severe (CARS)	Transitioning between activities Integrated preschool (5 disabled and 6 non-disabled children in total)	Mixed
Sawyer, Luiselli, Ricciardi, and Gower (2005)	1 M 4 years old Autistic disorder Functioning NR	Verbal and physical sharing Integrated preschool classroom within a primary school for children with developmental disabilities	Positive

Strain, Kohler, Storey and Danko (1994)	3 M 3, 4, 5 years old Autism Lower functioning	Positive social interactions Integrated preschool	Positive
Thiemann-Bourque, McGuff & Goldstein (2017)	2 M 1 F 4;5, 4:6, 4;7 years Autism Lower functioning	Communication , reciprocity and engagement Integrated preschool classroom	Positive
Trembath, Baladin, Togher and Stancliffe (2009)	3 M 3, 4, 5 years old Autism Functioning NR	Communicative behaviors 3 different inclusive preschools	Mixed
Zanolli, Daggett and Adams (1996)	2 M 4:2, 4:10 years old Autism Functioning NR	Initiations towards peers (verbal or nonverbal) University preschool classroom	Mixed

Note. NR indicates that data were not reported in a study.

Participants with ASD. A total of 85 children with ASD received intervention within the included studies. Where gender was reported, 88% (*N*=66) of participants were male and 12% (*N*=9) were female. All studies included preschool aged children, ranging in age from 2 years 9 months to 5 years 11 months. All of the included children had a diagnosis of ASD. Three studies (9%) included participants who presented with co-occurring diagnoses. Ganz and Flores (2008) included a child with autism who was diagnosed at the age of two with a speech delay. Petursdottir et al. (2007) included a child with ASD and co-occurring developmental delay. Lee and Lee (2015) included a participant with co-occurring diagnoses of autism, global developmental delay and microtia. Eight studies (25%) did not report data to indicate participants' functioning levels. Seven studies (25%) included only children who were categorized as lower functioning, four studies (13%) included only children who were identified as functioning within the moderate range, and one study (3%) included solely a child who was identified as higher functioning. The largest proportion of studies (10; 31%) included both children who were identified as functioning within the severe range and children who were identified as functioning within the mild-moderate range. One study (3%) included participants whose functioning levels varied from one another, ranging from severe to high functioning.

Specific selection and inclusion criteria for participants were reported in seven studies (22%). The remaining studies did not report specifications beyond diagnosis and participant availability. Criteria in relation to pre-requisite skills included demonstrating ability to follow simple requests, comprehensible expressive language of one-to-two word statements, ability to perform simple tasks, ability to imitate adults, and interest in engaging with other children (Carr & Darcy, 1990; Ganz & Flores, 2008; Garfinkle & Schwartz, 2002; Nelson, McDonnell, Johnston, Crompton & Nelson, 2007). Inclusion criteria relating to skills deficits included poor observational learning skills, deficits in and low levels of peer interactions, poor social skills, difficulty with social-communication initiations, difficulty in transitioning, and individual education plan objectives related to the target skills (Carr & Darcy, 1990; Garfinkle & Schwartz, 2002; Hundert et al., 2014; Kern & Aldridge, 2006; Nelson et al., 2007; Sainato et al., 1987).

A number of studies did not report specific inclusion criteria, but reported that participants presented with skill deficits relating to target behaviors for intervention, for example, children infrequently interacted with peers appropriately and/or spontaneously (Belchic & Harris, 1994; Haring and Lovinger, 1989), shared food or toys with peers only

when prompted (Lee & Lee, 2015), and participants did not make any initiations towards peers or siblings (Zanolli et al., 1996).

Settings. The 32 studies included in this review were conducted within preschool settings where children with ASD were included with typically developing peers. The majority of studies (20; 63%) occurred in integrated or inclusive preschool settings in which there were approximately equal numbers of children with and without developmental disorders or other disabilities. Five studies (16%) were carried out in mainstream preschool services in which the majority of children were typically developing. Participants in Haring and Lovinger (1989) attended special education preschools, but were integrated into mainstream preschools for one-to-one and a half hours per day. One study (3%) was carried out across both mainstream and integrated settings (Nelson et al., 2007). Two studies (6%) were carried out in special education settings in which children were joined by typically developing children for a period of each day (Carr & Darcy, 1990; Petursdottir et al., 2007). One study (3%) was conducted within a preschool service for emotionally disturbed children, in which typically developing children with behavioral problems supported children with ASD (Odom and Strain, 1986).

Target skills. A wide range of skills were targeted within the studies included in this review. Several studies targeted specific skills, for example, play skills (Hundert et al., 2014), sharing (Sawyer et al., 2005) and conversation (Ganz & Flores, 2008). Broad skill repertoires were also targeted in several studies, for example, imitation (Carr & Darcy, 1990; Garfinkle et al., 2002), and social interactions (e.g., Belchic & Harris, 1994; Kern & Aldridge, 2006). Kohler and colleagues (1997) targeted several areas including imitation, cooperative nonverbal interactions and verbal exchanges, and Individual Education Plan (IEP) goals achieved.

Social, communication, and play skills, targeted alone or in combination, were the most common skills targeted (29; 91%). A number of studies targeted social skills, including reciprocal interactions, initiations, and responses (e.g., Belchic & Harris, 1994; Katz & Girolametto, 2013; Kohler et al., 2007; Sainato et al., 1992; Zanolli et al., 1996). Some studies targeted a range of social and communicative behaviors, including ‘Keys to Play’ strategy targeting social communication skills to enter play groups (Nelson et al., 2007), and sharing and play organising (e.g., Goldstein et al., 1992; Odom & Watts, 1991). Four studies focused intervention on communication skills, with Ganz and Flores (2008) teaching scripted

phrases in play. An incidental teaching approach was used by McGee and colleagues (1992) to teach requesting skills to gain access to preferred items. Within this study, peers were also taught to prompt turn-taking to increase incidental teaching opportunities. Trembath and colleagues (2009) and Thiemann- Bourque et al. (2017) taught peers to teach communication using a speech generating device. Laushey and Heflin (2000) targeted a range of social and communication skills, including gaining attention, waiting for turn, requesting and responding appropriately to answer, and attending to a speaker. Three studies focused on social and play skills (Haring & Lovinger, 1989; Kern & Aldridge, 2006; McGrath et al., 2003).

Three studies targeted other skill repertoires through PMI. Carr and Darcy (1990) targeted imitation and Jones & Schwartz (2004) aimed to increase labelling of stimulus sets. Sainato et al. (1987) targeted transitioning between activities.

Intervention outcomes for children with ASD. Positive results were demonstrated in 23 studies (72%) with increases across target skills for all participants. Mixed results were reported in nine studies (28%). No study was identified as demonstrating negative results.

With regards to participant functioning level, the study that included one child who was identified as high functioning demonstrated mixed results (Petursdottir et al., 2007). All four of the studies including children who were identified as functioning within the moderate range demonstrated positive results (100%). Of the seven studies that solely included children who were identified as lower functioning, five studies (71%) demonstrated positive results. Six of the ten studies (60%) that included both children who were lower functioning or severe as well as children who were identified as moderate demonstrated positive results. The study that included participants who were identified as functioning at different levels (from mild to severe), demonstrated positive results.

Peer characteristics. Table 3.2 presents the descriptive information for peers, peer training and PMI procedures included in the studies in the current review. Over 242 peers participated in the studies included in the current review. The number, gender and/or age of peers was not reported in all studies. Where this information was available, 54 male peers and 53 female peers were included in the studies in the current review. All peers attended preschool services and ranged in age from 2 years to 6 years 4 months. Peers included in the majority of the studies in the current review were matched in terms of age and gender to the children with ASD with many studies also including additional peers of different ages and

genders. Of the 22 studies (68%) where peers were matched in age to children with ASD, 14 (64%) demonstrated positive results.

Inclusion criteria for peers were reported in 30 studies (94%). Across most studies, criteria for peers included being typically developing and in attendance at the same preschool as the participant with ASD. Eighteen studies (86%) that included peer availability or attendance as an inclusion criteria demonstrated positive results. Specifically, Strain et al. (1994) indicated that peers had to be in attendance in the preschool for at least five months prior to the study. In addition to requiring peers to be typically developing, several studies reported age appropriate or advanced cognitive abilities and IQ, language repertoires and school performance as selection criteria. Of the studies where typical development and/or age appropriate skill repertoires were identified as peer selection criteria, 14 studies (67%) demonstrated positive results. Ten studies identified a history of compliance with instruction as a peer selection criteria and nine (90%) of these studies demonstrated positive results. Kern and Aldridge (2006) included all children in the research setting as peers, including children with and without disabilities. Typically developing children who presented with behavioral problems were included as peers in Odom and Strain (1986), with one peer dropping out of the study prematurely as he became disruptive and refused to engage with the child with ASD.

Twelve studies (38%) reported that peers were selected based on having social competencies (e.g., age appropriate social skills (Katz & Giromaletto, 2013) or enthusiasm in social interactions (e.g., Trembath et al., 2009). Furthermore, four studies (13%) required the peers to have had positive social interactions with or social interest in the child with ASD, with Zanolli et al. (1996) measuring this at baseline. Of these studies, ten (71%) demonstrated positive results. Three studies required peers to have no social history (Goldstein et al., 1992; Petursdottir et al., 2007) or no negative social history (Lee & Lee, 2015) with the child with ASD. McGee and colleagues (1992) selected high status peers based on peer and teacher report sociometrics.

Table 3.2
Table of Peer Information from the Included Studies

References	Peer Information and Peer Selection Criteria	Peer Similarity to Children with ASD	Peer Training	PMI Procedure	Peer Outcome Variables and Results
Belchic and Harris (1994)	3 M and 2 F 3:8- 4:7 years Teacher nomination • Regular attendance • Compliance with adult instructions • History of positive social behavior with classmates • At least average school performance • Willingness to participate in the study	Younger Gender matched (+F)	N/A	Proximity	NR
Bellini, Gardner, Hudock & Kashima-Ellingson (2016)	2 Gender and age NR • Typically developing peers in the preschool class	NR	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training	Initiation; prompting and reinforcement	NR
Carr and Darcy (1990)	1 M 5 years old • Availability (selected based upon) • History of being 'teacher's helper' • Highly reinforced by adult attention • Compliance • Average IQ	Older Gender matched	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training	Prompting and reinforcing	NR
Ganz and Flores (2008)	1 M and 3 F 4, 4, 4, 5 years old • Age • No identified disabilities or delays	Age matched	Instructions Modeling Roleplay Prompting	Initiation	NR

	• Ability to produce four-word sentences • Good attendance	Gender matched (+F)	Corrective feedback In-vivo training Visual supports		
Garfinkle and Schwartz (2002)	Gender and *N* NR 3-6 years old NR	Age matched	Instructions Prompting Corrective feedback In-vivo training Visual supports	Proximity	NR
Goldstein, Kaczmarek, Pennington, and Shafer (1992)	5 M and 5 F 3:3-6:4 years old • Normal or above normal cognitive abilities • Age-appropriate language skills • Observed prior to study as rarely initiating toward the child with ASD	Age matched (+older) Gender matched (+F)	Instructions Modelling Roleplay Prompting Corrective feedback In-vivo training Visual supports Conditioned reinforcement	Initiation	Social behaviors and strategy use: Positive
Haring and Lovinger, 1989; Experiment 1	5 (Gender and age NR) • Nominated by teacher as being highly interactive during play times • Responsive to adult instruction	NR	Instructions Corrective feedback Prompting In-vivo training Conditioned reinforcement	Prompting and reinforcing	Responsivity of peers to participant's initiations; mixed
Haring and Lovinger, 1989; Experiment 2	5 (gender and age NR) • Typical development • Availability • Volunteered to take part	NR	Instructions Prompting Corrective feedback In-vivo training Conditioned reinforcement	Prompting and reinforcing	Responsivity of peers to participant's initiations: Positive
Hundert, Rowe and Harrison (2014)	41 (classmates) Gender and age NR • Typically developing	NR	Instructions Modeling Roleplay	Initiation; proximity	NR

	• In attendance at same preschool		Prompting Corrective feedback In-vivo training Visual supports Conditioned reinforcement		
Jones and Schwartz (2004)	2 M and 1 F 4 years old • Attendance in same preschool class • Teacher report that peer was a friend of the child with ASD and/or was someone the child with ASD often spent time with	Age matched Gender matched (+M, -F)	Instructions Prompting Corrective feedback Prior training	Proximity	NR
Katz and Girolametto (2013)	2 M and 4 F 4:0, 4:8, 4:1, 4:11, 5:5, 5:6 years old • Teacher nomination • Typical language development (teacher-report) • Typical social skills (teacher-report) • Attendance in same class • Interest in interacting with the child with ASD	Age matched Gender matched (+F)	Instructions Roleplay Prompting In-vivo training Visual supports	Initiation; proximity	NR
Kern and Aldridge (2006)	32 (classmates with and without disabilities) including 8 peer buddies 2-5 years old Teacher nomination • Interest in music • Social skills • Relationship with the child with ASD • Motivation to participate and interact with the child with ASD	Age matched (+younger)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training	Proximity	Peer task behavior and positive peer interactions: Mixed

Kohler, Greteman, Raschke, and Highnam (2007)	1 M and 5 F 4 years old • Good attendance • Age-appropriate play and social skills • High levels of compliance with teacher directions	Age matched Gender matched (+M, +F)	Instructions Modeling Roleplay Prompting Corrective feedback Prior training Visual supports Conditioned reinforcement	Initiation; proximity	Social overtures directed to child: Positive
Kohler, Strain, Hoyson, Davis, Donina and Rapp (1995)	6 M; 3:4-5:2 years old • Typically developing • In attendance at same preschool	Age matched Gender matched (+M)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Conditioned reinforcement	Initiation	Peer supportive initiations and responses: Positive
Kohler, Strain, Hoyson and Jamieson (1997)	22 (gender NR) 3:1-5:2 years old • Age-appropriate skills in most or all developmental domains	Age matched	Prompting In-vivo training	Proximity	NR
Kohler, Strain, Maretsky and DeCesare (1990)	7 (gender NR) 3-4 years old • Typically developing • In attendance at same preschool	Age matched (+younger)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Conditioned reinforcement	Initiation	Peer supportive initiations and responses: Positive
Laushey and Heflin (2000)	Gender and *N* NR 5:2-6:3 years old • Typically developing	Age matched	Instructions Prompting In-vivo training	Initiation; proximity	NR

	• In attendance at same preschool		Conditioned reinforcement		
Lee and Lee (2015)	9 (gender NR) 3:8-4:3 years old Teacher nomination • Regular school attendance • Compliant behavior • Age-appropriate social communication skills • No negative social history with participants	Age matched (+older)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports Conditioned reinforcement	Prompting and reinforcing; Initiation; proximity	Reciprocal social interactions: Positive
Lefebvre and Strain (1989)	3 M and 3 F 3:7, 4:6, 4:5, 4:7, 4:1, 5:5 years old • Regular attendance • Age-appropriate play and levels of social initiations • General compliance with teacher directions	Age matched Gender matched (+M, +F)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Conditioned reinforcement	Initiation; proximity; prompting and reinforcing	Appropriate peer initiations and responses towards child: Positive
McGee, Almeida, Sulzer-Azaroff, and Feldman (1992)	3 F 4:5-4:11 years old • Eldest typical developing children in preschool • Regular attendance • High level of compliance • Age-appropriate language skills (teacher-report) • High status among peers (teacher- report and peer sociometrics)	Age matched (+younger) Gender not matched	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports	Prompting and reinforcing	Peer initiations towards and responses to target child: Positive
McGrath, Bosch,	10 M and 8 F 3-4 years old • Regular attendance	Younger	Instructions Modeling Roleplay	Initiation; proximity; prompting	Reciprocal social

Sullivan, and Fuqua (2003)	• Teacher nomination	Gender matched (+M, +F)	Prompting Corrective feedback In-vivo training Visual supports	and reinforcing	interactions: Positive
Nelson, McDonnell, Johnston, Crompton, and Nelson (2007)	Gender, *N* and age NR • Typically developing • In attendance at same preschool	NR	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports	Proximity	NR
Odom and Strain (1986)	3 M and 1 F 4-5 years old Peers attending centre for emotionally disturbed children (all had behavioral problems) • Displayed age-appropriate language, communicative and social skills • Typically complied with adult requests	Age matched Gender matched (+F)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports Conditioned reinforcement	Initiation	Positive initiations to children and total positive responses to children's initiations: Positive
Odom and Watts (1991)	2 M and 2 F 4, 5, 5, 5 years old • Displayed age-appropriate language and cognitive skills • In attendance at the same preschool	Age matched Gender matched (+F, -M)	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Conditioned reinforcement	Initiation	Positive social initiations and interactions by peers to children: Positive
Petursdottir, McComas, McMaster, and Horner (2007)	3 M 5 years old • Teacher nomination as a peer who might work well with the child with ASD	Age matched Gender matched	Prompting Corrective feedback In-vivo training	Proximity	Social interactions: Mixed

	• No history of playing with the child		Conditioned reinforcement		
Sainato, Goldstein, and Strain (1992)	1 M, 2 F and two gender NR 3:10, 4:2, 4:7, 3:10, 4:2 years old • Identified as more compliant (teacher) • Displayed appropriate play skills	Age matched Gender matched (+F, -M)	Instructions Modeling Roleplay Prompting In-vivo training Visual supports Conditioned reinforcement	Initiation	Total strategy use during free play: Positive
Sainato, Strain, Lefebvre and Rapp (1987)	3 M and 3 F 4:2-5:0 years old • Selected as the only typically developing children in attendance at the same preschool	Older Gender matched (+F)	Instructions Modeling Roleplay Prompting In-vivo training Visual supports	Proximity	NR
Sawyer, Luiselli, Ricciardi, and Gower (2005)	Gender NR 3-5 peers in each session Age NR • Absence of disabilities • In attendance at same preschool	NR	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training	Proximity	Peer sharing: Positive
Strain, Kohler, Storey and Danko (1994)	10 (gender NR) 3-5 years old • Availability (in same classroom as participants) • Had attended preschool for at least 5 months prior to the study	Age matched	Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports Conditioned reinforcement	Initiation; Prompting and reinforcing	NR

Thiemann-Bourque, McGuff & Goldstein (2017)	1 M and 2 F 4;5-4;6 years • Age appropriate social skills (teacher report) • Consistent attendance • Ability to attend to teacher directed lessons for a minimum of 20 minutes • Expressed a willingness to participate	Age matched Gender matched (+F, -M)	Self-monitoring Instructions Modeling Roleplay Prompting Corrective feedback In-vivo training Visual supports	Initiation; Proximity	Social communication: Positive
Trembath, Baladin, Togher and Stancliffe (2009)	3 M and 3 F 5, 5, 4, 5, 3, 4 years old Teacher nomination • Age appropriate language skills • Active participants in preschool activities • Able to follow instruction and routines • Generally enthusiastic in interactions with other children	Age matched Gender matched (+F)	Instructions Modeling Roleplay Prompting Prior training	Initiation; proximity; prompting and reinforcing	Peer-participant communicative behavior: Positive
Zanolli, Daggett and Adams (1996)	4 M and 6 F 4, 6, 4, 4, 4, 5, 4-6 years old • Approached either child with ASD during pre-baseline sessions • Verbally expressed interest in either child with ASD • Observed to play frequently with the child with ASD's preferred activities • Good social skills (based on teacher nominations)	Age matched (+older) Gender matched (+M, +F)	Instructions Roleplay Prompting Corrective feedback In-vivo training	Prompting and reinforcing	Unprompted peer delivery of consequences (delivers tangibles and responds to participant initiations): Positive

Note. NR indicates that data were not reported in a study. (+) denotes that other peers were included in a study in addition peers who were matched to the child/children with ASD on age/gender.

Fifteen studies (47%) utilized either teacher report measures or teacher nomination to select peers to participate in the studies. Four studies (13%) reported that peers were selected based on their motivation to take part in the research. The majority of the means of assessing peer eligibility were subjective involving teacher report or recommendation of typical development, with the exception of seven studies (22%) in which standardized measures were used; Carr and Darcy, 1990 (Standord-Binet IQ); Goldstein et al., 1992 (Learning Accomplishment Profile); Odom and Strain, 1986, and Odom and Watts, 1991 (California Preschool Social Competency Scale); Sainato et al., 1987, and Sainato et al., 1992 (McCarthy Scales of Children's Abilities); Trembath et al., 2009 (Type Token Ratio; Number of Different Words). Trembath and colleagues (2009) supported subjective teacher reports of peer suitability for inclusion with caregiver reports and direct observations made by the researcher during initial visits to the preschools.

Peer training procedures. All studies in the current review incorporated elements of BST (instructions, modelling, roleplay, prompting, corrective feedback) to train peers. All studies excluding one (Petursdottir et al., 2007) provided peers with instructions in the form of an introduction, description and/or explanation of the intervention target skills, and/or rationale. Most involved verbal discussion with a number of studies presenting information to peers using illustrated storybooks, (e.g., Trembath et al., 2009). The majority of studies (25; 76%) involved adult modeling and/or role-play of intervention procedures and target skills. In Lee and Lee (2015) puppets were used during adult modeling and role-play to teach target skills to peers. Peer-peer role play and/or practice was facilitated in six studies (19%). Peer-participant role play was facilitated in 12 studies (38%). Katz and Girolametto (2013) provided opportunities for role play of new skills through use of puppets which were featured in illustrated books introducing the intervention. Prompting was used in 31 studies (97%) and corrective feedback was employed in 25 studies (78%).

The majority of studies (19; 59%) employed these five components of BST (instructions, modelling, roleplay, prompting, corrective feedback) in combination. Of these studies, 15 (79%) reported positive results. Thirteen studies (41%) used less than five of these components of BST in combination. Of these studies, eight (62%) reported positive results. Twenty-three studies (72%) incorporated additional supports for peers (e.g., visual supports (e.g., Katz & Giromaletto, 2013); conditioned reinforcement systems (e.g., Hundert et al., 2014); self-monitoring (Strain et al., 1994)). Of these studies, 17 (74%) reported positive results.

A distinction was noted between studies in which peer training occurred only prior to PMI sessions with children with ASD present, and studies in which in-vivo training or support was provided. The majority of studies (28; 88%) incorporated in-vivo support or training for peers. Of these studies, 20 (71%) reported positive results.

Peer-mediated intervention procedures. The PMI procedures were employed in isolation in 21 studies (66%). Proximity was the most common PMI procedure employed alone in nine studies (28%), with five of these studies (56%) demonstrating positive results. Seven studies (22%) employed initiation strategies alone with three studies (43%) demonstrating positive outcomes. Initiation strategies involved teaching peers to engage in behaviors such as tapping a child on the shoulder to get their attention (McGrath et al., 2003; Sainato et al., 1992), to engage him/her in play (Odom & Watts, 1991), and to initiate conversation (Goldstein et al., 1992). Prompting and reinforcing was the sole PMI procedure employed in five studies (16%), with positive results demonstrated in four studies (80%). Prompting and reinforcing procedures included incidental mand training involving providing full vocal prompts and providing mand-specific reinforcement (McGee et al., 1992).

Eleven studies (34%) used a combination of two or more PMI procedures. Initiation and proximity were utilized together in five studies with positive outcomes demonstrated in each of these studies (100%). Two studies employed initiation and prompting and reinforcing procedures with positive results in both studies (100%). Four studies employed the three PMI procedures together with three studies demonstrating positive results (75%).

Peer outcome variables. Nineteen studies (59%) reported results on outcome variables relating to peers. Peer outcome variables included targets similar to those for children with ASD, for example, social interactions (e.g., Goldstein et al., 1992; Kohler et al., 1995), social initiation (Kohler et al., 2007), communicative behavior (e.g., Thiemann-Bourque et al., 2017; Trembath et al., 2009), and sharing (Sawyer et al., 2005). Peer skills relating to implementation of intervention were also reported, including task behavior (Kern & Aldridge, 2006), strategy use (Goldstein et al., 1992; Sainato et al., 1992), unprompted delivery of consequences and responding appropriately to participant initiations (Zanolli et al., 1996), and responsiveness to participant initiations (Haring & Lovinger, 1989). Of the 19 studies reporting on peer outcomes, positive results were demonstrated in 16 studies (84%) with increases across peer outcome variables. Mixed results were reported for peer outcome variables in three studies (16%).

Strength of research studies. Relevant information regarding study design, strength ratings and presence or absence of generalization, maintenance, treatment integrity, and social validity measures are presented in Table 3.3. As previously outlined, each study was evaluated using Reichow and colleagues (2008) criteria for measuring the strength of research. Within the current review, five studies (16%) were rated as strong. Sixteen studies (50%) were rated as adequate and eleven studies (34%) were rated as weak.

Generalization, maintenance, treatment fidelity and social validity. All studies (100%) employed a combination of three or more technologies of generalization to programme for generalization (Stokes & Baer, 1977). The most commonly employed generalization promotion strategy was programming for common stimuli which was coded for all studies given that peers were present in both training and generalization settings in each study in the current review. The majority of studies trained sufficient exemplars to programme for generalization of skills. For instance, a number of studies conducted training sessions across settings (e.g., Kohler et al., 1990) and across activities or materials (e.g., Belchic & Harris, 1994). Introduction to natural maintaining contingencies (e.g., fading of contrived reinforcement) was also employed in the majority of studies. Training loosely involving teaching under more variable conditions and this strategy was used within 21 studies (66%). The strategies of sequential modification, training to generalize and utilizing indiscriminable contingencies to programme for generalization were employed in fewer studies within the current review. Haring and Lovinger (1989) employed natural and indiscriminable contingencies as well as training to generalize through teaching peers to respond to only 50% of participant's initiations. This represented the intermittent schedules of reinforcement found within the natural environment and promoted generalization of skills across individuals as the participant had to initiate towards another peer when a peer did not respond.

Fifteen studies (47%) presented data measuring generalization. Generalization of the participants' skills was measured across settings (e.g., Belchic & Harris, 1994; Carr & Darcy, 1990), novel peers (e.g., Petursdottir et al., 2007; Trembath et al., 2009), and materials or activities (e.g., Ganz & Flores, 2008; Hundert et al., 2014). Sainato and colleagues (1992) measured generalization of peer's strategy use to novel children with ASD and across activities. Belchic and Harris (1994) measured generalization of skills to the playground setting, with untrained children with autism and with the participants' siblings in the home.

Fifteen studies (47%) included data on maintenance of intervention outcomes. Where latency to maintenance data collection was reported, these data were collected after varying periods of time post completion of intervention and over different numbers of sessions. Ten studies (31%) assessed maintenance of skills immediately following the completion of intervention and/or once stable performance at mastery criteria was achieved, and measured maintenance of skills over several weeks. McGee and colleagues (2008) programmed for maintenance by systematically fading out teacher prompts for peers. Lee and Lee (2015) included an intervention-fading phase, following completion of peer training. This phase involved gradually fading out teacher prompting. Four studies (13%) assessed maintenance following an extended period of time after termination of experimental condition; including four-to-five weeks post-intervention, over two sessions (Katz & Girolametto, 2013); six-to-eight weeks post-intervention, over four sessions (Kohler et al, 1997); within six weeks into new school year (Laushey & Heflin, 2000); and 40 and 60 days post-intervention (Sawyer et al., 2005).

The majority of studies (26; 81%) collected data on treatment integrity and positive results for treatment integrity were reported in the majority of studies measuring treatment integrity. Thirteen studies (41%) included pre-intervention training to a pre-determined mastery criterion. Five studies (16%) carried out pre-intervention peer training but did not specify the mastery criteria. A number of studies assessed treatment integrity through direct observation, with or without feedback, and/or interobserver agreement on occurrence of target behaviors (e.g., Garfinkle & Schwartz, 2002; Lefebvre & Strain, 1989). In Zanolli et al., (1996) the integrity of teacher's delivery of peer training was assessed. Nine studies (28%) used fidelity checklists to assess peer implementation completed by an observer (e.g., Bellini et al., 2016; Petursdottir et al., 2007; Thiemann-Bourque et al., 2017), and one study incorporated staff and peers' self-evaluation of implementation of the strategies (Sainato et al., 1992). In Sainato et al. (1992) mean agreement between peer and researcher ratings ranged from 77-93%. In some studies in which treatment integrity was found to be poor, additional training was provided (e.g., Garfinkle & Schwartz, 2002). Seven studies (22%) did not measure treatment integrity beyond initial peer training lessons.

Specific measures of social validity were presented in nine studies (28%). Eight studies measured social validity from staff and one study included parent-report. Two studies involved independent observers blind to treatment conditions in the assessment of social validity who viewed videotapes across pre- and post-intervention phases. The majority of

studies in the current review (88%) met the criteria set out by Reichow and colleagues (2008) for social validity. These studies incorporated a number of factors, which established the social validity of research. Factors include research having been carried out in the natural environment, use of socially acceptable intervention procedures, and producing clinically significant behavior change. For example, Laushey and Heflin (2000) selected socially significant target skills through multi-disciplinary collaboration with a team of early years' educators.

Discussion

The current review aimed to evaluate the use of PMI with preschool children with ASD within inclusive educational settings. Thirty-one articles (32 experiments) meeting the inclusion criteria were identified and included in the current review. Positive outcomes were reported for all participants across all outcome variables in 23 studies (72%). Similarly, positive gains were demonstrated across all peers in 16 of the 19 studies (84%), which presented data on peer outcomes. The majority of studies (21; 66%) achieved research strength ratings of strong or adequate (Reichow et al., 2008). These positive findings lend support to the certainty of evidence demonstrated for PMI for preschool children with ASD in the current review with regards to the reported participant and peer outcomes. Furthermore, social, communication and play skills were targeted in 29 studies (91%) within the current review which lends support to the suggestion that PMI may be a particularly suitable intervention to support social development and social inclusion within inclusive preschool services (Watkins et al., 2015).

Table 3.3

Table of Research Design, Strength Ratings (Reichow et al., 2008), Strategies to Program for Generalization and Inclusion of Generalization, Maintenance, Treatment Integrity and Social Validity Measures

References	Design	Strength of Research	Generalization Promotion Strategies	Assessment Included			
				Generalization	Maintenance	Treatment Integrity	Social Validity
Belchic and Harris (1994)	MB/MP	A	NC;PCS;SE;TG	●	●		
Bellini, Gardner, Hudock & Kashima-Ellingson (2016)	MB	A	NC;SE;TL;IC;PCS;TG		●	●	●
Carr and Darcy (1990)	MB	A	NC;SE;PCS	●	●	●	
Ganz and Flores (2008)	CC	A	NC;SE;PCS	●	●	●	
Garfinkle and Schwartz (2002)	MB	W	SE;TL;PCS	●	●	●	●
Goldstein, Kaczmarek, Pennington, and Shafer (1992)	R	A	NC;SE;TL;PCS			●	
Haring and Lovinger, 1989; Experiment 1	MB	W	NC;SE;TL;IC;PCS	●			
Haring and Lovinger, 1989; Experiment 2	MB	W	NC;SE;TL;IC;PCS	●			
Hundert, Rowe and Harrison (2014)	MB	A	NC;TL;PCS	●		●	
Jones and Schwartz (2004)	PT	A	NC;SE;PCS		●	●	
Katz and Girolametto (2013)	MB	A	NC;SE;TL;PCS		●	●	●

Kern and Aldridge (2006)	MB	W	NC;SE;TL;PCS				●	
Kohler, Greteman, Raschke, and Highnam (2007)	MB	A	NC;SE;TL;PCS			●	●	
Kohler, Strain, Hoyson, Davis, Donina and Rapp (1995)	W	S	NC;SE;TL;PCS				●	
Kohler, Strain, Hoyson and Jamieson (1997)	MB	W	NC;SE;TL;PCS			●	●	
Kohler, Strain, Maretsky and DeCesare (1990)	AT	S	NC;SE;TL;PCS	●			●	
Laushey and Heflin (2000)	R	S	NC;SE;TL;PCS;IC	●		●	●	●
Lee and Lee (2015)	MB	A	NC;SE;TL;PCS			●	●	●
Lefebvre and Strain (1989)	W	W	NC;SE;TL;PCS				●	
McGee, Almeida, Sulzer-Azaroff, and Feldman (1992)	MB	A	NC;SE;TL;PCS;IC	●		●	●	
McGrath, Bosch, Sullivan, and Fuqua (2003)	AB	W	NC;SE;TL;PCS				●	●
Nelson, McDonnell, Johnston, Crompton, and Nelson (2007)	MP	A	NC;SE;PCS			●	●	●
Odom and Strain (1986)	AT	S	NC;SE;TL;PCS				●	
Odom and Watts (1991)	MB	S	NC;SE;TL;PCS					
Petursdottir, McComas, McMaster, and Horner (2007)	W/MB	W	NC;SE;TL;PCS;IC	●			●	●
Sainato, Goldstein, and Strain (1992)	MB	A	SM;NC;SE;TL;PCS	●			●	

Sainato, Strain, Lefebvre and Rapp (1987)	AT	W	NC;SE;PCS	●		●	
Sawyer, Luiselli, Ricciardi, and Gower (2005)	ABCB	W	NC;SE;PCS		●		●
Strain, Kohler, Storey and Danko (1994)	MB	A	NC;SE;PCS;TL				
Thiemann-Bourque, McGuff & Goldstein (2017)	MP	A	NC;SE;TL;IC;PCS;MG;TG	●		●	
Trembath, Baladin, Togher and Stancliffe (2009)	MB	A	NC;SE;TL;PCS	●		●	
Zanolli, Daggett and Adams (1996)	MB/MP	W	NC;SE;PCS		●	●	

Note. Under research design, MB denotes multiple baseline, MP denotes multiple probe, W denotes withdrawal design, R denotes reversal, AT denotes alternating treatments, PT denotes parallel treatments and CC denotes changing criterion design. Under strength of research, S indicates a strong rating, A indicates an adequate rating and W denotes a weak rating, based upon Reichow et al. (2008). Strategies to program for generalization are presented as: train and hope (TH); sequential modification (SM); introduce to natural maintaining contingencies (NC); train sufficient exemplars (SE); train loosely (TL); use of indiscriminable contingencies (IC); program common stimuli (PCS); mediate generalization (MG); and train "to generalize"(TG). Reporting of generalization, maintenance, treatment integrity and social validity data are represented by a filled black circle.

This review further explored various intervention characteristics within PMI for preschool children with ASD. With regards to the use of PMI in skills teaching for preschool children with ASD, the positive results demonstrated in the current review support the use of PMI to teach a broad range of skills across the domains of communication and social competence for children with ASD aged between 3 and 5 years. However, further research is warranted employing PMI to teach other skill repertoires (e.g., pre-academic skills, imitation), given the limited number of studies that targeted such skills in the current review. Furthermore, it warrants mention that analysis employed in the current review to identify study results as positive, mixed or negative did not indicate the magnitude of the intervention impact. Future research should employ further analyses and meta-analytic techniques (e.g., nonoverlap of pairs (NAP); Tau-U) to investigate this further. Within their review of PMI for children with ASD, Watkins and colleagues (2015) noted a limitation regarding the generalization of findings to broader ASD populations beyond the predominantly moderate-high functioning population included in their review. Interestingly, in the current review, the moderate-high functioning population represented the minority, with the majority of the participants identified as functioning within the lower functioning or severe and moderate ranges. Within the current review, of 17 studies including children with lower functioning profiles, 11 studies reported positive results lending preliminary support to the application of PMI with preschool age children with ASD and lower cognitive functioning profiles. A small number of studies also demonstrated positive results for children with co-occurring difficulties and, as such, future research is warranted to further evaluate the efficacy of PMI for preschool children with ASD with varying functioning profiles and co-occurring diagnoses and to investigate and develop enhanced supports within PMI for these populations.

The findings regarding peer characteristics in the current review are interesting and have important implications for future research and practice. Previous research has outlined possible reservations regarding the abilities of preschool age children to implement PMI (Chan et al., 2009; Watkins et al., 2015). Within the current review, preschool age peers demonstrated exceptional abilities to acquire new skills and support learning for children with ASD. For example, Trembath and colleagues (2009) demonstrated that peers successfully learned to use a speech generating device (SGD), and teach children with ASD how to use it despite having had no prior experience using an SGD previously. The majority of studies matched peers to some extent to participants in terms of age and gender which demonstrated

positive results. The majority of studies also reported details of additional selection criteria for peers (e.g., age, availability, age appropriate skills, good attendance, compliance). Preliminarily, the success rates demonstrated respectively by studies requiring peers to; (a) be in attendance in the same preschool as the child with ASD, (b) have developmentally appropriate cognitive and language abilities, (c) have a history of compliance, and (d) demonstrate social competence and enthusiasm in social interactions, suggest that these are important, relevant criteria for selecting peers for PMI at preschool stage. Both of the studies that included children with behavioral or developmental difficulties as peers demonstrated mixed results, which may suggest that further supports are warranted where peers have skill deficits in particular areas. Future PMI research should continue to provide detailed information about peers and the peer selection process to allow for further analysis of the impact of peer characteristics on intervention outcomes, and to inform identification of prerequisite skills for peers within PMI. Future research is also warranted to identify the optimum levels of training and support for peers with different abilities to maintain intervention success and treatment fidelity within PMI.

With regards to peer training procedures, a number of common characteristics of peer training protocols were noted. The majority of studies included; (a) instructions, (b) modelling, (c) role-play, (d) prompting (e) corrective feedback, (f) visual supports, and (g) conditioned reinforcement systems, which demonstrated positive results. Furthermore, the majority of studies included in-vivo training for peers with the children with ASD as well as initial training sessions, which also demonstrated success. These comprehensive approaches to peer training are promising and future research should continue to further evaluate and develop training protocols for preschool age peers within PMI and, in particular, additional supports for peers with differing skill levels and abilities. Analysis of the resource and time intensity required for such training procedures was beyond the scope of the current review and this remains an important area for future research regarding the efficiency of PMI at preschool stage.

In the current review, peers were taught to use each of the PMI procedures outlined by Odom and Strain (1984) and Watkins et al., (2015). Proximity and initiation procedures were employed commonly across studies whereas prompting and reinforcing was employed in a smaller number of studies in the current review. Interestingly, where these procedures were employed in isolation, prompting and reinforcing demonstrated the highest success rate (80% across 5 studies). Success rates were higher where studies employed a combination of two or

more PMI procedures in comparison to the use of the PMI procedures in isolation. However, given the unequal number of studies within each of these categories, these findings should be regarded as preliminary. Future research should further evaluate the comparative success rates of the PMI procedures alone and in combination for preschool children. It would also be pertinent to evaluate the level of training and support required for preschool peers to successfully use each PMI procedure in order to identify a "best fit" in terms of PMI procedure efficacy and training efficiency for preschool children.

Across studies employing PMI with preschool children with ASD in the current review, the collection of data regarding generalization and maintenance of intervention outcomes, social validity, and treatment fidelity was also evaluated. Measures of generalization were included in half of the included studies with measures of maintenance included in less than half of the studies. Given the importance of generalization and maintenance of intervention outcomes as an indicator of intervention success and in ensuring that the target skills occur across time and contexts as necessary (Bellini et al., 2007), this finding is disappointing and lends little to an analysis of the overarching success of PMI in supporting generalization and maintenance outcomes. However, all of the studies included in the current review were identified as having programmed for generalization by employing a combination of the generalization promotion strategies outlined by Stokes and Baer (1977) including programming for common stimuli, training multiple exemplars, and introducing natural maintaining contingencies. Future research should continue to employ and evaluate these strategies within PMI, and incorporate measures of generalization of the target skills across a broad range of settings, communication partners, and activities as well as evaluating maintenance of intervention outcomes over prolonged periods of time, for example, following children's transition into new school environments.

Previous research has raised concerns regarding the ability of young children to correctly implement interventions within PMI (Chan et al., 2009). Therefore, it is a positive finding that measures of treatment integrity were reported in the majority of studies in the current review. Treatment integrity was measured using a variety of methods, including mastery criteria during peer training, direct observation during PMI sessions, and peer self-evaluation. Positive results for treatment integrity were reported in all studies lending further support to the ability of preschool children to acquire the necessary skills to become effective interventionists. However, treatment integrity was not consistently measured across conditions, with seven studies not measuring treatment integrity beyond initial peer training

lessons. This raises concerns regarding potential inconsistency in the delivery of intervention. The role of peer self-monitoring and self-evaluation of strategy use was evaluated by Sainato and colleagues (1992). Sainato and colleagues (1992) incorporated staff and peers' self-evaluation of implementation of the strategies and found positive mean agreement between peer and researcher ratings ranging from 77-93%. Future research could employ similar procedures and should ensure that peers are trained to criterion prior to commencing PMI sessions. Furthermore, fidelity checks should be conducted regularly, with additional training and support provided as necessary.

The perceived social validity of treatment procedures and outcomes is an important indicator of future support for an intervention. If the participants, teachers, parents, and others involved in the intervention report positive outcomes and experiences, the likelihood that the interventions will continue to be implemented may increase (Kennedy, 2002). In the current review, the majority of studies met the criteria for social validity set out by Reichow and colleagues (2008) in designing procedures and choosing target skills which were socially acceptable. However, direct measures of social validity were only included in nine studies and the majority of these studies evaluated staff perceptions of the PMI. The positive findings from these measures suggest that PMI was often perceived to be an acceptable intervention for use in inclusive preschool settings, was considered beneficial to both participants and peers, and was supported by preschool staff. It is imperative for future research to include direct measures of social validity of PMI with preschool children across stakeholders (preschool staff, parents, children, and peers) to evaluate the efficacy, suitability and acceptability of these strategies. Furthermore, given the increased interactions between peers that occur within PMI, additional measures of sociometrics, social interactions, and friendships before, during, and after intervention are warranted to further evaluate the social significance of PMI.

As previously outlined, a number of limitations regarding PMI applications have been raised in previous research and the current review aimed to investigate these within PMI for preschool age children. Chan and colleagues (2009) suggested that peers involved in PMI may miss out on instructional time. However, the findings from the current review indicated that most intervention sessions lasting between 10-15 minutes and were typically carried out during 'free-play' time. Furthermore, PMI may be particularly suitable for preschool settings in this regard given the lower emphasis on curricular targets and increased time devoted to social interaction and development in preschool settings in comparison to later school

settings. Watkins et al. (2015) suggested that PMI may be inefficient for preschool children in that implementation with this population may require considerably more time and resources than interventions with older children or adult interventionists. As previously mentioned, detailed analysis of the time and resource intensity required to implement PMI with this population was beyond the scope of the current review, however, descriptions of the training for peers outlined in the included studies indicated that peer training for preschool children in PMI may require considerable time and resources. Comparisons of the resources required for skills teaching with adult interventionists versus peers and intervention outcomes, efficacy and feasibility, as well as a cost-benefit analysis of the additional gains in terms of social interaction associated with PMI, are important areas for future research in this regard. Future research should also prioritise developing strategies for peer training within PMI for preschool children which may reduce the time and resources required while maintaining treatment integrity. Concerns have also been raised in the literature regarding the potential for the skill deficits and challenges experienced by participants with ASD to be highlighted inadvertently through the use of PMI (Chan et al., 2009). A number of studies in the current review aimed to minimize this potential issue by involving all children in a class-wide buddy system so as to prevent the stigmatisation of any children with ASD (Hundert et al., 2014). Similarly, Garfinkle and Schwartz (2002) included all participants and peers in intervention, with each child taking turns imitating the actions of their classmates. It is recommended that future research continue to employ such strategies and include measures of peer-child social interactions outside of intervention sessions to examine if PMI can potentially reduce stigmatisation of children with ASD and support the development of friendships through positive interactions.

Given that 32 experiments that employed PMI with preschool age children were identified from a 31 year period, and considering the decreasing trend suggested in Figure 1, it would appear that the presumed limitations and concerns regarding the use of PMI with preschool children may be relatively prevalent today. However, findings from the current review suggest that the evidence does not support these concerns. Across the studies included in the current review, a wide range of skills were targeted and improved for preschool children with ASD within inclusive settings through interventions involving their peers. Predominantly, positive results were demonstrated for both children with ASD and their peers, and interventions were considered socially valid. As outlined previously, there is a need for evidence-based interventions to support skill development for preschool children

with ASD so that they can access the learning opportunities afforded by inclusive education and develop critical skill repertoires for later success at this early stage (Barton & Smith, 2015; Camargo et al., 2014; Wang et al, 2011). PMI represent an important area for future research in this regard as they have the potential to provide unique benefits as empirically supported strategies for skill development, which also increase opportunities for social interaction.

4. An Evaluation of Parents as Behavior Change Agents in the Preschool Life Skills Program

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Abstract

Parent training is an important area for research within behavior analysis as parental involvement in intervention can support intervention efficacy, acceptability, and accessibility. The Preschool Life Skills (PLS) program is a preventive program designed to address the increasingly prevalent risk factors for preschool problem behavior through teaching 13 preschool life skills. We evaluated a parent training procedure to teach parents to use the PLS program at home. Within 6 home-based sessions, we employed behavioral skills training to teach 6 parents to implement the PLS program with their children (3 years 3 months to 4 years 11 months). This application of the PLS program led to an increase in preschool life skills and a decrease in problem behavior and supported some generalization of the target preschool life skills from the home to preschool settings.

Keywords: functional communication, instruction following, parent training, preschool life skills, social skills

Introduction

Proficiencies in social, academic, self-regulation, and communication skills in early childhood are associated with successful transitions to education settings and continuing success within these settings (Abenavoli, Greenberg, & Bierman, 2017; McPherran Lombardi, & Levine Coley, 2014). In contrast, deficits in these skill domains are often associated with impeded development and can be predictive of problem behavior (e.g., aggression, disruption, non-compliance; Hanley, Heal, Tiger, & Ingvarsson, 2007). Skill deficits and problem behavior in early childhood have been associated with poorer outcomes

in later life, for example, emotional or behavioral disorders, and social or academic difficulties (Hanley et al., 2007; Vo, Sutherland, & Conroy, 2012). Some of the empirically identified risk factors for the development of problem behavior (e.g., low socioeconomic status, communication deficits; Abenavoli et al., 2017; Doubet & Ostrosky, 2015) are increasingly prevalent in early childhood with increases in language diversity, economic disparity, and variance in family circumstances (Odom, Buysse, & Soukakou, 2011). Given the abundance of evidence demonstrating the success of function-based interventions in decreasing problem behavior, Hanley et al. (2007) designed the Preschool Life Skills (PLS) program as a preventive application of this technology. The PLS program aims to impede the development of problem behavior and prepare preschool children for the social complexities of transitioning to kindergarten through teaching preschool life skills (Hanley et al., 2007).

The 13 target skills within the PLS program were identified as the most common functionally equivalent skills targeted to replace problem behavior within the literature, as well as skills that kindergarten teachers identified as important for school readiness (Hanley et al., 2007). The skills are divided into four units (Instruction Following, Functional Communication, Tolerance for Delay, and Friendship Skills). The PLS Units are then targeted progressively using behavioral skills training ([BST] i.e., instructions, modeling, role-play, feedback), and contriving situations that evoke the target skill or problem behavior (evocative situations; Hanley et al., 2007). Hanley et al. (2007) highlighted the need for further research, refinement, and development of the PLS program, and a recent review of the PLS program literature demonstrated that progress has been made toward this goal (Fahmie & Luczynski, 2018). To date, over 70 preschool children and 30 teachers across 12 classrooms have been involved in applications of the PLS program, with this research consistently showing increases in the target skills and decreases in problem behavior (Fahmie & Luczynski, 2018). Furthermore, the PLS program has repeatedly received high ratings of acceptability and stakeholder satisfaction (Fahmie & Luczynski, 2018). Fahmie and Luczynski reported that the PLS program has been evaluated in different intervention formats (i.e., class-wide, small group, one-to-one; Francisco & Hanley, 2012; Hanley et al., 2007; Luczynski & Hanley, 2013) and with modified teaching strategies (e.g., Beaulieu & Hanley, 2014; Francisco & Hanley, 2012). Recently, the PLS program has also demonstrated positive outcomes for children with developmental disabilities (e.g., Falligant & Pence, 2017; Robison, Mann, & Ingvarsson, 2019; Rodriguez, Levesque, Cohrs, & Niemeier, 2017) and has been evaluated outside of the United States (Gunning, Holloway, & Healy, 2018).

It is widely recognized that successful behavior change, and acquisition of new skills, requires consistent learning opportunities across varying circumstances, people, and settings (e.g., Dogan, et al., 2017). Therefore, in childhood, parental involvement in teaching and intervention is of paramount importance (Stocco & Thompson, 2015). Parent involvement in intervention has repeatedly been associated with benefits such as increased opportunities for learning, as well as positive generalization and maintenance outcomes (Dogan et al., 2017; Heitzmann-Powell, Buzhardt, Rusinko, & Miller, 2014). Involving parents in intervention can benefit children, parents, and practitioners by saving time and resources (Dogan et al., 2017), and can overcome some of the barriers that restrict access to intervention for families (e.g., cost, availability, accessibility; Comer et al., 2017; Heitzmann-Powell et al., 2014).

The importance of considering generalization promotion within intervention development has been recognized since the work of Stokes and Baer (1977), and Stokes and Osnes (1989). As described by Luczynski, Hanley, and Rodriguez (2014), the application of the PLS program incorporates several generalization promotion strategies (e.g., exploit current functional contingencies, train loosely). Luczynski et al. evaluated generalization as an outcome of the PLS program. When initially positive generalization results began to decline over time, Luczynski et al. systematically evaluated the impact of additional generalization promotion strategies to improve outcomes. Sufficient generalization outcomes were not obtained until teacher training had been employed suggesting that it is not sufficient to assume that a functional skill will be reinforced in the natural environment. Furthermore, the study highlighted the importance of training for individuals within the child's environment to ensure that skills contact appropriate contingencies during acquisition. The authors suggested that future research should evaluate the effects (i.e., acquisition, generalization, maintenance) of parent implementation of the PLS program within the home.

There are numerous parenting programs based on social learning principles that currently represent the "gold standard" in supporting positive outcomes and preventing problems for children (Sanders, Kirby, Tellegen & Day, 2014). For example, reviews and meta-analyses of The Incredible Years (Gardner & Leijten, 2017), Triple P-Positive Parenting Program (Sanders et al., 2014), and Parent Child Interaction Therapy (Thomas, Abell, Webb, Avdagic & Zimmer-Gembeck, 2017) have indicated positive parent and child outcomes. However, variability in outcomes for individual children and families, and the factors which may influence this, are repeatedly highlighted as areas warranting further research in parent education and training (Gardner & Leijten, 2017; Thomas et al., 2017;

Sanders et al., 2014). Stocco and Thompson (2015) suggested that the behavioral contingencies that exist for parental behavior in the natural environment may contribute to this variability in outcomes and parental adherence and outlined the potential utility of parent implementation of the PLS program in this regard. The use of evocative situations (i.e., situations that would either evoke the new skill or problem behavior) within the PLS program would provide parents with practice situations to respond to their child's behavior, thus, creating a learning opportunity for the child, as well as establishing a learning history for the parent's skills teaching (Stocco & Thompson, 2015). Furthermore, given that parents would be taught to reinforce appropriate skills and provide corrective feedback in the presence of inappropriate behaviors (i.e., problems of omission, problems of commission) within these naturalistic situations, this may support generalization and maintenance of adaptive behaviors post-intervention (Nefdt, Koegel, Singer, & Gerber, 2010).

Based on these findings and suggestions for future research, the aim of the current study was to teach parents to use the PLS program through in-vivo behavioral skills training (BST), as BST has demonstrated effective outcomes in parent training for both parents (e.g., development of teaching responses) and children (e.g., improvements in social skills; Dogan et al., 2017). Parent and child outcomes following parent training in the PLS program were investigated in terms of parents' demonstration and knowledge of correct teaching strategies, children's skill acquisition and generalization, and changes in levels of problem behavior in the form of problems of omission (PO) and commission (PC). Furthermore, the social validity of the PLS program as a parent-implemented, home-based intervention was evaluated.

Method

Participants, settings, and materials. Participants were recruited by distributing information flyers and invitation letters to preschool services (see Appendix A for sample recruitment materials). Parental consent and child assent were obtained prior to commencement. Researchers obtained children's assent by explaining the project in a child-friendly manner and asking them to color a smiley face (to indicate assent) or a sad face (to indicate dissent) on their assent form (see Appendix B). All parents and children were assigned dyad numbers and pseudonyms. Six parents and seven children took part in the current research in seven parent-child dyads (one mother participated with her two children in Dyads 1 and 2). All of the participating parents were female and between 31 and 44 years of

age (*M*=39.8, *SD*=4.5). Apart from Bethany who was American, all of the participating mothers were Irish. Four of the children who participated were male and three were female. The children were aged between 3 years 3 months and 4 years 11 months (*M*=4.2, *SD*=0.68) at the start of this study. All children were Irish and lived in households that included their mother, father, and siblings (range, 1-3). John had been identified as having delayed speech in early childhood, and all of the other children were typically developing. All children attended preschool and continued to attend preschool for the duration of the study. Amy, John, Adam, Max, Kate and Fiona attended preschool for 3 hours a day, 5 days per week, while Bobby attended preschool for 3 hours per day, 2-3 days per week. Research sessions took place in participants' homes and generalization observations took place in the preschool setting. Parent-child dyads are presented in Table 4.1.

Table 4.1
Parent-Child Dyads

Parent	Child/Children
Laura	Amy
	John
Ruth	Adam
Joanne	Max
Bethany	Bobby
Susan	Kate
Hannah	Fiona

Across all direct measures in the current research, researchers collected data using paper and pencil, and recorded all sessions using a video camera. The first author provided a "prompt-sheet" that described the elements of BST in non-technical language to parents. The sheet also included space to write notes regarding relevant everyday situations that previously evoked problem behavior (see Appendix C). The researcher also provided a poster "Progress and Practice Tracker" for each child with visual reminders for each skill that affixed to the poster with Velcro (see Appendix D for a sample). This poster contained the child's name, a section for previously targeted skills ("Skills I've Learned"), and a separate section for the target skills in the unit being taught ("Skills I'm Practicing This Week") with 20 Velcro pads and 20 Velcro smiley faces. A selection of toys and activities were used throughout the study (e.g., Duplo™, toy train, craft kits, Playdoh™, jigsaws, marble run).

Measures. The primary dependent variables were parents' teaching strategies and children's PLS. Evocative situations (trials) were established to provide a direct measure for these variables. Child and parent performances were recorded within trials, and percentage

correct was calculated at each phase in the study. In addition, indirect measures of the children's PLS were collected, as recommended by Hanley et al. (2007). Measures of parental knowledge of teaching strategies, generalization of children's PLS, and social validity of the program were also included.

Parent measures.

Parent direct measures. During baseline and post-test, parent teaching was directly measured within one trial for each PLS (i.e., 11 trials in total). The observer scored correct teaching when the parent arranged the evocative situation for the skill correctly (e.g., Asks for Help: handing the child a box they could not open, Responds to Name: calling the child's name clearly), and delivered reinforcement or corrective feedback correctly (i.e., praising a correct skill or provided activity-related reinforcement, delivering corrective feedback for incorrect skills or problem behavior). Parents were required to complete both of these teaching elements correctly within a trial in order for correct parent teaching to be recorded. The observer scored incorrect teaching if a parent: (a) failed to arrange the evocative situation for a skill or did so incorrectly, (b) reinforced problem behavior or incorrect skills, or (c) failed to reinforce a PLS. This measure was also employed within trials to criterion during parent training. Across measures, the researcher calculated percentage correct parent teaching by totaling the number of trials in which correct teaching was recorded, dividing this by the total number of trials in which the parent was observed, and multiplying by 100.

Parent knowledge measure. Parents were asked to identify important target skills for their child (one from each PLS unit and two additional parent identified targets, i.e., a total of six skills), and to demonstrate, to the best of their ability, how they would teach each skill (Dogan et al., 2017). Parents modeled or described how they would teach skills (e.g., "I would get down to his level and remind him", "I might say – okay, I have to make this phone call so you need to wait"). The researcher recorded parent responses (using pencil and paper recording) within each of the six opportunities against a checklist of teaching strategies. The checklist included: giving instructions/rationale, modelling, roleplay, arranging evocative situations, and providing corrective feedback (Dogan et al., 2017).

Child measures.

Child direct measures. Within each trial for each skill, the observer recorded the child's behavior as: (a) a PLS, (b) a PO (i.e., approximation of the correct skill or no response), or (c) a PC (i.e., problem behavior). If the parent teaching procedure was not

implemented correctly, the observer did not collect data on the child's skills. The percentage of trials in which each of these responses occurred (i.e., PLS, PO, PC) was calculated by totaling the number of trials in which each behavior occurred, dividing this by the total number of trials in which the child was observed, and multiplying by 100.

Table 4.2 includes the targeted PLS, operational definitions, and examples of PO and PC. Table 4.2 also displays sample evocative situations and the average number of trials in which children were observed across the phases of the current research. Each child who completed the program was observed in an average of 215 trials (range, 210-229) across the duration of the study.

Child indirect measures. Parents completed the indirect measure of the PLS (Hanley et al., 2007). This is a 13-item questionnaire within which the respondent is presented with an evocative situation for each of the PLS targets and asked to report whether it is more likely that the child will engage in a PLS or problem behavior in that situation. The responses from this measure are converted into a percentage of situations in which the respondent reported that a correct skill was more likely to occur than problem behavior. The PLS indirect measure demonstrated mean interrater agreement of 75% across respondents, acceptable item-by-item agreement, and high outcome agreement (Hanley et al., 2007).

The Social Skills Improvement System (SSIS; Gresham & Elliott, 2008) was also used as a further indirect measure of the outcomes of the PLS program given the overlap between a number of items in the SSIS and PLS program targets (Gunning et al., 2018). The SSIS assesses the skill domains that are considered important for successful social interaction. The SSIS Parent Form includes a social skills scale and a problem behavior scale. The social skills scale includes 46 items across seven subscales: communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. The problem behavior subscale contains 32 items across four subscales: externalizing, bullying, hyperactivity/inattention, and internalizing. Parents rate how often their child displays a behavior or skill on a four-point scale (Never, Seldom, Often, Almost Always). Scores on each subscale are summed to produce a raw score, which is then converted to a standard score. Standard scores range from 40 to 133 for the social skills scale, and from 77 to 160 for the problem behavior scale. Higher scores on the social skills scale indicate higher levels of social skills, whereas higher scores on the problem behavior scale indicate higher levels of behavioral problems. The internal consistency estimates for the SSIS Parent Form are

adequate (α coefficients range from .76 to .88), and the SSIS has demonstrated high test–retest reliability (r=.82) and validity evidence (Gresham & Elliott, 2008).

Social validity. The researchers asked all parents and children to complete social validity measures at the end of the research. The parent social validity measure, based on the Luczynski and Hanley (2013) questionnaire, required that parents rate their agreement with statements about the PLS program and training, the research, and changes in their child's skills and behavior on a 1-7 Likert-type scale. There was also space for additional comments and recommendations. A researcher conducted an informal interview with each child, during which the researcher asked the child their opinions of the program through five questions. The first two questions were Yes/No answer questions (i.e., Did you like doing the project? Do you think other children would like it?). The researcher then asked the child to identify their favorite and least favorite parts of the project (e.g., What was your favorite thing that we did? What did you not like as much?). Finally, the researcher asked an open-ended question for any further comments (e.g., Is there anything else you would like to say about it?).

Interobserver agreement (IOA). The majority of the research sessions conducted in the children's homes were video recorded so that IOA and treatment fidelity could be monitored. Video data were available for the following proportion of sessions across the current research: initial baseline (67%), Unit 1 (100%), Unit 2 (83%), Unit 3 (83%), Unit 4 (100%), and post-test (83%). On four occasions, video data were not recorded due to incorrect set up of the recording equipment and a sibling turning off the camera.

In order to establish IOA for the direct measures, an independent research assistant watched the videos of three to four sessions (60-67%) across phases for each dyad. Where videos were available, the research assistant viewed initial baseline and post-test sessions and two teaching sessions. The researchers viewed post-test sessions and three teaching sessions because baseline video data were not available for Adam or Max. The research assistant recorded data for the parent and child separately. An agreement was defined as the independent research assistant scoring the same response for the child (PLS, PO, or PC) or parent (correct or incorrect teaching), as the researcher during each trial (i.e., trial-by-trial agreement). The experimenters calculated IOA by dividing the number of agreements by the number of agreements plus disagreements and converting the result to a percentage.

Table 4.2

Skill Units, Operational Definitions and Sample Evocative Situations for the Preschool Life Skills

PLS Units and Skills	Operational Definition PO and PC Example	Sample Evocative Situations (average number of evocative situations for each child at baseline, intervention and post-test sessions)
Unit 1 Instruction Following		
Skill 1. Responds to Name	Orients toward the speaker and makes eye contact. Within 2 seconds. PO: Does not respond PC: Shouts "Go away!"	Parent calls child to ask them a question or give an instruction. (6,4,6)
Skill 2. Follows 1 Step Instructions	Begins to complete the instruction within 3 seconds. Completes in a timely manner. PO: Does not complete the instruction PC: Shouts "No!"	Parent asks the child to show them something or find something. (6,4,6)
Skill 3. Follows Multi-step Instructions	Begins to complete the instruction within 3 seconds. Completes in a timely manner. PO: Completes 1 step but not the other(s) PC: Whines and says "No you do it"	Parent gives the child an instruction within games (e.g., asks child to find the giraffe and put him beside the elephant), tidy up time (e.g., pick up and put away) or general (e.g., go into the kitchen and open the door to let the cat in). (6,4,6)
Unit 2 Functional Communication		
Skill 4. Asks for Help	Requests assistance within 45 seconds of difficult task/problem e.g. "Help me" or similar PO: Gives up without seeking assistance PC: Throws item	Difficult play activities (e.g., a building task or marble run), making a snack, having toys difficult to access (e.g., sealed playdoh, tightly closed bubbles). (6,4,6)

Skill 5. Requests Attention	Requests attention appropriately "Excuse me" or "Name" PO: Does not use the person's name when their attention is diverted PC: Pulls on the person	Parent diverts their attention to another child or task or engages in a conversation with another adult. (6,4,6)
Skill 6. Requests to Adults	Makes an appropriate request to an adult e.g. "Can I ____?" PO: Says "mine" or one word as a request PC: Grabs the item	Parent controls access to an item or area (e.g., holding the box with the toys), getting food, going outside. (6,4,6)
Unit 3 Tolerance for Delay		
Skill 8. Tolerates Adult Delay	Waits appropriately for 30 s (absence of additional requests or behavior e.g. poke) PO: Does not wait e.g., wanders away, forgets request PC: Shouts and repeats request	Parent asks the child to wait for their turn, a toy or a snack. Parent is having a conversation and asks the child to wait. (6,4,6)
Unit 4 Friendship Skills[a]		
Skill 10. Says "Thank You"	Says "Thank you" within 5 s of receipt of item/access PO: Does not say "thank you" PC: Sticks tongue out	Parent provides access to something (e.g., toy, drink, snack) or provides assistance. (5,3,5)
Skill 11G. Greets Others[b]	Within 1 minute of a newcomer arriving, delivers a greeting e.g. "Hi" or "I like __" PO: Does not greet the person PC: Says "Oh no, go away"	Other family members arrive home. Researcher arrives for the session. (2,2,3)
Skill 11C. Compliments Others[b]	Coming up with a compliment in the form: "I like ____" (e.g., your shoes) when asked to think of something nice to say to someone PO: Does not respond with a compliment PC: Responds inappropriately e.g., toilet talk	Parent asks "Can you think of something nice you could say to_____ (e.g., sibling, parent, grandparent)?" (5,2,4)

Skill 13. Comforts Others	Within 1 minute of an event approaches the victim and comforts e.g. "Are you ok?" or hug PO: Does not respond to person who is upset or injured PC: Laughs	Parent simulates mild injury e.g. bump leg on table or describes something sad that happened to them (5,1,3)

Note. Three of the PLS (Skill 7: Framed request to peers, Skill 9: Tolerating delay from peers and Skill 12: Sharing) were not directly taught within the parent-led preschool like skills (PLS) program due to inconsistencies in the availability of siblings or peers to take part across the program. PO = problem of omission; PC = problem of commission.

[a]At the initial baseline session, it was observed that evocative situations for the skills in Unit 4 were less frequent in the home setting than those for the skills in Units 1, 2 and 3. As a result, children were observed in fewer evocative situations at each phase for the skills in Unit 4 as this more accurately reflected the frequency of natural opportunities for these skills within the home context.

[b]It was observed at baseline that the evocative situation for Skill 11 (Greeting/Compliments) as defined in Hanley et al. (2007) was not appropriate within the social context of the current research. A newcomer arriving served as an evocative situation for a greeting but not a compliment. Therefore, Skill 11 was divided into two skills in the current research: 11G (Greetings) and 11C (Compliments).

Mean IOA across baseline sessions was 97% (range, 92-100% for children's responses) and 95% (range, 93-100%) for parent responses. Across teaching sessions, mean IOA was 92% (range, 85-100%) for children's responses and 96% (range, 92-98%) for parent responses. Mean IOA across post-test sessions was 92% (range, 85-100%) for children's responses and 97% (range, 93-100%) for parent responses. For the generalization observations in the preschool settings during baseline and post-test, another staff member simultaneously and independently recorded the children's behavior during trials. During baseline, IOA across 21% of trials was 93%. During post-test, IOA across 23% of trials was 90%.

Design and procedure. The current study employed a multiple probe design across units of skills repeated across dyads. The research commenced with the initial baseline session during which observers collected all baseline measures. Following this, each dyad experienced the same teaching and testing sequence. One unit of skills was targeted at each intervention session progressively from Unit 1 to Unit 4. The final session was the post-test session in which all post-test measures were completed. Sessions occurred weekly and the duration of each session was between one to two hours. For all sessions, the researcher provided a choice of 15- to 20-min activities (e.g., playdoh, marble runs) that occasioned multiple opportunities for the target PLS skills for that session (e.g., a building activity for the listening skills). Trials occurred approximately every 2 to 3 min across sessions. In general, breaks (approximately 5 min) occurred naturally at the transitions between activities and when the researcher was in discussion with the parent.

Across all phases, the observer scored trials for the PLS within evocative situations that involved the child and parent. If evocative situations did not naturally occur for a skill within the first two activities in a session, the researcher asked the parent to set them up (e.g., to fake an injury for Comforts Others or to ask the child to wait for Tolerates Adult Delay). The observer scored parent teaching as incorrect in such instances given that this was not independent, and child responses were not scored.

Initial baseline. At the outset of the initial baseline session, the researcher introduced herself, provided an overview of the project schedule, and described the PLS program. She then provided an opportunity for parents and children to ask questions. All direct and indirect parent and child measures were completed at this session. An average of 60 trials (range, 57-

64) occurred for each child within their initial baseline session. The researcher delivered no programmed consequences for PLS, PO, or PC during initial baseline sessions.

Intervention sessions. The intervention sessions followed the same general format across PLS Units and for each dyad: (a) trials for the skills targeted during the previous session, (b) parent training (in-vivo BST for the new PLS Unit, independent parent PLS delivery), and (d) summary discussion. At the beginning of each session, the researcher observed parents and children in four trials for each of the skills targeted during the previous session, with fewer trials presented for Unit 4 as outlined in Table 1.

Parent training. The researcher delivered in-vivo parent training with the child and parent. The researcher gave an introduction and rationale for the target skills and provided models of PLS, PO, and PC (one or two models of each, per skill) for the parent and child. The researcher then asked the parent to roleplay two or three evocative situations in which the parent created the evocative situation and delivered corrective feedback as the researcher demonstrated correct skills, PO, and PC. The researcher and parent then swapped roles for an additional one or two evocative situations. This resulted in an average of five roleplays across skills in the unit, and children identified whether the skill was correct or incorrect in each. Correct identification by the child resulted in praise and an incorrect response resulted in corrective feedback. The researcher then completed a brief activity with a discrete beginning and end (e.g., a small jigsaw puzzle, building a small train track) with the child. Within this activity the researcher modeled the teaching procedure for three to five trials and discussed the teaching strategies (i.e., arranging evocative situations, delivering corrective feedback and reinforcement) with the parent. In total, in-vivo BST occurred for approximately 15 min per session and the parent and researcher presented a maximum of 12 learning opportunities (i.e., opportunities to respond within roleplays or evocative situations) for the child.

The experimenter then offered the child the choice of activities outlined previously, and the parent set up the activity. Within this activity, the parent carried out PLS teaching independently (i.e., arranging evocative situations, providing corrective feedback or reinforcement contingent on the child's response). This continued for the remainder of the session with the researcher providing corrective feedback to the parent contingent upon any incorrect teaching and intermittent descriptive praise contingent upon correct teaching. The researcher remained at the activity with the parent and child, but limited direct involvement in the activity so that the parent implemented the teaching strategies independently. An

average of 25 trials (range, 24-27) were observed for each child within each intervention session.

Parent teaching criterion. At the first training session, the criterion for the session to conclude was the parent demonstrating 90% correct teaching across 20 trials. All parents met the criterion during the initial session. Given that the teaching strategies were the same across PLS Units, and to prevent parent and child fatigue, the criterion for the sessions to conclude was then reduced. In subsequent sessions, sessions concluded when parents had demonstrated 90% correct parent teaching or three consecutive correct trials in at least 10 trials where the majority were correct. The observers recorded parent teaching and child responses during these trials.

Corrective feedback and practice opportunities. At the outset of each session, if the parent demonstrated any incorrect teaching within trials for the skills targeted during the previous session, the researcher delivered corrective feedback (i.e., described the error and modeled correct teaching). If the child engaged in PO and/or PC more often than the correct PLS, the researcher made a note of the error and embedded additional practice opportunities for this skill within the activity for that session. These practice opportunities involved the researcher providing a reminder of the skill for the child and setting up an average of three trials, which typically occurred before the introduction of the next PLS Unit. The researcher conducted these trials, providing descriptive praise for correct responses and corrective feedback for incorrect responses.

Additional supports. To promote parents' implementation of intervention between sessions and within the natural context, a number of additional supports were provided. At the end of each session, the parent and researcher discussed relevant everyday situations that would occasion evocative situations for the target skills. The researcher wrote these examples on the "prompt-sheet" for the parent. The researcher also brought visual reminders for the new target skills to each session and placed them on the "Progress and Practice Tracker," which was displayed in a prominent location in the house. Researchers told parents and children that they should place smiley faces on the chart any time they practiced or worked on the target skills between sessions. Researchers asked parents to use the chart as they preferred, with an emphasis on use as a visual reminder rather than a reinforcement system. The "prompt-sheet" and "Progress and Practice Tracker" were designed as self-monitoring tools, as self-monitoring has been posited to support intervention implementation in the

natural environment (e.g., Belfiore, Fritts, & Herman, 2008). To support child engagement during sessions, the researchers; identified preferred activities by asking children what they liked to do at the outset of the study, provided a choice of activities (with discrete end points/products), and allowed children to change the activity at any stage during the session.

Post-test. The post-test session began with the trials for the target skills from PLS Unit 4. Following this, trials for the rest of the target skills were conducted as during baseline. A researcher conducted the social validity interview with each child during this session, and parents completed the parent social validity questionnaire and all indirect measures. An average of 56 trials (range, 53-59) occurred for each child within their post-test session.

Generalization. The researcher attended each child's preschool for 1 to 2 days each during the baseline phase and during post-test to complete observations. These observations were designed to provide a preliminary investigation of generalization of the targeted skills across settings (due to time constraints, it was not possible to complete baseline observations in preschool for John and Adam). The researcher carried out observations for each child during 15- to 20- min periods and recorded the child's responses in naturally occurring evocative situations across contexts (e.g., outside, classroom), activities (e.g., small group time, free play, snack), and people (e.g., teachers, peers). On average, the researchers observed each child in 21 evocative situations (range, 15-31) in the preschool setting during baseline and in 25 evocative situations (range, 20-34) during post-test. Throughout generalization observations, there were no programmed consequences for PLS, PO, and PC.

Treatment fidelity. A 5-item checklist was developed for the parent training procedure. This included the researcher (a) providing an introduction and rationale for the target skills; (b) modeling correct performance, PO, and PC for each target skill; (c) roleplaying correct performance, PO, and PC with the parent; (d) discussing evocative situations, target skills, and corrective feedback with parent and; (e) modeling at least three trials with the child. An independent research assistant viewed the available videos and recorded fidelity of the researcher's implementation against this checklist for each dyad within each of the intervention phases (i.e., Unit 1, Unit 2, Unit 3, Unit 4). The observers scored videos for all Unit 1 and Unit 4 intervention sessions, and 83% of videos for Unit 2 and Unit 3 intervention sessions. Observers recorded a correct response for each step of the training procedure that the researcher implemented correctly and divided the total number of

correct steps by five (total steps in the procedure) and multiplied by 100 to obtain a percentage for each intervention session. For all available video recorded sessions, fidelity of implementation was 100% across all dyads and PLS Units.

Results

Each of the dyads completed the parent PLS program across 6 weeks. Intervention sessions were arranged weekly, and across the program several sessions were rescheduled due to extraneous factors (e.g., adverse weather conditions, familial commitments). As a result, the minimum number of days between two intervention sessions was four and the maximum was 15. Across dyads, across the program, there was an average of seven days between intervention sessions. Due to scheduling conflicts, the teaching session for Unit 4 was also the post-test session for Hannah and Fiona and, therefore, data are presented for this dyad for Units 1-3 only. Parents in the current research appeared to utilize the "Progress and Practice Tracker" to monitor practicing during the days between training sessions (based on parent report and researcher observation of charts/smiley faces at each session). In two houses (Laura/Amy/John and Bethany/Bobby), the researchers prepared charts and visuals for non-participating siblings close in age to the participating children who requested charts.

For Unit 1, all parents met the training criterion within 20 trials and the majority met criterion within 10 trials. Laura met the criterion for Unit 1 within 13 trials and Unit 2 in 15 trials, while all other parents met the criterion for Unit 2 in 10 trials. The majority of the parents met the criterion for Unit 3 within 10 trials, although Hannah required 15 trials to meet this criterion. Both Ruth and Joanne met the criterion for Unit 4 after 15 trials. Laura, Bethany, and Susan required 10 trials to meet the criterion for Unit 4. Across trials to criterion, correct parent teaching occurred within 89% of trials in which their child performed a PLS (N = 175) and 71% of trials in which their child engaged in a PO or PC (N = 78).

Figure 4.1 displays the percentage of correct parent teaching (i.e., arranging the evocative situation and delivering reinforcement/corrective feedback correctly) within the trials for the previously targeted skills at the outset of each session. Overall, parents performed correct teaching on 84% of trials on average (range, 50-100%). Across these trials, parents demonstrated correct teaching within 89% of trials in which their child engaged in a PLS (N = 215) and 75% of trials in which their child engaged in a PO or PC (N = 60).

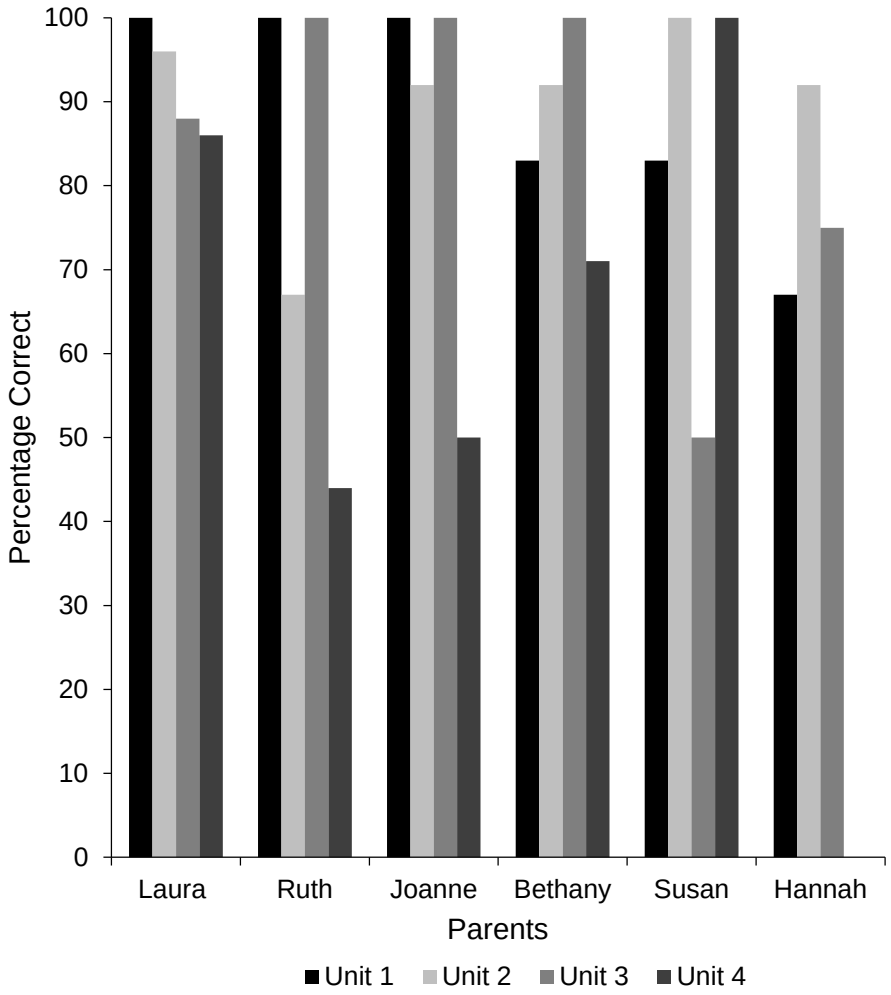

Figure 4.1. Correct teaching demonstrated by each parent within the trials for the previously targeted PLS Unit at the outset of each session.

The percentage of evocative situations in which parents demonstrated correct teaching during baseline and post-test are presented in Figure 4.2. During baseline, correct teaching ranged from 0-20% (M = 6.8, SD = 8.01). Susan demonstrated the most correct teaching during baseline (20%), and Laura, Ruth and Joanne failed to demonstrate correct teaching for any skill. During post-test, correct teaching increased substantially for all parents. Correct teaching ranged from 55-100% across parents during post-test (M = 72.7, SD = 16.12).

During baseline, the teaching strategies most commonly identified by parents across the PLS were providing a rationale and instructions for the skills (83% and 67%, respectively). Fewer parents demonstrated the use of modeling, creating evocative situations, roleplay, or feedback during baseline (≤33%). During post-test, all parents identified

providing instructions and arranging evocative situations as teaching strategies (100%). Parents also described using the strategies of providing a rationale for the target skill and feedback for children's performance commonly during post-test (83%). Fewer parents identified modelling and roleplay as teaching strategies during post-test (≤33%). During baseline, when parents were asked about teaching the parent-identified skills other than the PLS (e.g., being gentle with a baby sibling, fussy eating, tolerating no, independent play), the strategies identified were providing a rationale (50%) and instructions (17%). During post-test, the most commonly identified strategies to teach these skills were creating evocative situations (67%) and providing feedback (50%). Fewer parents identified the use of instructions, rationale, modeling, or roleplay as strategies to teach these skills during post-test (≤33%).

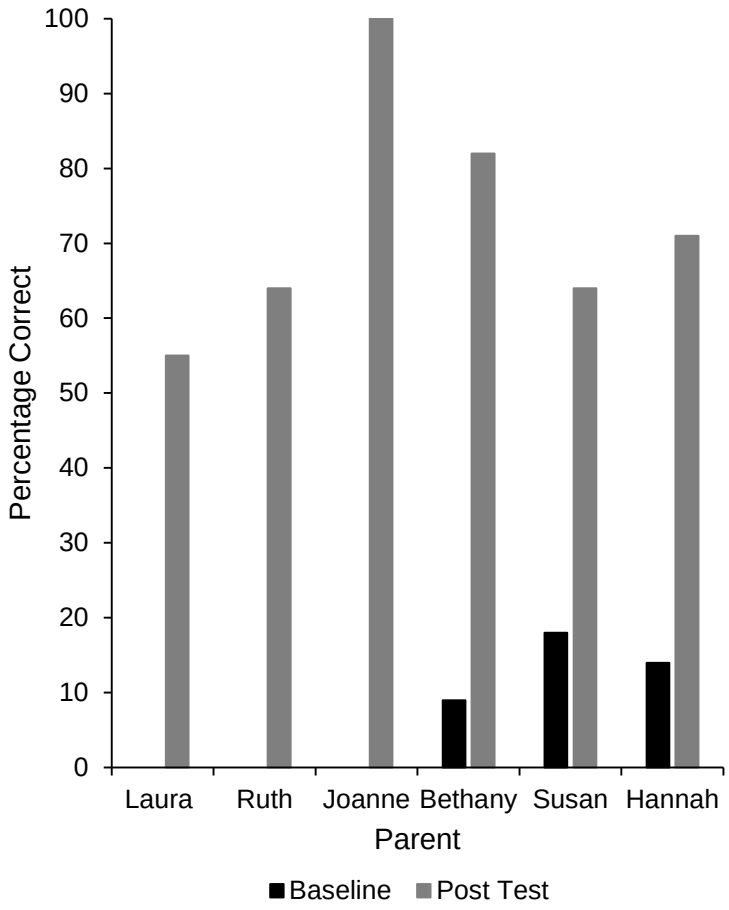

Figure 4.2. The percentage of trials with correct parent teaching at baseline and post-test.

Figure 4.3 displays the effects of the parent PLS program on the relative occurrence of PLS, PO, and PC for children across the PLS Units. Across children, during baseline, PLS were most consistently demonstrated within trials for the skills in Unit 1. Engaging in PLS occurred less often and PO and PC were more common across children for the skills in Units 2, 3, and 4.

Across PLS Units, increases in the targeted skills were evident for each child following parent PLS. Corresponding decreases in PO and PC were also evident after parents targeted the skills in each PLS Unit. Across the program, performance of the previously targeted skills within trials during subsequent sessions remained high for all children, with PO and PC remaining at low levels in comparison to baseline.

During baseline of Unit 3, when a PLS did not occur, PC were likely to occur. Following parent PLS, PC decreased substantially for all children. The changes in the probability of PLS after parents targeted the skills in Unit 4 (Saying “Thank You”, Greetings, Compliments, Comforting Others) were the most modest across children. Although additional practice opportunities were not required for any child for any skill in Units 1, 2 or 3, all of the children required additional practice opportunities for one or two of the skills in Unit 4.

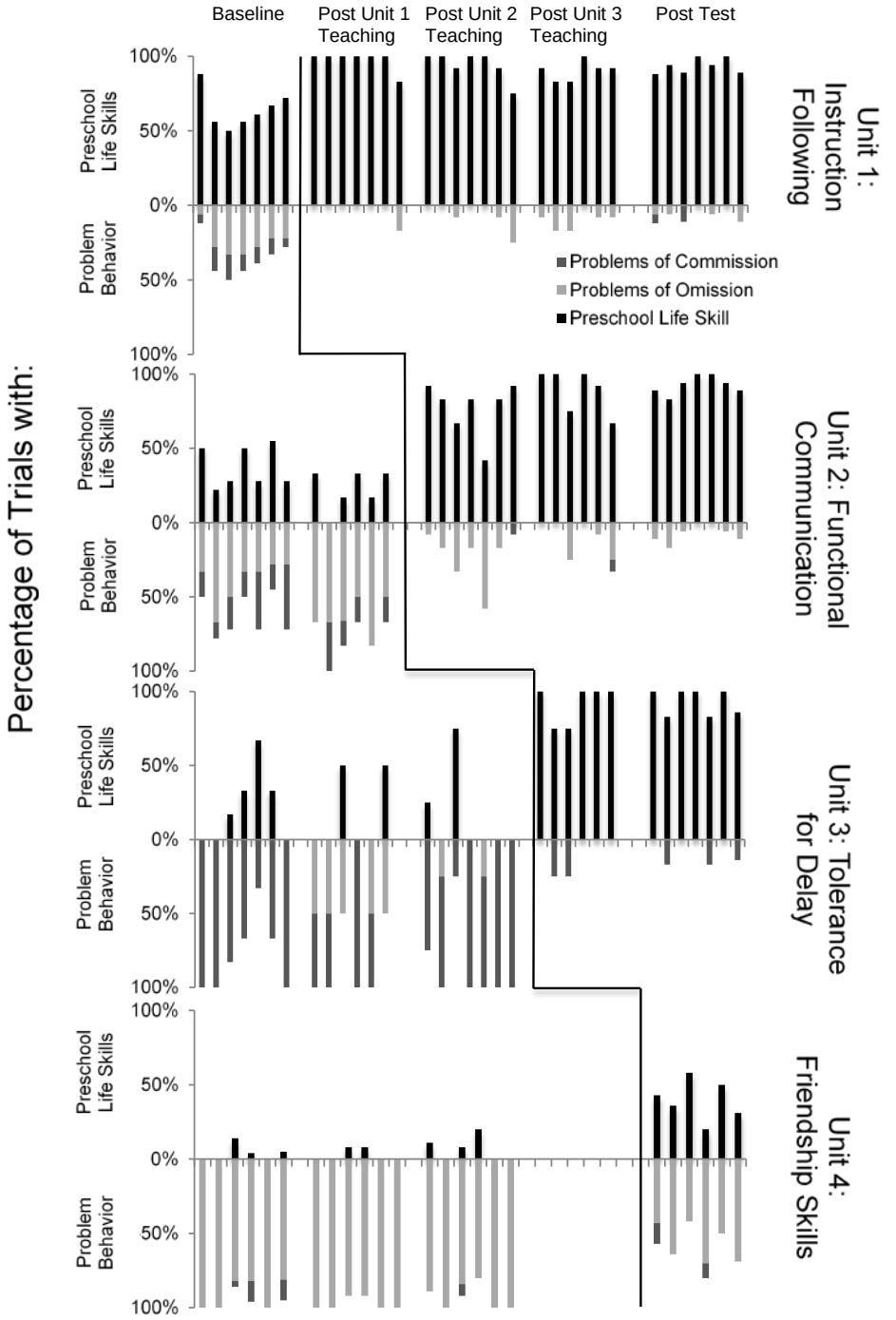

Figure 4.3. The percentage of trials in which children engaged in PLS and problem behavior for each child across the units of the PLS program and the phases of the current study. Each panel represents a PLS Unit of target skills, and each vertical bar represents the performance of an individual child.

Figures 4.4-4.7 display the percentage of trials in which a PLS occurred during baseline and post-test in the home and in the preschool setting for each individual child. Data from the home setting are depicted by the black bars with the effect size for each child presented to the left beneath their name. Cohen's d statistics were calculated to describe the size of the effect of the parent PLS program on the target skills at home. The baseline mean percentage of trials with PLS was subtracted from the post-test mean percentage of trials with PLS and divided by the mean of the standard deviations during baseline and post-test (Hanley et al., 2007; McConville, Hantula, & Axelrod, 1998). Effect sizes for the individual children ranged from 1.1 to 2.3, which is considered a large effect (Cohen, 1994). The data presented in these figures demonstrate that overall, the occurrence of PLS in the home increased for all children during post-test. The effects of the parent PLS program varied across children and across target skills. In the home, increases during post-test were more consistently demonstrated for the PLS in Units 1, 2 and 3, with the majority of the children demonstrating PLS on 100% of post-test trials for some of these skills. During post-test, increases in the occurrence of PLS were more modest and varied across children for the skills in Unit 4 (e.g., Amy, Max, Kate).

A preliminary analysis of children's PLS performance across units (Figures 4.4-4.7) based on their parent's correct teaching within evocative situations for the previously targeted skills (Figure 4.1) was conducted based on visual analysis. While Laura demonstrated high levels of correct teaching across PLS Units, outcomes for John and Amys' Unit 4 PLS were mixed. Ruth demonstrated more incorrect teaching for Units 2 and 4, but Adam's Unit 2 PLS were high at post-test whereas his Unit 4 PLS were lower. Similarily, Susan's lowest teaching performance occurred for PLS Unit 3, but Kate demonstrated high levels of Unit 3 PLS at post-test. Although Susan's correct teaching for Unit 4 was high, Kate's Unit 4 PLS were lower at post-test. Joanne's correct teaching was lower in PLS Unit 4 which was reflected in Max' post-test Unit 4 PLS (apart from Skill 11G Greetings). In contrast, while Bethany's correct teaching was lower for PLS Unit 4, Bobby's post-test Unit 4 PLS were comparatively high. Similarily, Hannah demonstrated lower correct teaching for PLS Units 1 and 3 but Fiona's post-test PLS were high across units.

Figures 4.4, 4.5, and 4.7 display generalization data from the preschool setting on the gray bars, with the number of trials per skill in parentheses on the y-axes. During baseline, the occurrence of PLS was varied, with the majority of children demonstrating the most success with the PLS Unit 1 skills. During post-test, performance of the skills in PLS Units 1,

2, and 3 improved for the majority of the children. The skills in Unit 4 demonstrated the most variability in correct post-test preschool performance across children. Interestingly, no child was observed in a naturally occurring evocative situation for Complimenting Others during baseline in the preschool context. Furthermore, only two children were observed in an evocative situation for Comforting Others during baseline and post-test in the preschool context (Amy and Max).

During baseline, the mean score on the PLS indirect measure was 56%, which increased to a mean score of 88% after parent PLS. During post-test, there was also evidence of some change in children's scores on the SSIS, with mean scores on the social skills subscale increasing from 96 to 106 (representing an increase from the 37th to 65th percentile) and mean scores on the problem behavior subscale decreasing from 108 to 101 (representing a decrease from the 72nd to 56th percentile).

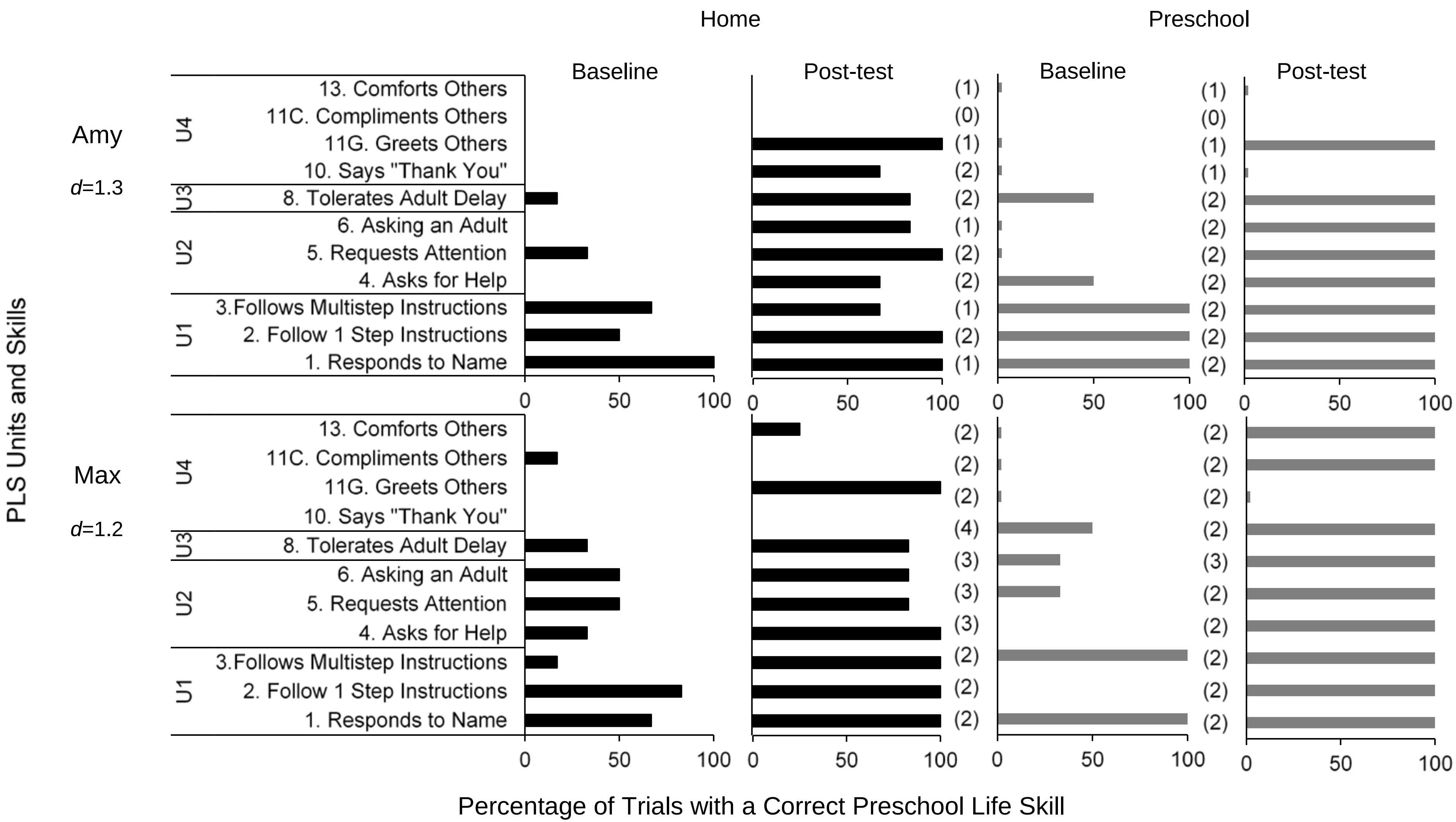

Figure 4.4. Trials with PLS during baseline and post-test for Amy and Max. The number of trials per skill in the preschool setting are presented in parentheses on the y-axes.

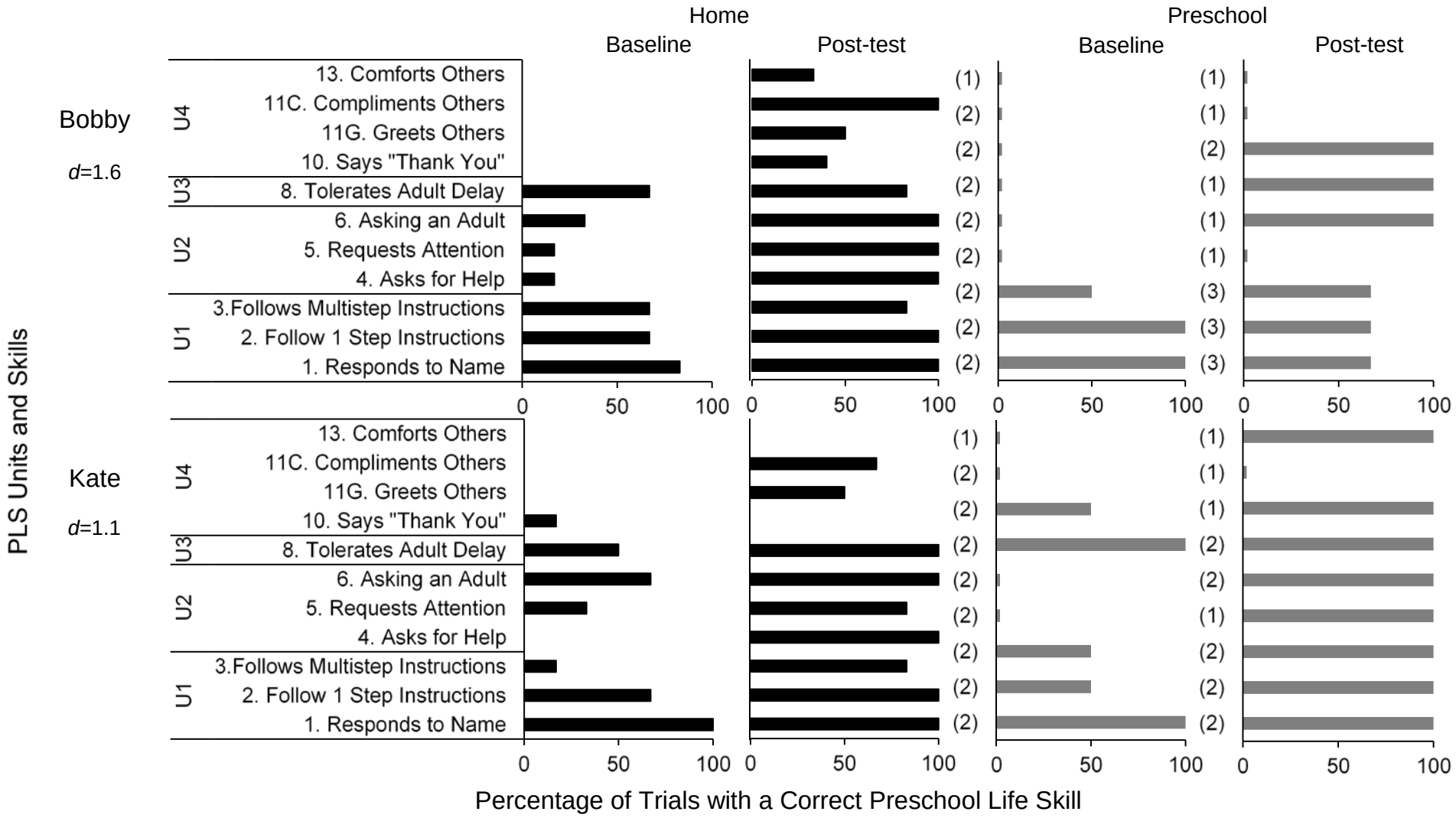

Figure 4.5. Trials with PLS during baseline and post-test for Bobby and Kate. The number of trials per skill in the preschool setting are presented in parentheses on the y-axes.

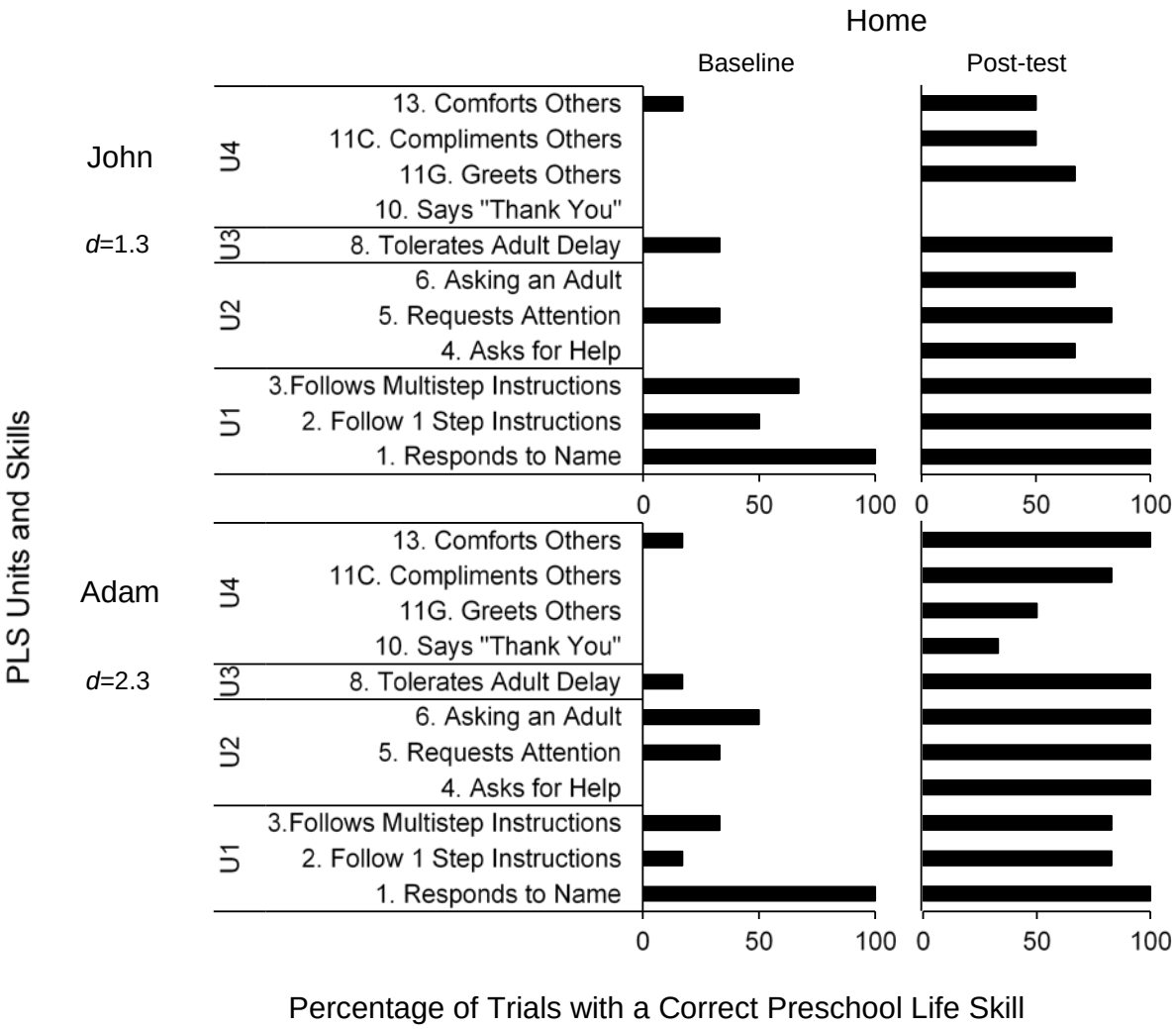

Figure 4.6. Trials with PLS at home during baseline and post-test for John and Adam. Effect sizes for each child are presented to the left.

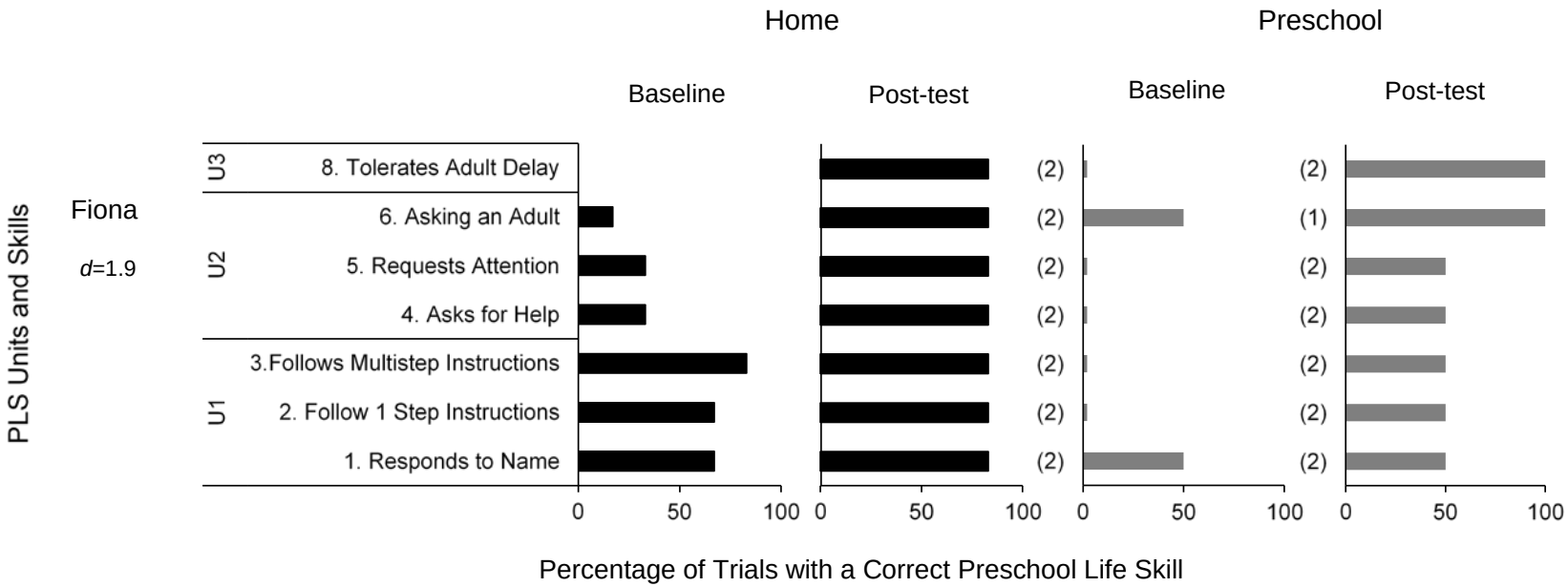

Figure 4.7. The percentage of trials in which a PLS occurred during baseline and post-test for Fiona. The number of trials per skill in the preschool setting are presented in parentheses on the y-axes.

Social validity data are presented in Table 4.3. Parents' ratings of the statements regarding the parent PLS program, the training and the outcomes for them and their children were consistently high. The social validity questionnaire also provided space for further comments and suggestions and parents highlighted their children's understanding of the program and the target skills (e.g., "she seems to really get it") as well as increases in the target skills (e.g., "more cooperative, better waiting"). Parents also further described the training and taking part in the program very positively: "I was delighted with the program", "I'm amazed at how something so simple works. I wish there was a chance for every parent to do it", and "Both the children and myself got a lot out of this." The children's opinions of the program were also positive with all children saying that they enjoyed taking part in the parent PLS program and they thought other children would like it. When asked about specific things they enjoyed, children mentioned some of the activities (e.g., marble runs, foam building kits) as well as certain PLS (e.g., listening, comforting, waiting), and the "Progress and Practice Tracker."

Discussion

The current research aimed to evaluate parent training in a home-based application of the PLS program, to support preschool children's skill development and prevent problem behavior in early childhood (Hanley et al., 2007). In line with suggestions from previous parent training research, BST was employed to teach parents to create and capture learning opportunities in the natural environment, and measures of the impact of this for both children and parents were included (Dogan et al., 2017; Stocco & Thompson, 2015). Correct parent teaching increased substantially during post-test, and parents demonstrated increased knowledge of teaching strategies with some generalization of this knowledge to novel skills. Results of the direct and indirect measures for children indicated improvement of targeted PLS and reduction of problem behavior for all children. Some preliminary evidence of generalization of children's skills to the preschool environment was also demonstrated. Social validity results further supported this application of the PLS program, with parents describing the program and training as useful, easy to implement, and worthwhile. Parents and children also reported that they enjoyed taking part. Overall, these results provide initial support for the parent training procedure and parent PLS program outlined in the current research.

Table 4.3
Social Validity Results

	Parents (*N*=6)		Children (*N*=7)	
	Mean Score	Range	Yes	No
Statement[a]				
I enjoyed taking part in this research.	6.8	6-7		
I think my child enjoyed taking part in this research.	6.8	6-7		
I feel that I received sufficient training on this teaching program.	6.8	6-7		
I found the training sessions useful and the teaching program easy to follow and use.	6.8	6-7		
I feel that I learned some useful new strategies for teaching my child new skills.	6.6	6-7		
I will be able to apply the skills and strategies I have learned during this program to teach different skills and to teach my other children (if applicable).	6.8	6-7		
I think my child's skills improved following the teaching program.	6.5	6-7		
I noticed positive differences in my child’s behavior during this research.	6.3	5-7		
I think these skills will be useful life skills for my child.	6.8	6-7		
I would recommend for other children and parents to experience this teaching program.	7			
Question				
Did you like doing the project?			7	0
Do you think other kids would like it?			7	0

[a]Statements were scored on a Likert scale which ranged from a score of 1 (Strongly Disagree) to 7 (Strongly Agree)

It is interesting to consider the behavioral mechanisms likely responsible for the increases in correct parent teaching and children's PLS. The parents' increased use of teaching strategies created more learning opportunities for both the child and the parent. During these learning opportunities, parents' use of reinforcement for PLS and corrective feedback for PO or PC differentially reinforced engaging in the new skills. The resulting increase in children's skills positively reinforced parent teaching, while corresponding decreases in PO and PC negatively reinforced parent teaching. Therefore, parents were more likely to continue to use the teaching strategies, providing further learning opportunities and strengthening this positive feedback loop. This is interesting to consider in relation to the work by Gerald Patterson and colleagues regarding coercion theory, which describes how some parenting practices can lead to aversive behavior becoming reciprocally reinforcing for both the child and parent (e.g., Patterson, 1982; Smith et al., 2014). Parent PLS may be a useful strategy for altering this negative feedback loop, alongside the existing family interventions based on this theory (Fisher & Skowron, 2017).

Fidelity of parent teaching was monitored only within intervention sessions, so it is unclear if fidelity of implementation was consistent on the days when the researcher was not present. This represents an important area for future research in developing methods of monitoring treatment fidelity that are accessible and acceptable to both parents and applied researchers. It is interesting to note that children's skill acquisition was generally high in the current research, even though parent fidelity varied in sessions. This may suggest that there is the potential for some flexibility in fidelity requirements while maintaining intervention efficacy. Certain technology advancements may be useful in this regard, for example, using video calls or submissions, and social media platforms for parents to highlight difficulties they may be experiencing. Recent research has evaluated the use of telehealth within the provision of behavior analytic intervention with promising results (e.g., Fisher et al., 2014; Peterson, Piazza, Luczynski, & Fisher, 2017; Wacker et al., 2013).

It will also be important for future research to systematically evaluate the relationship between correct parent teaching and children's acquisition of the PLS. Within the current research, a preliminary analysis of children's PLS based on their parent's correct teaching revealed inconsistent results across parent-child dyads. As outlined previously, monitoring of intervention implementation and fidelity at home could contribute to a better understanding of this relationship. Furthermore, it will be important to investigate additional factors that may impact upon parent teaching, for example, levels of problem behavior, motivation, time

to dedicate to teaching, household size etc. One consistent finding relates to the friendship skills targeted in PLS Unit 4. Baseline levels of these skills were low and, any increases following parent PLS were relatively modest in comparison to Units 1, 2 and 3. Regardless of parent correct teaching demonstrated within the in-session evocative situations for Unit 4, post-test Unit 4 PLS were varied and relatively low across children.

Unit 4 contains the largest number of skills in the program, and these skills are generally the most complex, which may have represented a challenge for parents. The evocative situations for the skills in Unit 4 also tend to be mediated by social situations, which may have been more difficult for parents to arrange. Future research could evaluate additional supports necessary to improve acquisition of the skills in Unit 4 within the parent PLS program. For example, providing a longer teaching period for Unit 4 or arranging sessions with siblings or peers. Peer mediation within the PLS program has previously demonstrated success with skill acquisition and maintenance (Beaulieu & Hanley, 2014; Beaulieu, Hanley & Roberson, 2013). As the PLS program has demonstrated success within preschool settings (Gunning et al., 2018; Hanley, Fahmie & Heal, 2014; Hanley et al., 2007), future research could also explore collaborative PLS applications across home and preschool contexts with parents and educators delivering teaching.

The current research took place in the child's home and provides evidence for the numerous benefits to conducting applied research in the natural environment. Positive results demonstrated for parents and children, in combination with the high social validity, sibling interest, and family engagement in the intervention, support the utility, efficacy, and acceptability of conducting interventions in the natural context. However, there are several limitations within the current research related to challenges that arise when conducting applied research in the natural environment. Constraints on time and resources due to the intervention occurring across six households in different locations produced inconsistent intervals between training sessions across participant dyads. Future research regarding the parent PLS program could also explore different training delivery models which may be less time and labor intensive on the part of the researcher and parent. Group workshops where parents attend with their children may be a useful avenue for research in this regard. Although this may increase effort for parents, Wymbs et al. (2017) demonstrated that the majority of parents in their study indicated a preference for group training where individual training was unavailable. The application of parent PLS with multiple children/siblings may

also warrant future research, particularly given the positive outcomes for Laura, Amy, and John who attended all sessions together.

The current study is the first to evaluate a parent PLS program within the home context and, as such, the success of this program is an addition to the growing PLS literature. The parent training procedure in the current research was designed based on previous PLS and parent training research (Dogan et al., 2017; Hanley et al., 2007; Lafasakis & Sturmey, 2007). The positive outcomes in the current research lend support to this training delivered as a 6-week intervention, with 1 to 2 hr sessions per week. The current study did not directly measure generalization and maintenance of parent skills; however, inclusion of such measures will be an important consideration for future research (Stocco & Thompson, 2015). Furthermore, within intervention sessions, the researcher and parent delivered the instructions, modeling, and roleplay teaching components together, whereas the parent ran the PLS teaching activities independently. It is a limitation of this study that parents were not taught to use instructions, modeling, and roleplay independently as this may have increased their knowledge and use of these strategies. Furthermore, the researcher implemented the additional practice opportunities for children when necessary, and this would be a useful skill to teach parents. Future research should teach parents to use BST and to implement additional practice independent of the researcher.

Generalization to the preschool environment may have occurred because of the following generalization promotion strategies within parent PLS: targeting functional behaviors, teaching to recruit natural consequences, modifying maladaptive consequences, teaching across stimuli and within the natural environment, and programming common stimuli in intervention. Generalization was assessed within naturally occurring evocative situations and, therefore, not standardized across children. However, it is evident in Figures 4.4, 4.5, and 4.7 that, for the majority of skills, the number of evocative situations observed in the generalization setting for each child during baseline was the same as post-test. This lends support to the generalization results, particularly given that conducting generalization probes during baseline and post-test controls for existing levels of behavior in the generalization setting prior to intervention (Gunning et al., 2019). Due to time and resource constraints, maintenance or follow up data were not collected in the home or preschool setting. Future research regarding the parent PLS program should continue to measure generalization of the target skills using standardized observations and should include follow-up probes after

intervention has concluded to assess sustained outcomes (Dogan et al., 2017; Heitzmann-Powell et al., 2014; Luczynski et al., 2014).

Preventive intervention has been identified as an important area for research and development (Parish, 2013), as interventions delivered early in life have been shown to mitigate risk factors for problem behavior (Dawson-McClure et al., 2015). Parent training in intervention is associated with numerous benefits with respect to learning, generalization, maintenance, intervention accessibility, and family empowerment (Boettcher–Minjarez, Mercier, Williams, & Hardan, 2012; Dogan et al., 2017; Heitzmann-Powell et al., 2014). The positive results demonstrated in the current research provide preliminary support for this application of the PLS program and highlight parents' abilities to support and guide their children's learning and development through everyday learning opportunities, within a relatively brief, enjoyable, and straightforward program.

5. An Evaluation of the Parent Preschool Life Skills Program with Children with Autism Spectrum Disorder

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Abstract

Teaching parents to use skills teaching strategies can support positive intervention outcomes such as increased acquisition, generalization, and maintenance. Parent training can also overcome some of the barriers to accessing evidence-based interventions (e.g., cost, accessibility) for parents of children with autism spectrum disorder (ASD). We evaluated a parent training procedure to teach parents to use The Preschool Life Skills (PLS; Hanley, Heal, Tiger & Ingvarsson, 2007) program. The PLS program was designed to teach important preschool life skills and prevent the development of problem behavior at an early stage. Within six University-based sessions, we taught 7 parents to use the PLS program with their children with ASD (3 years 11 months to 6 years 9 months). Results supported this parent implementation of the PLS program for children with ASD and highlighted important considerations to support positive outcomes for individual children.

Keywords*:* autism, early intervention, preschool life skills, parent training, social skills

Introduction

Autism spectrum disorder (ASD) is a pervasive neurodevelopmental disorder with typical onset in early childhood, characterized by deficits in social communication, and restricted or repetitive patterns of behavior (American Psychiatric Association (APA), 2013). Early intervention is increasingly recognised as critical in ameliorating and addressing

existing deficits as well as preventing adverse outcomes at later stages (Ruppel, Hanley, Landa, and Rajaraman, in press; Vernon, 2014). The extensive literature regarding interventions based in Applied Behavior Analysis (ABA) provides the strongest empirical support in the remediation of deficits and development of skills for individuals with ASD, however, a research-practice gap is evident in the lack of the application of ABA interventions in practice settings (Wainer & Ingersoll, 2015). Wainer and Ingersoll (2015) posit that the discordance between service and delivery models of intervention studied in empirical research settings and the models that are feasible and available in existing clinical settings underlie this research-practice gap. One potential resource to bridge this gap is to teach people who interact with individuals with ASD on a regular basis, to employ intervention methods (Lafasakis & Sturmey, 2007; Watkins et al., 2015).

In particular, parental intervention involvement recognizes the importance of parents and their ability to provide intervention (Nefdt, Koegel, Singer, & Gerber, 2010). In general, interventions targeting behavior change for children necessitate parental involvement and implementation (Stocco & Thompson, 2015). Furthermore, when targeting and increasing skill repertoires, parental training in teaching procedures leads to increased learning opportunities at home and in the community which may support generalization and maintenance (Dogan et al., 2017; Jang et al., 2012). For parents of children with ASD, parent training has been associated with benefits for both parents and children. Parents have been successfully taught to support their children's behavior, social, and communication development, and positive parent outcomes include increased skills, confidence, knowledge, and decreases in parental stress (McConachie & Diggle, 2007; Schultz, Schmidt, & Stichter, 2011; Shire et al., 2015). It is not surprising, therefore, that active parent participation, education, and training in intervention is increasingly advocated for for parents of children with ASD (Oono, Honey, & McConachie, 2013; Stadnick, Stahmer, & Brookman-Frazee, 2015) in providing support for both the child and the family (Symon, 2005). However, reviews of parent-mediated interventions have highlighted the need for further research evaluating and developing parent training and education employed (Oono et al., 2013; Schultz et al., 2011).

The Preschool Life Skills (PLS) program is an early educational and preventive intervention developed by Hanley and colleagues (2007) which has repeatedly demonstrated success in increasing important PLS and decreasing problem behavior for preschool children (Fahmie & Luczynski, 2018; Gunning, Holloway, & Healy, 2018; Hanley, Fahmie, & Heal,

2014; Hanley et al., 2007). In recent research, modifications of the PLS program have been employed with children with developmental disabilities (e.g., Falligant & Pence, 2017; Francisco & Hanley, 2012; Robison, Mann, & Ingvarsson, 2019; Rodriguez, Levesque, Cohrs, & Niemeier, 2017). Furthermore, Ruppel et al. (in press) have developed the Balance program, a home-based, parent-implemented program that aims to prevent the development of severe problem behavior, based on the PLS program.

The PLS program for parent-implementation with typically developing preschool children was modified for use within an Irish context (Gunning & Holloway, in press). Results indicated that children's PLS and parents' use of teaching strategies (setting up skill opportunities, providing reinforcement or corrective feedback) increased. The authors posited that the underlying behavioral mechanisms supporting behavior change for both parents and children could be conceptualized as a positive feedback loop in parent-child interactions, where parent teaching (a) was reinforced by changes in child behavior (increased skills, decreased problem behavior) and, (b) reinforced these changes in child behavior. The authors suggested that this may have interesting applications in relation to coercion theory, in potentially altering the negative feedback loop that arises from problem behavior becoming reciprocally reinforcing for both the child and parent through some parenting practices (Gunning & Holloway, in press; Patterson, 1982; Smith et al., 2014). In particular, parent-child interactions are more complex where a child may demonstrate significant challenges with communication and social interactions, as well as challenging behavior or cognitive difficulties (Boettcher-Minjarez, Mercier, Williams, & Hardan, 2012; Shire et al., 2015). Children with ASD tend to make fewer social initiations, spend less time engaged with caregivers, and reject more of caregiver's interaction attempts in comparison to their typically developing peers (Shire et al., 2015). Therefore, the authors hypothesized that the parent PLS program may be a useful avenue for research regarding parent intervention for children with ASD.

In the Republic of Ireland, the prevalence rate for ASD has been estimated at between 1-1.5% (Irish Department of Health, 2018). In 2018, 65% of early childhood education (ECE) services in the Republic of Ireland reported having at least one child with a diagnosed disability (including ASD) in attendance, which represented an 8% increase from the previous year (Pobal, 2018). In contrast to the service system in the United States, there are currently no practice guidelines for the behavior analytic treatment of ASD in Ireland. If a child receives a diagnosis of ASD, the early education options include general ECE, early

intervention classes, and home tuition (Daly et al., 2016). The National Council for Special Education (NCSE) report regarding education provision for children with ASD indicated that parents in Ireland were frustrated with the lack of support from external professionals and the absence of information or guidance regarding the supports their children were entitled to, and available, qualified personnel who could provide such support (Daly et al., 2016).

Within this context, the current research aimed to evaluate the parent PLS program (Gunning & Holloway, in press) with parents and their children with ASD, and to investigate the modifications required to support parent implementation and children's skill acquisition. Parent and child outcomes were evaluated in terms of acquisition of PLS, levels of problem behavior, parental use of teaching strategies and social validity of the PLS program.

Method

Participants, settings, and materials. To recruit participants, information flyers and invitation letters were circulated to autism service providers and schools. Seven children with ASD and their parents took part in the study in seven parent-child dyads. Five children took part with their mothers and two children took part with their fathers. Participating parents ranged in age from 36 years to 43 years (M=40, SD=2). All of the participating parents and children were Irish with the exception of Alex's mother who was German. Dyad pseudonyms, children's gender, age (M=5 years 10 months, SD=11 months), diagnosis, presenting skill profiles (communication and instruction-following repertoires), and school information are presented in Table 5.1. Communication and instruction following repertoires were determined based on parent report and observations during baseline (Falligant & Pence, 2017). The Gilliam Autism Rating Scale Third Edition (GARS-3; Gilliam, 2014) was completed for each child in the current research and the ASD severity level indicated on this measure is included in Table 5.1. For two children, a sibling (Cathy) and tutor (Andy) also attended their sessions but did not directly participate in the research.

Table 5.1
Table of Participant Characteristics

Child Name & Gender (M/F)*	Parent Name & Gender	Age (years: months)	Diagnosis (age at diagnosis)	Autism Severity Level (GARS-3)	Co-Occurring Disabilities	Communication	Instruction-Following	School Placement
Alex M	Jane F	6: 5	ASD (6 years)	Level 2	N/A	Full sentences	Multi-step directions	ASD Unit in primary school
Cathy F	Megan F	6: 9	ASD (4 years)	Level 2	N/A	Full sentences	Multi-step directions	Mainstream primary school (with SNA and learning support)
Harry M	Lara F	5: 3	ASD (3.5 years)	Level 2	N/A	Full sentences	Multi-step directions	Mainstream preschool with AIM support Home tuition
Andy M	Bill M	5: 2	ASD (2 years)	Level 3	N/A	1-word phrases	Multi-step directions	ASD Unit in primary school Home tuition
Jill** F	Chloe F	3: 11	ASD (3 years)	Level 3	N/A	No reliable verbal communication	None	Preschool for children with developmental disabilities
Eddie** M	Jack M	4: 10	ASD (2.5 years)	Level 3	Global Developmental Delay	Vocal verbal approximations and PECS	Multi-step directions	Preschool for children with developmental disabilities
Eva F	Sophie F	4: 4	ASD (2.75 years)	Level 3	N/A	No reliable verbal communication	None	Preschool for children with developmental disabilities

* M/F = Male/Female

** Eddie and Jill also demonstrated high levels of problem behavior (tantrums, crying).

Parental consent and child assent (for children who had the verbal ability to comprehend the assent activity) were obtained prior to commencement. The assent activity involved explaining the project to the children in a child-friendly manner and asking them to color a smiley face (to indicate assent) or a sad face (to indicate dissent) on their assent form. For children who could not complete the assent activity, child assent was discussed with the parent and the researcher and parent decided how to monitor assent during sessions (e.g., discussing indicators that the child was enjoying themselves and/or needed a break or to terminate the session).

The research sessions took place in a university setting in a large room furnished with desks and chairs and children's toys. A variety of toys and activities were used in the current research (e.g., toy train sets, jigsaws, skittles, balls, Playdoh). A video camera was used to record research sessions. For the direct measures employed in the current research, pencil and paper data collection was used. As in Gunning and Holloway (in press), a "prompt-sheet" for parents describing behavioral skills training (BST) and with space for noting evocative situations, and a "Progress and Practice Tracker" were provided for each dyad to support program implementation in the home.

Measures. Evocative situations (trials) were established to provide a direct measure for the primary dependent variables: parent teaching and children's PLS. Parent and child responses were recorded within trials and, at each study phase, percentage correct was calculated. Indirect measures of the children's PLS and measures of social validity were taken.

Parent measures.

Direct measure of parent teaching. Correct parent teaching was recorded when the parent correctly and independently created an evocative situation for the skill (e.g., giving a clear one-step instruction – Skill 2), and correctly delivered corrective feedback (e.g., praising a correct skill or providing activity-related reinforcement). If either of these teaching elements did not occur or were incorrect, parent teaching was recorded as incorrect (e.g., if a parent did not arrange an opportunity for a skill or reinforced problem behavior). This measure was recorded during baseline and post-test for each parent (one trial per PLS) and within trials to criterion during parent training. To compute percentage correct parent teaching, the number of evocative situations in which correct parent teaching was recorded

was divided by the total number of evocative situations the parent was observed in and multiplied by 100.

Child measures.

Child direct measures. Within trials in which parent teaching was independent, their child's behavior was recorded as: (a) a PLS, (b) a problem of omission (PO; approximation of the correct skill or no response), or (c) a problem of commission (PC; problem behavior). Performance of a PLS was also recorded as either: (a) an independent skill, where the child engaged in the correct skill without prompting from the parent or, (b) a prompted skill, where the parent provided a prompt (i.e., gestural/physical prompt for Unit 1 skills, vocal verbal model for Unit 2 skills). Both prompted and independent PLS were included as correct PLS. The total number of trials in which each behavior occurred was divided by the total number of trials the child was observed in for each skill and multiplied by 100 to compute percentage of occurrence.

Table 5.2 displays the PLS program units, PLS, operational definitions and modifications, examples of PO, and PC, and sample evocative situations. The average number of trials each child was observed in per research phase is also presented in Table 5.2. Alex, Cathy, and Harry were each observed in an average of 191 trials for PLS (range, 187-197) across the duration of the study. Andy, Jill, Eva and Eddie were each observed in an average of 95 trials for PLS (range, 77-122) across the study.

Each dyad completed the parent PLS program individually and did not necessarily target all of the PLS. Based on their presenting skill profiles, target skill selection was modified for Andy, Jill, Eva and Eddie, and their parents were asked to select the most important skills from PLS Units 1-3 to target through the parent PLS program. Table 5.3 presents an overview of the skills targeted with each dyad across the current research. Within Unit 3, the additional skill of Tolerating No was targeted for Eddie and Andy and was operationally defined as accepting denial of a request or access to something by refraining from problem behavior.

Table 5.2

Skill Units, Operational Definitions and Sample Evocative Situations for the Preschool Life Skills

PLS Units and Skills	Operational Definition PO and PC Example	Sample Evocative Situations (average number of evocative situations for each child at baseline, intervention and post-test sessions)
Unit 1: Instruction Following		
1. Responds to Name	Orients toward the speaker and makes eye contact. Within 2 seconds. PO: Does not respond PC: Shouts “Go away!”	Parent calls child to ask them a question or give an instruction. (6,4,5)
2. Follows 1 Step Instructions	Begins to complete the instruction within 3 seconds. Completes in a timely manner. PO: Does not complete the instruction PC: Shouts “No!”	Parent asks the child to show them something or find something. (6,4,6)
3. Follows Multi-step Instructions	Begins to complete the instruction within 3 seconds. Completes in a timely manner. PO: Completes 1 step but not the other(s) PC: Whines and says “No you do it”	Parent gives the child an instruction within games (e.g., asks child to find the giraffe and put him beside the elephant), tidy up time (e.g., pick up and put away) or general (e.g., go into the kitchen and open the door to let the cat in). (6,4,6)
Unit 2: Functional Communication[a]		
4. Asks for Help	Requests assistance within 45 seconds of difficult task/problem e.g. “Help me” or similar PO: Gives up without seeking assistance PC: Throws item	Difficult play activities (e.g., a building task or marble run), making a snack, having toys difficult to access (e.g., sealed playdoh, tightly closed bubbles). (6,4,6)
5. Requests Attention	Requests attention appropriately “Excuse me” or “Name” PO: Does not use the person’s name when their attention is diverted PC: Pulls on the person	Parent diverts their attention to another child or task or engages in a conversation with another adult. (6,4,6)

6. Requests to Adults	Makes an appropriate request to an adult e.g. “Can I ____?” PO: Says “mine” or one word as a request PC: Grabs the item	Parent controls access to an item or area (e.g., holding the box with the toys), getting food, going outside. (6,4,6)
Unit 3: Tolerance for Delay		
8. Tolerates Adult Delay	Waits appropriately for 30 seconds (absence of additional requests or behavior e.g. poke) PO: Does not wait e.g., wanders away, forgets request PC: Shouts and repeats request	Parent asks the child to wait for their turn, a toy or a snack. Parent is having a conversation and asks the child to wait. (5,3,5)
Unit 4: Friendship Skills[b]		
10. Says “Thank You”	Says “Thank you” within 5 seconds of receipt of item/access PO: Does not say “thank you” PC: Sticks tongue out	Parent provides access to something (e.g., toy, drink, snack) or provides assistance. (6,3,5)
11G. Greets Others[c]	Within 1 minute of a newcomer arriving, delivers a greeting e.g. “Hi” or “I like __” PO: Does not greet the person PC: Says “Oh no, go away”	Other family members arrive home. Researcher arrives for the session. (3,2,2)
11C. Compliments Others[b]	Coming up with a compliment in the form: “I like ____” (e.g., your shoes) when asked to think of something nice to say to someone PO: Does not respond with a compliment PC: Responds inappropriately e.g., toilet talk	Parent asks “Can you think of something nice you could say to_____ (e.g., sibling, parent, grandparent)?” (2,2,3)
13. Comforts Others	Within 1 minute of an event approaches the victim and comforts e.g. “Are you ok?” or hug PO: Does not respond to person who is upset or injured PC: Laughs	Parent simulates mild injury e.g. bump leg on table or describes something sad that happened to them (1,1,2)

Note. Three of the PLS set out by Hanley et al. (2007) that are mediated by peers (Skill 7: Framed request to peers, Skill 9: Tolerating delay from peers, and Skill 12: Sharing) were not targeted in the current research. PO denotes a problem of omission and PC denotes a problem of commission.

[a] For Andy, Eva and Jill, the operational definitions for Unit 2 skills were to use a one-word phrase for the request (e.g., “help”, “Daddy”, “biscuit”). For Eddie, vocal verbal approximations were selected for Skills 4 and 6 based on baseline observations and parent report (e.g.,

"puh-" for help, "tee-" for television). In addition to specific targets, "tuh-" (approximation of "want") was targeted as a general request for instances where an approximation had not been identified at baseline (e.g., to request a piece of a jigsaw).

[b]At the initial baseline session, it was observed that evocative situations for the skills in Unit 4 were less frequent in the home setting than those for the skills in Units 1, 2 and 3. As a result, children were observed in fewer evocative situations at each phase for the skills in Unit 4 as this more accurately reflected the frequency of natural opportunities for these skills within the home context.

[c] Skill 11 was divided into two skills in the current research: 11G (Greetings) and 11C (Compliments) as the evocative situation for these two skills was not the same during baseline.

Table 5.3
Overview of Preschool Life Skills Targeted for Each Dyad

	PLS Unit 1			PLS Unit 2			PLS Unit 3		PLS Unit 4				
Dyad Child (parent)	**Skill 1**	**Skill 2**	**Skill 3**	**Skill 4**	**Skill 5**	**Skill 6**	**Skill 8**	***Tolerates No***	**Skill 10**	**Skill 11C**	**Skill 11G**	**Skill 12**	**Skill 13**
Cathy (Megan)	■	■	■	■	■	■	■		■	■	■	■	■
Alex (Jane)	■	■	■	■	■	■	■		■	■	■	■	■
Harry (Lara)	■	■	■	■	■	■	■		■	■	■	■	■
Andy (Bill)	■	■		■	■	■	■	■					
Eddie (Jack)	■	■		■		■	■	■					
Eva (Sophie)	■	■		■		■							
Jill (Chloe)	■	■		■		■							

Child indirect measures. Parents completed the PLS indirect measure (Hanley et al., 2007) for their child. Additionally, parents were asked to identify another caregiver who was not involved in the program and/or a school teacher, to complete the PLS indirect measure (Hanley et al., 2007) for their child. The PLS indirect measure is a 13-item questionnaire which presents evocative situations for each of the PLS skills. The respondent is asked to report whether it is more likely that the child will engage in a PLS or problem behavior within these situations. Responses are computed as the percentage of situations where the respondent reported that a correct skill was more likely to occur than problem behavior. In the current research, as the thirteen PLS were not targeted with every child, responses on this measure were computed only for the skills targeted through parent PLS for each individual child. The PLS indirect measure has demonstrated good interrater agreement, acceptable item-by-item agreement, and high outcome agreement (Hanley et al., 2007).

Social validity. At the end of the current study, parents were asked to complete a social validity measure that was based on the questionnaire developed by Luczynski and Hanley (2013). Parents were asked to rate their agreement with statements about the PLS program, participating in the research, the training sessions and changes in their child's skills and behavior during the program on a 1-7 Likert scale. There was also space for additional comments and recommendations. To evaluate social validity from the participating children's

perspectives, informal interviews were carried out with Alex, Cathy, and Harry. The children were asked five questions about their opinions of the program (Did you like doing the project?, Do you think other children would like it?, What did you like doing the most?, What did you not like doing so much?, Is there anything else you would like to say about it?).

Interobserver agreement (IOA). Research sessions were video recorded so that IOA and researcher treatment fidelity could be monitored. In order to establish IOA for the direct measures, an independent research assistant watched the videos of four to five sessions (67-100%) across phases for each dyad. Post-test video data were not available for Cathy due to a recording malfunction.

The research assistant recorded data for the parent and child separately. An agreement was defined as the independent research assistant scoring the same response for the child (PLS, PO, or PC) or parent (correct or incorrect teaching), as the researcher during each trial (i.e., trial-by-trial agreement). IOA was calculated by dividing the number of agreements by the number of agreements plus disagreements and converting the result to a percentage.

Mean IOA across baseline sessions was 89% (range, 70-100% for children's responses and 91% (range, 72-100%) for parent responses. Across teaching sessions, mean IOA was 90% (range, 67-100%) for children's responses and 87% (range, 69-100%) for parent responses. Mean IOA across post-test sessions was 94% (range, 78-100%) for children's responses and 91% (range, 75-100%) for parent responses.

Design and overview. A multiple probe design across units of skills repeated across dyads was employed. All dyads attended an initial baseline session at the outset of the research during which all baseline measures were taken. Following this, sessions (approx. 2 hours) were arranged weekly for six weeks. The final session for all dyads was the post-test session in which all post-test measures were completed.

Harry and Lara, Cathy and Megan, and Alex and Jane all experienced the same teaching and testing sequence whereby one unit of skills was targeted at each intervention session progressively from Unit 1 to Unit 4 (Gunning & Holloway, in press). The program was modified for Andy and Bill, Jill and Chloe, Eva and Sophie, and Eddie and Jack, based on these children's presenting skill profiles. It was anticipated that extended teaching time may be required for these children, given that they presented with higher ASD severity scores. Furthermore, given baseline levels of problem behavior for Eddie and Jill were high, and previous findings indicated that parents found it more challenging to respond correctly to

incorrect PLS trials (Gunning & Holloway, in press), it was expected that the parents in these dyads may need additional support in responding to PO and PC. Therefore the researcher consulted with parents to select their priority target skills from Units 1-2 (Jill and Chloe, Eva and Sophie) and Units 1-3 (Andy and Bill, Eddie and Jack) and allotted one to two weeks to teaching each unit of skills.

For all sessions, children were provided with a choice of activities (e.g., Duplo, craft sets) that occasioned multiple opportunities for the target PLS skills for that session (e.g., a building activity for the listening skills). Activities lasted 15- to 20-min for Cathy, Harry, and Alex. Breaks (approx. 5 min) occurred naturally at the transitions between activities and when the researcher was in discussion with the parent. For Andy, Jill, Eva, and Eddie, activities lasted 10- to 15-min and breaks (approx. 15 min) were provided more frequently. Within activities, trials were presented every 1-2 min for all children. For Andy, Jill, Eva, and Eddie, based on their individual preferences, a combination of brief activities with a discrete beginning and end (e.g., a jigsaw with 12 pieces where the parent controls access to 6 pieces) and environmental arrangements (e.g., placing a sealed, transparent box with a preferred snack in it in clear view) were set up by the parent.

Trials were recorded across the phases of the current research within evocative situations that involved the child and parent. The researcher asked parents to set up evocative situations (e.g., to hold required materials for the activity for Requests to Adults) if these did not naturally occur within the first two activities in a session. In such instances, child responses were not recorded and parent teaching was recorded as incorrect.

Procedure.

Initial baseline. The researcher introduced herself, the research, and provided an overview of the research and the PLS program. She then answered any questions from the parents or children. All direct and indirect parent and child measures were completed at this session. During baseline, an average of 55 trials for the PLS (range, 53-56) were observed for Alex, Cathy, and Harry, and an average of 30 trials (range, 22-33) were observed for Andy, Jill, Eva, and Eddie. There were no programmed consequences for PLS, PO, or PC during the initial baseline sessions.

Intervention sessions. Each intervention session followed the same general format across PLS units and for each dyad: (a) trials for the skills targeted during the previous session, (b) parent training, and (d) summary discussion. At the beginning of each session,

parents and children were observed in four trials for each of the skills targeted during the previous session. Fewer trials were observed in for PLS Unit 4 skills given the nature of these skills as described previously.

Parent training. As in Gunning and Holloway (in press), parent training began with in-vivo BST for approximately 15 min for Cathy, Harry and Alex. Within this time, a maximum of 12 learning opportunities (opportunities to respond within roleplays or evocative situations) were presented for the child by the parent and researcher. There were three steps involved in in-vivo BST: (1) Introduction and Modeling, (2) Roleplay Game, and (3) Activity Model.

Introduction and modeling. The researcher provided an introduction and rationale for the skills in the PLS unit for the session, and modeled one to two PLS, PO, and PC for each target skill for the parent and child. The number of skills targeted in an intervention session ranged from one to four across PLS units.

Roleplay game. The parent and researcher roleplayed approximately five trials, alternating the roles of parent (creating the evocative situation and delivering corrective feedback) and child (demonstrating correct skills, PO, and PC), while the child identified if the skills were correct or not. The parent and researcher asked a question such as “Is that how you do it?” to which the child responded with an affirmative for a correct skill (e.g., saying “yes” or giving a thumbs up), or a negative for an incorrect skill (e.g., saying “no”). The child received praise for correct responses and corrective feedback for incorrect responses from both the parent and researcher.

Activity model. The researcher modeled three to five trials for the parent within a brief activity with the child (e.g., building a small train track). Within this activity teaching strategies for each skill were discussed with the parent.

For four dyads, namely, Andy and Bill, Chloe and Jill, Sophie and Eva, and, Jack and Eddie, a discussion was held instead of in-vivo BST. Following the trials for the previous week’s skills, progress was discussed with the parent and, if the decision was made to move on, teaching strategies for each new target skill were discussed. These parents were also taught to use prompts (gestural, partial-physical, vocal verbal models) through modelling during this time.

Following in-vivo BST or the parent discussion, the child was offered a choice of activities, and the parent set up the activity. The parent carried out PLS teaching independently (i.e., arranging evocative situations, providing corrective feedback or reinforcement contingent on the child's response) during this activity and subsequent child-chosen activities for the remainder of the session. The researcher provided corrective feedback to the parent contingent upon any incorrect teaching and intermittent descriptive praise contingent upon correct teaching. Within intervention sessions, an average of 83 trials for the PLS (range, 78-88) were observed for Alex, Cathy, and Harry, and an average of 37 trials (range, 27-59) were observed for Andy, Jill, Eva, and Eddie.

Criterion. The criterion for the intervention sessions to conclude was correct parent teaching for three consecutive trials within at least 10 trials. To meet this criterion, the majority of trials also had to be correct. During these trials, parent teaching and child responses were recorded. At the outset of each intervention session, the criterion to move to the next PLS unit was the child engaging in PLS more often than PO or PC during the trials for the skills targeted during the previous week. On a number of occasions, a parent indicated that they would prefer to continue working on the same PLS for an extended time rather than moving on to the next PLS unit. The requests were accommodated by the researcher.

Corrective feedback and practice opportunities. During the trials for the previous week's skills, the researcher delivered corrective feedback (describing the error and modeling correct teaching) if the parent demonstrated any incorrect teaching. If the child did not meet criterion to move on to the next PLS unit (i.e., engaged in PO and/or PC more often than correct PLS), the researcher made a note of the error and arranged for additional practice opportunities for this skill within that session.

For Cathy, Alex, and Harry, practice opportunities were set up by the researcher who reminded them of the skill and set up an average of three trials for them to practice it. The researcher provided descriptive praise for correct responses and corrective feedback for incorrect responses within these trials. In general this occurred before the introduction of the next PLS unit. If Jill, Eva, Eddie, or Andy did not meet criterion, the parent was asked to embed additional practice opportunities within the first two activities of the session, prior to moving on to the next PLS unit.

Additional supports. During the discussion at the end of each intervention session, the parent was asked to think of relevant everyday situations that would occasion evocative

situations for the target skills and the researcher wrote these on the “prompt-sheet”. The parent “prompt sheet” for Bill, Chloe, Sophie, and Jack also included any individualized operational definitions for target skills and additional information regarding responding to problem behavior in evocative situations for each skill (see Appendix E). The visual reminders for the new target skills were given to the children for the “Progress and Practice Tracker”. As in Gunning and Holloway (in press), parents were asked to display the “Progress and Practice Tracker” prominently at home and to use it as they preferred, with an emphasis on use as a visual reminder rather than a reinforcement system.

Post-test. The post-test session began with the trials for the target skills from the previous PLS unit followed by trials for the rest of the PLS. The researcher conducted the social validity interviews, and parents completed the parent social validity questionnaire and all indirect measures. During post-test, an average of 54 trials for the PLS (range, 53-55) were observed for Alex, Cathy, and Harry, and an average of 29 trials (range, 24-37) were observed for Andy, Jill, Eva, and Eddie.

Treatment fidelity. A 4-item checklist was developed for the parent training procedure. This included the researcher, (a) providing an introduction and rationale for the target skills; (b) modeling or describing correct performance, PO, and PC for each target skill; (c) roleplaying correct performance, PO, and PC with the parent, or modeling at least three trials with the child, and (d) discussing evocative situations, target skills, and corrective feedback with parent. An independent research assistant viewed the available videos and recorded fidelity of the researcher’s implementation against this checklist for each dyad within each intervention session. A correct response was recorded for each step of the training procedure that the researcher implemented correctly and the total number of correct steps was divided by four (total steps in the procedure). Results were expressed as a percentage for each intervention session. Fidelity of implementation across all dyads was 100% for Unit 1, 80-100% for Unit 2, 75-100% for Unit 3, and 100% for Unit 4. On two occasions the researcher did not complete step (c).

Results

Each of the dyads in the current research completed the parent-led PLS program across an average of six weeks (range, 4-9). Intervention sessions were arranged once a week, however, during the program, extraneous factors led to rescheduling of sessions (e.g., familial

commitments, holidays). Therefore, the minimum number of days between two intervention sessions during the program was three days and the maximum was fifteen days. Across dyads, across the program, there was an average of nine days between intervention sessions. All dyads targeted Instruction Following (PLS Unit 1) and Functional Communication (PLS Unit 2). Five dyads (Alex/Jane, Cathy/Megan, Harry/Lara, Andy/Bill, Eddie/Jack) targeted Tolerance (PLS Unit 3), and three dyads (Alex/Jane, Cathy/Megan, Harry/Lara) targeted Friendship (PLS Unit 4). "Progress and Practice Tracker" charts and visuals were prepared for siblings for four dyads (Andy/Bill, Cathy/Megan, Harry/Lara, Alex/Jane). These siblings were close in age to the participating children and parents indicated that this would be useful to support family engagement in the parent PLS program at home.

Training criterion was met within 10 trials for Unit 1 for 6 parents. Megan met this criterion in 13 trials. All parents met the training criterion for Unit 2 within 10 trials. Of the dyads that completed Unit 3, 4 parents met the criterion for Unit 3 within 10 trials, and Megan required 12 trials to meet this criterion. Megan, Lara, and Jane all met the training criterion for Unit 4 within 10 trials. Within trials to criterion, correct parent teaching occurred within 90% of trials in which their child performed a correct PLS (N=181) and 82% of trials in which their child engaged in a PO or PC (N=44).

The percentage of trials with correct parent teaching for the skills targeted in the previous session are presented in Figure 5.1. On average, correct parent teaching occurred within: 74% of trials for PLS Unit 1 (range, 50-100%), 76% of trials for PLS Unit 2 (range, 42-100%), 90% of trials for PLS Unit 3 (range, 75-100%), and 33% of trials for PLS Unit 4 (range, 18-60%). Within these trials at the outset of each session, parents demonstrated correct teaching within 80% of trials in which their child engaged in a correct PLS (N=128) and 50% of trials in which their child engaged in a PO or PC (N=70).

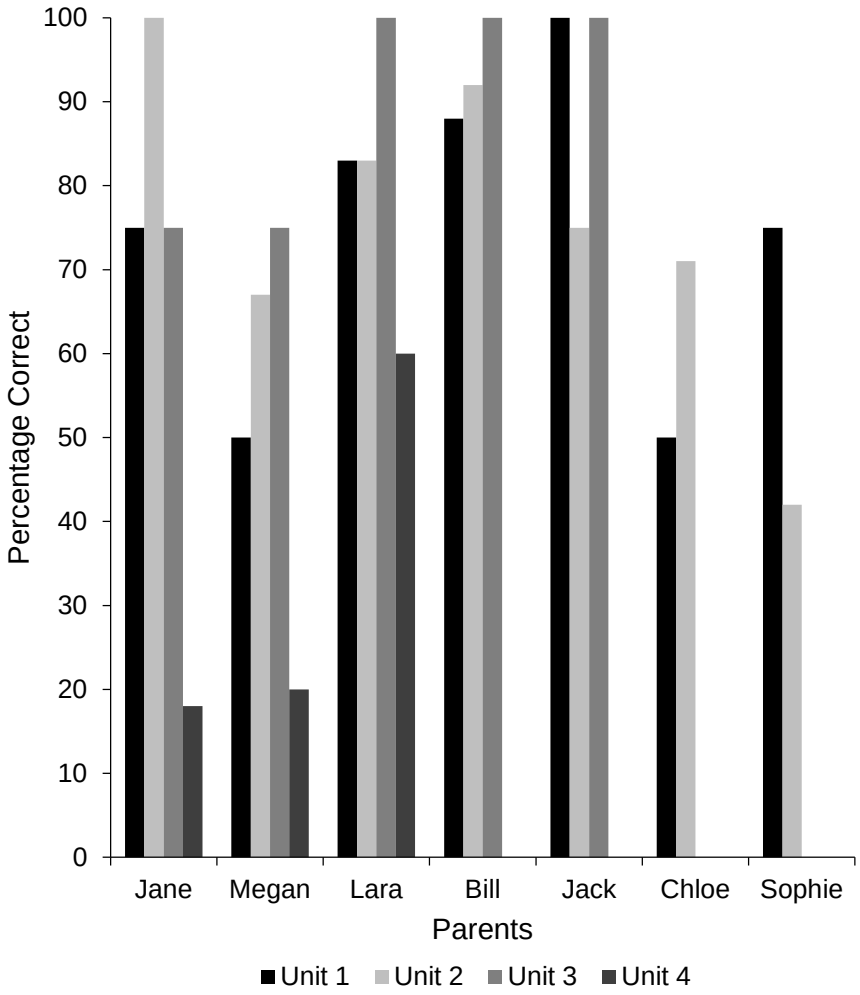

Figure 5.1. Correct teaching demonstrated by each parent within the trials for the previously targeted PLS Unit at the outset of each session.

Figure 5.2 displays the percentage of trials in which parents demonstrated correct teaching during baseline and post-test. Correct teaching occurred within 36% of trials on average during baseline (range, 17-60%). During post-test, correct teaching increased for the majority of parents, occurring within an average of 78% of trials (range, 27-100%). Correct teaching for Megan was low at baseline (36% of trials) and decreased at post-test (27% of trials).

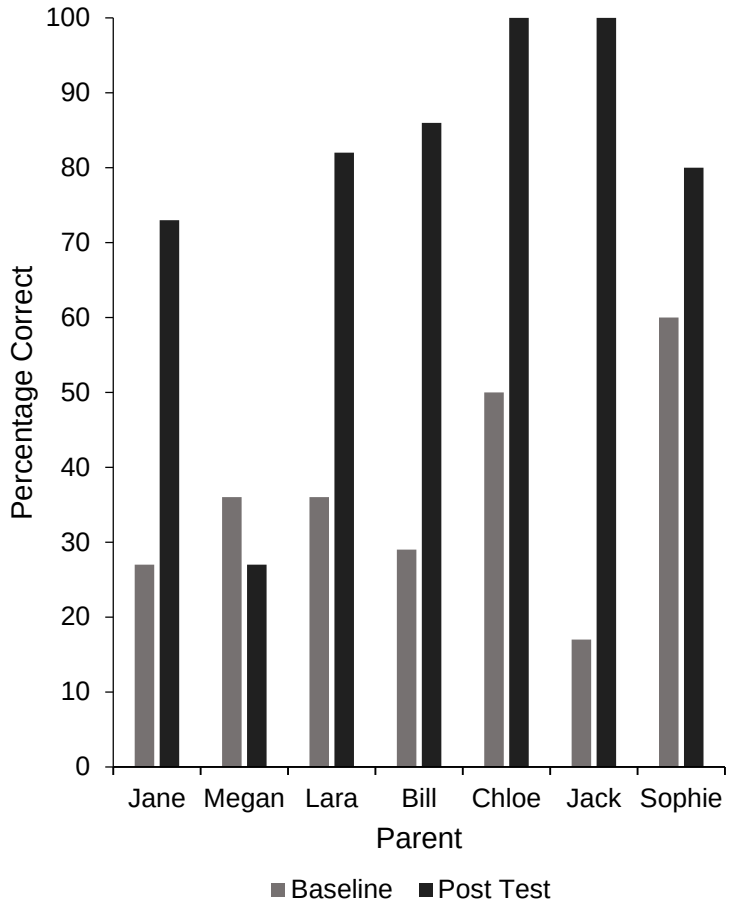

Figure 5.2. The percentage of trials with correct parent teaching at baseline and post-test.

The effects of the parent PLS program on the relative occurrence of PLS, PO, and PC for children across the PLS units are presented in Figure 5.3. During baseline, correct PLS were most commonly observed for PLS Unit 1 skills, however performance varied across children (range, 17-67%). Correct PLS were not consistently demonstrated within trials for the skills in Units 2, 3, or 4 during baseline and PO and PC were frequently observed within these trials.

In general, increases in the PLS and corresponding decreases in PO and PC were evident across PLS Units 1, 2, and 3 following parent PLS. An increase in correct performance of the skills in PLS Unit 4 was evident for Cathy, with little evidence of change for Alex and Harry. PC were most commonly observed within trials for PLS Units 2 and 3 during baseline. In general, decreases in PC were evident across children within these PLS units during post-test. Within Units 1 and 4 during baseline, PO were more frequent and these

decreased post parent PLS. A number of children needed additional practice opportunities following parent PLS across the program. Additional practice was conducted with Jill, Andy, and Eva for PLS Unit 1, Cathy, Jill, Harry, Eva, Andy, and Eddie for PLS Unit 2, Harry and Andy for PLS Unit 3, and Alex and Harry for PLS Unit 4. For Cathy and Harry, additional practice in Units 2 and 3 respectively, resulted in increased PLS. Given that the additional practice for PLS Unit 4 occurred within the post-test session for Alex and Harry, the impact of this is not evident in Figure 5.3.

However, an increase in correct PLS following additional practice was not evident for Andy for Unit 1 skills until the Post Unit 3 session. Jill required additional practice for PLS Unit 1 which resulted in increased PLS in the Post Unit 2 session. However, she then required additional practice for PLS Unit 2 and these skills did not improve until the post-test session. Across these sessions, Jill's Unit 1 PLS decreased. A similar pattern is evident in Eva's data, whereby initial improvements in Unit 1 PLS decreased as additional practice was employed for Unit 2 PLS. Substantial increases in both Jill and Eva's Unit 2 skills were evident at post-test.

After parent PLS and subsequent additional practice, performance of the previously targeted PLS within trials during subsequent sessions varied across children and PLS units. Taking Alex and Andy, for example, Alex's performance of the skills in PLS Units 1-3 remained consistently high post parent PLS whereas there were limited increases in his Unit 4 skill performance. Andy's skill performance varied across PLS units post parent PLS with a range of 50-100% correct for PLS Unit 1, 44-78% for PLS Unit 2, and 100% for PLS Unit 3. Andy and Harry's Unit 2 PLS, and Eddie's Unit 3 PLS were variable after parent PLS.

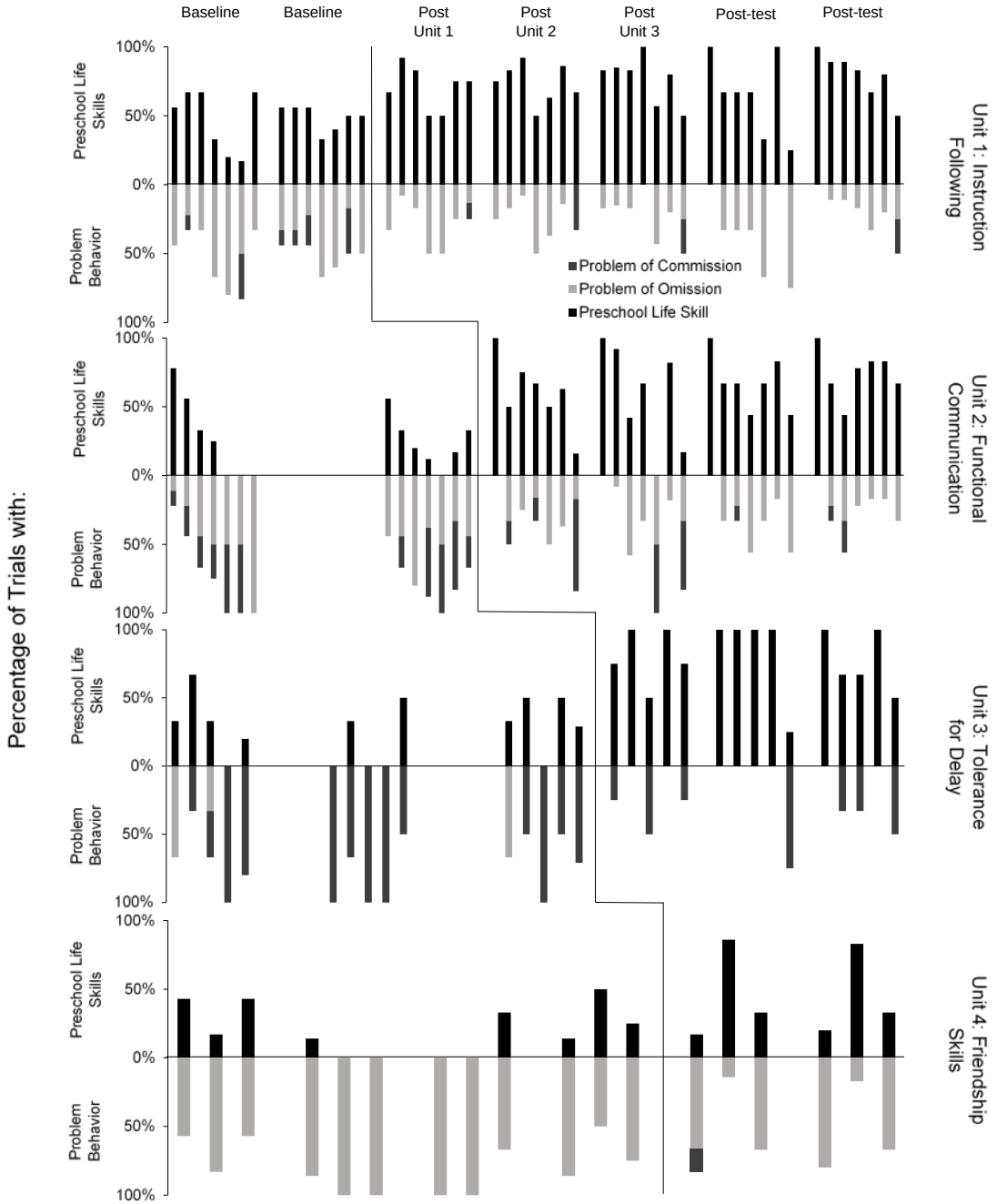

Figure 5.3. The percentage of trials in which children engaged in PLS and PO or PC problem behavior for each child across the units of the PLS program and the phases of the current study. Each panel represents a unit of PLS, and each vertical bar represents the performance of an individual child.

Figure 5.4 displays the percentage of trials in which a PLS occurred during baseline and post-test for each individual child. Overall, the occurrence of PLS increased for all children during post-test. The increase in PLS varied across target PLS and children. Baseline levels of the PLS were higher for Alex, Cathy and Harry. Post-test increases were most evident for PLS Units 1, 2, and 3 for Alex. For Cathy and Harry, PLS increased across PLS units with a small number of skills remaining unchanged or decreasing slightly (e.g., Greeting Others for Cathy and Comforting Others for Harry). Substantial increases in targeted PLS were evident during post-test for Andy, Jill, Eddie, and Eva, for whom baseline levels were low. A decrease was observed for Tolerating Adult Delay for Eddie and for Following 1 Step Instructions for Jill and Eva during post-test. Effect sizes were calculated using Cohen's d statistics (Gunning & Holloway, in press; Hanley et al., 2007; McConville, Hantula, & Axelrod, 1998) and medium to large effects were demonstrated (range, 0.5-2.8, Cohen, 1994).

A preliminary visual analysis of children's PLS performance across units (Figure 5.4) based on their parent's correct teaching (Figure 5.1) was conducted. For four dyads, there appeared to be a relationship between the children's post-test PLS and correct parent teaching. Jane and Lara demonstrated lower levels of correct teaching for PLS Unit 4 which was reflected in lower or more varied correct Unit 4 PLS demonstrated by Alex and Harry at post-test. Bill's correct teaching was high across PLS Units and Andy's post-test PLS were also high. Chloe demonstrated lower correct teaching for PLS Unit 1 which was reflected in Jill's post-test Unit 1 PLS. However, while Megan demonstrated lower levels of correct teaching across PLS Units 1, 2, and 4, Cathy's post-test PLS were high for PLS Units 1 and 2, with some correct PLS evident for Unit 4. Similarily, correct teaching was lower for PLS Unit 2 for Sophie but Eva demonstrated increases in correct Unit 2 PLS at post-test. Jack demonstrated high levels of correct teaching across units, however, Eddie's Unit 3 PLS decreased at post-test.

The proportion of correct PLS which were prompted versus independent for each child during baseline and post-test were compared. For all children, the total number of trials with correct PLS had increased during post-test. Across children, an average of 31% of correct PLS during baseline were prompted and this decreased to 20% during post-test. The proportion of prompted PLS decreased for Alex, Cathy, Andy, and Jill between baseline and

post-test and remained unchanged for Eddie. For Harry and Eva, the proportion of prompted PLS had increased during post-test, however, independent PLS were still frequent, occurring in 82% of trials with a PLS for Harry and 38% of trials with a PLS for Eva.

Results on the PLS indirect measure were mixed. Megan, Bill, Chloe and Jack reported increases in PLS for Cathy (20% increase), Andy (17% increase), Jill (50% increase), and Eddie (34% increase). Jane, Lara and Sophie reported decreases in the PLS for Alex (10% decrease), Harry (20% decrease), and Eva (20% decrease). The PLS indirect measure was also completed by a second respondent (another caregiver) and returned for four children. Andy's mother reported no change in his PLS between baseline and post-test. Cathy's teacher reported a 10% decrease in her PLS across the parent PLS program. Harry's support teacher reported a 10% increase in his PLS at post-test. Eddie's mother and teacher both reported increases of 17% in his PLS at post-test.

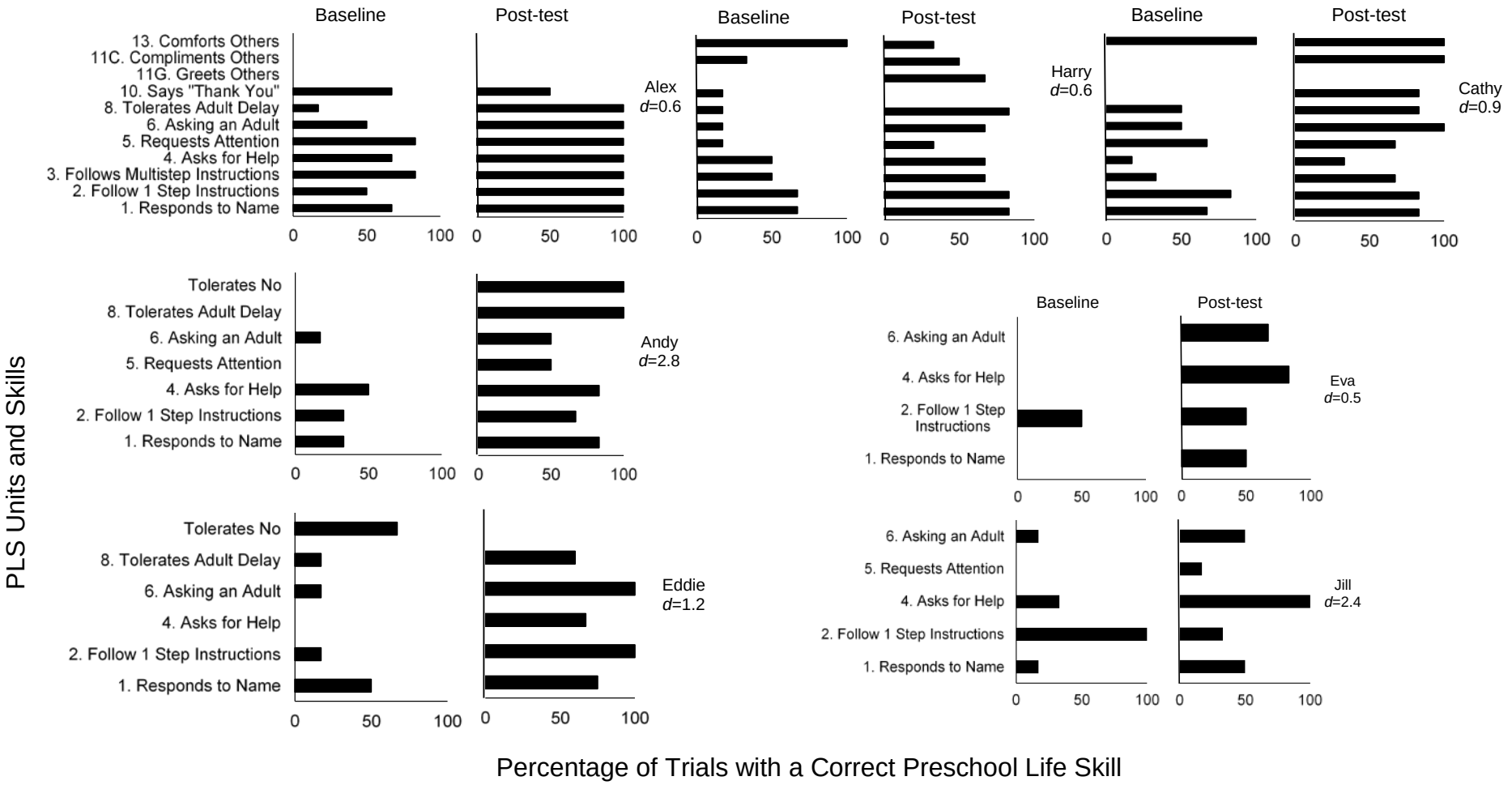

Figure 5.4. Percentage of trials in which PLS occurred during baseline and post-test for Alex, Cathy, Harry, Andy, Jill, Eddie and Eva. Effect sizes for each child are presented to the left.

Social validity data are presented in Table 5.3. Parents' ratings of the statements regarding the parent PLS program, the training and the outcomes for them and their children were consistently high. The social validity questionnaire also provided space for further comments and suggestions and parents highlighted their children's progress with the PLS: "Harry has greatly improved at greeting people when he arrives on scene", "She learnt better ways to ask for help, saying please and thank you and coping with waiting", "My child is nonverbal but has gained the ability to ask for help and individual items by using what he has learnt. He has gained longer waiting tolerances". Parents also noted changes in their children's behavior: "We have seen great improvements in her communication and behavior, and our connection with her.", "The difference in Jill's behavior from first session to the final one was amazing". Parents also further described the training and taking part in the program very positively: "It is a very good program reminds you to bring back to basics", "Would have loved it to be longer…we just didn't want the program to end", "This program restored a lot of confidence in me that had waned a bit…since Eva's diagnosis", "We have gained valuable lessons and real world skills that we will continue for years to come." Alex, Cathy and Harry also had positive opinions of the program saying that they enjoyed taking part in the parent PLS program and that they thought other children would like it.

Discussion

The current study aimed to evaluate the parent PLS program (Gunning & Holloway, in press) with parents and their children with ASD within an Irish context. Parent-mediated interventions represent an important area for research within this context given the existing empirical support for the positive impact of early intervention, and the limited access to such resources for children with ASD in Ireland. The demonstrated increases in children's PLS and parent teaching, taken together with the positive social validity responses, provide preliminary support for this program for use as a parent delivered intervention.

Within the current research, the parent PLS program as designed for typically developing children with children with ASD (Gunning & Holloway, in press) was evaluated. Collectively, outcomes for Alex, Cathy, and Harry suggest that this program delivery may be suitable for children with ASD who present with similar language, play, and instruction following repertoires to their peers, and low baseline levels of problem behavior. However, the variation in acquisition across dyads and PLS Units, and the adaptations made to the program for other children warrant further discussion.

Table 5.3
Social Validity Results

	Parents (*N*=7)		Children (*N*=3)	
	Mean Score	Range	Yes	No
Statement[a]				
I enjoyed taking part in this research.	7			
I think my child enjoyed taking part in this research.	6.6	6-7		
I feel that I received sufficient training on this teaching program.	6.9	6-7		
I found the training sessions useful and the teaching program easy to follow and use.	6.7	6-7		
I feel that I learned some useful new strategies for teaching my child new skills.	6.7	6-7		
I will be able to apply the skills and strategies I have learned during this program to teach different skills and to teach my other children (if applicable).	6.7	6-7		
I think my child's skills improved following the teaching program.	6.6	5-7		
I noticed positive differences in my child's behavior during this research.	6.1	5-7		
I think these skills will be useful life skills for my child.	6.7	6-7		
I would recommend for other children and parents to experience this teaching program.	6.9	6-7		
Question				
Did you like doing the project?			3	0
Do you think other kids would like it?			3	0

[a]Statements were scored on a Likert scale which ranged from a score of 1 (Strongly Disagree) to 7 (Strongly Agree)

A prominent research question within PLS research relates to the optimal consultative models for variations of the program that ensure best outcomes, as well as cost and resource efficiency (Fahmie & Luczynski, 2018). The synthesizing of findings from previous parent PLS research with the current study, and research on the Balance Program (Ruppel et al., in press) provide interesting considerations for future research. In particular, discussion of child factors, parent factors, and modifications in response to challenges is warranted.

Falligant and Pence (2017) highlighted the impact of presenting skill profiles (e.g., verbal and listener repertoires) for children with developmental disabilities within the PLS program. Ruppel et al. (in press) also suggested that play and language skills likely moderate outcomes in the Balance program. Within the current research, Andy, Jill, Eva, and Eddie had very limited language, play, and listener skills, and higher levels of problem behavior during baseline. Overall, fewer skills were targeted with these children and more modifications were required to support their progress across the parent PLS program. However, within this relatively brief, parent-mediated intervention, all of these children achieved improvements in important skill areas (listener, communication, and tolerance), which indicates that elements of the parent PLS program described here may be informative in the development of future interventions for children with similar presenting skill profiles. Future research could incorporate these findings to develop optimised program variations matched to children's presenting skill profiles.

The current findings regarding the PLS program for children with developmental disabilities suggest that some language and play skills may be prerequisites to success (Falligant & Pence, 2017; Ruppel et al., in press). When such prerequisite skills are absent, it may be useful to consider addressing these deficits prior to the program. The first step of the Balance program involves identifying synthesised and personalized reinforcers and teaching parents to promote rapport and engagement prior to skills teaching (Ruppel et al., in press). Within the current research, parents completed reinforcer inventories (Integrated Behavioral Solutions Incorporated, 2000) for Andy, Jill, Eddie, and Eva to identify preferred items (e.g., parent's phone, preferred food and drinks) as these children did not engage with toys or play activities during baseline. An important extension is to incorporate conditioning or sampling new reinforcers within this step if children have a similar, limited community of existing reinforcers. This step could also be extended to promote play skills prior to beginning instruction, such that children have the prerequisite skills to access the learning opportunities within parent-mediated PLS programs.

Findings from the current research also highlight the importance of consideration of parent factors within intervention development. In keeping with previous findings regarding the positive feedback loop between parents and children, it is pertinent to consider parent behavior with regards to the reinforcing efficacy of their child's skills. As outlined, a number of parents in the current research requested to extend teaching time for a PLS unit. For example, Chloe asked to continue with PLS Unit 2 (Functional Communication) for the remainder of the program, rather than progressing to PLS Unit 3 (Tolerance for Delay). Jill did not reliably use language to communicate during baseline. Following parent PLS for Unit 2, Chloe reported increases in Jill's use of functional language at home with great enthusiasm, and expressed concerns about delaying access to requested items. As outlined, it was also noted that Jill's Unit 1 PLS decreased somewhat while the Unit 2 PLS were being targeted supporting the suggestion that Chloe may have been practicing the Unit 2 PLS more often, perhaps because the resulting increase in Jill's language was a more potent reinforce for Chloe's teaching skills (positive feedback loop). Given that the purpose of parent training is to influence parental behavior across contexts with their children, it is important to consider these variables influencing parent behavior in future research. Parents could be asked to develop a hierarchy of target skills at the outset of parent PLS, to incorporate parent motivation and preference. Where a delay, denial, or thinning of reinforcement is to be introduced, it will be important to develop parent and child criteria to progress, and to ensure that parents are supported to implement the procedure.

As outlined, a number of children required additional practice for PLS within the current research, and this did not always result in improvements. Furthermore, during the remainder of the program PLS varied across children and units following parent PLS. An important area for future research to improve acquisition and maintenance of PLS regards the development and validation of parent and child criteria. Within the current research, dyad progression through the parent PLS program and implementation of additional practice opportunities was primarily contingent on children's skill performance as opposed to parent teaching. However, within trials to criterion, progression was contingent upon parent teaching performance. It is hypothesized that this mismatch may have impacted upon parent teaching and children's skills. We noted that the range of correct child PLS within trials to criterion was 40-100% in the current research. Future research could evaluate whether a certain performance within these trials is indicative of better overall acquisition of the target skills. This could be used to inform a future performance aim for children within intervention

sessions, prior to progressing to the next unit. We also noted that correct parent teaching performance was generally high within trials to criterion whereas errors occurred more often within intervention trials. In particular, parent teaching was incorrect in 50% of intervention trials with a PO or PC. Across the program, Megan, Jack, Sophie, Jane and Lara all demonstrated ≤50% correct teaching within intervention probes for a PLS unit. However, unless their child did not meet the criterion for progression or the parent asked to extend the teaching time for that PLS unit, the dyad would progress. Therefore, it is pertinent that future research incorporate both parent and child criteria for training to conclude, and for progression through the parent PLS program. Furthermore, the additional practice employed in the current research consisted primarily of additional trials for the child (Alex, Cathy, Harry) or the parent-child dyad (Andy, Jill, Eddie, Eva) and was not successful for all children. It will be important to consider and develop formalised booster protocols to support both parent and child success when results are not satisfactory. In recent research, Robison et al. (2019) have demonstrated the utility of a performance criterion of 75% and progressively increasing inter-trial intervals within booster teaching, which would be useful to consider in progressing this research.

With regards to parent performance within intervention probes, it is possible that the contingencies operating on parent behavior at home differed from those within the university context. The differences between the direct observation of children's PLS and the parent responses that indicated decreases on the PLS indirect measure during post-test support this suggestion. In previous parent led PLS research, it was hypothesized that the parent PLS program positively impacted upon the feedback loop between parents and children, such that parent teaching reinforced children's PLS and vice versa (Gunning & Holloway, in press). However, it was also highlighted that systematic evaluations of the relationship between correct parent teaching and children's acquisition of the PLS, and factors influencing this are pertinent for future research. Within this study, inconsistent results from the preliminary analysis of children's PLS based on their parent's correct teaching further highlight the need for such research. For example, further support may have been warranted in the current research to alter existing contingencies at home given the complexity of parent-child interactions with children with ASD. Home visits and additional support in responding to PO and PC may be useful considerations for future research in this regard. Furthermore, programming the initial step of the Balance program outlined previously could alter existing

parent-child contingencies and therefore may be an essential step where problem behavior is already occurring.

It is important to acknowledge limitations of the current research. Intervention sessions occurred exclusively in the University context which limits the generality of findings. While this reflects what service provision is likely to encompass, future research should expand the parent PLS program with children with ASD to the home setting or other relevant contexts. Falligant and Pence (2017) suggested that additional steps may be necessary to foster generalization and maintenance of the PLS and extension of the program across different contexts and interaction partners would be useful in this regard. A further limitation of this study is the lack of measurement of generalization or maintenance of outcomes for parents or children, which will be critical in future research. Parent delivery of intervention has been associated with increased generalization and maintenance of children's skills, a recognised difficulty for children with ASD (Camargo et al. 2016; Neely et al. 2015). As such, future research should evaluate the impact of parent PLS on children's skills at home, in the community and within their preschool settings. It will also be important to measure parent teaching across contexts (e.g., home, community) within future research, and to support generalization and maintenance of these skills if these are not evident. It may be useful to consider supplementary supports such as home visits, telehealth formats, video submissions and feedback, as a form of sequential modification if parent teaching does not generalize (Stokes & Baer, 1977; Stokes & Osnes, 1989).

Considering that one of the fundamental dimensions of ABA is that the analysis of behavior is applied (Baer, Wolf & Risley, 1968), systematic research to advance the dissemination and implementation of these effective, evidence-based services for individuals with ASD is of paramount importance (Wainer & Ingersoll, 2015). The current research provides preliminary support for a parent-mediated PLS program for children with ASD, an area highlighted for future research (Fahmie & Luczynski, 2018). Furthermore, this intervention was relatively successful within a context where behavior-analytic service provision is very limited, which is useful in informing future research to extend supports within such contexts. As outlined, future research incorporating the findings and recommendations for future research outlined in this study, along with the Balance Program, could inform the development of parent PLS programs tailored to parent and child needs and abilities and intervention context.

6. Descriptive Analysis of Preschool Social Interactions: Evaluating a Protocol for Identifying Preschool Social Behavior

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Study 1. Descriptive Analysis of Preschool Social Interactions: Evaluating a Protocol for Identifying Preschool Social Behavior

Abstract

Supporting social competence in early childhood is associated with the development of friendships, positive outcomes across developmental domains, and preventing challenges in later life. However, within social skills interventions to improve social competence, identifying and selecting target social skills that are likely to be functional within a child's environment represents a complex challenge. In the current research, descriptive analysis was employed within the preschool context, to identify the common, functional social skills that typically developing children engage in, within naturally occurring social exchanges. The influence of environmental variables on social behavior within the preschool context was analysed. An analysis of the common perceived motivating operations and consequences for social behavior was also conducted. Specific social behaviors that are likely to be functional and developmentally appropriate within the preschool context were identified. Analyses of factors are discussed in terms of recommendations for supporting social skills interventions in early educational settings.

Keywords: behavior analysis, descriptive analysis, preschool, social skills, social competence

Introduction

Early childhood friendships and social inclusion are recognized as important facilitators of positive quality of life outcomes (Camargo et al., 2016; Meyer & Ostrosky, 2014). Successful social inclusion provides opportunities for social interactions and play with peers, which in turn supports the development of social competence and friendships (Camargo et al., 2016). Across the extensive literature regarding social skill development and intervention in inclusive settings, the importance of success within social interactions is recognized as a critical building block for these outcomes (Boudreau et al., 2015; Bauminger-Zviely & Agam-Ben-Artzi, 2014; Watkins et al., 2017). However, it is also repeatedly highlighted that some children experience barriers to success within early childhood social interactions and developing friendships (Calder, Hill & Pellicano, 2012; Odom et al., 2011). In particular, the challenges in social communication experienced by children with autism spectrum disorders (ASD), tend to impact upon their abilities to initiate and maintain social interactions, and can negatively influence their peers' perceptions of their social skills (Gresham, 2016; Terpstra & Tamura, 2008).

To address this challenge, the development of social skills interventions to improve social skills and foster success within social interactions has been abundant within the literature in applied behavior analysis (ABA), with researchers increasingly evaluating this literature through systematic reviews and meta-analyses (Camargo et al., 2016; Gresham, 2014; Vale et al., 2015). While success is evident for social skills interventions, further research is required to continue to develop these interventions and address gaps within this literature. In particular, the identification of target social skills and deficits, and supporting social skill generalization and maintenance are repeatedly identified as important issues within the social skills intervention literature (Boudreau, Corkum, Meko & Smith, 2015; Camargo et al., 2014; Watkins et al., 2017; Whalon et al., 2015; Wong et al., 2015).

Within ABA, functional assessment and analysis have informed interventions to decrease problem behavior and increase skills for over 50 years (Beavers, Iwata & Lerman, 2013; McComas, Vollmer & Kennedy, 2009). Central to success within this literature is the identification of the antecedent situations that occasion problem behavior, and the consequences that maintain it, often within the natural environment (Boyd et al., 2011). In 2009, the Journal of Applied Behavior Analysis published an issue with a special section highlighting the potential for applying quantitative, descriptive, functional assessment to behavior within the natural environment, to inform an understanding of the social and environmental contingencies that influence behavior within this context (McComas et al.,

2009). Several studies have employed this approach to identify possible contingencies for preschool problem behavior within preschool classrooms (Addison & Lerman, 2009; McKerchar & Thompson, 2004), as well as informing an understanding of instruction-based interactions within preschools (Ndoro et al., 2006).

These studies represent novel applications of descriptive, functional assessment to develop a quantitative description of interactions, as they occur within the natural environment. This information can then be used to deduce variables that may influence behavior, that is, the naturally occurring antecedents and consequences that are prevalent for important behaviors, which can inform the development of interventions (Ndoro et al., 2006). To date, the majority of studies within this relatively limited area have continued to focus on problem behavior (Boyd et al., 2011). Boyd et al. (2008; 2011) outlined the potential for descriptive assessment and analysis to inform social skill intervention development for children with ASD. Based on existing evidence suggesting that certain contextual, antecedent factors influence peer-related social behaviors for preschool children, Boyd et al. (2008) carried out a descriptive analysis with seven preschool children with ASD across variations in peer group size, child- versus adult-led activities, and levels of teacher engagement. Peer-related social behaviors were found to be higher in smaller groups, child-led activities, and when there was limited teacher involvement (Boyd et al., 2008). Following this study, Boyd et al. (2011) employed descriptive analysis to assess outcomes of peer-related social behavior for children with ASD, as a means of identifying potentially reinforcing consequences for these behaviors. While prosocial, peer-directed behaviors were relatively low in frequency, access to tangible items and peer attention were identified as potentially important, naturally occurring consequences for these behaviors (Boyd et al., 2011). Boyd et al. (2008; 2011) highlighted the importance of future research employing the same methodology with typically developing children in order to identify the environmental events associated with prosocial behavior in typical development.

While this research is in early stages, it represents an exciting avenue for social skills research and intervention development, and addressing some of the existing literature gaps. Across the social skills intervention literature, the range of social skills targeted is immense, from tightly defined response topographies to broader response classes, covert, nonverbal social behaviors to overt behaviors, and relatively simple skills to complex repertoires (Camargo et al., 2014; McCoy et al. 2016; Rao et al., 2008; Watkins et al., 2015). Disappointingly, it has been highlighted that the rationale for selecting target social skills is

rarely identified within studies (Gresham, 2016; Matson et al., 2007). When considering social skills targets for children, the lack of consensus within the social skills literature regarding defining social skills, and selecting and prioritizing intervention targets poses a significant challenge, and is likely to contribute to identified weaknesses in social validity, generalization, maintenance, and ecological validity (e.g., Camargo et al., 2014; Driscoll & Carter, 2010; Ledford et al., 2016; Matson & Wilkins, 2009; Matson & Goldin, 2014; Whalon et al., 2015). Ideally, social skills that are developmentally appropriate, associated with successful social interactions, and likely to be reinforced in the natural environment should be targeted.

With regard to defining, selecting and prioritizing intervention targets within social skills intervention, descriptive analyses of typically developing preschoolers' peer-related social behaviors could identify relevant social skills that are most successful (i.e., associated with a higher probability of a positive outcome) within the preschool context. When the identification of target social skills is based on systematic, empirical assessment in the natural environment, target skills are likely to be functional, have high social and ecological validity, and be reinforced across contexts and time, supporting generalization and maintenance (Chandler et al., 1992; Gresham, 2016; Matson et al., 2007). Furthermore, identification of variations in topography of these skills within the natural environment could also provide an empirical basis for "training loosely" (i.e., targeting variations in response topography) within social skills interventions to support generalization and maintenance (Stokes & Baer, 1977).

Gresham conceptualized social skills deficits as skills deficits, performance deficits, self-control skill deficits, and self-control performance deficits (Gresham, 1986; Boyd et al., 2011). Each type of deficit is defined based on the specific challenge a child has with the skill, and appropriate assessment and intervention strategies for each deficit type are delineated (Gresham 1986). Several reviews of the social skills literature have advocated for the importance of assessing and distinguishing between these deficits, and utilising intervention strategies matched to deficit type, however, most research regarding social skills intervention tends to assume a social skill deficit on the part of the children (Boyd et al., 2011; Gresham, 2001; Matson et al., 2007). The types of social deficits which have been proposed within the literature, along with relevant assessment and intervention strategies are presented in Table 6.1.1. Gresham advocated for the use of testable hypotheses of social deficits to inform the social behaviors or skills to target, and descriptive analyses of social behavior could inform the development of such hypotheses (Boyd et al., 2011).

Table 6.1.1
Types of Social Deficits, Assessment, and Intervention Strategies as outlined by Gresham (1986) and Camargo et al. (2016)

Social Deficit	Behavioral Description	Assessment	Intervention Strategies
Social skill deficit	Child does not engage in the social skill because the skill, or a critical component skill, is not within their repertoire	Knowledge Past performance	Behavioral skills training (BST)
Social performance deficit	The social skill is in the child's repertoire but they do not engage in it within situations where it is required	Performance	Antecedent and consequent control strategies
Self-control skill deficit	Child has not learned the social skill due to an emotional arousal response. May present as aversive social behaviors.	Knowledge Past performance Emotional response	BST Emotional arousal reduction strategies
Self-control performance deficit	The social skill is in the child's repertoire but they do not engage in it within relevant social situations due to an emotional arousal response.	Performance Emotional arousal response	Antecedent and consequent control strategies Self-control strategies
Social fluency deficit	The social skill is in the child's repertoire but they do not engage in it fluently	Fluency Normative comparisons	Fluency-based instruction

Boyd et al. (2011) also highlighted the importance of understanding social interactions between typically developing pre-schoolers through descriptive analyses in providing a comparison for children with ASD. This could empirically inform the identification of common differences in the types of social deficits that exist between these populations (Boyd et al., 2011). In developing social skills assessment and interventions, such information could inform targets through identifying the normative frequency, duration and fluency of social skills at this developmental phase (Boyd et al., 2011). Furthermore, where these types of research studies are conducted across age groups, geographical locations, cultures, settings and social interaction contexts and situations, both assessment and intervention for social skills could become more sensitive to such important contextual factors (Matson & Wilkins, 2009). Such research could also inform an understanding of the development of appropriate and inappropriate social behaviors within the natural environment (McKerchar & Thompson, 2004).

In terms of developing social skills interventions, in general social skills interventions are rarely tailored to fit individual needs, aligned to address specified deficits, or informed by contextual variables that may influence outcomes (Boyd et al., 2011). Peters and Thompson (2015) advocated for the development of programs to teach social repertoires that are sensitive to naturally occurring discriminative stimuli and social reinforcers, as well as being resistant to periodic extinction as a critical goal in supporting individuals with ASD to benefit from the opportunities associated with social inclusion and interventions informed by descriptive analyses would support progress in this regard. Identifying preschool, peer-related, prosocial behaviors, and the antecedent conditions that occasion them would indicate the optimum social skill intervention factors specific to the context within which they are utilized, such as, group size, setting and activities as well as peer and adult roles (Boyd et al., 2008; 2011). Based on the findings from descriptive analyses, direct experimental analyses could be designed to evaluate the validity of consequences hypothesized to reinforce social behavior, which could then be incorporated in intervention with regard to optimum teaching/activity conditions, reinforcement delivery etc. (Boyd et al., 2011).

Within the field of behavior analysis, the concept of motivation is understood through motivating operations (MOs), antecedent conditions which impact on the reinforcing or punishing effect of a consequence and influence the current frequency of behavior to access or avoid that consequence (Michael, 1982). Increasingly, the importance and utility of considering MOs in research is being recognized, particularly with regard to mand training and increasing the effectiveness of interventions for problem behavior (Langthorne et al., 2012; Lechago et al., 2013; Hanley et al., 2007). Within the Preschool Life Skills (PLS) program, a successful intervention for preschool problem behavior, MOs are captured within "evocative situations". Evocative situations are situations which are likely to evoke either the target skill or problem behavior, that is, situations within which the MO is present (Fahmie & Heal, 2018; Hanley et al., 2007). An understanding of common MOs for preschool social behavior, through descriptive analysis, could inform the development of social evocative situations for social skills intervention. Such information is likely to support generalization and maintenance of intervention outcomes through identification of natural situations where MOs are present which can then be employed across contexts in teaching, in a similar way to natural language training for verbal operants (Peterson, 2009).

The current research aimed to conduct a descriptive analysis of social operants commonly observed within preschool settings, that is, the antecedent and consequent

conditions associated with peer-directed social behavior within the natural preschool setting. Specifically, the current research aimed to identify the frequency of social behaviors (social initiations, responses, and concurrents), contextual factors influencing the frequency of these behaviors, and the consequences for these behaviors in the natural environment. The naturally occurring MO for social behaviors were also hypothesized.

Method

Participants, settings and materials. Twelve children aged between 2 and 5 years took part in the study. The inclusion criteria for children included, attending a preschool service, being aged between 2 and 5 years, and for parental consent and child assent to be obtained. This study took place across two community based preschool settings in the west of Ireland, hereafter denoted Preschool A and Preschool B. Nine children took part in Preschool A, comprised of four girls and five boys aged between 2 and 4 years. In Preschool B, three children participated, two girls and one boy aged between 3 and 5 years. Children's pseudonyms and information is presented in Table 6.1.2. All children were typically developing and Irish. In each preschool the video-recorded observations in the current study took place across one week during summer.

Preschool A was a large purpose-converted house which contained a baby room, toddler room, kitchen and lunch room and two preschool rooms. The preschool rooms were located upstairs. One was a large room with two activity centres, a block corner, a water table, a home corner and a reading nook. The other room was designated for art and toys. There was a large outdoor play area with outdoor toys and activities. Preschool A had approximately 12 children attending during the course of this research. As it was summer time (i.e., outside of term time), there were three older children attending Preschool A as a full day care service. These children were aged between 6 and 11 years. One preschool staff member was responsible for the children in Preschool A for the morning session and another staff member was responsible for them for the afternoon session.

Preschool B was a large building with two preschool classrooms. Each classroom had approximately 24 children aged between 3 and 5 years in attendance during the course of the observations for this research. Classrooms were arranged into three centers with approximately eight children at each centre. There were three staff members in each classroom and each was a lead teacher for one group of children. Each classroom also had a

book corner, a play area, and an open space for large group activities. There was a large outdoor area with activities and toys. In both settings, preschool staff were asked to continue with daily activities and routines as they normally would during the course of the research.

Table 6.1.2
Children's Information

Child's name	Age in years	Gender*	Preschool
Evan	4	M	A
Paul	2	M	A
Beth	3	F	A
Rachel	3	F	A
Will	4	M	A
Chuck	3	M	A
Carmen	4	F	A
Ollie	4	M	A
Carly	2	F	A
Bradley	3	M	B
Lauren	5	F	B
Suzy	4	F	B

*M denotes male and F denotes female.

Procedure.

Consent and assent. At the outset of the current research the general purpose of the research (i.e., to understand more about preschool social interactions) was explained to staff and their consent to be video-recorded within the preschool was obtained. Information and consent forms were then sent to parents (see Appendix F). When parental consent had been obtained, an assent activity was completed with each child where the purpose of the research and the way in which the observations would be conducted was explained in child friendly language, and children were asked if they were happy for the researcher to video record them and watch the videos later.

Video observations. Video recording was conducted across various activities in both preschools. The primary researcher recorded activities for approximately 15 minutes by setting the camera up in a location where the majority of the children were visible. Recordings were taken across semi structured and free play activities throughout the day. The days and times of recordings were based on group availability and what was going on during the typical preschool day and, as such, the specific activities, group size, materials and locations varied for each child. The minimum minutes of footage recorded for an individual child was 35 minutes.

A total of four recorded observations were obtained for the majority of the children. For Bradley, Lauren, and Beth, a total of three recorded observations were obtained due to absences. In order to standardize data across children, the duration of the video recordings that was observed and coded was set at 10 minutes where possible. Given that the aim of the study was to observe natural activities and social interactions, children were not prompted to stay within the video camera frame range. As such, in a number of observations, the target child moved out of the shot. When this occurred, observers noted the time the child left the frame and the time they returned. If this was greater than 30 seconds, the observers extended the 10 minute limit to address this. For example, in Paul's second observation, he was off screen for 2 minutes 45 seconds, so the absolute duration of footage coded for this observation was 13 minutes 33 seconds to ensure that Paul's behavior was coded for as close to 10 minutes as possible.

A total of 57 individual observation videos were coded, representing a total duration of 11 hours and 4 minutes of footage. The average duration of each coded observation was 10 minutes 46 seconds (range, 6 min 19s-13 min 2s). Where two or more participating children were present in one observation video this was coded for each child individually in turn, i.e., the researchers only ever watched and coded one child's behavior at a time.

Coding system. Direct, continuous, sequential measurement was employed to code target child behavior as it occurred in the natural context. A direct observation coding system was developed for the purpose of the current research based on previous research, and coding was completed using the Noldus XT25 Observer software. At the beginning of the observation, observers allowed a 30 second acclimation period within which they identified the target child. Following this, every instance of peer-directed social behavior was coded for the target child for the duration of the observation (10 minutes). Peer-directed social behavior was defined as any child behavior directed toward a peer and/or in direct response to a peer. On observing a peer-directed social behavior observers waited 3 seconds (to observe the consequence) and then coded the behavior, consequence, and perceived MO as outlined in Figure 6.1.1. Event codes were used for the behaviors of initiations, responses and concurrents which were mutually exclusive. The consequence and perceived MO for each social behavior were coded as modifiers.

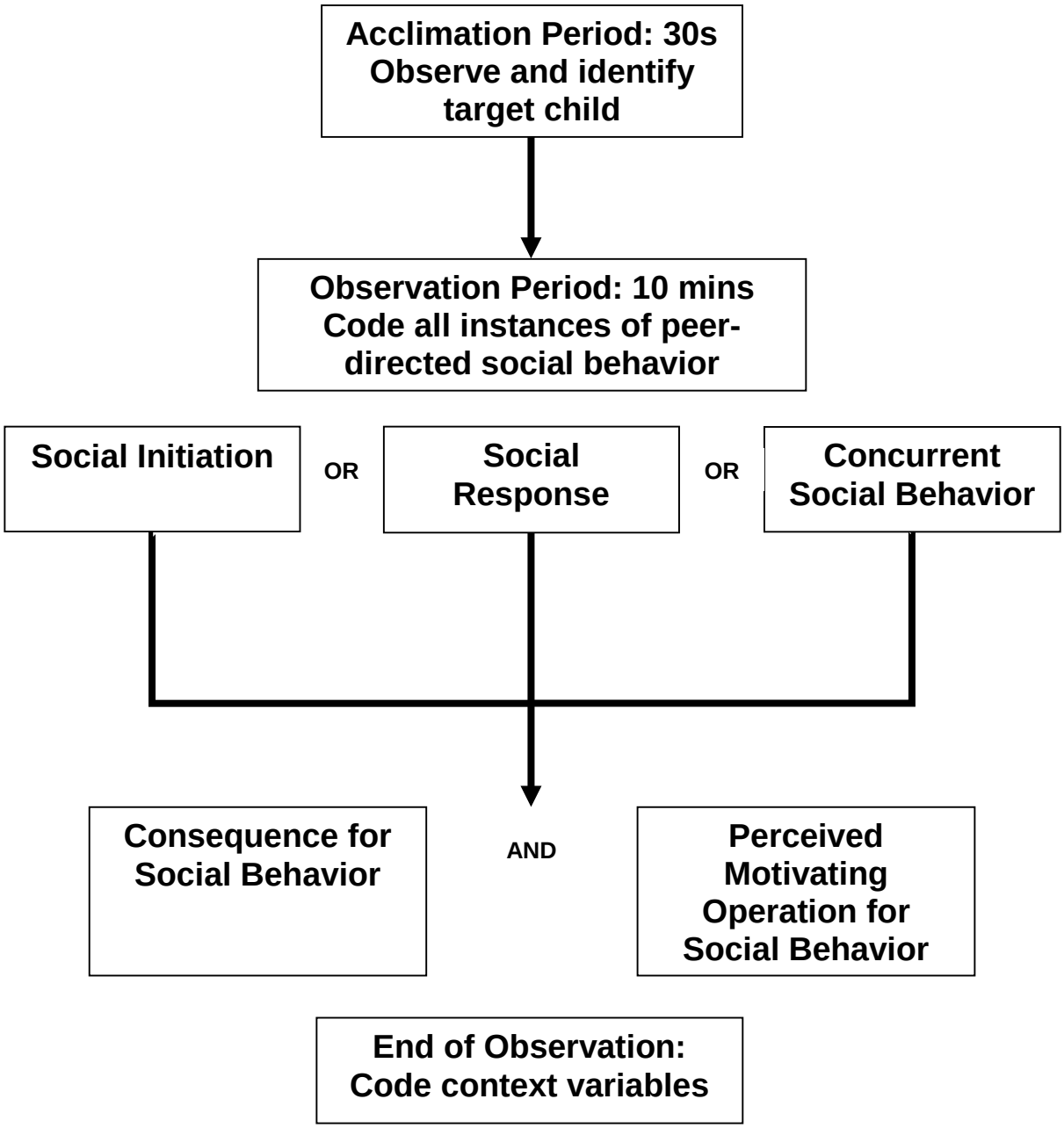

Figure 6.1.1. Outline of the coding system for preschool peer-directed social behavior

Many of the context variables, behaviors and operational definitions included in the observation coding system in the current research were based on the social behavior coding system for Project GATORSS (generalized assessment tools for observing and remediating social skills) (Conroy & Asmus, 2006). However, modifications were also made to this coding system and it was applied differently within the current research. The definitions for peer group size, activity, and play format from Project GATORSS were used in the current research to denote information about the activity within which an observation occurred (antecedent information). In addition to this, observers noted if the activity was semi-

structured or free play. This information was noted in a comment at the end of each observation in Observer and was based on the activity information that represented what was occuring for the majority of the recording.

When a target child engaged in a peer directed social behavior the observer would wait for three seconds and then code the behavior, consequence, and perceived MO. Operational definitions for the social behaviors are presented in Table 6.1.3. Initiation behaviors of helping/affection/comfort, negative initiation, and initiated but can't tell were the same as the Project GATORSS coding system. Within the current research, requests and comments were coded as two separate behaviors, and comments also included niceties (McFadden et al., 2014) or compliments. Play organizer initiations were defined as in the Project GATORSS coding system and also included turn-taking initiations as defined by McFadden et al. (2014). In the current observation coding system, non-vocal initiations were defined based on definitions from Zanolli et al. (1996), and McFadden et al. (2014). The definition for share initiations in the current research was based on Strain et al (1995). The researchers defined disagree/disapproval initiations based on initial observations/trialling of the coding system.

For social responses, an active response (as defined within Project GATORSS) was further defined based on definitions outlined by Thiemann and Goldstein (2004), and Kohler and Strain (1990). An appropriate refusal was included with disagreeing as an active response in the current research. The behaviors of passive response, no response, and continuing the current activity from Project GATORSS were coded under the same behavior in the current coding system. The definitions for negatives and responded but can't tell in the current research were based on Project GATORSS. The definition of ignore/noncompliance was developed by the researchers based on initial observations.

The Project GATORSS code codes the duration of social interactions, identifies these as positive or negative, and codes the outcome of the entire interaction. Within the current research, the objective was to identify the specific social behaviors and contingencies that extend and maintain social interactions. As such, behaviors within social interactions (i.e., after a sequence of three reciprocal social behaviors between the target child and a peer) were coded as concurrent social behaviors based upon the child concurrents code developed by Strain and colleagues (1995; 1994; 1995). Concurrent social behaviors also included the initiation and response behaviors outlined previously. In addition to this information,

observers noted if the target child's social behavior (i.e., initiation, response, concurrent) was non-vocal.

In the current observation coding system, the definitions for consequences were initially based upon those in the Project GATORSS coding system and are presented in Table 6.1.4. These were expanded upon based on initial trialling of the coding system, and consideration of the likelihood that peer social behavior would occur as a consequence to target child social behavior. Therefore, efforts were made to represent the social behaviors outlined previously as consequences to social behavior. Similarily, given that peer social behavior was expected to act as an antecedent to, and possible MO for target child social behavior, the definitions for perceived MOs were based upon the perceived goal code utilized in Conroy et al. (2007) with additional MOs based upon the social behavior definitions. The perceived MOs coded are presented in Table 6.1.5. Observers could code more than one consequence or perceived MO for each behavior. The full coding system and operational definitions are available by request from the first author.

Observer training and interobserver agreement. The primary researcher trained two research assistants to use the observation coding system across six one to three hour sessions (13-14hr total). This training was based on the training utilized in Boyd et al. (2011), Kohler et al. (1995) and Strain and Kohler (1995). Initial sessions involved discussion and memorizing of the coding system, including operational definitions and scoring procedures. These sessions also involved an introduction to Noldus XT25 Observer and training on how to use the program. The subsequent training sessions involved practice observations with video data that were not being included in the research study such that the observers could compare and discuss each other's scoring on a behavior-by-behavior basis. At this stage, some modifications were made to the observation coding system based on situations observed within these initial sessions.

Table 6.1.3

Operational Definitions for Peer-Directed Social Behavior

Behavior Group	Behaviors	Operational Definition
Social Initiations		
Coded when there was no social behavior between the child and peer in the previous 6s.	Helping/Affection/Comfort (HAC)	Any verbal or gestural behavior directed toward a peer that provides assistance, comfort, or affection in an attempt to elicit a social response. This includes casual touching (e.g., gently putting a hand on target child or peers back).
	Request (R)	Any verbal or gestural behavior directed toward a peer in an attempt to elicit peer attention or access to objects/activities. Requests may include physically joining the play activity, inviting, calling, offering materials, seeking information and/or seeking help/assistance
	Comment/Nicety/ Compliment (CNC)	Any verbal or gestural behavior directed toward a peer which primarily appears to be an attempt to elicit peer attention. For example, commenting and complimenting, manners.
	Play Organizer/Turn Taking (POTT)	A specific verbal or gestural request directed toward a peer in an attempt to elicit compliance/attention and/or to direct or organize the play activity including role assignment, directing an activity, and coordinating pretend play and social contact. Includes any statements with the word "turn" or referring to turns.
	Negative Initiation (NI)	Any nonaccidental verbal or gestural act with the potential to cause harm to peer(s)/object(s). Includes throwing objects toward a peer, destroying peers' objects/structures, name calling, yelling, hitting, or other negative statements/behaviors directed toward peer. Also includes physical or non-physical forms of aggression, such as facial expressions (e.g., sticking tongue out at peer), body posturing (e.g., leaning toward a person, close to his/her face), or social exclusion (e.g., telling a peer he/she can't play), that cause harm to others through less direct means. Always considered a negative behavior and is scored within the context of a social situation.
	Disagree/ Disapproval (DD)	Any verbal or nonverbal initiation indicating disagreement or dislike.
	Share (S)	A verbal or nonverbal offer of something to a peer or attempt to include them in an activity. Includes sharing toys, passing items required for activity e.g., pencils, playdoh and including the peer in an ongoing activity.
	Nonvocal (NV)	Any non-vocal initiation that could not be coded under the other definitions
	Initiated but can't tell (ICT)	Coded when it is clear to the observer that an initiation occurred, but the nature of the initiation is unclear. This includes occasions when the target child and peer cannot be seen or heard clearly to observe the statement/behavior, but, because of subsequent behaviors, it is clear that an initiation has occurred.
Social Responses		

Coded when social behavior directed at a peer occurs within 3s of the peer's behavior.	Active Responses:	
	Acknowledge/ Compliment/ Nicety (ACN)	A response to an initiation (without agreeing), compliment to the peer or use of manners.
	Repeat (Re)	Coded when the child repeats the peer's initiation (verbatim).
	Answer/Clarify/Play Organizer (ACPO)	A response to a peer's initiation providing an answer, instruction or more information. Includes answering a question, providing/clarifying an instruction, providing more information.
	Respond (related comment) (Res)	A response to a peer that consists of a comment related to the activity.
	Agree/Confirm (AC)	A positive response to a peer initiation, agreeing with the peer.
	Disagree/ Appropriate Refusal (DAR)	An active, overt rejection of a peer initiation in an appropriate way. Includes saying "no" and rejecting a peer suggestion. Does not include any problem behavior e.g., shouting, pushing, grabbing (negatives).
	Share/Give (SG)	A physical response to a peer initiation through providing access to a toy, play area, item etc.
	Passive/No Response/Continue Current Activity (PNC)	Any verbal or gestural behavior that the child engages within 3-seconds of an initiation to allow the peer to engage and continue with an initiated behavior directed toward him or her without showing obvious signs of distress or discomfort OR coded when the target child either knowingly or unknowingly ignores the initiator or continues to engage in the same play behavior. This includes allowing a peer to touch, engage in an activity, play with the same materials, and remain in proximity.
	Negatives (Neg)	Any verbal or gestural response behavior that has the potential to cause harm to peer(s)/object(s). Includes throwing objects toward a peer, destroying peers' objects/structures, name calling, yelling, hitting, or other negative statements/behaviors directed toward peer. Also includes non-physical forms of aggression, such as facial expressions, body posturing, or social exclusion, that cause harm to others through less direct means.
	Ignore/ Noncompliance (IN)	A passive behavior or lack of behavior in response to a peer initiation that ignores or does not comply with the peer initiation.
	Responded but can't tell (RCT)	Coded when it is clear to observer that a response occurred, but the nature of the response is unclear. This includes occasions when the target child and peer cannot be seen or heard clearly by observer to observe the statement/behavior, but, because of subsequent behaviors, it is clear that a response has occurred.
Concurrent Social Behavior		

Social behavior within a sequence of ≥3 reciprocal social behaviors. Coding concurrents begins with the third behavior and ends when there is a break of 3s between reciprocal social behaviors.	Initiation and response behaviors coded as above within concurrent code. Denoted with C- (e.g., C-HAC, C-ACPO).

Table 6.1.4

Coding Definitions for Consequences for Peer-Directed Social Behavior

Peer Compliance (PC)	Coded where the target child's social behavior results in a peer complying with a suggestion
Peer Information (PI)	Coded when a peer provides information in response to the target child's social behavior
Peer Attention (PA)	Coded when the primary outcome of the target child's social behavior is attention from a peer or peers
Peer Action (PAct)	Coded when a peer engages in an overt/active behavior in response to the target child's social behavior
Peer Tangible (PT)	Coded when the social behavior results in a peer providing access to a toy/item/area which the child did not have access to
Peer Refusal/Disagreement (PRD)	Coded when a peer responds with a refusal to the target child's social behavior
Peer Ignore (PIg)	Coded when the peer(s) ignore/do not respond to the target child's behavior
Continued Access to Tangible (CA)	Coded when the target child maintains access to something after their social behavior
Peer gets Tangible (PgT)	Coded when the peer gets access to a tangible item immediately following or contingent upon the target child's social behavior
Escape Social Situation (ES)	Coded when the social behavior results in the target child leaving the social situation
Escape Social Situation to Stereotypy (ESSt)	Coded when the target child's social behavior results in removal/escape from the social situation AND they subsequently engage in stereotypy
Escape Social Situation to Stereotypy (EST)	Coded when the target child escapes the social situation and gets access to a tangible item
Adult Attention (AA)	Coded when the primary outcome of the target child's social behavior is attention from an adult
Adult Tangible (AT)	Coded when the social behavior results in an adult providing access to a toy/item/area
No Observable Outcome/ Activity Continues (NOAC)	Coded where there is no observable outcome to the target child's behavior or the current activity continues passively

Table 6.1.5
Coding Definitions for Perceived Motivating Operations for Peer-Directed Social Behavior

Peer Related	
	Peer Attention Diverted (MO-PA)
	Peer has Tangible (MO-PT)
	Peer Action/Compliance Required (MO-PAC)
	Information Required from Peer (MO-PI)
	Peer Needs/Wants Something or Child is Being Kind (MO-P)
Self Related	
	Child is Agreeing/Complying with Peer (MO-AC)
	Child is Attending to/Acknowledging Peer (MO-Att)
	Child has an Idea (MO-I)
	Child is Asserting (MO-As)
	Child is Disagreeing (MO-D)
	Child wants Social Interaction/Activity to Continue (MO-SIAC)
	Child wants to Escape Aversive Social Situation (MO-ES)
	Child is not Attending to the Situation or Doesn't Understand (MO-NADU)
Adult Related	
	Child wants Adult Attention (MO-AA)
	An Adult can Support the Interaction (MO-AS)
	An Adult Prompted the Social Behavior/MO is to Comply with the Prompt (APP)
Cannot Tell (MO-CT)	

Finally, the observers conducted independent observations to establish interobserver agreement. Interobserver agreement was obtained for one recorded observation (20%) for five children (42%). Agreement was calculated on a behavior-by-behavior basis. Interobserver agreement for identifying the occurrence of a social behavior was 63%, and agreement on the coding of the specific topography of behavior was 60%. Interobserver agreement for the consequences of social behavior was 78% and agreement for the perceived MOs was 90%.

Data analysis. The current study aimed to explore social behaviors (social initiations, responses, and concurrents) in terms of frequency, duration, antecedent/context factors, consequences, and perceived MOs, with typically developing preschool children.

The frequency of each social behavior group was calculated for each child and across children by totalling the number of times they engaged in a behavior from each group across

observations. Rate of social behaviors per minute for each child was calculated by dividing these totals (i.e., for social initiations, responses, concurrents, and total social behavior) by the total time observed for the child (in minutes). The duration of each social interaction was calculated for each child by calculating the duration between the time stamp of the first behavior in the interaction and the time stamp of the final behavior in the interaction. Total durations of social interactions were computed by adding the duration of each interaction for each child. Mean frequency and duration of interactions were calculated by dividing the totals by the number of children who were observed engaging in social interactions.

To explore the impact of environmental factors on social behavior across children, the number of observations in which each environmental factor was present was totalled (e.g., 21 observations occurred within child-led activities). The total frequency of each social behavior group, and total duration of social interactions, was then calculated for each environmental factor. Means for each behavior group were calculated by dividing the frequency by the total number of observations in which each environmental factor was present.

To provide an overview of the topographies of children's social behavior, the frequency of each specific topography of social behavior within the behavior groups was calculated, and these were rank ordered by frequency. The most common social behavior within each behavior group was also identified for each individual child.

The most commonly identified consequences for social behavior and perceived MOs were identified by totalling the occurrence of each consequence and perceived MO. To provide further analysis of these variables, the most common consequence and perceived MO for each topography of social behavior within behavior groups was calculated. If more than one consequence or perceived MO was coded for a behavior, both were included in the analysis.

Results

A total of 794 individual instances of social behavior were observed across children and observations. An overview of the social behaviors observed for each child in the current study is presented in Table 6.1.6. Social initiations represented 28% of total social behavior with a range of 2-51 social initiations across children. The average social initiations per observation was 5 (range, 1-17). Social responses represented 33% of total social behavior (range, 11-43 responses) and, per observation, the average social responses across children

was 6 (range, 3-11). Social concurrents comprised 38% of total social behavior (range, 0-76 concurrents), with an average of 7 social concurrents per observation (range, 0-13).

Rates of social behaviors are also presented for the children in the current study in Table 6.1.6. Rates of social initiations varied widely across children (range, 0.06-1.5/min). The rates of social responses ranged from 0.28/min to 0.98/min across children. Not all children were observed engaging in concurrent social behavior within social interactions. For six children who demonstrated concurrent social behavior, rates were relatively high (range, .74-1.77/min). Rates of concurrent social behaviors were lower for Bradley and Will.

Eight of the twelve children were observed engaging in social interactions at least once in the observations. A total of 69 social interactions (M=9, range, 0-14) were observed. The average duration of social interactions across children was 50s (range, 20-136s). The shortest social interactions were 3 seconds long (Bradley & Will). Across children, 40 social interactions were below 20s in duration (58%), 19 social interaction were 20s or more and less than 60s in duration (28%) and 10 social interactions were above 60s in duration (14%).

The social behavior observed across the antecedent, environmental variables analysed in the current study are presented in Table 6.1.7. The majority of children were observed within two adult-directed and two child-directed activities, as evidenced by the comparable numbers of observations for these variables. Given that the observations were naturalistic, the number of observations was not standardized across the other antecedent, environmental variables recorded.

With regards to the activity format, total social behavior, and duration of social interactions were highest within child-led activities (517; 2558s). The largest difference in social behaviors between adult-directed and child-led activities was in social concurrents, which were markedly higher within child-led activities. Social behavior was also differentiated dependent on group size. The total frequency of social behaviors was highest within large groups (344). Duration of social interactions was highest within 1:1 activities (1693s). Social concurrents were highest within 1:1 activities (165). Large group sizes were associated with the most social initiations (127) and responses (165). With regards to the activity observed, children demonstrated the most social behavior within the context of manipulative/block building activities (257). Social initiations were highest within pretend/sociodramatic play activities (69), responses were highest within art/sensory

activities (112), and concurrents were highest within manipulative/block building activities (150).

Table 6.1.6

Individual Children's Social Behavior

Child	Social Initiations		Social Responses		Concurrent Social Behaviors		Total Social Behavior	Total Duration of Social Interactions (s)
	Total	Rate	Total	Rate	Total	Rate		
Bradley	11	.39/min	19	.68/min	10	.36/min	40	80
Evan	37	.84/min	43	.98/min	46	1.05/min	126	344
Paul	12	.26/min	27	.59/min	35	.76/min	74	287
Lauren	51	1.5/min	31	.91/min	25	.74/min	107	231
Beth	2	.06/min	14	.42/min	0		16	
Suzy	7	.18/min	12	.32/min	0		19	
Rachel	6	.15/min	11	.28/min	0		17	
Will	17	.40/min	24	.57/min	17	.40/min	58	150
Chuck	6	.13/min	15	.33/min	43	.96/min	64	543
Carmen	35	.81/min	13	.30/min	76	1.77/min	124	667
Ollie	13	.31/min	33	.79/min	0		46	
Carly	29	.67/min	23	.53/min	51	1.19/min	103	501
Total	226		265		303		794	2803
Mean*	5		6		7		18	62.28

*The figures reported in this table are the mean across total observations

Table 6.1.7
Social Behavior across Antecedent, Environmental Variables

	Format		Group Size			Activity					
	AD	CL	1:1	S	L	V	M/B	A/S	P/S	Sn.	Mult.
Total Obs.	24	21	5	7	28	5	9	19	9	2	6
Total Social Initiations (M)	101 (4)	125 (6)	16 (3)	51 (7)	127 (5)	32 (6)	50 (6)	56 (3)	69 (8)	3 (2)	48 (8)
Total Social Responses (M)	147 (6)	118 (6)	27 (5)	48 (7)	165 (6)	25 (5)	57 (6)	112 (6)	59 (7)	2 (1)	35 (6)
Total Social Concurrents (M)	29 (1)	274 (13)	165 (33)	46 (7)	52 (2)	40 (8)	150 (17)	72 (4)	62 (7)	0	19 (3)
Total Social Behavior (M)	277 (12)	517 (25)	208 (42)	145 (21)	344 (12)	97 (19)	257 (29)	240 (13)	190 (21)	5 (3)	102 (17)
Duration (M)	245 (10)	2558 (122)	1693 (339)	331 (47)	417 (15)	373 (75)	1466 (163)	641 (34)	515 (57)	0	181 (30)

AD denotes adult directed and CL denotes child led. Group size is denoted as S for small, L for large, and V for varies which indicates that the number of peers varied across the observation (e.g., the activity began with one to one and gradually more peers joined in to form a large group). A/S denotes an art/sensory activity, P/S denotes pretend/sociodramatic play, Sn. denotes snack time, and Mult. indicates that children were engaged in multiple activities. Obs. denotes observations. Means (M) reported are across the total observations with that antecedent condition.

Figure 6.1.2 displays the total instances of each specific topography of social behavior coded across all observations. The most common social initiations across children were requests, comment/nicety/compliments, and play organizer/turn-taking. Within social interactions, these were also the most common initiations observed. With regard to social responses, acknowledge/compliment/niceties were the most common behavior, followed by passive/no response/continuing the activity, and ignore/non-compliance. The most common response behaviors within social interactions were answer/clarify/play organizer, agree/confirm, and disagree/appropriate refusal. Across all observations, 14% of the typically developing children's social behavior was nonvocal.

The most commonly observed specific social behavior for each child is presented in Table 6.1.8. For seven children, comments/niceties/compliments were among the most common social initiation behaviors. Requests were among the most common social initiation behaviors for five children. Six children engaged in acknowledging social responses most frequently. For four children, the most common concurrent social behaviors were initiations, with play organizer/turn taking occurring most frequently across children. Responses were the most frequently observed concurrent social behavior for three children.

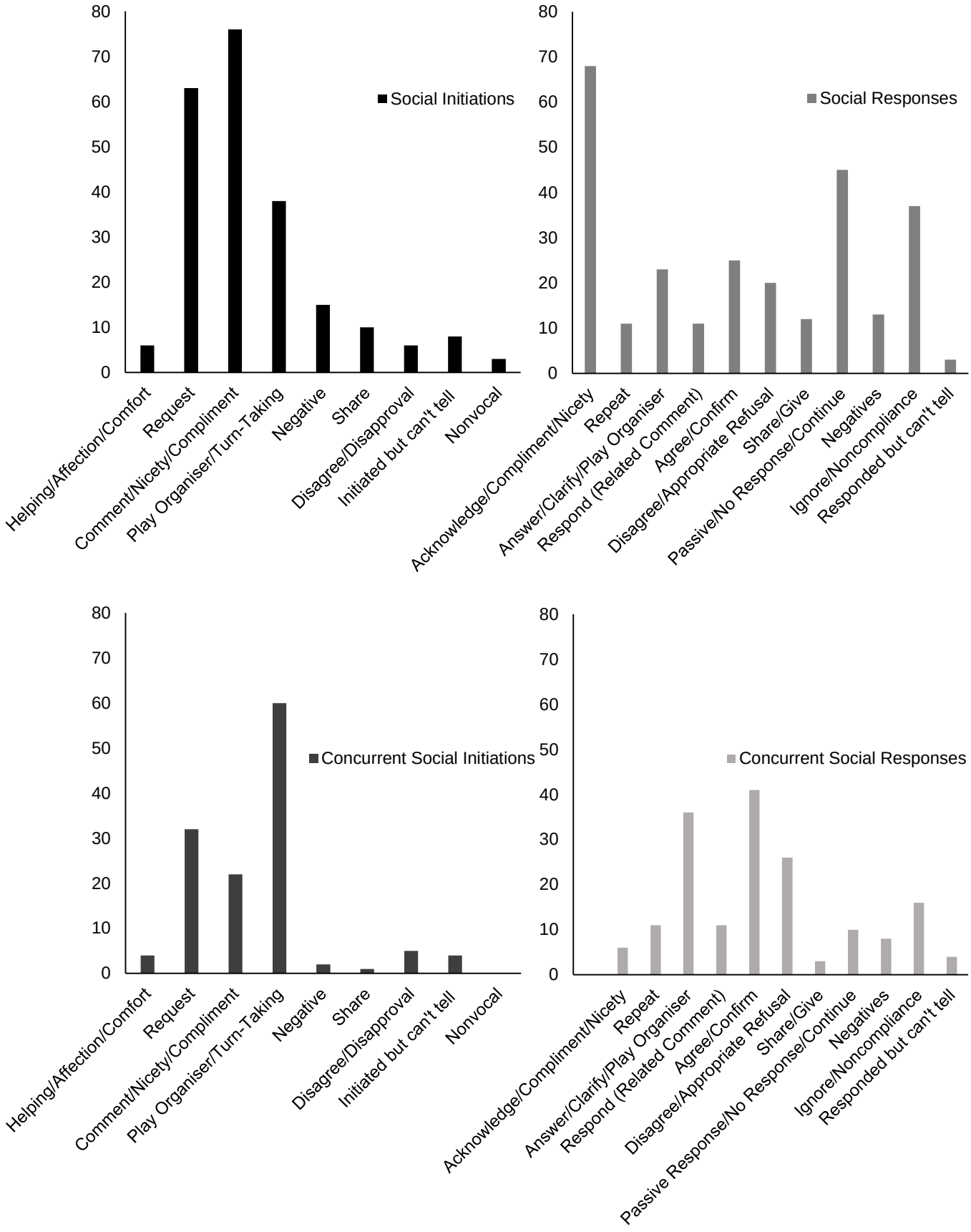

Figure 6.1.2. The totals for each specific topography of social behavior across observations.

Table 6.1.8
Most Common Specific Social Behaviors Observed for Each Child

	Social Initiations	Social Responses	Concurrent Social Behaviors
		Typically Developing Children	
Bradley	CNC & NV	Neg.	C-Re
Evan	CNC	ACPO	C-POTT
Paul	R	IN & PNC	C-IN
Lauren	CNC	ACN & PNC	C-CNC
Beth	CNC	ACN	None
Suzy	NI	IN	None
Rachel	R	ACN	None
Will	POTT & R	AC	C-AC
Chuck	CNC & R	PNC	C-POTT
Carmen	R	ACN	C-R
Ollie	CNC	ACN	None
Carly	CNC	ACN	C-POTT

Table 6.1.9 displays the most commonly observed consequences for specific social behaviors. Note that only instances where the social behavior-consequence pair was observed on greater than five occasions are included. Across children, the most common consequences for social behavior were for the activity to continue (218, 27%) and peer attention (185, 23%). Various peer mediated consequences were identified as consequences for preschool social behavior: peer ignores (86, 11%), peer compliance (78, 10%), peer refusal/disagreement (73, 9%), peer action (51, 6%), peer information (50, 6%), peer gets tangible (20, 3%), peer gives tangible (16, 2%), and peer tells on child (2, <1%). Adult attention occurred following social behavior on 37 occasions (5%). A child escaped the social situation contingent on their social behavior on 21 occasions (3%). Children maintained access to a tangible item as a consequence of social behavior on 3 occasions (<1%). The observed consequence of social behavior was an improvement in the activity on 7 occasions (<1%), and access to tangible from an adult or source other than the peer in 9 instances (1%).

Table 6.1.9
Most Common Consequences for Preschool Social Behavior

Social Behavior		PC	PA	PI	PIg	ES	NOAC
Initiations	R		**17**		**17**		
	CNC		**24**				
	POTT	**12**					
Responses	ACN						**53**
	Re		**5**				
	ACPO		**11**				
	AC						**11**
	DAR		**6**				
	PNC						**27**
	Neg					**9**	
	IN						**27**
Concurrents	C-R			**15**			
	C-CNC		**8**				
	C-POTT	**21**					
	C-Re		**8**				
	C-ACPO			**10**			
	C-AC						**17**
	C-DAR		**9**				
	C-PNC						**9**

Table 6.1.10 displays the most commonly coded perceived MOs for specific preschool social behaviors. Again, only instances where the perceived MO-social behavior pair was observed on greater than five occasions are included. The most common perceived MOs for preschool social behavior were wanting the activity or social interaction to continue (174, 22%) and looking for peer attention (156, 20%). Self-related perceived MOs were commonly observed for social behavior: having an idea to contribute (134, 17%), attending to a peer (95, 12%), asserting (44, 6%), communicating compliance with a peer direction or idea (32, 4%), and disagreeing (18, 2%). Peer-related perceived MOs were also observed across all children: peer action or compliance needed (49, 6%), needing information from a peer (39, 5%), and wanting a tangible item from a peer (24, 3%). On several occasions the perceived MO was altruistic or polite, using manners or responding to a peer need (54, 7%). The perceived MO of not attending to others around them, being engrossed in their own activity, and/or not understanding the social situation was coded in 41 instances (5%). Escaping an aversive social situation was the perceived MO for social behavior on 33 occasions (4%). The perceived MO for social behavior was to obtain adult attention on 21 occasions (3%), and to improve the activity on 4 occasions (<1%).

Table 6.1.10
Most Common Perceived Motivating Operations for Preschool Social Behavior

Social Behavior		MO-PA	MO-PT	MO-PI	MO-P	MO-AC	MO-Att	MO-I	MO-As	MO-ES	MO-SIAC	MO-NADU
Initiations	R	**27**										
	CNC	**65**										
	POTT							**15**				
	NI		**7**									
Responses	ACN						**64**					
	Re										**11**	
	ACPO						**5**	**5**	**5**		**5**	
	Res	**6**										
	AC					**10**					**11**	
	DAR								**9**			
	PNC				**13**						**13**	
	Neg									**9**		
	IN											**22**
Concurrents	C-R			**16**								
	C-CNC	**9**										
	C-POTT							**45**				
	C-Re										**9**	
	C-ACPO			**10**								
	C-AC										**21**	
	C-DAR							**11**				
	C-PNC										**7**	
	C-IN							**5**				**5**

Discussion

This study possibly represents the first of its kind to utilize descriptive analysis to explore the social behavior of typically developing preschool children within the natural, preschool environment (Boyd et al., 2011). The recording and subsequent coding and analysis of 794 social behaviors for 12 children across 8.5 hours of footage, provided interesting results to contribute to this sparse literature base. Employing descriptive analysis with typically developing preschool children in order to empirically assess what typical social behavior looks like at this developmental stage aligns with suggestions from previous research (Boyd et al., 2011). Given the preliminary nature of this research, results should be extrapolated with caution, and the primary recommendation for future research is to replicate and extend the current study. However several interesting findings from the current research warrant discussion.

As outlined, the coding system for preschool social behavior within the current research was developed based on the Project GATORSS coding system, as well as coding systems employed within relevant research studies. This code was developed across a number of months by a team of behavior analytic researchers, and further refined based on initial trial coding runs. These initial trial runs were critical for code development, in that the research team identified a number of required additions and edits (e.g., behaviors, consequences, perceived MOs to add to the code). Having completed this stage, the code was employed with no further edits across the included children's observations, and appeared to capture preschool social behavior. Furthermore, the data obtained were useful in beginning to address the research questions. However, while this code was based on the Project GATORSS code and existing coding systems, this study represents the first application of it to preschool social behavior. Further research, validation, and edits will be required to develop this code further, and to tailor the data obtained to various research questions.

With regards to developing the empirical understanding of preschool social behavior, the current findings provide an interesting insight into typical preschooler social interactions, as they occur within the natural environment. Across children, social behavior was relatively evenly allocated between the three behavior groups (i.e., social initiations, responses, and concurrents). This may indicate that it is important to consider target social skills from each of these behavior groups within social skills interventions for children who present with social skills deficits. Camargo et al. (2016) highlighted the importance of distinguishing between the social behavior groups within social skill assessment and intervention, paricularly to improve matching of interventions to specific social deficits (Gresham, 1986). As outlined, the code in the current research was developed initially from the empirical literature regarding preschool social behavior, and then further informed by initial direct observations. Given that each specific topography of behavior was observed within the current research, with many frequently observed across children, these topographies and definitions may be useful for practitioners and researchers in selecting social skills to assess and target.

The current research also resulted in interesting findings regarding empirical targets for preschool social development. As outlined, the frequency and rate of engagement in social initiations, responses, and concurrent social behaviors varied widely across children, indicating that future research is warranted, and a "one size fits all" approach to assessing and intervening for social skills may be contraindicated. In general, social interactions were brief,

with the longest social interaction recorded lasting just over five minutes. The majority of social interaction were less than 20 seconds long. This finding is interesting in terms of expectations for preschool social interactions, as it may suggest that a number of brief interactions during the course of an activity is a more developmentally appropriate goal then consistent interaction for the entire duration. Similarly, it is interesting to note that one of the most common social response behaviors was ignore/non-compliance, and a frequent behavior within social interactions was disagree/appropriate refusal. Whereas the general focus in social skills interventions tends to be on prosocial behaviors fostering engagement, it is important to consider skills such as these as potential assertive social behaviors, supporting children to communicate what they want within social situations (Swee, Kaplan, & Heimberg, 2018).

The findings from the current research regarding antecedent, environmental factors support previous findings from Boyd et al. (2008). For all children, child-led activities were associated with the highest frequency of social behaviors, and the longest duration of social interactions. These findings are interesting to consider with regards to informing the optimum level of adult support and interaction within social skills interventions (Boyd et al., 2008). Further research regarding these findings could empirically identify the natural preschool contexts, and adult involvement that promote the most social behavior. This information could then be employed to develop training for early childhood educators in strategies for stepping back and allowing children to interact independently within these contexts, as well as recognizing when further support is required (Boyd et al., 2008).

Interestingly, across all children in the current study, total social behavior was highest within large group contexts, and durations of social interactions were longest within one-to-one situations, similar to findings from Boyd et al. (2008). Within social skills interventions, these factors may be important to consider in differentiating intervention for different social behavior groups and social deficit types, for example, it may be pertinent to target social initiations within a large group activity, and interactions within a one-to-one set up. Findings from the current research also suggest the activities likely to provide the most social evocative situations for each social behavior group. Furthermore, in informing the promotion of social skill development within preschools, these findings reiterate the importance of considering the context (activity type, group size etc.) to foster children's success. Confirmation of the influence of these environmental factors within future research could inform the development of a checklist for setting up the preschool setting to promote social

skills and interactions. Such a tool could then be incorporated into training, policy development, and evaluations for preschools.

Findings from the current research regarding consequences of and perceived MOs for social behavior further emphasize the importance of considering peers within social skills intervention. Peer mediated consequences and peer related perceived MOs were among the most commonly identified across children. This finding is interesting to consider with regards to the social performance deficits described by Gresham (1986), as well as in relation to developing social skills interventions. Preliminarily, these findings support the both the potential evocative and reinforcing effect of peers' behavior on other children's behavior. Peer-mediated interventions (PMI) have an established evidence base for social skills intervention, however the literature employing PMI with preschool children remains limited (Watkins et al., 2015). The current findings suggest that development of PMI for preschool children is a critical area for research, as peer behavior may comprise many of the social evocative situations, and socially reinforcing consequences that preschool children encounter within the natural environment. Incorporating these within social skills intervention would likely therefore promote social and ecological validity, and generalization and maintenance; areas highlighted for future research (Camargo et al., 2014; Ledford et al., 2016).

Interestingly, consequences for preschool social behavior within the current research were idiosyncratic to an extent, with the most common consequences representing only 20-30% of social behaviors. Analysis of the relevance of these consequences to preschool social behavior is precluded by the lack of quantification of the observed contingencies within the current research. At present, there are a number of methods to quantify contingent relations within research employing descriptive analyses (Lloyd, Kennedy, & Yoder, 2013). However, limited consensus exists regarding the most appropriate method, and the sufficiency of data required to support these methodologies (Lloyd et al., 2013). Future development in this area could inform the application of such methodologies within replications of the current research, to quantitatively evaluate the relevance of consequences to peer-directed social behavior. However, it is important to caution against the interpretation of such findings as indicative of reinforcement effects, which would require experimental demonstration (Lloyd et al., 2013). However, such findings would be useful in supporting programming for generalization through programming natural contingencies and schedules in intervention (Stokes & Baer, 1977; Stokes & Osnes, 1989; Gunning et al., 2019).

The primary aim of the development of the coding system for perceived MOs was to identify naturally occurring situations in which an establishing operation is likely to be in effect for preschool social behavior. These findings, in turn, could inform the development of social evocative situations for social skills interventions which closely resemble the natural environment, thus supporting generalization and maintenance (Stokes & Baer, 1977; Stokes & Osnes, 1989; Gunning et al., 2019). As previously outlined, the current findings indicated that peer behavior is important to consider. Within PMI, social evocative situations based on the current findings could involve, for example, having a peer control access to activity-related items, or having individual peers have one piece of information each in an activity where all of the information is required. The importance of self-related perceived MOs was also evident in the current research and the authors posit that these could be incorporated in tandem with the peer social evocative situations. For example, having a peer have necessary information and an activity-related direction to give, could capture the perceived MOs of wanting peer information, and communicating compliance with the peer direction. For researchers and practitioners, the information in Table 10 can tentatively be employed to identify useful peer- and child-related social evocative situations. This may be particularly useful in informing assessment of Gresham's social deficits, in addition to tailoring matched intervention strategies to address these (1986). For example, within the current research not attending, being engrossed in their own activity, or not understanding the social situation were coded as one perceived MO for social behavior. However, it would likely be possible to further analyze these individually, perhaps identifying social skill versus performance deficits depending on the social evocative situation.

The current research had a number of limitations that are pertinent to discuss. Firstly, given that the observations were naturalistic, elements of these were not standardized (e.g., not all children were observed in each antecedent context, individual observation durations were shorter on a number of occasions). Observations across contexts should be standardized in future research to provide a more rigorous comparative analysis. However, naturalistic observations align with the current research questions and support the ecological validity of the data, and measures were taken to preserve the integrity of the data within the current research (e.g., extending observations if a child was not visible for over 30 seconds).

The video footage in the current research was of average quality with some interference from background noise, and interobserver agreement was lower than optimum for the identification and coding of social behavior. It is possible that the quality of the

footage impacted upon this. In future research, it would be useful to consider employing higher quality equipment and technology. Furthermore, given the complexity of the coding system, it may be pertinent to extend observer training in future research and employ a training criterion. It is also important to consider other sources of information within the development of social skills interventions, for example, qualitative information from educators, parents, children (both typically developing and with disabilities) (Calder, Hill & Pellicano, 2012). Such measures were not included in the current research and represents an important consideration for future research.

Early childhood social interactions are some of the critical building blocks for friendships and social development, supporting positive life outcomes (Boudreau et al., 2015; Bauminger-Zviely & Agam-Ben-Artzi, 2014). Supporting all children to access the learning opportunities within social interactions is an important goal within research and practice (Camargo et al., 2016; Watkins et al., 2017). To date, however, questions remain regarding how to achieve this goal within the extensive literature base in this area (Camargo et al., 2014; Watkins et al., 2017). The emerging practice of applying descriptive, functional assessment technology to prosocial behaviors represents an exciting, to date underutilized, avenue for this research (Boyd et al., 2008; Boyd et al., 2011; McComas et al., 2009). The current research has contributed to this limited literature base through setting out recommendations for future social skills assessment and intervention research, based upon empirical, descriptive observations within the natural preschool environment.

Study 2. Descriptive Analysis of Preschool Social Interactions: Evaluating a Protocol for Identifying Preschool Social Behavior with Children with Additional Needs.

Introduction & Objective

As outlined, Boyd et al. (2008; 2011) utilised descriptive analysis to identify peer-directed social behavior, antecedents, and consequences for preschool children with ASD. The authors outlined the benefits of conducting similar research with typically developing children, as demonstrated in Study 1. Given the posited differences in social behavior between children with additional needs and their typically developing peers, and the distinctions between the coding system and analyses employed in previous studies and those outlined in Study 1, the current study aimed to replicate Study 1 with three children with additional needs (Boyd et al., 2008; 2011).

Method

Participants and setting. Three children with additional needs took part in the descriptive analysis in Preschool B. All of the children were male. Alan was 5 years old and had a diagnosis of ASD. His parents were Polish and Czech. Jack was a 3 year old Irish boy with Down Syndrome. John was 5 years old and was of Polish nationality. At the time of the observations John was undergoing assessment for a developmental disability. These children were recruited in the same manner as Study 1. When parental consent was obtained, the researcher and preschool teacher worked together to communicate the research to each child and ask for assent for the recordings. All children indicated their assent to participant.

Procedure. The procedure and data analysis for the descriptive analysis was identical to the previous study.

Interobserver agreement. Interobserver agreement was obtained for one recorded observation (20%) for two of the boys (67%) and the procedure was the same as previously outlined. For identifying the occurrence of a social behavior interobserver agreement was 91%. Interobserver agreement on the coding of the specific topography of behavior was 66%. Interobserver agreement for the consequences of social behavior was 75% and agreement for the perceived motivating operations (MOs) was 91%.

Results

Four individual recorded observations each, and a total of 2 hours and 20 minutes of footage was obtained and coded for Alan, Jack and John. The average duration of each coded observation was 11 minutes (range, 10 min 30s-12 min 46s). A total of 182 individual social behaviors were observed across Alan, Jack, and Johns' observations.

Table 6.2.2 presents the social behaviors observed for each child. Social responses represented 42% of social behavior (range, 20-35 responses), with an average of 6 social responses (range, 5-9) occurring per observation. Social initiations comprised 39% of total social behavior (range, 17-28 initiations). The average social initiations per observation was 6 (range, 4-7). Social concurrents represented 19% of total social behavior (range, 2-18 concurrents). The average social concurrents per observation was 3 (range, 0-5) across children. Rates of social initiations were comparable between the three boys (range, .39-.65/min). Jack engaged in a higher rate of social responses (.81/min) in comparison to Alan (.42/min) and John (.48/min). Alan and John engaged in higher rates of social concurrents

(.31/min, .41/min respectively) in comparison to Jack (.05/min). All three of the children were observed engaging in social interactions at least once in the observations. A total of 11 social interactions (M=4, range, 1-6) were observed. The average duration of social interactions across Alan, Jack, and John was 65s (range, 17-129s). The shortest social interactions were 3 seconds long (John). Across children, six social interactions were below 20s in duration (55%), three social interaction were 20s or more and less than 60s in duration (27%) and two social interactions were above 60s in duration (18%).

Table 6.2.3 represents the differences in social behavior across the antecedent, environmental variables. As previously outlined, because observations were naturalistic, these were not standardised across the environmental variables, rather, observations were conducted within the typical contexts for each child. Total social behavior was highest (114) within child-led activities, and the duration of social interactions were longest within these activities (326s). Social concurrents were more frequently observed within child-led activities. Large group contexts were associated with the highest social behavior (68), and the longest duration of social interactions was observed within 1:1 activities (298s). The highest social initiations (19) and concurrents (31) were observed in 1:1 activities for Alan, Jack, and John, with social concurrents rarely occuring within the other group contexts. Large group sizes were associated with the highest social responses (35). With regards to the activity type, the highest social behavior overall, and individually was observed in pretend/sociodramatic play activities (total, 94; social initiations, 29; responses, 31; concurrents, 34) and these activities were also associated with the longest social interaction duration (326s).

The most commonly observed specific social behaviors for Alan, Jack, and John are presented in Table 6.2.4. For Alan and John, nonvocal initiations were among the most common social initiation behaviors. Alan and Jack also frequently engaged in requests. Comments/niceties/compliments were also among the most common social initiation behaviors for Jack. For all three children, acknowledging/compliments/niceties were the most common social responses. most frequently. For Alan, the most common social behaviors within interactions were play organiser/turn-taking initiations. For Jack, the most common social behaviors within interactions were initiations that could not be identified as one of the codes, and ignore responses. For John request initiations and agree responses were most common within social interactions.

Table 6.2.2

Individual Children's Social Behavior

Child	Social Initiations		Social Responses		Concurrent Social Behaviors		Total Social Behavior	Total Duration of Social Interactions (s)
	Total	Rate	Total	Rate	Total	Rate		
Alan	26	.54/min	20	.42/min	15	.31/min	61	198
Jack	28	.65/min	35	.81/min	2	.05/min	65	17
John	17	.39/min	21	.48/min	18	.41/min	56	129
Total	71		76		35		182	344
Mean*	6		6		3		15	28.66

*The figures reported in this table are the mean across total observations

Table 6.2.3
Social Behavior across Antecedent, Environmental Variables

	Format		Group Size				Activity					
	AD	CL	1:1	S	L	V	M/B	A/S	P/S	Sn.	Mult.	Sp.
Total Obs.	6	6	2	1	6	3	1	2	5	2	1	1
Total Social Initiations (M)	32 (5)	39 (7)	19 (10)	10	32 (5)	10 (3)	9	6 (3)	29 (6)	4 (2)	13	10
Total Social Responses (M)	35 (6)	41 (7)	16 (8)	10	35 (6)	15 (5)	5	11 (6)	31 (6)	5 (3)	14	10
Total Social Concurrents (M)	1 (0)	34 (6)	31 (16)	0	1 (0)	3 (1)	0	1 (0)	34 (7)	0	0	0
Total Social Behavior (M)	68 (11)	114 (19)	66 (33)	20	68 (11)	28 (9)	14	18 (9)	94 (19)	9 (5)	27	20
Duration (M)	18 (3)	326 (54)	298 (149)	0	18 (3)	17 (6)	0	18 (9)	326 (65)	0	0	0

AD denotes adult directed and CL denotes child led. Group size is denoted as S for small, L for large, and V for varies which indicates that the number of peers varied across the observation (e.g., the activity began with one to one and gradually more peers joined in to form a large group). A/S denotes an art/sensory activity, P/S denotes pretend/sociodramatic play, Sn. denotes snack time, Mult. indicates that children were engaged in multiple activities, and Sp. denotes a sport activity. Obs. denotes observations. Means (M) reported are across the total observations with that antecedent condition.

Table 6.2.4
Most Common Individual Specific Social Behaviors Observed for Alan, Jack, and John

	Social Initiations	Social Responses	Concurrent Social Behaviors
Alan	NV & R	ACN	C-POTT
Jack	CNC & R	ACN	C-ICT & C-IN
John	NV	ACN	C-R & C-AC

CNC=comment/nicety/compliment, NV=nonvocal, R=request, ACN=acknowledge, C-POTT=concurrent play organiser/turn taking, C-ICT=concurrent initiated but can't tell, C-IN=concurrent ignore/noncompliance, C-R=concurrent request, C-AC=concurrent agree/confirm.

Table 6.2.5 displays the most commonly observed consequences for social behavior. As previously outlined, only social behavior-consequence pairs that were observed on five or more occasions are presented. For Alan, Jack, and John, the most common consequences for social behavior were peer attention (40, 22%), the activity continuing (36, 20%), and peer ignores (34, 19%). Other peer mediated consequences identified as consequences for social behavior included: peer action (20, 11%), peer refusal/disagreement (9, 5%), peer compliance (6, 3%), peer information (2, 1%), peer gets tangible (2, 1%), peer gives tangible (5, 3%), and peer tells on child (1, <1%). Adult attention occurred following a child's social behavior on 23 occasions (13%). A child escaped the social situation contingent on their social behavior on 6 occasions (3%). Maintaining access to a tangible item was coded as a consequence of social behavior on 6 occasions (3%).

Table 6.2.5
Most Common Consequences for Preschool Social Behavior

Social Behavior		PA	PIg	NOAC
Initiations	R	**7**	**7**	
	CNC		**6**	
	NV		**6**	
Responses	ACN			**9**
	IN			**13**
Concurrents	C-POTT	**5**	**5**	

The most commonly coded perceived MOs for social behavior are presented in Table 6.2.6. The most commonly identified perceived MOs were for the activity or social interaction to continue (54, 30%), and not attending to others around them, being engrossed

in their own activity, and/or not understanding the social situation (27, 15%). Peer-related perceived MOs were also observed: wanting a tangible item from a peer (23, 13%), looking for peer attention (18, 10%), needing peer action or compliance (17, 9%), and requiring information from a peer (1, <1%). The perceived MO was altruistic or polite, responding to a peer need on 14 occasions (8%). Self-related perceived MOs were also noted: attending to a peer (22, 12%), asserting (10, 5%), communicating compliance with a peer direction or idea (9, 5%), having an idea to contribute (3, 2%), and disagreeing (3, 2%). Escaping an aversive social situation was the perceived MO for social behavior on 3 occasions (2%). The perceived MO for social behavior was to obtain adult attention on 10 occasions (5%). A perceived MO of complying with a prompt from the teacher was noted in 8 instances (4%).

Table 6.2.6
Most Common Perceived Motivating Operations for Preschool Social Behavior

Social Behavior		MO-PA	MO-PT	MO-PAC	MO-P	MO-Att	MO-SIAC	MO-NADU
Initiations	R			**8**				
	HAC				**6**			
	CNC	**9**						
	POTT						**6**	
	NI		**5**					
	NV						**12**	
Responses	ACN					**20**		
	IN							**15**
Concurrents	C-POTT						**9**	

Discussion of Findings and Suggestions for Future Research

The purpose of this research was to trial the descriptive analysis of social interactions outlined in Study 1 with children with additional needs. Similarly to the previous study, this methodology revealed interesting findings regarding the social behavior of preschool children with additional needs. At the outset, it is important to highlight that fewer children were included in this study and, as such, less social behavior was coded overall. Fewer observations were also carried out for each antecedent, environmental variable, and these were not standardised. Therefore, the findings outlined below are preliminary, and future research is necessary to further develop and validate both the findings and this protocol.

As in the previous study, the coding system developed appeared to capture social behavior for children with additional needs comprehensively which provides additional preliminary support for its efficacy in research. A number of distinctions between the children's behavior in the current study, and that of the typically developing children in the previous study were noted, and may be useful in guiding and informing future research. In terms of rate and proportions of social behavior, the children with additional needs engaged in more social initiations and responses, and fewer social concurrents in comparison to the typically developing children. Interestingly, while the children with additional needs engaged in fewer social interactions overall, the duration of these interactions was comparable to those of their peers. While these data are preliminary, this finding could inform future research regarding assessing social deficits (Gresham, 1986). This may indicate a difference in the prevalence of deficits initiating interactions in comparison to deficits in maintaining interactions, which could suggest that there are different social deficits underlying these challenges.

The impact of environmental factors on social behavior in the current research was comparable to the findings from the previous study and Boyd et al. (2008). Child-led activities were associated with the most social behavior for the children with additional needs. Interestingly, adult behavior was the consequence for social behavior on 13% of occasions, in comparison to 5% for the typically developing children in the previous study. Additionally, complying with a teacher prompt was coded as a perceived MO in the current study, whereas this was not observed in the previous study. In line with the suggestions for future research regarding adult involvement and educator training previously outlined, it may be useful to comparatively investigate educator behavior and involvement in social interactions of pre-schoolers with and without additional needs.

The analysis of contextual factors also preliminarily indicated that social behavior was higher overall for children with additional needs within one-to-one contexts which could suggest that this would be a useful context to begin social skills intervention within. Furthermore, social behavior was more frequent and social interactions were longer within pretend/sociodramatic play activities. Pretend/sociodramatic play may represent a less demanding social activity for children with additional needs, as it is generally inherently flexible with no discrete end product or goal. Therefore, peers may be more open to, and tolerant of differences in social behavior and play, within these activities. However, it is important to note that children with ASD often experience difficulties with pretend play

which may have counteractive effects. Future research could consider identifying the play activities within which social behavior is highest for individual children with additional needs, prior to social skills intervention, and begin teaching within those activities.

Of note, was the marked difference in vocal and nonvocal social behavior between the children with additional needs and their peers. Over half of the social behavior of children with additional needs was nonvocal, in comparison to 14% of the typically developing children's social behavior. The consequences of peer attention and the activity continuing occurred for a similar proportion of the children' social behavior as their peers (approx. 20%). However, the peer ignoring the child's social behavior was also identified as a common consequence for children with additional needs (19%). Peer perceptions of the social behavior of children with additional needs can impact upon the frequency and success of social interactions (Terpstra & Tamura, 2008). If these preliminary findings are further supported, it will be important to consider, for example, that typically developing children may not attend to, understand, or know how to respond to nonvocal social behaviors. Each of these difficulties could be addressed through peer training, within social skills interventions, such that as the child with additional needs learns more developmentally appropriate social skills to recruit natural reinforcement from peers, the peers learn how to respond to approximations of/different topographies of these skills through peer training.

This finding may also be reflected in differences in common social behaviors between children with additional needs and their peers. It is important to acknowledge the difference in the sample sizes for typically developing children (N = 12) and children with additional needs (N = 3), and therefore these comparisons are preliminary and warrant further research. For social initiations, the most frequent social behaviors of children with additional needs were similar to their peers (requests, 16; comment/nicety/compliments, 11), with fewer play organiser/turn-taking initiations and more frequent nonvocal initiations (13). Social response behaviors of acknowledge/compliment/niceties (30) and ignore/non-compliance (24) were also demonstrated frequently by children with additional needs, whereas they engaged in passive/no response/continuing the activity less frequently. Within social interactions, play organiser/turn-taking were the most common social initiations observed (12), and agree/confirm were the most common social responses (4), indicating somewhat less variation in social behavior than their peers.

The findings of the current research provide further support for the suggestion of the importance of involving peers within social skills intervention. The prevalence of peer-mediated consequences and peer-related MOs demonstrates the potential evocative and reinforcing effect of peer behavior for children with additional needs. Within the current research, it was possible to differentiate that wanting peer attention or a tangible item from a peer were the most common peer-related perceived MOs. Future research could incorporate such findings into intervention development, and the creation of social evocative situations. Interestingly, one of the commonly identified perceived MOs in the current research was not attending to others around them, being engrossed in their own activity, and/or not understanding the social situation (27, 15%), which is distinct to the findings with typically developing children. It is likely that this broad code could encompass a number of the social deficits outlined by Gresham (1986, e.g., performance, skill). It may be useful in future research to further delineate this code in comparative studies, as it may provide an indication of the prevalence of the different deficit types across populations.

While the previously outlined findings are interesting, it is important to recognise the preliminary nature of this research. The objective was to explore the application of a method of descriptive analysis developed with a typically developing preschool population, with children with additional needs. The limitations outlined in the previous study apply to this research also. In addition, the small number of participants preclude extrapolation of findings and the primary recommendation is to replicate and extend this methodology for analysis of social behavior. However, with no modifications, it was possible to use the same methodology and analysis to describe interesting aspects of preschool social behavior of children with additional needs within the natural environment. Furthermore, results indicated avenues for future research and development within this area. This study also supported the development of the social skills intervention outlined in Chapter 7.

7. Developing Preschool Social Circles

Introduction

Successful social inclusion in early childhood education (ECE) supports developmental gains for typically developing children, particularly with regard to social skill development, making friends, and accepting differences (Aboud et al., 2012; Camargo et al., 2014; Hanline & Correa-Torres, 2012; Odom et al., 2011). Positive outcomes in these areas are associated with future skill development, improved quality of life and real-world success (Boudreau, Corkum, Meko, & Smith, 2015; Camargo et al., 2016; Watkins, Kuhn, Ledbetter-Cho, Gevarter, & O'Reilly, 2017). However, it is increasingly understood that fostering successful social inclusion to demonstrate this impact is more complex than simply including children with different abilities within the same ECE context (Odom et al., 2011; Vakil, Freeman, & Swim, 2003). Without evidence based support, the social deficits and problem behavior often presenting for children with developmental disabilities impede success in peer interactions and developing friendships (Camargo et al., 2014; Watkins et al., 2015; Zeedyk, Cohen, Eisenhower, & Blacher, 2016). These difficulties can also impact upon peer perceptions, and their choice of interaction partners (Odom et al., 2004; Terpstra & Tamura, 2008).

Considering the complexity of social behavior and the social environment, developing social skills interventions and supports for social inclusion represent a difficult task. There are a wide variety of interventions described within the social skills literature, and an even wider variety of social skills targeted, which can impede the selection of "best fit" intervention strategies and target skills (Matson & Wilkins, 2009; Camargo et al., 2014; Ledford, King, Harbin, & Zimmerman, 2016; Watkins et al., 2017; Whalon, Conroy, Martinez & Werch, 2015). In Chapter 6 of the current thesis a descriptive analysis methodology was employed to observe and analyse preschool children's social behavior within the ECE context. Findings identified social behaviors (initiations, responses, and concurrents) that were frequently demonstrated by typically developing preschool children, and the normative performance of these behaviors (frequency, rate, duration). Teaching these skills within intervention is likely to be socially valid and impactful, as they are likely to recruit reinforcement and be perceived as appropriate by peers.

Within the limited research applying descriptive analysis methodology to prosocial behavior with preschool children, findings have been linked to assessing and intervening with specific types of social deficit, that is (Boyd, Conroy, Asmus, McKenney, & Mancil, 2008; Boyd, Conroy, Asmus, & McKenney, 2011; Camargo et al., 2016; Gresham, 1986). In particular, improving assessment of, and matching of intervention strategies to, skills versus performance (motivation) social deficits, are important areas for research in social skills intervention (Boyd et al., 2008; Boyd et al., 2011; Camargo et al., 2016; Gresham, 1986). Targeting the correct deficit increases the likelihood that the behavior change will be functional within the natural context, be evoked in social situations, and recruit natural reinforcement. Matching of intervention strategies to the specific deficit is critical as intervention effects may not generalize readily across skills (Camargo et al., 2016). For example, using behavioral skills teaching to teach a social skill is not likely to address a motivation deficit. In Chapter 6, prevalent motivating operations (MO), and consequences for peer-directed social behavior were identified, and the utility of incorporating these within intervention strategies to address a specific social deficit warrants research. For example, to address a social motivation deficit peer-related MOs could inform social evocative situations (SES) to be incorporated within intervention. For this purpose, the perceived MOs identified in Chapter 6 have been conceptualised as SES in Table 7.1.

Table 7.1
Perceived MOs Conceptualised as Social Evocative Situations

Social Evocative Situation	Description
Peer Attention	A peer is not attending to the child
Peer has Tangible	A peer is holding or engaging with a toy or materials that the child does not have access to
Peer Compliance	Within the context of the activity, the child is giving the peer an instruction
Peer Information	The peer has information that the child does not have access to
Peer Direction	A peer gives a direction or makes a comment
Peer Show/Call	A peer calls the child or shows them something
Peer Contradicts	A peer contradicts the child
Escape Social Situation	An aversive social situation for the child
Adult Attention	An adult is not attending to the child
Peer Need	A peer is without toys/materials or asks the child for something
Adult Prompt	An adult prompts social behavior
Continuing the Activity/ Social Interaction	A play activity or social interaction with a terminal goal. Also coded for concurrent social behavior which is not coded within another SES

While it is recognised that successful peer interactions are fundamental in supporting social development, the development of peer mediated interventions for pre-schoolers has been limited (Camargo et al., 2014; Watkins et al., 2015; Wong et al., 2015). In Chapter 3 of the current thesis, a systematic review of the existing literature employing PMI with preschool children was conducted, and demonstrated that preschool peers were successfully trained to use PMI strategies, and the application of these strategies resulted in skill increases for their peers with ASD. Several recommendations for preschool PMI were outlined. Peer characteristics associated with the most success within preschool PMI were to be a similar age, attend preschool regularly and consistently, be relatively compliant, and enthusiastic in social interactions. Combinations of the PMI strategies (initiation, proximity, prompting and reinforcing) were suggested to represent the most effective PMI for preschool children. Behavioral skills training (BST; instructions, modelling, roleplay, reinforcement, and corrective feedback) in peer-only sessions followed by in-situ training, was identified as the most effective peer training protocol within PMI. Taken together with the findings outlined in Chapter 6 regarding frequencies and rates of social behavior, common peer-related motivating operations, and consequences within social interactions, BST could be employed to teach peers to create SES, and respond to social behavior in a way that reflects contingencies in the natural environment. Findings from this study also suggest that teaching peers to recognise and understand non-vocal communication, and tolerate refusals and non-compliance would support successful social interactions within intervention.

Given that social behavior occurs across contexts and individuals, training for natural behavior change agents represents an important consideration within interventions to support social inclusion (Dogan, et al., 2017; Doubet & Ostrosky, 2015; Stocco & Thompson, 2015). In addition to peers, parents and ECE educators represent important interaction partners for preschool children. Chapters 4 and 5 of the current thesis evaluated a parent implementation of the Preschool Life Skills (PLS) program with parents of typically developing children and children with ASD. These studies demonstrated the benefits of involving parents in intervention with regards to skill acquisition, social validity, and generalization. However, the social skills targeted within the PLS program demonstrated the least improvement within these studies which was posited to result from the limited SES within contexts without peers. These findings therefore supported a preschool-home collaborative approach to social skills intervention. Regarding training for parents and ECE educators, BST and naturalistic strategies have demonstrated success in supporting intervention within preschool and at home

(Gunning, Holloway, & Healy, 2018; Higgins, Luczynski, Carroll, Fisher, & Mudford, 2017; Mrachko & Kaczmarek, 2017).

While certain strategies have demonstrated empirical success in teaching social skills, ensuring generalization and maintenance of these skills remains problematic (Bellini, Petersm Benner, & Hopf, 2007; Boudreau et al., 2015; Camargo et al., 2014; Watkins et al., 2015). Chapter 2 of the current thesis was a systematic review analysing the use of generalization promotion strategies, and measurement of generalization of outcomes within preschool social skills intervention research. Results highlighted the utility of the generalization promotion strategies outlined by Stokes and Baer (1977) and Stokes and Osnes (1989), and the importance of embedding these strategies within intervention development. Recommendations for future research promoting generalization within social skills intervention were also presented. Intervention and treatment factors posited to support generalization promotion included teaching within the natural environment, alternating activities and interaction partners, incorporating visual supports, and programming fading of contrived reinforcement to natural contingencies. Self-mediated strategies are also useful in generalization promotion, and particularly relevant for self-control social deficits (incorporate functional mediators). Child-led activities were associated with the highest frequency of social behavior observed in Chapter 6, suggesting that these are suitable activities for social skills intervention. Within Chapter 2 session durations of 15-20 minutes, 2-3 days per week were identified as optimum for generalization promotion.

Teaching the skills identified in Chapter 6 is also likely to foster generalization of outcomes, as these skills were directly observed within social interactions in the natural preschool environment. These skills are therefore likely to contact natural contingencies of reinforcement within the preschool environment (exploit current functional contingencies). Furthermore, within Chapter 6 functional operational definitions of the classes of social behaviors to target were provided, which represents an empirical basis for teaching sufficient responses (training loosely). The use of PMI, parent education, and ECE educator training represents both exploiting current functional contingencies and incorporating functionl mediators. Furthermore, learning is encouraged occur across individuals, settings, and stimuli within a home-preschool collaborative model (train loosely).

The development of evidence-based supports for social inclusion within the ECE context is timely to support every child to access the learning opportunities within ECE and

reach their potential (UNESCO, 2015; UN SDGs, 2015; Haslip & Gullo, 2018). The current thesis has developed the evidence base for Preschool Social Circles (PSC), a context-specific, empirically-informed, social skills intervention to improve social inclusion for children with ASD in ECE in Ireland. The objective of this chapter is to outline a protocol for a pilot evaluation of this intervention to determine efficacy, feasibility and acceptability.

The protocol for a pilot evaluation of PSC has been developed in line with the relevant guidelines for planning pilot studies outlined by Moore, Carter, Nietert, and Stewart (2011). The authors emphasise the importance of careful consideration and design of pilot studies to ensure that objectives are clearly outlined, the relevant data are obtained to address these objectives, and findings are employed to inform further research and development. The objectives of the current pilot study are to assess the efficacy of PSC in increasing social skills for children with ASD, and to evaluate the feasibility and acceptability of PSC within the Irish ECE context. It is expected that the results of this pilot evaluation will inform modifications to and further development of PSC to be evaluated in subsequent single case research and small scale between groups designs, with the overall objective of informing a randomised controlled trial (RCT) of the finalised intervention.

Protocol for a Pilot Evaluation of PSC

Study design. The pilot study will employ a single subject research design (SSRD), a multiple probe design across social skills, repeated across children with ASD. Within ABA, SSRD are often employed prior to larger scale studies in order to provide initial evidence for the efficacy of an intervention. Furthermore, within a SSRD, it is possible to evaluate individual differences and challenges, to identify modifications required to support success. An overview of study phases, and the measures obtained at each phase is provided in Figure 7.1.

Recruitment, consent and assent. The pilot study will recruit six children with ASD. With nine target social skills, this will provide a minimum of 54 opportunities to demonstrate experimental control. A minimum of three typically developing peers will be recruited for each child to set the occasion for learning to occur across social partners. The pilot study will be conducted across a minimum of three ECE services, so as to gain an initial understanding of the feasibility and acceptability of PSC from parents and ECE educators, findings which can then be incorporated in later studies.

Information regarding the research study will be distributed to inclusive ECE settings, and through early intervention and ASD services. Criteria for inclusion will be for a child to be aged between 3 and 6 years, have a diagnosis of ASD, and be attending an inclusive ECE setting. Based on the findings from the current thesis (specifically Chapters 3, 4, and 5), play skills, language level, and levels of problem behavior will be assessed at intake to inform the identification of relevant pre-requisites for success within PSC. If it is found that these skills are important for supporting success within PSC, future research incorporating and evaluating strategies to increase these skills or address problem behaviour prior to intervention, as in the Balance program (Ruppel et al., in press), will be warranted.

At least one parent per child will be required to participate in the research. Within the ECE setting, educators will be asked to take part with a minimum criterion of one participating educator within the ECE setting. ECE educators will then be asked to distribute information to peer's parents inviting them and their child to participate. Educators will also be asked to identify highly suitable peers (based on the previously outlined criteria) at this stage. Consent/assent for a minimum of three typically developing peers and their parents will be required for participation. For included children, to prevent stigmatization, all children in the ECE class will be invited to participate. Group activities will be arranged within the study for two purposes; to measure generalization of the target social skills for children with ASD, and to give all children an opportunity to take part (reducing the identifiability of the peers and child with ASD).

Activity selection. ECE educators will be consulted to identify regular preschool activities that are likely to promote social behavior. Each activity will be carefully planned such that multiple SES are likely to occur (as described in Table 7.1 and Table 7.2). Furthermore, consultation with the ECE educator and preliminary observations will be employed to ensure that the children with ASD are able to actively participate in and contribute to the offered activities. To foster success for children with ASD and their peers, activities will be one-to-one or small group (i.e., one child with ASD and two peers) format.

Target social skills. The social skills, operational definitions, and SES (for direct assessment and learning opportunites) adapted from Chapter 6 are presented in Table 7.2. These skills have preliminarily been selected as the target skills within PSC and arranged hierarchically to inform progression for through the program, with the proviso that further research is required to validate this.

Procedure and measures.

Baseline.

Indirect measure of social skills and deficits. Parents will be asked to complete the indirect measure of their child's social skills presented in Appendix G. The indirect measure of the target skills has been developed based on the indirect measure utilised within the PLS program (Hanley et al., 2007). Furthermore, this indirect measure has been designed to preliminarily identify a skill or performance social deficit by describing possible child responses to social situations based on Gresham's (1986) descriptions of social deficits. It is important to note that validation of this measure, similar to that outlined by Hanley et al. (2007) is warranted prior to this pilot study.

Direct measure of social skills and deficits. A direct observation of children with ASD and the included peers within SES will be conducted, within which each child response will be identified as a correct skill, or the relevant social deficit.

An observation of a PSC activity with the ECE educator, the child with ASD and the selected peers will be conducted. Within this observation, social behavior will be directly recorded for the child with ASD and the peer, the peer's use of teaching strategies will be recorded, and the educator's use of prompts or reinforcement for the child with ASD and peer will be noted. An additional observation of all participating children will be conducted in a large group activity, with momentary-time sampling employed to record social interactions across the group as a collateral outcome. Parents will be consulted as a group regarding preferred frequency of parent education sessions, which will be accommodated if possible.

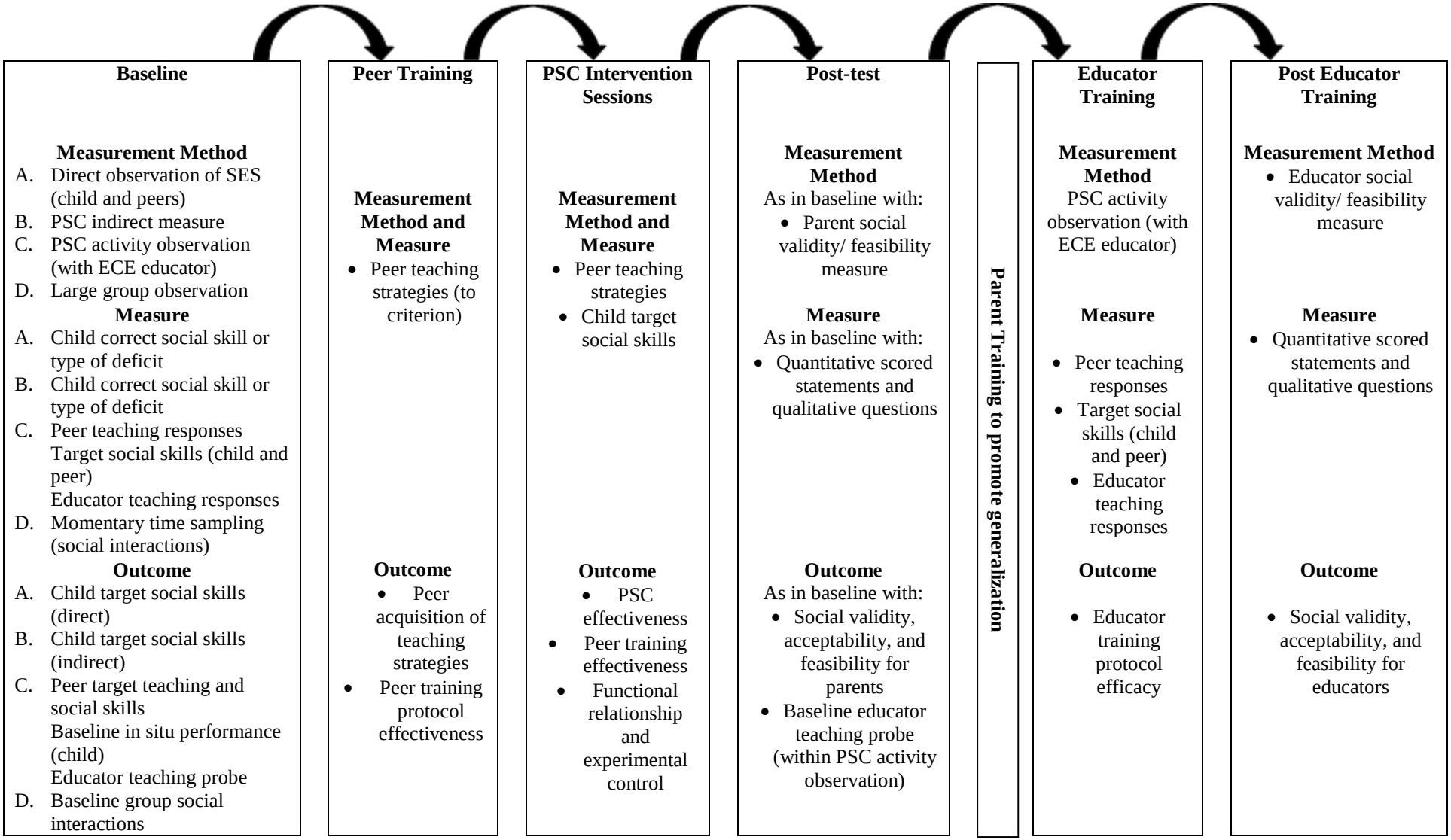

Figure 7.1. Overview of pilot study phases and measures.

Table 7.1.

PSC Target Social Skills, Operational Definitions, Social Evocative Situations, and Peer Consequences

Skill	Operational Definition	Social Evocative Situations (SES:) and Examples* Peer Consequence (PeerCon.:)
Social Initiations (also social initiation behaviors targeted within interactions)		
Requesting	A verbal or gestural behavior directed toward a peer in an attempt to elicit peer attention or access to objects/activities. May include physically joining the play activity, inviting, calling, offering materials, seeking information and/or seeking help/assistance. Examples: Johnny calls Bill Johnny is coloring and asks Bill to color with him. Nonexamples: Johnny watches Bill and Erin play with the blocks but does not join the play area. Johnny plays blocks next to Erin and Bill, but uses only his own blocks or blocks from the bucket everyone is using.	As initiations: SES: Peer Attention (e.g., a "Show and Tell" activity where children have to choose a peer to show/tell to, and initiate to them) PeerCon.: Peer provides attention or ignores (50:50) Within interactions: MO: Peer Information (e.g., a craft activity where each child controls access to necessary items (e.g., aprons, gluesticks, paint brushes), a treasure hunt activity where each child has a clue) PeerCon.: Peer provides information
Commenting, Niceties & Compliments	A verbal or gestural behavior directed toward a peer which primarily appears to be an attempt to elicit peer attention. For example, commenting and complimenting, manners. Examples: High five Johnny says to Bill, "My block can fly." Nonexamples: Johnny looks at what Bill and Erin are doing but says nothing Johnny approaches Bill and says "Let's play dinosaurs, you can build the mountain"	As initiations and within interactions: SES: Peer Attention (e.g., a craft or Show and Tell activity where each child has to comment on a peer's craft/item, an I Spy game where each child has to comment on something in the environment, a morning routine with individualised peer to peer greetings (e.g., high fives, fist bumps etc.)) PeerCon.: Peer provides attention
Organising Play & Turn Taking	A specific verbal or gestural request directed toward a peer in an attempt to elicit compliance/attention and/or to direct or organise the play activity including role assignment, directing an activity, and	As initiations and within interactions: SES: Peer Compliance (e.g., a Follow the Leader activity where the child is the leader, turn taking

	coordinating pretend play and social contact. Includes any statements with the word “turn” or referring to turns. Examples: Johnny tells Erin to be the mom and Bill to be son while playing house. Johnny says he is first and then it is Bill’s turn. Nonexamples: Johnny plays house, Erin says, "I want to be mom." Johnny says, “OK, I want to be the dad”. Johnny asks Erin to play house with him.	games e.g., Snakes and Ladders™, Connect 4™, Musical Statues/Bumps with turns to choose the music, decide the rules etc.) PeerCon.: Peer complies or continues the activity
Social Responses		
Acknowledging, Compliments & Niceties	A response to an initiation (not an agreement). Also includes giving a compliment or using manners. Examples: Bill says “I’m going to the sand table”, Johnny says “Oh” Erin shows Johnny her playdoh, Johnny says “Wow!” Nonexamples: Bill says “I’m going outside”, Johnny says “me too” Erin shows Johnny her playdoh, Johnny says “That’s stupid”	SES: Peer Show/Call (e.g., Show and Tell or craft activities, news at Circle Time where each child responds to a peer’s story, apeer gives out materials, napkins at lunch etc.) PeerCon.: Activity continues, peer does not overtly react
Passive Responding	A verbal or gestural behavior within 3-seconds of an initiation to allow the peer to engage and continue with an initiated behavior (without showing obvious signs of distress or discomfort) Also coded when the target child either knowingly or unknowingly ignores the initiator or continues to engage in the same play behavior. This includes allowing a peer to touch, engage in an activity, play with the same materials, and remain in proximity. Examples: Bill hugs Johnny and Johnny allows the hug to occur, but Johnny does not wrap his arms around Bill. Bill sits down beside Johnny and begins to add Lego pieces to his structure and Johnny lets him continue.	SES: Continuing the Activity/Social Interaction or Peer Need (e.g., activity/centre rotations whereby children take turns to switch activities while others remain at their activity (i.e., children are moving between and joining activities frequently), the target child is given access to a highly preferred activity, item or area that peers are likely to join) PeerCon.: Activity continues, peer does not overtly react

	Nonexamples: Bill attempts to hold Johnny's hand, and Johnny sticks his hand in his pocket and says, "I don't want to." Bill sits down beside Johnny and begins to play blocks with him. Johnny hands him some blocks	
Appropriately Ignoring & Not Complying	The child ignores a peer initiation or does not comply with a peer suggestion or instruction passively or covertly. Examples: Bill asks Johnny to "come play" with blocks and Johnny continues to drive his truck and does not acknowledge Bill's request. Erin is building a tower with Johnny and says "Not those blocks", Johnny continues to use the blocks in the same manner Nonexamples: Bill calls Johnny over, Johnny says "No thanks I'm busy" Erin says "You can be the tiger", Johnny continues to play with the animals	SES: Peer Contradicts (e.g., children are asked to choose an activity and ask a peer if they want to play with them, a Follow the Leader game where children have a "Free Pass" to ignore or not comply with a specified number of instructions) PeerCon.: Activity continues, peer does not overtly react
Social Concurrents Responses		
Answering, Clarifying & Organising Play	The child responds to a peer's initiation with an answer, instruction or more information. Includes answering a question, providing/clarifying an instruction, providing more information. Examples: Bill asks "Where's the car gone?", Johnny says "Over there" Bill puts a block on the tower Johnny and Bill are building, Johnny says "Okay we need two more now" Nonexamples: Bill asks "Will I get some mud?", Johnny says "Yeah" (Agree/Confirm) Bill puts a block on the tower Johnny and Bill are building, Johnny says "Yeah that's great!" (Acknowledge/Compliment)	SES: Peer Information (e.g., a Treasure Hunt where each child has required information/clues, a Follow the Leader activity where peers have to ask the leader for clarification/instructions, a Q&A for stories at Circle Time) PeerCon.: Peer provides information

Agreeing & Confirming	The child responds positively to a peer's initiation by agreeing with them Examples: Bill says "Let's go", Johnny runs off with him Erin says "I'm the baby", Johnny says "ok" Nonexamples: Johnny is playing with the blocks, Bill comes over and says "I'm going to build a tower" and joins Johnny, Johnny continues to play with the blocks Bill says "We need 3 cars", Johnny says "and 10 trucks"	SES: Continuing the Activity/Social Interaction (e.g., a craft activity where the child controls access to necessary items (e.g., aprons, gluesticks, paint brushes) and peers must ask for them, a peer has access to a highly preferred activity or item and asks the child to play) PeerCon.: Activity continues, peer does not overtly react
Disagreeing & Refusing Appropriately	The target child actively/overtly rejects a peer initiation in an appropriate way. Includes saying "no" and rejecting a peer suggestion. Does not include any problem behavior e.g., shouting, pushing, grabbing. Examples Bill says "Let's play dinosaurs", Johnny says "no" Erin says "We need the red car", Johnny says "No, the blue one" Nonexamples: Erin says "This is my teddy", Johnny says "I have that at home" Bill says "I'll get the crayons", Johnny says "I'll get paper"	SES: Peer Compliance (e.g., a peer has access to an activity or item that the child does not like and asks the child to play, the child has access to a highly preferred item or activity and the peer asks for it, an activity with an end goal is set up and children are given contradictory (but equally effective) instructions on what to do) PeerCon.: Peer provides attention

*It is important to note that natural opportunities for these skills are likely to occur within typical routines, activities and interactions too. It may be useful to dedicate some time prior to intervention, within baseline observations, to identify the contexts in which these opportunities arise naturally.

Deficit-intervention strategy matching. As outlined, the indirect measure for PSC has been designed to incorporate an initial assessment of the type of social deficit based on Gresham's (1986) definitions (Appendix G). The results for this measure and the corresponding direct measure for each child will be used to inform individual children's PSC program. For example, if a parent response on the indirect measure indicates a social motivation deficit, and this is confirmed within the direct observation measure, PSC intervention strategies will incorporate peer MO manipulations, pairing, and conditioned reinforcement to increase the value of social interactions/peer behavior as a reinforcer. If the direct observation results differ from the indirect measure, for example, indicating a skill deficit, then peer modelling, prompting, and reinforcing will be employed in conjunction with the aforementioned strategies. See Table 7.3 for deficit types and corresponding intervention strategies.

Table 7.3.
PSC Intervention Strategies Tailored to Match Social Deficit Types (Gresham, 1986)

Social Deficit Type	Tailored Intervention Strategies
Skill Deficit	Peer modelling, prompting and reinforcement
Motivation (Performance) Deficit	Condition peers as reinforcers Conditioned reinforcement systems (e.g., FR1 tokens for engaging in requests, FR5 exchange within activity, yoked to peer where suitable) Peer related MOs

Peer training. Instructions and a rationale for the PMI strategies will be provided to participating peers. The researcher will model teaching strategies (contriving SES, reinforcing correct social behavior), and provide opportunities to role-play these. Descriptive praise will be delivered for correct responses, and corrective feedback will be delivered contingent on any incorrect responses. Prior to progressing to in-vivo training peers will be required to answer a comprehension question correctly, demonstrate correct teaching within one role-play with a correct skill, and one role-play with an incorrect response.

The peer will then progress to in-vivo training within PSC activities with the child with ASD. Within these activities, the visual supports (rules for the target social skill and reminders of the PMI strategies), and conditioned reinforcement system will be introduced. The researcher will provide reinforcement (descriptive praise) and corrective feedback for

peer PMI strategies continuously, and intermittent reinforcement to both children for attending/engaging in the activity. If the peer does not engage in social behavior for over two minutes, the researcher will provide a verbal prompt. To progress to the intervention phase, peers will be required to demonstrate correct teaching in the majority of opportunities within an activity, including both responses to correct skills and incorrect responses from the child with ASD.

PSC intervention sessions. PSC activities will be set up with 2 peers and the child with ASD, 2-3 times per week in the ECE setting. Activities will be 15-20 minutes in duration, and children will be offered a choice of activity at the outset as outlined. See Table 7.2. One target skill from each social behavior group will be targeted at a time, with one session per week allotted to each behavior group. The activity sessions will be identical to the in-vivo training for peers, apart from the researcher role. The researcher will only prompt peers if no social behavior occurs for over 2 minutes, and will only provide conditioned reinforcement to the peers and child with ASD for practicing the target social skill (e.g., peer initiation behavior, child with ASD response behavior). Conditioned reinforcement will only be available for the social skills currently being targeted, whereas social praise will be provided for other, incidental social behaviors. When a target social skill has been acquired it will move to maintenance, whereby descriptive praise will be delivered intermittently for correct skills. Probes for previously acquired skills will be interspersed within PSC sessions to assess maintenance. Corrective feedback will be delivered if a peer engages in two consecutive incorrect trials. Criterion to progress to the next social skill for the child with ASD will be three consecutive correct social skills within SES in one session, or 80% correct within two consecutive sessions.

Post-test. After the child with ASD has demonstrated acquisition across the target social skills, the baseline measures outlined will be repeated to provide a post-test comparison. All measures will be repeated at this phase. If successful generalization is not evident within the large group observations during this phase, additional teaching will be conducted within larger group contexts. Parents will be asked to complete the social validity and feasibility measure at this stage (Appendix I).

Generalization and educator probe. The repeated post-test observations of a PSC activity with the ECE educator, the child with ASD and peers will be conducted for two purposes. Firstly, generalization of the skills for the children with ASD and their peers to an

activity with a different adult, and with no programmed intervention strategies will be evaluated. Secondly, the educator's use of prompts, reinforcement, and corrective feedback will be used to obtain a baseline of educator behavior, prior to training. These observations will be repeated three to five times to establish stable responding.

Parent training. To support generalization to the home context, parent training will occur. Based on the group feedback during baseline, parent sessions will be arranged at the preferred frequency. These sessions will involve a review of the skills the children have been taught. BST will be employed to teach parents how to capture SES and deliver corrective feedback and reinforcement for social skills at home, and time for questions will be provided. Parents will also receive summary information, including target skills, and potential SES in the home context to encourage practicing with their child at home (see Appendix H).

Educator training. If the educator does not intermittently praise the target social skills, prompt social behavior if it does not occur approximately every 2 minutes, and/or deliver corrective feedback for incorrect social behavior, or if the children's skills demonstrate a decreasing trend, educator training will commence. An initial educator training session will be conducted to outline the rationale and steps involved in PSC. Modelling and roleplay will be conducted with the researcher modelling teaching strategies and providing opportunities for the educator to roleplay prompting, delivering reinforcement, and corrective feedback. In-situ BST will then occur within PSC activities with the peers and child with ASD, within which the researcher will provide reinforcement for correct educator responses and corrective feedback for incorrect responses. Criteria for educator training to conclude will be two consecutive PSC activities with correct educator teaching demonstrated in the majority of opportunities, and maintenance of stable performance of children's skills above baseline. At this stage, educators will be asked to complete the social validity and feasibility measure (see Appendix I).

Analysis. Throughout the pilot study, visual analysis of data levels and trends will be employed to evaluate the impact of PSC on social behavior for children and peers, peer teaching strategies, and educator teaching strategies, across the phases previously outlined. Scores on the PSC indirect measure during baseline and post-test will be compared. Quantitative and qualitative parent and educator responses on the social validity and feasibility measure will be compiled.

Conclusion

PSC is a social skills intervention developed from several empirical research studies identifying evidence-based teaching strategies, subsequently informed by direct evaluations within and observations of, preschool social contexts. As such, PSC represents a comprehensive, systems-wide, contextually specific intervention to support social inclusion for children with ASD and additional needs within Irish preschool services. This chapter has outlined the development of PSC and a protocol for an initial evaluation of the intervention to determine efficacy, feasibility, and social validity. Future research directions will be outlined in the Discussion.

8. Discussion

Overview

This chapter will present a summary of the overall findings of the thesis, and discuss these findings in relation to the existing literature regarding social inclusion in early childhood education (ECE) and applied behavior analysis (ABA). The conceptual and theoretical implications of the current research within ABA and implications for future research and practice will be described. The contribution of this research to developing the evidence base for Preschool Social Circles (PSC), an intervention to improve social inclusion for preschool children with autism spectrum disorder (ASD) in Ireland will be outlined. Limitations and strengths of the thesis will be outlined. Concluding remarks will close this chapter.

Summary of Findings

- The systematic review in Chapter 2 provided an insight into the conceptualisation of generalization and maintenance within social skills interventions for children with ASD over 40 years of research. A coding system for the generalization promotion strategies developed within this study captured the strategies employed across the included social skills interventions. Success rate analyses identified combinations of generalization promotion strategies and intervention components, as well as treatment factors that appear to support generalization and maintenance of social skills.
- The systematic review in Chapter 3 highlighted the promise associated with the use of peer mediated intervention (PMI) with preschool children, identifying positive outcomes for children with ASD, and their peers. Given the detail reported in the studies included in this review, it was possible to identify optimal peer characteristics, and best practices with regard to peer training and PMI strategies, that are most likely to support success in social skills interventions for children with ASD.
- The parent training protocol developed and employed in Chapter 4 demonstrated that such training in the preschool life skills (PLS) program had positive outcomes for parents and typically developing preschool children. Findings highlighted the critical importance of considering the contingencies operating within the natural environment within intervention. Furthermore, generalization of PLS to the preschool environment was demonstrated for some children.

- The evaluation of the parent training protocol and parent PLS program in Chapter 5 demonstrated positive outcomes for parents and children with ASD. It was evident that additional considerations prior to, and modifications within, intervention were required to support outcomes for parents and children with ASD, dependent upon presenting skill profiles.
- The descriptive analysis conducted in Study 1 of Chapter 6 informed an initial understanding of typical preschool social behaviors and the contingencies that exist for these within the preschool environment. Useful information regarding preschool "social operants" (i.e., prevalent antecedents, social behavior, and consequences) was discovered. An analysis of social behavior across different environmental factors provided an understanding of the optimum conditions for social skills interventions. The prevalence of peer-related consequences and perceived motivating operations (MOs) for social behavior across children highlighted the importance of considering and including peers within social skills interventions to support best outcomes, social and ecological validity, generalization, and maintenance.
- Within Study 2 of Chapter 6, the descriptive analysis was replicated with children with additional needs. Preliminary findings provided information about preschool "social operants" for children who experience social deficits, and indicated similarities and differences to the social behavior of typically developing pre-schoolers.
- The findings from each chapter were incorporated into the development of PSC, that is; generalization promotion considerations (Chapter 2), best practices within the PMI component (Chapter 3), optimum parent training and involvement (Chapters 4 and 5), and empirically identified target skills, teaching arrangements and strategies (Chapter 6). A protocol for evaluating PSC was developed and outlined in Chapter 7.

It is evident that, to support acquisition, generalization, and maintenance of social skills for preschool children, a multi-faceted approach to intervention, involving natural interaction partners is critical. By definition, social behavior occurs across individuals and contexts, and is therefore exposed to various contingencies. To promote social behavior that is generalizable and durable across these situations, target social behaviors should be functional and relevant, and therefore likely to contact reinforcement across contexts. It is also critical to recognise that by definition, social behavior involves more than one person, and many people outside of the intervention context. Therefore, it is not sufficient to assume that if a child is taught a selected social skill, they will automatically experience more

opportunities for social interactions, and will be successful within these social interactions. While there are evidence-based strategies to teach social skills, consideration of how to decide the social skills to teach, and recognition that interaction partner behavior is a critical variable influencing acquisition and generalization of these skills, has been limited. The current research initially identified best practice from existing literature bases, and subsequently investigated natural contexts for social behavior, to empirically inform the application of these.

Applied Behavior Analysis and Supporting Social Inclusion: Theoretical Implications

Evaluating the evidence base. Central to the development of the current research was consideration of the question: "how does an individual become socially included?" (Cobigo et al., 2012). Within the current research, a behavior analytic approach was employed to address this question. The existing literature in ABA was examined to explore the factors that support or impede social inclusion through influencing interactions between children with social skills deficits and their interaction partners. As is increasingly recognised as best practice within scientific research, systematic literature reviews were employed to inform the comprehensive development of a protocol for supporting meaningful inclusion. The systematic reviews encompassed a time period of 30-40 years of research with children with ASD, with a total of 59 studies evaluating generalization within social skills interventions and 32 studies employing PMI with preschool children. This represents an extensive evidence base from which to inform intervention development. In addition to this, the literature regarding training in behavioral teaching strategies for ECE educators and parents was also reviewed to identify evidence-based training strategies.

Considering the natural environment. Across the studies in the current thesis, consideration of the natural environment in which social behavior occurs was critical. While this process was time and resource intensive, the current thesis represents a body of research considering, investigating, and incorporating natural environment influences from the outset. Furthermore, the importance of involving natural behavior change agents in intervention to support generalization and maintenance, and to improve access to evidence-based support for children with ASD has been repeatedly emphasized (Dogan et al., 2017; Granpeesheh, Tarbox, Dixon, Peters, Thompson, & Kenzer, 2010).

It was evident that the development of training protocols for natural behavior change agents at preschool stage was important within the current thesis to support best outcomes in

social skills intervention, and to bridge the research-practice gap. Best practices were identified from the literature for PMI and ECE educator training, and these were contextually informed by the descriptive analyses in Chapter 6. To design a parent training protocol and address gaps within the parent training literature, the PLS program was selected. The PLS program was chosen as it has demonstrated success with ECE educator and PMI delivery, it incorporates strategies suited to home-based intervention, and a number of social skills are targeted within the program (Beaulieu & Hanley, 2014; Fahmie & Luczynski, 2018; Gunning, Holloway, & Healy, 2018; Hanley, Heal, Tiger, & Ingvarsson, 2007).

Preschool-home collaborative intervention. In considering the development of strategies to support social inclusion within ECE in the current thesis, careful consideration was given to the suitability of these strategies within an ECE context. The outcomes from Chapters 4 suggested that parent training can support skill generalization to the ECE context. However, as outlined, results for the PLS social skills suggested that teaching social skills is more feasible and relevant within the ECE context in comparison to the home setting. Findings from the current thesis therefore emphasize the potential for preschool-home collaborative learning with regard to social skills, incorporating evidence-based training for ECE educators, complemented by parent involvement and training.

The PLS program. Since the initial study in 2007, the evidence base for the PLS program has continued to develop, expanding applications to varying populations, and incorporating procedural modifications (Fahmie & Luczynski, 2018). Chapters 4 and 5 represent some of the first research to include parents as behavior change agents within the PLS program. The parent training protocol outlined was successful in increasing parent teaching skills, and parents indicated that this was a useful and enjoyable program. Furthermore, children's PLS increased and problem behaviors decreased, with some evidence of generalization to the preschool environment in Chapter 4. In Chapter 5 positive outcomes were demonstrated for children with ASD with different presenting skill profiles, indicating the utility of this program across preschool children and families with varying support needs. Future research recommendations previously outlined for the parent PLS program include; further evaluation and consideration of home contingencies, fostering parent independence in all teaching strategies, evaluation of generalization and maintenance of outcomes, and identifying/teaching prerequisite skills. Some suggestions for skills that may be pre-requisites for success with parent PLS for children with ASD are language skills, play skills, as well as a community of identified preferred items or activities. In addition to this, findings indicated

that higher levels of problem behaviour prior to parent PLS may impede progress. These factors warrant further research. Furthermore, the Balance program, a parent-implemented variation of the PLS program has been developed in the United States (US) over the course of the current thesis (Ruppel, Hanley, Landa, & Rajaraman, in press). The first step of this program may address these pre-requisite skills as outlined previously, indicating that it may be a useful addition to the parent PLS program described in the current thesis. As such, future replications of Chapters 4 and 5 should incorporate findings from Balance program evaluations.

Parent training and education. Within the parent training literature, it is repeatedly acknowledged that outcomes often vary across families (Thomas, Abell, Webb, Avdagic, & Zimmer-Gembeck, 2017; Stocco & Thompson, 2015). Within the current research recommendations by Stocco and Thompson (2015) were considered within the development of the parent training protocol and evaluation of findings in Chapters 4 and 5. This contributed to an understanding of the impact of existing contingencies for both parent and child target skills at home, and the importance of supporting change in these where necessary. Based on preliminary analyses, it was hypothesized that parent and child outcomes were linked to parental success and challenges in altering the existing contingencies between their behavior and their child's skills. However, these analyses were limited in scope and further research will be critical in informing an understanding of this relationship and the factors that influence it. A number of possible influences were put forward in the previous chapters, which should be evaluated within future development of parent implemented interventions.

The current thesis also highlighted several modifications to the parent PLS program as described which are recommended for future research. Extending the teaching period for skills that are more challenging or a higher priority for parents may be warranted. Training models that incorporate group workshops or parents completing parent PLS with more than one of their children may also be useful. Promoting parent independence in each element of teaching within parent PLS (BST, evocative situations, additional practice) is also an important modification for further parent PLS program development. In line with this, parent-implemented additional practice or booster teaching could incorporate increasing inter-trial intervals as in Robison et al. (2019).

Interestingly, one of the reasons that the PLS program was selected within the current research was the inclusion of social skills targets within PLS Unit 4 (Friendship Skills).

Hanley et al. (2007) selected these skills based on common replacement skills for preschool problem behavior, and kindergarten teachers' opinions. In particular, the skills in PLS Unit 4 were selected such that children would be taught to provide social reinforcers to others (Hanley et al., 2007). The generally mixed results for this PLS unit within Chapters 4 and 5 were posited to be influenced by limited access to peers and the additional time required to coordinate social situations within which to practice these skills. As such, future suggestions for PLS research also included the evaluation of different delivery models including PMI (Beaulieu & Hanley, 2014; Beaulieu, Hanley, & Robison, 2013), and collaborative home-preschool models.

The mixed results for PLS Unit 4 in Chapters 4 and 5 also highlighted the importance of developing the empirical evidence base for target social skills and social evocative situations (SES), in Chapter 6, to ensure that these target skills are likely to be evoked and reinforced in the natural environment. It was hypothesised that looking specifically at the preschool setting within Ireland might identify other social skills that were not represented within the PLS but were a good cultural and contextual fit for Irish preschool children.

Target social skills. The broad range of target social skills and limited consensus on how or why to select certain targets within social skills interventions was evident in the systematic reviews conducted as part of the current thesis. While the differentiation between specific social behaviors within social behavior groups has been outlined in detail in previous research coding children's social interactions (Conroy & Asmus, 2006; Conroy, Boyd, Asmus, & Madera, 2007; Kohler & Strain, 1990; Strain, Danko, & Kohler, 1995; Strain, Kohler, Storey, & Danko, 1994), delineation of specific social behaviors within these groups was rarely reported, therefore impeding the identification of a hierarchy of target social skills, and the relevance of different skills within different contexts. The current research conceptualised social interactions as a form of "social operant" within which antecedents, social behaviors, and consequences could be first identified, and later targeted for change to support social skill development and inclusion. Based on this position, the findings outlined in Chapter 6 informed the selection and development of the target skills, operational definitions, measurement, SES, and teaching arrangements within PSC, identified initially from research regarding preschool social interactions, and empirically validated through direct observation of preschool children's social interactions within Irish preschools. This approach to social skills assessment and intervention development represents a novel

application of a behavior analytic framework to a complex, socially significant challenge within society.

The descriptive analysis in Chapter 6 supported the identification of a set of peer-directed social skills that had contextual fit. Interestingly, the target skills identified differed from the peer-directed social skills targeted within the PLS. Within the PLS these skills include; requesting from peers, tolerating delay imposed by peers, saying thank you, greeting and complimenting others, sharing, and comforting others. The skills that overlapped between the PLS and the descriptive analysis were requesting from peers and complimenting, however the operational definitions and SES for these skills differed. The skills identified within the current thesis were explicitly identified as social initiation, response, or concurrent behaviors, which is distinct to the PLS peer-directed skills. Skills highlighted as important targets for preschool children within an Irish context included; requesting, commenting/niceties/compliments, play organiser/turn taking, acknowledging, passively responding, appropriate ignoring/non-compliance, answering, agreeing, and disagreeing.

Social deficit types. Gresham's conceptualisation of social skills deficits (1986) has, in recent years, repeatedly been highlighted as important for future research in social skills assessment and intervention (Boyd, Conroy, Asmus, & McKenney, 2011; Camargo et al., 2016). Within this research, efforts were made to incorporate this recommendation throughout, and particularly within the development of PSC, through interpretation of the findings from Chapter 6. Within PSC, the indirect and direct measurement is intended to assess the existing social deficit, and intervention strategies are then matched to the identified social deficit (Gresham, 1986). However, this represents the early stages of this research. The indirect measure has not yet been evaluated or validated within a large sample and, as such, future research will continue to develop and refine this measure with direct observation of social deficits, so as to inform a comprehensive social skills assessment procedure. Furthermore, the social deficit-intervention strategy matches proposed in the current thesis warrant further research to systematically evaluate the utility of this approach.

Motivating operations and intervention. Within ABA, the concept of incorporating MOs within intervention is increasing (Langthorne, McGill, & Oliver, 2012; Lechago, Howell, Caccavale, & Peterson, 2013). Hanley et al. (2007), developed the use of and term "evocative situations" to describe the method of employing MOs within intervention through establishing opportunities in which an existing skill, or deficit (in the form of preschool life

skills or problem behavior) is likely to be evoked. For example, handing a child a snack that they cannot open is likely to evoke either asking for help or perhaps, crying. In Chapters 4 and 5, the use of evocative situations by parents with no prior behavior analytic training was effective and socially valid, emphasising the utility of incorporating MOs within intervention. To date, an empirical analysis of the MOs for preschool social behavior within the natural environment had not been attempted. However, as evident in the current thesis, the information obtained from such an analysis contributed to the identification of learning opportunities that reflect and capitalize upon the natural context. As such, it is suggested that future research continues to develop the process for identifying MOs in the natural context, and employing these within skills teaching interventions.

Peer-mediated intervention. While PMI are considered evidence based practice for teaching social skills, concerns remain within the literature regarding the suitability of this intervention approach for preschool age children (Watkins et al., 2015). Findings from the systematic review in Chapter 3 indicated that these concerns may be prevalent within the ABA research community, with a suggested decreasing trend in preschool PMI studies over time. However, findings from this review also indicated the promising potential of PMI for preschool children. The importance of peer-related MOs and consequences evident within Chapter 6 further emphasized the importance of future development of preschool PMI to improve acquisition and generalization of social skills in intervention.

The concept of feedback loops between interaction partners discussed within Chapters 4 and 5 further demonstrates the utility of a behavior analytic conceptualisation of social interactions, and is relevant to PMI development. Similar to the positive feedback loop between a child and parent, a peer-to-peer feedback loop proposes that teaching target children and their peers relevant social skills, should lead to peer social behavior reinforcing the target child's social behavior, and vice versa. Where difficulties arise, if the consequences children are delivering to one another are identified through descriptive analysis, as in Chapter 6, these can be addressed. For example, if Johnny asks Bill for a toy (i.e., request initiation), Johnny's social initiation behavior evokes a response behavior from Bill (e.g., he says no; disagree/refusal response). Bill's response behavior then acts as both a consequence for Johnny's initial behavior (i.e., punishment or extinction for request initiation), and an antecedent for Johnny's next social behavior (i.e., the MO of wanting an item from a peer remains). It is likely with such information that it would be possible to identify the relevant social deficits, and replacement functional social skills to teach each child within PMI. In

future research, this process could also be employed to individualise PSC when necessary. Within Chapter 3 it was noted that evidence for preschool PMI where the peers had additional needs was limited, and an evaluation of existing contingencies between children prior to intervention, may support accessibility for more children to benefit from PMI.

Generalization promotion. Generalization of outcomes in social skills interventions is critical in providing children with the skills to access social learning opportunities across contexts, and the opportunities to learn more complex social competencies necessary across the lifespan (Camargo et al., 2014; Rao, Beidel, & Murray, 2008; Watkins et al., 2015; Zeedyk, Cohen, Eisenhower, & Blacher, 2016). However, generalization of social skills, and the factors supporting this, have remained relatively elusive entities in research (Camargo et al., 2014; Osnes & Lieblein, 2003; Watkins et al., 2015). The consideration of generalization promotion was fundamental to the current thesis. Empirical findings in Chapter 2 indicated that the clinic/university setting was associated with the strongest generalization outcomes, and there was evidence of generalization from the home-based intervention in Chapter 4. However, social skills intervention within the school setting was also associated with positive generalization outcomes in Chapter 2, and findings from Chapters 4 and 5 suggested that social skills may be more challenging to target in contexts where peers are not readily available. Therefore, as the natural context for early social learning, these findings reiterate the importance of ECE as an environment within which to establish evidence based practices for teaching social skills. Furthermore, findings across Chapters 2, 3, and 6 indicated that employing peers as behavior change agents within this context is likely to support generalization. The role of parents in supporting generalization of intervention outcomes is also highlighted within the current thesis. This is an important consideration for future research and applied practice to ensure there is a systems wide approach to targeting social skills, including parents, peers, and ECE educators in intervention.

The empirical identification of target social skills, demonstrated which Chapter 6, is important in increasing the likelihood that skills are functional social behaviors for preschool children, and therefore likely to contact natural contingencies of reinforcement within the preschool environment (exploit current functional contingencies). Direct observations have informed the development of functional operational definitions of important social response classes to target, providing an empirical basis for teaching sufficient responses (training loosely). The current thesis further outlined matching of evidence based strategies (PMI, typical preschool activities with embedded SES, BST, parent and ECE educator training) to

optimum intervention and treatment factors associated with best generalization outcomes in Chapter 2. These findings demonstrate empirically informed applications of the generalization promotion strategies (exploit functional contingencies, train loosely, incorporate functional mediators), which can be incorporated within applied practice with preschool children.

Synthesized contingencies for social skills. The identified consequences for social behavior are interesting to consider in terms of the developing line of research regarding synthesized contingencies for problem behavior. Hanley, Jin, Vanselow, and Hanratty (2014) proposed an alternate functional analysis (interview informed synthesized contingency analysis: IISCA), and intervention development procedure for problem behavior which incorporates multiple MOs and consequences within assessment and intervention. Where traditional functional analysis assumes that problem behavior is influenced primarily by the independent effect of an individual contingency (e.g., attention), the IISCA operates on the assumption that problem behavior can be influenced by multiple contingencies (e.g., adult attention to access escape from demands) (Hanley et al., 2014; Fisher et al., 2016). As has been outlined in the current research, the techniques developed within the functional assessment (FA) and analysis literature, have been slow to extend to behavior other than problem behavior (Boyd et al., 2011). However, within the current research, the coding system in Chapter 6 allowed for the recording of more than one perceived motivating operation and consequence for each social behavior, and this occurred on multiple occasions. Future replications could empirically demonstrate the prevalence of synthesized contingencies within the natural environment, and inform a greater understanding of the influence of these on preschool social behavior.

Research Implications and Future Directions

Social skills selection. Within Chapter 2, all included studies were coded as incorporating the generalization promotion strategy of addressing functional behaviors, given the assumed relevance of social skills as an intervention target. However, findings across the current studies suggest that this assumption may be flawed. For example, the social behaviors of passively responding, ignoring peers, and disagreeing with peers were commonly observed in Chapter 6. However, no study in Chapter 2 explicitly targeted similar assertive social behaviors with preschool children with ASD. Additionally, the social skills targeted within PLS Unit 4 (Friendship Skills) were proposed to be functional preschool social skills,

selected based on existing literature. However, these skills were not reliably observed within the Irish home or preschool context in Chapters 4 and 5, and the results for these skills following parent PLS were generally mixed. These findings highlight the importance of developing contextually specific empirical evidence bases for target social skills and SES (in Chapter 6), to ensure that the social skills targeted are likely to be evoked and reinforced in the natural environment.

Future replications of the research outlined in Chapter 6 will contribute to a comprehensive picture of "typical" preschool social behavior, accounting for contextual and cultural variables. Through such research, the suggested hierarchy of social skill targets proposed in this thesis can be refined, or perhaps tailored to context as necessary, for example play organiser/turn taking initiations may be less common in some cultural contexts than others. Furthermore, additional evidence for and refinement of, the influence of environmental factors (e.g., activity type, group size, adult input etc.), through replications, could inform optimum general ECE set up to promote social interactions. In progressing similar research with children with additional needs, replications with children with different developmental disabilities, or additional needs is imperative. With comparisons between such findings and the replications with typically developing children outlined, it will be possible to identify common social deficits to assess and target e.g., engaging in a skill at a lower frequency in comparison to peers, or lower rate or fluency of social behavior in comparison to peers. Furthermore, such findings will provide important information regarding the contextual factors that support and impede social behavior for children with developmental disabilities or additional needs (e.g., activity type, ECE educator involvement).

Social skills intervention. While findings from Chapter 6 indicated the prevalence of certain consequences for preschool social behavior, and these are incorporated within PSC, the relevance of these consequences remains to be seen (Hanley, 2012). Future research in this area could be approached through replications of Chapter 6, collating findings regarding common consequences for social behavior. Within such research, it would also be interesting to compare the most frequent consequences for social behavior across children who are typically developing and those with additional needs to identify relevant similarities or differences which could inform intervention. However, it will also be critical to evaluate the relevance of consequences for preschool social behavior through social skills intervention evaluations (including PSC). Peer training and delivery of the frequently identified consequences for social behavior within intervention will provide an evaluation of the

reinforcing efficacy of these consequences. Furthermore, findings across these types of studies may inform further refinement of social deficit assessment and intervention. For example, if preschool social behavior does not increase when contingent peer consequences are applied, it may be useful to consider if this reflects a social performance deficit, and therefore conditioning or pairing with peers is warranted within intervention.

Findings from Chapters 4 and 5 informed an understanding of the modifications required to an intervention designed for typically developing children, to support children with ASD. For future research, it is suggested that such modifications are considered within intervention development as much as possible. For example, presenting skill profiles appeared to influence intervention outcomes within Chapter 5, and a number of suggestions were outlined for future research (e.g., assess prerequisite skills, increase training in responding to problem behavior where this is high at intake etc.). With such considerations during intervention development, it may be feasible to design interventions within which the modifications are described in advance with criteria for their use (e.g., a presenting skill profile of no functional communication, failure to meet criterion on a target skill). Similarly, future research regarding PSC could develop delivery variations within the response-to-intervention (RTI) model framework. The RTI model is a three-tier model in which each tier represents the intensity of intervention required to support best outcomes (Gresham, 2005). As described in Chapter 7, PSC would likely represent a Tier 2 intervention. Variations whereby the social skills were targeted in a preventive manner for all children could be a Tier 1 PSC intervention. The previously described method of identifying maladaptive consequences within social interactions for individual children, and addressing these within PSC could represent a Tier 3 intervention.

Measurement of a number of suggested pre-requisites for success within PSC are included in Chapter 7 (e.g., play skills, language level, and levels of problem behaviour). However, at present the validity and impact of these suggested pre-requisites on success within PSC is unknown as the program has not been piloted. There may also be pre-requisite skills related to peers, for example, tolerating peer proximity or joint attention that are important to consider. Identification of pre-requisite skills for success within PSC, and development of protocols to establish these will be an important consideration in future research and development regarding PSC.

Treatment fidelity. A recurrent consideration within the current research regarded treatment fidelity, given the emphasis on teaching natural behavior change agents to implement teaching strategies. Concerns regarding peer treatment fidelity within PMI, and parent adherence to protocols within parent implemented intervention were outlined in Chapters 3, 4, and 5. Within Chapters 4 and 5, challenges in obtaining treatment fidelity data outside of intervention sessions meant that inferences regarding fidelity at home were made based on in-session performance. However, it was clear that, without evidence of 100% fidelity of implementation within intervention sessions, large improvements in children's skills occurred. Furthermore, social validity ratings were high indicating that parents enjoyed the program and found it manageable with regards to resources and time. In future research, it may be useful to consider what is "good enough" with regards to treatment fidelity, and how to measure this. This is particularly relevant when considering the difficulties inherent in involving natural interaction partners in intervention and teaching across contexts (e.g., scheduling difficulties, resource requirements etc.), and the goal of providing evidence-based, effective support to as many individuals as possible. It may also be useful to identify if progression through an intervention improves treatment fidelity as a function of the positive feedback loop, such that behavior change in the desired direction shapes the natural behavior change agent's teaching, thereby improving treatment fidelity.

There may also be benefits to flexibility with regard to treatment fidelity to be considered with peers. Take, for example, a situation where a peer has been taught to reinforce a child with ASD's social initiations. Implementation of this strategy with 100% treatment fidelity, may not reflect the natural contingencies existing within social interactions, and thus the child's initiations could be exposed to extinction or punishment in other contexts. Intermittent, unpredictable reinforcement fosters resistance to extinction and generalization, and IISCA research has demonstrated the utility of this approach (Gunning et al., 2019; Hanley et al., 2014; Ruppel et al., in press). This also more closely resembles the natural social environment as evidenced in Chapter 6 where ignoring and refusing responses were prevalent. Perhaps, within PMI, a similar schedule could be achieved through relaxing requirements for peer treatment fidelity to a predetermined minimum. However, future research toward this goal must ensure that such a strategy improves rather than disimproves treatment effects.

Generalization. The findings from Chapter 2 have contributed greatly to an understanding of the status of generalization data collection, and the use of generalization

promotion strategies within social skills interventions for children with ASD. The methodology, coding system and analysis outlined in Chapter 2 were developed based on the existing generalization literature (Chandler et al., 1992; Neely et al., 2015; Stokes & Baer, 1977; Stokes & Osnes, 1989). Given the success of this methodology in obtaining the findings outlined, it is recommended that future research employ similar reviews for social skills interventions for other age groups (e.g., school age, adolescents, adults). Given the importance of generalization as an outcome within ABA interventions for any behavior (Baer, Wolf, & Risley, 1968), this review methodology could also be employed across different skill domains (e.g., academic skills, communication etc.) to identify generalization promotion strategies and optimum conditions supporting best outcomes for these targets.

Practice Implications

Importantly, ABA is a research-driven field of practice. As such, within a program of research in ABA such as the current thesis, it is important to consider and outline the findings that can inform practice within ABA and improve socially significant outcomes. Based on a collation of existing literature, and direct observation within preschool classrooms, a comprehensive list of important preschool social skills has been identified in Chapter 6, and could support the development of operational definitions and teaching opportunities for practitioners. Furthermore, the preliminary identification of the most common social skills within this chapter could inform target skill selection or identification of deficits within social skills programs for both individual preschool children with developmental disabilities, and groups of children within ECE settings. The conceptualization of the social deficit types within the indirect measure outlined in Chapter 7 could also assist practitioners in distinguishing between social deficits and identifying existing deficits for those they work with. The suggested intervention strategies to match specific social deficits presented in Chapter 7 could then inform the development of teaching strategies to address these deficits.

In Chapter 2, firstly, the overall success rates identified for the generalization promotion strategies can assure practitioners that incorporating any of these strategies within social skills instruction for a preschool child is likely to support the child to use the skill across settings, individuals, and time. Secondly, the information outlined in Tables 2.2.6 and 2.2.7, can preliminarily inform the matching of evidence based practices, and contextual factors with generalization promotion strategies for practitioners. As outlined, it is also

expected that, pending further research, PSC could be employed by both ABA practitioners and ECE educators as a useful social skills intervention to support social inclusion.

The environmental, antecedent factors posited to influence social behavior within Chapter 6 can be utilised by practitioners and educators to arrange their teaching environment in such a way that promotes and supports social interactions. As outlined, with further research, these findings could be incorporated into ECE educator training, and ECE setting evaluations, thus supporting educators to foster this developmental domain within ECE. With regard to informing educator training, findings from the current research suggest that it may be useful for practitioners to consider not only training educators on how and when to intervene to support social interactions, but also when to "step back" and allow the interaction to unfold. Within parent training, the protocols outlined in Chapters 4 and 5 could be employed by practitioners working with children with similar skill profiles. These findings also highlight the importance of identifying potential maladaptive contingencies that exist within the home context and addressing these within parent training. Throughout the current research, the importance for practitioners of considering naturally occuring MOs, and the practice of identifying evocative situations for target skills for use within teaching programs has been emphasized.

Strengths and Limitations

The current research represents a thorough series of empirical studies developing the evidence base for a comprehensive, contextually relevant, social skills intervention for children with ASD. A particular strength of the current research was the application of recognized research strategies to address novel research questions. While systematic reviews are currently abundant within ABA, and represent the "gold standard" of evidence synthesis (Smith & Iadarola, 2015; Vale et al., 2015), the application of this methodology to a concept such as generalization has been scarce (Osnes & Lieblein, 2003; Swan, Carper, & Kendall, 2016). Furthermore, the utility of the application of FA methodologies to analysing social behavior and developing a social skills intervention represents a novel contribution of this thesis.

This creative approach to research design addressed several existing challenges within the social skills literature as described. Central to the development, design, execution, and interpretation of all findings informing PSC within the current research have been the dimensions of ABA, and suggestions for progression of the field (Baer et al., 1968).

Furthermore, the current research was conducted within a context where access to evidence-based resources for preschool children with additional needs and their families are limited, representing an important extension to bridge the research-practice gap and support access to such resources for all who will benefit from them.

However, a number of limitations of the current research should be addressed. With regards to intervention development for children with additional needs, the majority of the studies in the current research focused exclusively on ASD. As defined previously, the umbrella term "additional needs" can encompass developmental disabilities such as ASD, but also includes experiential diversity, and other challenges. Therefore it could be argued that the findings of the current thesis may not generalise to children with other additional needs. However, within the current research, it was considered appropriate to focus on ASD for two primary reasons. Firstly, social comunication deficits represent a defining characteristic of ASD, thereby suggesting that these children experience some of the greatest challenges with social interactions, and an intervention designed to support their needs is likely to support children with other difficulties in social interactions. Secondly, as outlined, there exists an abundance of research within ABA regarding social skills intervention for children with ASD, which enabled the development of this research based on existing evidence.

The current research was restricted also in that the focus was on peer-directed social skills for analysis and intervention design. As outlined, social competence encompasses a broad range of skills and abilities, including other important areas such as joint attention, social cognition etc., and some of these other domains of social competence may be prerequisites to peer-directed social skills (Gresham, 2015). However, given the vast literature regarding social competence, and the challenges outlined in defining domains of social competence, it was considered important at the outset of the current research, to select and define the type of social skills to be addressed. Peer-directed social skills were selected because they are the skills involved in preschool social interactions, and therefore relevant and important in supporting social development, making friends, and fostering inclusive ECE contexts.

Much of the research included in the current thesis occurred within the applied setting, and involved individuals from the natural environment (Chapters 4-6). Applied research can be associated with multiple challenges, many of which were experienced throughout the current research. Time and resource constraints can reduce access to

participants and settings, increase unpredictability of scheduling, and impact upon measurement of fidelity. The limitations within the current chapters associated with these difficulties have been outlined, however, it was considered necessary to carry out the current research within the applied setting despite these issues, so as to identify real-world facilitators and barriers to success.

Finally, PSC represents the culmination of the findings across the current thesis into the development of an intervention which aims to teach social skills to preschool children through including all members of their social community (i.e., parents, peers, and teachers). The study protocol outlined in Chapter 7 describes a proposed evaluation protocol for PSC, however, this was not completed within the current thesis. The scope, resource, and time requirements of the empirical studies, which informed the development of PSC precluded evaluating the intervention within this thesis. The evaluation of PSC outlined will be necessary to establish the efficacy, feasibility, and acceptability of this intervention.

In designing a pilot study, is important to consider the future research questions to be informed by the pilot results to guide the development and planning of future studies (Moore et al., 2011). Initially, replications of the single subject design outlined in Chapter 7 will be required to establish the evidence base for PSC, and to identify any necessary modifications. With progress in this regard, it will be possible to conduct a randomised, controlled trial initially to establish the efficacy of PSC in comparison to normal education within ECE, and subsequently in comparison to other preschool social skill interventions.

As outlined in Chapter 7, consideration of social validity and feasibility are paramount in developing PSC further. It will also be important to consider the accessibility and a cost-benefit analysis of peer- versus adult-led instruction within future research, as highlighted in Chapter 3. Direct measurement of generalization and maintenance of outcomes, social validity, and collateral changes in social inclusion (e.g., friendships, stigma reduction, sociometrics) should also be included in future evaluations to best support meaningful social inclusion. Furthermore, parent, ECE educator, peer and child feedback and suggestions should be continuously sought and incorporated where possible. It is important also to highlight that, while the current research focused exclusively on preschool children, future research could conduct similar studies to inform the development of a comprehensive, contextually informed, social skills intervention for other age groups.

Conclusion

Over the past half century in ABA, the technology of FA, and function-based intervention for problem behavior has repeatedly demonstrated socially significant improvements for many individuals. Given the centrality of social connection in people's lives, and the commitment of the field of ABA to apply empirical strategies to socially significant issues, it is surprising that the application of FA technology to social competence is only now emerging. If understanding the function of behavior, and the contextual variables influencing it, is critical to achieving socially significant, lasting decreases in behavior, it is likely that achieving meaningful changes in social skills requires similar analysis. The current research has contribute extensively to this area of research.

The current thesis employed a comprehensive, systematic approach to intervention development, establishing the evidence base for intervention components and implementation prior to developing an intervention protocol. PSC is a culmination of the empirical chapters of the thesis, therefore representing an evidence-based, contextually-informed social skills intervention. As outlined, future research will aim to evaluate the PSC protocol. The future research objectives will likely inform progress past many of the difficulties which are repeatedly highlighted within the social skills intervention literature, regarding target skill selection and assessment, generalization, designing interventions of good contextual fit, involving key stakeholders, and demonstrating social and ecological validity.

As the context for the first opportunities for social interaction outside of the home, ECE is central to supporting social inclusion. Teaching social skills in ECE is likely to support success within social interactions and friendship formation, leading to more social learning opportunities, which may foster positive outcomes in terms of social development. Improvements in these areas mitigate existing risk factors, and are associated with positive outcomes in later life. Positive social interactions in ECE are likely to support the development of children who are both socially included by their peers, and inclusive of their peers, regardless of differences or disabilities. Within the increasingly diverse ECE populations around the world, and the context of a world increasingly defined by barriers or "walls", these positive interactions could contribute to a more tolerant, inclusive society.

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Appendices

Appendix A. Information flyer and letter for parents (Chapters 4 & 5)

Would you like to help your child to learn some useful skills for preschool and starting primary school?

IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn

NUI Galway
OÉ Gaillimh

We are looking for parents and 3-6 year old children to take part in a research study.

Our aim is to equip you with teaching skills and tools to support the development of your child's social, communication and school readiness skills.

Taking part will involve:

- Participating in parent education workshops with your child once a week for approximately 8 weeks

Please contact Ciara Gunning at ciara.gunning@nuigalway.ie for more information

Ciara Gunning
School of Psychology,
Arts Millenium Building Extension,
National University of Ireland,
Galway.

28th November 2017

Dear parents/guardians,

My name is Ciara Gunning and I am a PhD researcher in National University of Ireland, Galway. I am carrying out my research under the supervision of Dr. Jennifer Holloway and this research is funded by the Irish Research Council. I have a degree in Psychology and a Masters in Applied Behaviour Analysis as well as experience working with both typically developing children and children with special needs.

I would like to invite you and your child to take part in my research. Within the current study I am going to evaluate a programme for parents which targets the development of key social, communication and school readiness skills and promotes positive behaviour for preschool and Junior Infant children with autism. These skills will be useful for your child in everyday life at home, in school/preschool and in the community. Participation would involve me delivering training with you and your child in your home for approximately 6-8 weeks in November/December 2017. These training workshops will be approximately 1-1.5 hours long and will be arranged once or twice a week to suit you. During these workshops, you will learn how to use this life skills programme and ways to support your child's skill development and promote positive behaviour in fun everyday activities and interactions.

I hope that participating in this research would be of great benefit to you and your child as the skills that you both learn will be useful and transferable across different contexts. Your skill development and your child's skill development will be continuously supported throughout the programme and this programme is a fun way to teach these important skills. I am currently making arrangements for this research so please contact me if you and your child are interested in taking part or if you would like more information at ciara.gunning@nuigalway.ie or (087) 2998767. Please note that places are limited and I will carry out some pre-assessments to determine eligibility and make sure that children will benefit from taking part.

I look forward to hearing from you.

With kind regards,

Ciara Gunning
Phone:
Email:

Appendix B. Child assent form (Chapters 4, 5, & 6)

Child Assent Form
Participant Identification No.: _____

Title of Project: **Evaluating a Parent-Led Implementation of the Preschool Life Skills Programme**

Name of Researcher: Ciara Gunning

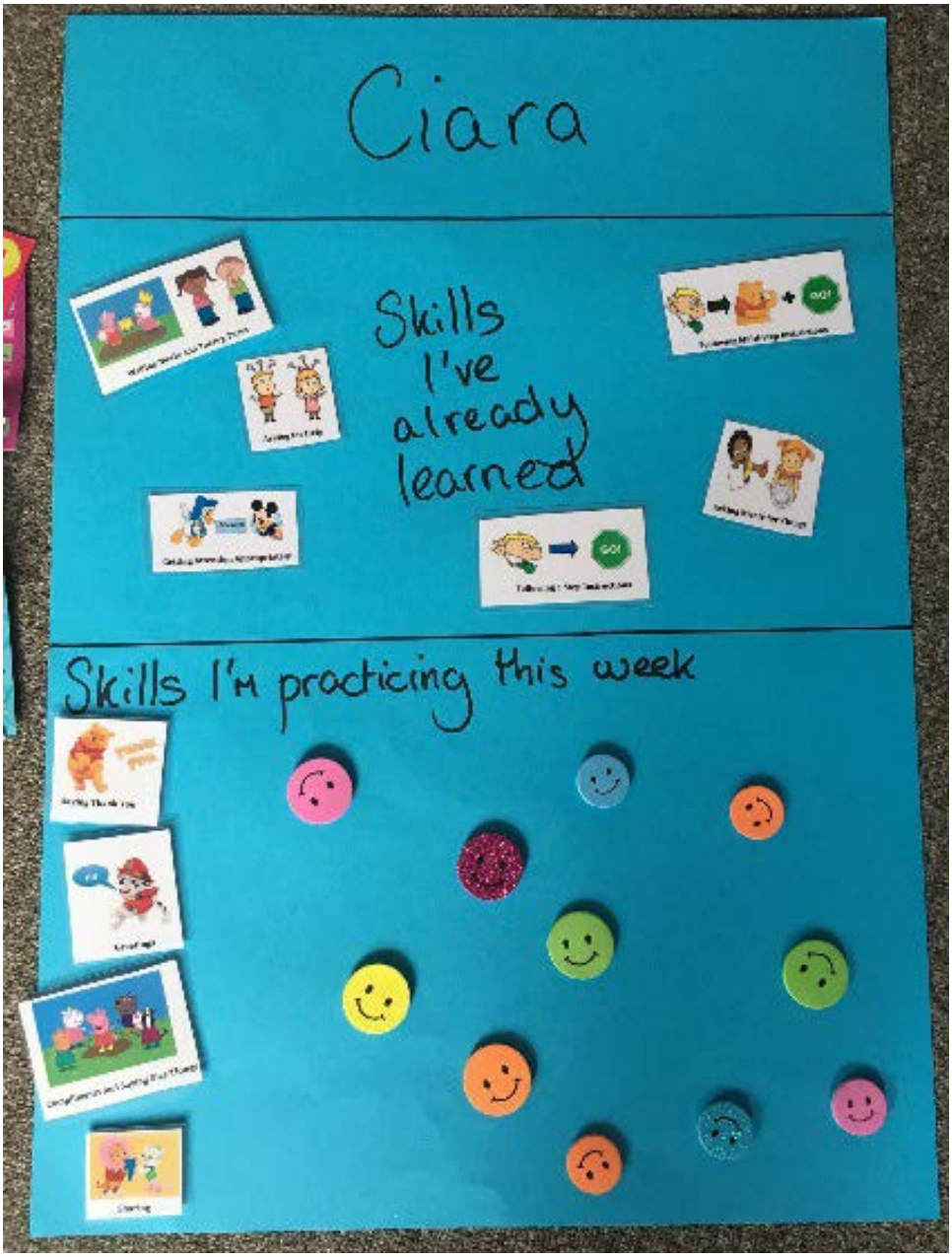
Would you like to do this project?

Appendix C. Prompt sheet for parents (Chapter 4)

Teaching Strategies

Instructions and Rationale	Talk About: How do we do the skill? And why? When might we use this skill?
Modelling	Show them how to do it! (give some right and wrong examples)
Roleplay	Let's practice together!
Feedback  	• Tell them when they get it right (praise) • Have another practice and show them the right way if they get it wrong (show them how to do it, help them along a little bit) **<u>Tip the Scales:</u>** make the correct skills more worthwhile than incorrect skills or problem behaviour
Practice Activities – Setting Up Opportunities	
Unit 1 – Listening	
Unit 2 – Communication	
Unit 3 - Waiting	
Unit 4 – Social Skills	

Appendix D. Progress and Practice tracker (Chapters 4 & 5)



Appendix E. Prompt sheet for parents (Chapter 5)

<table>
<tr><th colspan="2">Teaching Communication Skills</th></tr>
<tr><th colspan="2">What does the skill look like for _____?</th></tr>
<tr><td>Getting Attention</td><td></td></tr>
<tr><td>Asking for Help</td><td></td></tr>
<tr><td>Asking for Things</td><td></td></tr>
<tr><th colspan="2">How do we set up opportunities to practice?</th></tr>
<tr><td colspan="2">Divert your attention/Look away when you know _____ is going to approach you to ask for something or for cuddles etc.
Set up things that _____ cannot complete independently (e.g., tying shoes, getting dressed, opening tightly closed jars/boxes)
Hold something _____ likes or wants or put it somewhere _____ cannot access</td></tr>
<tr><th colspan="2">When could learning opportunities be set up?</th></tr>
<tr><th>Activities</th><th>Skills</th></tr>
<tr><td>Getting ready routines (morning or evening, when there is <u>time</u>)</td><td>Give an instruction like “Find your _____”, “Put on your _____” (for something _____ cannot do independently) [Asking for Help]
Put items required for these routines out of sight or in your hand (e.g., toothpaste, socks) so he has to ask you for them [Asking for Things]
Within each of these activities, divert your attention every so often so that _____ has to get your attention before asking you [Getting Attention]</td></tr>
<tr><td>Going places</td><td>Leave doors (e.g., car door, front door) locked until _____ asks you to open them
If it suits to buy something (e.g., a treat day), let _____ ask you for something in the shop that he likes (e.g., food, toy, book)</td></tr>
</table>

	• When getting ready for activities (e.g., swimming, sports etc.) wait for _____ to ask for help
Food/Meals	• Wait for ____ to ask for the snack/food/drink he wants (give a model if needed) • Give _____ the snack/bottle sealed so that he needs help to open them • Divert your attention every so often so that _____ has to get your attention before asking you for food/drink or to open something
Other?	

Things to Remember

Supporting _____ to Use his Words

- When you recognise that _____ wants or needs something, wait a few seconds to give him an opportunity to ask for it
- If he doesn't ask, show him how to by saying the word for him to repeat (e.g., "is it stuck? Say help me")
- Use simple language
- Minimize distractions

Responding to Asking and Not Asking

Tipping the Scales

Making asking more worthwhile than not asking, grabbing or crying/shouting.

✓	X
Asking = Gets What he is Looking For or Needs • Immediately give ____ your attention/ the thing he has asked for/ help with the problem he needs help with • Also give lots of praise/hugs and tickles and describe what he did ("Well done, you asked nicely!")	**Not Asking (giving up) or Asking Inappropriately (scream, cry, grab) = Does Not Get What he is Looking For or Needs** • Don't give your attention/ the thing wants/ help with the problem until he has asked using his words • If he does not ask first time round, say what he needs to say (e.g., "Help me", "Water") and wait for him to repeat this, then give him what he is asking for

Appendix F. Information flyer and letter for parents (Chapter 6)

28th May 2018

Dear parents/guardians,

My name is Ciara Gunning and I am a PhD researcher in National University of Ireland, Galway. I am hoping to attend _____ to carry out some research in the coming weeks.

I am carrying out my PhD under the supervision of Dr. Jennifer Holloway and with funding from the Irish Research Council. My background is in Psychology and I have a Masters in Applied Behaviour Analysis as well as experience working with both typically developing children and children with special needs at preschool stage. My research is aiming to develop supports for social inclusion in preschool, to help each child to access all of the learning opportunities and friendships that develop at this stage.

The research study I am currently hoping to carry out in _____ aims to explore how friendships develop for preschool children and how preschool children play and interact with one another. This study will include children of all skill levels and abilities, including any children with additional needs. Taking part would involve me carrying out video-recorded observations and audio-recorded interviews with children in _____. I would attend _____ for approximately a week during June 2018 and video-record 15 minute segments of everyday activities. There will be no interruption to the children's normal daily activities and schedule. If you are happy for me to, I will also interview the children about friendships and making friends in preschool. These interviews would occur in _____ during preschool and last about 5-10 minutes.

Any recordings made in this research will be kept strictly confidential and will only be viewed by myself, my supervisor and Garda vetted research assistants and will be destroyed after we have watched them. When we watch the videos we will be looking at the children's social interactions and their play skills. If you like, based on the video observations, I can make recommendations for social skills the children can work on and fun ways to teach these skills at home and in preschool.

There is no obligation for your child to take part. If you are happy for them to be involved I will ask them if they want to take part before we begin and I will ask you for some general information about your child (e.g., age, any diagnoses or additional needs, number of siblings). I have attached 2 forms overleaf (Form A and Form B). If you are happy for your child to take part in this research please complete Form A. If you would prefer that your child did not take part in this research please complete Form B. Please return these forms to _____ by 11th June 2018.

If you have any questions at all or would like more information please contact me at _____ or _____ and I will be happy to discuss these with you.

I look forward to hearing from you.

With kind regards,

Ciara Gunning

FORM A (Consent Form)

PLEASE COMPLETE THIS FORM <u>IF YOU ARE HAPPY FOR YOUR CHILD TO TAKE PART</u> IN THIS RESEARCH STUDY

ID No: _____(for completion by researcher)
Title of Project: Investigating Preschool Social Interactions and Friendships
Name of Researcher: Ciara Gunning

Please mark each box and sign below.

1. I confirm that I have read the information provided for the above study and have had the opportunity to ask questions. ☐

2. I am satisfied that I understand the information provided and have had enough time to consider the information. ☐

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

4. I agree for my child to take part in the above study and to participate in video-recorded observations in _____. ☐

5. I understand that any video/audio data created will be completely confidential and only be used for the purpose of this research and will be destroyed after use. ☐

Optional **Optional** ☐
I agree for my child to take part in an audio-recorded interview about making friends and friendships in preschool.

_____ _____ _____
Parent Name Date Signature

Parent Contact Information:
Phone: _____ and/or Email: _____

_____ _____
Researcher Signature Date

FORM B

PLEASE COMPLETE THIS FORM <u>IF YOU WOULD PREFER FOR YOUR CHILD NOT TO BE INVOLVED</u> IN THIS RESEARCH STUDY

Title of Project: Investigating Preschool Social Interactions and Friendships

Name of Researcher: Ciara Gunning

Please not that given the nature of the preschool setting, with children engaging in activities together, working and playing together and moving around, footage of your child may be recorded incidentally. When we watch the videos, we will not record data about your child and I will not interview your child during the research.

Please mark each box and sign below.

1. I confirm that I have been informed of the above research taking place in _____ and have had the opportunity to ask questions about this research. I am satisfied that I understand the information provided and have had enough time to consider the information. ☐

2. I understand that my child will not be directly interviewed or recorded by the researchers and that any incidental footage of my child will not be included in the research. ☐

3. I understand that any video/audio footage created will only be used for the purpose of this research and will be destroyed after use. ☐

_____ _____ _____

Parent Name Date Signature

Parent Contact Information (optional, if you would like to receive further information about the research):

Phone: _____ and/or Email: _____

_____ _____

Researcher Signature

Appendix G. Preschool Social Circles indirect skill measure (Chapter 7)

Preschool Social Circles Indirect Measure
Child: Respondent (relationship to child): Date:
Read each situation outlined and consider what your child is **most likely** to do in that situation. *Please tick the option that best represents what your child is **most likely** to do.*
Social Initiations
Requesting from a Peer *Uses their words or a gesture to appropriately ask for what they want (e.g., Will you play with me? Can I have that?)*
If a peer has a toy that my child wants, or my child wants a peer to do something, my child is most likely to… ■ Ask the peer appropriately (using words or a gesture) ☐ ■ Take what they want without asking/give up because they don't know how to ask the peer for what they want ☐ ■ Take what they want without asking/give up because they don't want to ask ☐
Commenting, Niceties & Compliments *Makes comments to peers to get their attention (e.g., look at this car), uses manners toward peers, and gives compliments*
If my child wants a peer's attention or to engage with a peer, my child is most likely to… ■ Make a relevant comment about something in the environment, be polite and compliment a peer ☐ ■ Not say much because they're not sure know how to make a relevant comment, use manners, or give compliments ☐ ■ Not say much because they don't want to ☐
Organising Play and Turn Taking *Uses their words or gestures to try to organise or direct a play activity and coordinate turns (e.g., pointing to the person whose turn it is, deciding who will play the mummy in a game of house)*
If my child has an idea about how the game should be played, who should do what, and whose turn it is, they are most likely to… ■ Use their words or a gesture to tell their peers the idea or what they need to do ☐ ■ Have an idea but not tell their peers because they're not sure how to ☐ ■ Not want to give ideas or organise the activity ☐
Social Responses
Acknowledging, giving Compliments and Niceties *Responds to peer's attempts to communicate or engage with them (e.g., looking when a peer says "look!", seeing a peer's art and saying "that's cool")*
If a peer tries to engage with my child by calling their name, showing or telling them something, my child is most likely to… ■ Acknowledge the peer either by looking at them, saying something or giving a compliment ☐ ■ Not do anything because they're not sure how to respond ☐ ■ Not respond or acknowledge the peer because they're not interested ☐
Passive Responding

Tolerates peer's initiating or joining the activity they are at
Note: A lot of preschool children have difficulty sharing toys or activities that they really like with peers so in considering this situation, think of an activity that your child likes to engage in but also doesn't mind sharing

If my child is engaged in an activity and a peer joins them, my child is most likely to…

- Allow the child to join the activity, continue to engage in the activity and stay in proximity to the peer for approx. 30 seconds ☐
- Leave the activity or engage in problem behavior (e.g., push the peer away, take all the toys) because they're not sure how to engage with the peer ☐
- Leave the activity or engage in problem behavior (e.g., push the peer away, take all the toys) because they don't want to engage with the peer ☐

Appropriately Ignoring and Not Complying
Calmly ignores a peer's initiation or instruction

If a peer approaches my child or asks them to do something, and my child doesn't want to, my child is most likely to…

- Not respond/Do nothing ☐
- Respond to the peer or follow the instruction because they don't know how to refuse ☐
- Respond to the peer or follow the instruction because they don't want to refuse ☐

Answering, Clarifying, & Organising Play
Appropriately answers a peer with an instruction or more information.

If my child and a peer are engaged in an activity and the peer asks my child a question (e.g., where's the t-rex?), my child is most likely to…

- Give the peer the answer or more information ☐
- Say nothing or say something irrelevant because they're not sure how to answer ☐
- Say nothing because they don't want to respond ☐

Agreeing and Confirming
Responds to a peer by agreeing (e.g., saying "yeah, let's do that", nodding)

If a peer makes a suggestion to my child that they agree with, my child is most likely to…

- Affirmatively acknowledge the peer by, for example, saying "yes"/nodding/joining the activity ☐
- Do nothing because they're not sure how to agree with the peer ☐
- Do nothing because they don't want to agree with the peer or are not interested ☐

Disagreeing and Refusing Appropriately
Actively rejects a peer initiation or suggestion by saying "no"/walking away etc.
Note. This does not include any problem behavior e.g., shouting, pushing.

If a peer approaches my child with an idea or initiation that my child is not interested in or doesn't want, my child is most likely to…

- Appropriately reject the peer's initiation, for example, saying "no thanks" or leaving the activity ☐
- Go along with the suggestion/initiation because they don't know how to refuse/disagree ☐
- Go along with the suggestion/initiation because they don't want to refuse the peer/disagree with them ☐

Appendix H. Preschool Social Circles sample parent information summary (Chapter 7)

<table>
<tr><th colspan="2">Teaching Requesting from Peers</th></tr>
<tr><th colspan="2">What does the skill look like for [child's name]?</th></tr>
<tr><td colspan="2">When he/she wants something from a peer, or wants to get their attention, he/she uses:
1. An appropriate verbal behavior (e.g., saying "Can I have that?")
or
2. An appropriate gestural behavior (e.g., pointing to a toy near the peer)</td></tr>
<tr><th colspan="2">How do we set up opportunities to practice?</th></tr>
<tr><td colspan="2">• When?
It can be best to practice these skills at times when your child has not had much interaction with peers in the previous hour or so. For example, a morning at the weekend may be better than directly after preschool.
• Where?
This skill can be practiced anywhere your child engages with other children their age.
• With whom?
Any peers around the same age as your child. This may include siblings, cousins, neighbours, children of your friends etc.</td></tr>
<tr><th colspan="2">When could learning opportunities be set up?</th></tr>
<tr><th>Activities</th><th>How to Set Up Practice Opportunities</th></tr>
<tr><td>Getting ready routines (morning or evening, when there is <u>time</u>)</td><td>• Have a peer nearby to be asked to help with something [child's name] can't do but the peer can (e.g., tie their shoes)
• Give each child one necessary item for a task (e.g., the hairbrush, hair ties, clips etc.) so that they have to ask each other for what they need</td></tr>
<tr><td>In play/fun activities</td><td>• Give each child some of the required materials but not everything they need to encourage asking one another (e.g., one child has the paint pots, one has the brushes, one has the aprons)
• In an activity where they are following instructions (e.g., baking) whisper the instruction to [child's name] and ask them to tell the peer what to do
• Prompt [child's name] to show something to the peer so that they need to get the peer's</td></tr>
</table>

	attention and ask them to come look (e.g., show him your room)
Food/Meals	• Give each child one necessary item for a meal (e.g., for breakfast: the spoons, the bowls, the cereal etc.) so that they have to ask each other for what they need • Give the peer the snack that [child's name] likes so that he can ask them for it

Things to Remember

- In situations with peers, when you recognise that [child's name] wants or needs something, wait a few seconds to give them an opportunity to ask for it
- If [child's name] doesn't ask, show or tell them what to do (e.g., "Do you need a spoon? Your sister has the spoons, ask her" or "Say – Can I have a spoon?")
- Use simple language
- Minimize distractions

Making Asking Peers for Things Worthwhile

Remember: Asking a peer for something is tricky, so we want [child's name] to usually get what they want or need from a peer every time at first, and to always be praised for asking

Practice Tracker

Tick a box each time your child practices the skill

Appendix I. Preschool Social Circles social validity and feasibility measure

(Chapter 7)

Participant Number:	
Please rate each statement from 1 – 7 by circling the number that represents how much you agree with the statement.	**1 = Strongly disagree** **2 = Disagree** **3 = Disagree somewhat** **4 = No opinion** **5 = Agree somewhat** **6 = Agree** **7 = Strongly agree**
I enjoyed taking part in this research.	**1 2 3 4 5 6 7**
I think my child/the children enjoyed taking part in this research.	**1 2 3 4 5 6 7**
I feel that I received sufficient training on the Preschool Social Circles programme.*	**1 2 3 4 5 6 7**
I found the training sessions useful and the Preschool Social Circles strategies easy to follow and use.*	**1 2 3 4 5 6 7**
I feel that I learned some useful strategies for teaching my child/children new skills.	**1 2 3 4 5 6 7**
I will be able to apply the skills and strategies I have learned during Preschool Social Circles to teach different skills and to teach my other children (if applicable)/other children that I work with in the future.	**1 2 3 4 5 6 7**
I think my child's/the children's skills improved following Preschool Social Circles.	**1 2 3 4 5 6 7**
	1 2 3 4 5 6 7

I noticed positive differences in my child's/the children's behaviour during this research.	
I think these skills will be useful life skills for my child/the children.	**1 2 3 4 5 6 7**
I would recommend for other children and parents/educators to experience Preschool Social Circles.	**1 2 3 4 5 6 7**
Please describe any differences that you noticed in your child's/the children's skills and/or behaviour during Preschool Social Circles.	
As you are aware, this research was an initial study to test the effectiveness of Preschool Social Circles, as well as to find out what parents and ECE educators thought of the program. **We are very grateful to you for taking part, and would really appreciate any additional comments or feedback you would like to provide here. In particular, if you have any suggestions about how Preschool Social Circles could be improved, please outline these below.** **(e.g., Was the program long/short enough? Were the time requirements manageable? Are there any additional supports that you feel would have been useful? Are there any other skills you think would be important to target for children this age? Is there anything you would change about how Preschool Social Circles was organised and run?)**	

*These statements will only be rated by ECE educators