

PEER-MEDIATED PIVOTAL RESPONSE TREATMENT FOR SCHOOL-AGED
CHILDREN WITH AUTISM SPECTRUM DISORDERS

by

Ainsley Meaghan Boudreau

Submitted in partial fulfilment of the requirements
for the degree of Doctor of Philosophy

at

Dalhousie University
Halifax, Nova Scotia
October 2015

© Copyright by Ainsley Meaghan Boudreau, 2015

TABLE OF CONTENTS

LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	viii
LIST OF ABBREVIATIONS AND SYMBOLS USED	ix
ACKNOWLEDGEMENTS	x
CHAPTER 1. INTRODUCTION	1
Social Skills Interventions for Children with ASD at School.....	2
Implementation Science as a Guide to Address the Research-Practice Gap	6
The Dissertation, in Brief.....	7
Peer-Mediated Pivotal Response Treatment.....	8
Aims of the Present Dissertation.....	10
CHAPTER 2. STUDY 1: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS: A SYSTEMATIC REVIEW	12
Abstract	13
Introduction.....	14
Study Aims	18
Method	19
Search Procedures	19
Level-of-Evidence Rating.....	20
Inter-Rater Reliability	20
Results.....	21
Literature Synthesis	22
Level of Evidence-Based Practice	25
Discussion.....	25

Limitations of Current Review Framework for Evaluating PMI	27
Limitations	28
Areas for Future Research	28
Conclusion	30
CHAPTER 3. STUDY 2: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT FOR CHILDREN WITH AUTISM SPECTRUM DISORDER: PROVIDER PERSPECTIVES ON ACCEPTABILITY, FEASIBILITY AND FIT AT SCHOOL.....	34
Abstract.....	35
Introduction.....	36
Study Aims and Research Questions	39
Method	40
Intervention.....	40
Participants.....	40
Data Collection	41
Procedure	42
Data Analysis	42
Results.....	43
Discussion.....	53
Importance of Intervention Target	53
Benefits to the Use of PRT at School	54
Barriers to the Use of PRT at School.....	54
Perceptions of the Concept of Peers as Intervention Agent.....	55
Using Educator Feedback to Inform Adaptations of Peer-Mediated PRT for School Use	56
Research Directions	56
Conclusions.....	57
CHAPTER 4. STUDY 3: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT AT SCHOOL FOR CHILDREN WITH AUTISM SPECTRUM DISORDER	59
Abstract.....	60

Introduction.....	61
Method.....	64
Participants.....	64
Study Design.....	65
Peer Education Procedures, Settings and Materials.....	65
Outcome Measures.....	67
Data Collection Procedures.....	71
Results.....	72
Outcomes (Children with ASD).....	72
Outcomes (TD Peers).....	78
Discussion.....	80
Limitations.....	85
Conclusion.....	87
CHAPTER 5. GENERAL DISCUSSION.....	96
Summary of Findings.....	96
Study 1: Peer-Mediated Pivotal Response Treatment for Young Children with Autism Spectrum Disorders: A Systematic Review.....	96
Study 2: Peer-Mediated Pivotal Response Treatment for Children with Autism Spectrum Disorder: Provider Perspectives on Acceptability, Feasibility and Fit At School.....	97
Study 3: Peer-Mediated Pivotal Response Treatment at School for Children with Autism Spectrum Disorder.....	99
Integration of Study Findings.....	100
Implications, Limitations, and Directions for Future Research.....	102
Theoretical Implication.....	102
Clinical/Educational Implications.....	108
Limitations.....	113
Directions for Future Research.....	117

Conclusion	120
REFERENCES	121
APPENDIX A.....	146
APPENDIX B.....	149
APPENDIX C.....	151
APPENDIX D.....	153

LIST OF TABLES

Table 2.1 Summary and Ratings of the Reviewed Studies 32

Table 2.2 Summary of Intervention Characteristics 33

Table 3.1 Participant Demographic Information 58

Table 4.1 Characteristics of Participants with ASD at Baseline..... 88

Table 4.2 Percentage of Peer Engagement and Rates of Social Initiations by
Participants with ASD with TD Peers 89

Table 4.3 Teachers' and Parents' Ratings of Social Skills for Participants with
ASD (Social Skills Improvement System Rating Scales) and Problem
Behavior (Child Behavior Checklist Parent Total Behavior T-Scores)..... 90

Table 4.4 Teachers' and Parents' Ratings of Peer Coaches' Social Skills (Standard Scores
on the Social Skills Improvement Rating System) and Parenting
Ratings of Problem Behavior (Child Behavior Checklist Total Behavior T-
Scores) Percentage of TD 91

Table 4.5 Percentage of TD Peer Coaches' Independent Implementation of PRT and
Associated Social-Communication Skills 92

Table 4.6 Global Outcomes for Children with ASD After Intervention..... 93

LIST OF FIGURES

Figure 4.1 Percentage engagement: Children with ASD and typical peers.....	94
Figure 4.2 Rates of initiations children with ASD made to typical peers.....	95

ABSTRACT

Despite dramatic progress in behavioral treatment of preschoolers with autism spectrum disorder (ASD), the gap in effective intervention models for children once they transition to school is striking. This dissertation examined an adaptation of the most common Pivotal Response Treatment (PRT) model (parent delivery) in which typically developing (TD) peers are taught to coach classmates with ASD. Specifically, peer coaches were taught to facilitate the social skills of children with ASD in natural settings (at school). This research had three aims, to: (1) systematically review evidence of the efficacy of peer-mediated PRT (PM-PRT) to increase social-communication skills for school-aged children with ASD (Study 1), (2) evaluate the acceptability and feasibility of PM-PRT for school use for young children with ASD, using content analysis of stakeholder interviews (Study 2), and (3) evaluate the efficacy of PM-PRT for children with ASD in their first year of school, targeting social engagement and initiations, using a case series of four single-subject design studies (Study 3). Study 1 results revealed that whereas most PM-PRT studies observed positive outcomes, the existing research base did not meet criteria for classification as promising or established EBP. In Study 2, stakeholders (educators and early intervention providers) had some knowledge of PRT, found the peer-mediated approach to be acceptable and feasible, but expressed several potential challenges with respect to TD peers as intervention agents. In Study 3, TD peers implemented PRT techniques with fidelity. Relatively brief training in PRT for peer coaches produced immediate and short-term (6 to 9 weeks following training) sustained increases in social-communication skills of children with ASD when playing with trained coaches, as well as with untrained TD classmates. Taken together, the three studies contribute to the evidence base of a promising school-based social skills intervention for children with ASD. This work advances the PM-PRT evidence base to the ‘promising EBP’ designation, promoting its use with the aim of stimulating additional research. This dissertation also highlights the relevance of research-education partnerships in the successful implementation of EBPs in school settings.

LIST OF ABBREVIATIONS AND SYMBOLS USED

ABA	Applied Behavior Analysis
ADI-R	Autism Diagnostic Interview-Revised
ADOS	Autism Diagnostic Observation Schedule
AIDS	Acquired Immune Deficiency Syndrome
APA	American Psychiatric Association
ASD	Autism Spectrum Disorder
ASK-R	Acceptance Scale for Kindergarten-Revised
CBCL	Child Behavior Checklist
CDC	Centers for Disease Control and Prevention
CIHR	Canadian Institutes of Health Research
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
DTT	Discrete Trial Training
EB	Evidence-Based
EBI	Evidence-Based Intervention(s)
EBP	Evidence-Based Practice(s)
EIBI	Early Intensive Behavioral Intervention
EIP	Early Intervention Providers
EPA	Educational Program Assistants
HIV	Human Immunodeficiency Virus
IEP	Individualized Education Programs
IKT	Integrated Knowledge Translation
IRR	Inter-Rater Reliability
IQ	Intelligence Quotient
KT	Knowledge Translation
<i>M</i>	Mean
NAC	National Autism Centre
NS	Nova Scotia
<i>N</i>	Total sample size
<i>n</i>	Subsample size
PDD-NOS	Pervasive Developmental Disorder - Not Otherwise Specified
PEM	Percentage of Data Points Exceeding the Median of Baseline Phase
PM-PRT	Peer-Implemented Pivotal Response Treatment
PMI	Peer-Mediated Intervention
PND	Percentage of Non-Overlapping Data
PRT	Pivotal Response Treatment
REP	Replicating Effective Programs
RCT	Randomized Control Trial
<i>SD</i>	Standard deviation
SSIS-RS	Social Skills Improvement System Rating Scales
STAR	Strategies for Teaching based on Autism Research
TD	Typically Developing
US	United States

ACKNOWLEDGEMENTS

I extend gratitude to my mentor, Dr. Isabel Smith. Isabel, you are the highest exemplar of a scientist practitioner. I continue to be impressed by the breadth and depth of knowledge, your high ethical standard, and mentorship of all those around you. You model a humble and impactful leadership style. Moreover, you demonstrate an important balance between nurturing individuals' personal and academic growth. Your career inspires me to strive for my goals, no matter how large, and at any stage of life. My doctoral training was greatly enhanced owing to your guidance.

I would also like to acknowledge my dissertation committee members, Drs. Christine Chambers and Penny Corkum. I am fortunate to have guidance from a committee of powerful female academics in pediatric psychology. I have greatly benefitted from your research expertise. You inspire me to think critically about research and clinical decisions in order to improve health outcomes for children. To my external examiner, Dr. Joseph Lucyshyn, thank you for taking the time to participate in an important moment in my academic career. I valued the opportunity to learn from you from a methodological and epistemological perspective.

Thank you to the Halifax Regional School Board, including the ASD team for believing in this project and partnering to pilot a novel intervention method. I would like to express my sincerest gratitude to the participating families, children, schools and the NS EIBI program staff. To Susan Bryson, thank you for hiring me, alongside Dr. Smith, to work at IWK's Autism Research Centre prior to returning to graduate school; you fostered an excitement about ASD research that still continues today. I also acknowledge the team of volunteers, staff and students who enthusiastically supported many aspects of

this project including Madison Acker, Erin Dempsey, Lindsay Fleming, Lucy Frederico, Kathryne Hoagland, Craig Isnor, Michelle Kerr, Katelyn Meko, Nicole Robinson, and Gil Ungar. The absence of windows in the lab couldn't dampen the sunny disposition among lab members. I would also like to thank Terry McCormick and Vickie Armstrong for your continued support throughout my time at the ARC. I consider all of you dear friends.

Thank you to the student body in the Psychology and Neuroscience department at Dalhousie. It was a great relief to find supportive colleagues that eased the many ups and downs of graduate life. A special thanks to Melissa Stewart and Katelyn Boerner for lightening up any moment. I am also grateful to Katie Birnie, Jennifer Richards, Jeff McLeod, Marie Eve-Couture, and Therese Chevalier for 'adopting' me into their class.

To Lara and Bridget, for being life-long friends, and supporting my seemingly life-long student career. To Daphne Lordly and Alex Mielnik, thank you for supporting James and me from small beginnings and nurturing our collective and individual strengths. Daphne, thank you for showing me that persistence pays off in the pursuit of a PhD. To my mother and father, Warna and George Boudreau, you have been my greatest cheerleaders throughout life, and now. Despite writing many pages in this dissertation, I find it difficult to find the words to express the depth of appreciation, love and gratitude I have for you. You made parenting and fostering optimal child development look easy. To my husband, James, thank you for your unwavering partnership in this process and for seeing my greatness even when I can't see it myself. You inspire me to think outside the box and live an extraordinary life.

CHAPTER 1. INTRODUCTION

There is a pressing need for evidence-based interventions targeting social skills for children with ASD at school. Social impairment is the core characteristic of children with ASD (Rutter, 2005; American Psychiatric Association, 2013) and the number of students with ASD included in the regular classroom is increasing (DiSalvo & Oswald, 2002; Koegel et al., 2012b; Watkins et al., 2015). Early elementary school experiences shape the later social development of children with ASD (Bal et al., 2014) which persists throughout the lifespan (Locke et al. 2010; Orsmond, Krauss, & Seltzer, 2004; Whalen, Conroy, Martinez, & Werch, 2015). It is thus surprising that few evidence-based interventions targeting social skills for children with ASD exist at school. While early intensive behavioral intervention (EIBI) for children with ASD has amassed impressive empirical support (National Autism Centre, 2015), comparable research examining evidence-based interventions for school-aged children is lacking (Hess et al., 2008). Tellingly, the National Autism Centre's standards report for evidence-based practice (EBP) in ASD identified the examination of treatments studied in real-world settings as a priority area for future research (National Autism Centre, 2009, 2015). The present dissertation aims to address this gap. A promising model of school-based social skills intervention for children with ASD (peer-implemented Pivotal Response Treatment, PRT; Pierce & Schreibman, 1995) was examined (Boudreau, Corkum, Meko, & Smith, 2015b). The present introductory chapter outlines relevant background information and provides justification for the current dissertation research.

Social Skills Interventions for Children with ASD at School

Full inclusion at school is considered current best practice for children with disabilities of all kinds, including children with ASD (Hardman, Drew, & Egan, 2008). Inclusion models require students with ASD to receive services and supports appropriate to their individual needs in the general education classroom (Hardman, Drew, & Egan, 2008; Mastropieri & Scruggs, 2010). Although inclusion is based on the premise that children with special needs such as ASD will have opportunities to learn from and benefit from interactions with their peers, there is little empirical support for this claim (Ferraioli & Harris, 2011). When inclusion supports are put in place, there is usually a focus on academic goals, often to the exclusion of social skill goals, despite their cardinal value to children with ASD. Without intervention, the social trajectories of children with ASD lag behind those of their typically developing (TD) classmates (Bal et al., 2014). Most evidence suggests that children with ASD need targeted interventions to succeed socially in inclusive classrooms (Ferraioli & Harris, 2011).

Since few known etiologies of ASD exist (Schaefer & Mendelsohn, 2013) intervention efforts have been aimed at ameliorating associated symptoms. Thus, the goal of many social skills intervention programs is to help children with ASD achieve a more typical developmental trajectory (Bellini, Peters, Benner, & Hopf, 2007). By intervening early, it is presumed that the maladaptive patterns of social functioning become less entrenched and closer to that of a TD child (Cecil, 2004). Social skills interventions for children with ASD have a wide range of theoretical orientations and intervention targets. Interventions based on applied behavior analysis (ABA) are among the most frequently used types of social skills intervention (Reichow et al., 2010). ABA is an umbrella term

for the science of applying learning theory and principles of operant conditioning to human problems and has a long history of research in the ASD intervention field (Wolf, Risley, & Mees, 1964; Lovaas, 1987). Video modeling approaches (e.g., child or adult models social skills on video), based on observational learning/social learning theory (Bandura, 1977; 1997), have also gained popularity in the literature (for a review, see Bellini & Akullian, 2007). Social skills intervention targets also vary; some interventions target social skills directly, whereas others target over-arching skills such as communication, in addition to specific social skills (Reichow & Volkmar, 2010).

Until recently (e.g., Stahmer, Suhrheinrich, Reed, & Schreibman, 2012; Reichow & Volkmar, 2010), few researchers had studied social skills intervention at school (Bellini et al., 2007). This is surprising given the pressing and persistent nature of social impairments in children with ASD. Earlier social skills intervention studies conducted with school-aged children with ASD were primarily in lab settings. The relative lack of effectiveness studies conducted in real-world settings is often referred to as the ‘research-to-practice gap’ in evidence-based interventions (EBI) for children with ASD at school (Reichow et al., 2008). This gap is frustrating to researchers and educators alike (Stahmer et al., 2012). Educators feel that researchers do not consider the complexity of implementing interventions in real-world environments with children who display the range of presentations of ASD, but instead focus on interventions designed and tested in controlled settings with more homogenous samples (Stahmer, Collings, & Palinka, 2005; Iadarola et al., 2014).

Several reasons have been posited for this research-to-practice gap for children with ASD at school. The first reason for the research-to-practice gap may be that the

current model of clinical outcomes research has impeded the dissemination of evidence-based practices (Dingfelder & Mandell, 2011; Glasgow et al., 2003; Weisz et al., 2004). For example, the assumption that studies carefully designed and implemented in lab settings with homogenous groups of participants (efficacy trials) will be effectively translated to community settings is not warranted (Dingfelder & Mandell, 2011; Lord et al., 2005). Rather, there is reportedly a 20-year lag between the development of evidence-based treatments and their integration into routine community practice (Walker, 2004). Weisz and colleagues (2004) advocated for a new model of clinical outcomes research in which researchers attend to the community settings in which the service will be delivered from the outset of research design. Recently, Wood et al. (2015) advocated for flexible and integrative implementation of EBP in schools for children with ASD.

A second possible reason for the research-to-practice gap for children with ASD at school is a resounding lack of social validity research examining ASD intervention approaches (Callahan et al., 2008, 2015). Social validity has been defined as a construct encompassing the acceptability of the intervention target and procedures of interventions (Callahan et al., 2008; Kazdin, 1977; Wolf, 1978). Proctor et al. (2011) further refined the definition to include the ‘appropriateness’ of the intervention and the perceived fit, compatibility, or relevance of an EBP given the specific setting or consumer. Social validity is highly correlated with the effective use of interventions in clinics, schools, and homes (Gresham, Cook, Crews, & Kern, 2004).

A lack of researcher-education partnerships is also contributing to the gap in evidence-based practices for children with ASD at school. Ideally partnerships should be sought at outset of research design. This allows researchers to address questions that are

relevant to stakeholders, obtain buy-in, collaborate to design more ecologically valid interventions from the outset, and tailor dissemination efforts (Dingfelder & Mandell, 2011; Stahmer et al., 2012).

Finally, the challenging context of school for research likely contributes to the research-to-practice gap for children with ASD. It is difficult to meet the heterogeneous needs of youth with ASD in a cost-effective manner in the educational environment. Teachers do not often have the time or training to identify the unique learning and social skill characteristics of children with ASD or implement EBP for children with ASD (Ferraioli & Harris, 2011; Simpson, de Boer-Ott, & Smith-Myles, 2003). Challenging but important pragmatic considerations affect those who conduct research at school (e.g., consent for video-recording children's behaviour on the playground, negotiating how to incorporate research into the curriculum, scheduling around school events, and unexpected absences). There are also some unique methodological constraints for school-based researchers, such as school board policies on social research tools such as peer nomination procedures, and ethical considerations for randomized control trials (Kasari, Rothermam-Fuller, Locke, & Gulsrud, 2012).

Despite the challenges of implementing school-based social skills intervention research for children with ASD, school is also an ecologically valid social skills intervention opportunity. Few intervention settings can offer children such abundant social opportunities as school. Moreover, the majority of a child's day is spent at school. Since children with ASD have difficulty generalizing learning to new people and contexts (Ferster & DeMyer, 1961; Hume, Loftin, & Lantz, 2009; Koegel et al., 2001; Lovaas, 1987), a pragmatic solution is to incorporate social skills interventions at school with

their peers. Peers offer ideal social skills models. When peers are incorporated into social skills interventions for children with ASD, motivation, learning, and generalization of skills are further enhanced (Chan et al., 2009). Given the promise and need for social skills interventions at school it is imperative that we examine research models to bridge this gap.

Implementation Science as a Guide to Address the Research-to-Practice Gap

Implementation science is a burgeoning field that involves active collaboration between researchers and community stakeholders (Bammer, 2005; Proctor et al., 2009). It offers a systematic, research-based approach to better understanding why EBPs may or may not be favorably adopted, including stakeholders' perceptions of barriers and strengths (Damschroder, Aron, Keith, Alexander, & Lowery, 2009; Powell, Proctor, & Glass, 2014). Implementation science has been identified as a priority research area in Canada (Barwick, Phipps, Johnny, Myers, & Coriandoli, 2014; Tomm-Bonde et al., 2013) and by the United States National Institutes of Health (NIH; 2013). A related term, knowledge translation (KT), has gained prominence in the Canadian research community (Graham et al., 2006; Lomas, 1993, McGrath, Lingley-Pottie, Emberly, Thurston, & McLean, 2009). The Canadian Institutes of Health Research (CIHR) describes KT in two ways as: 1) end of grant KT and 2) integrated KT. End of grant KT involves activities that make knowledge users (i.e., policy makers, clinicians, the public) aware of the knowledge obtained during research (CIHR, 2012). Integrated KT is an action-oriented approach to research that involves collaboration between researchers and knowledge users from the outset of research design (CIHR, 2012). Integrated KT also seeks to reduce the gap between science and implementation, but specifies that knowledge

exchange activities should be integrated throughout the research process (CIHR, 2006; Lomas, 1993). Using an integrated KT approach allows researchers to gain the perspectives of knowledge users to enhance the acceptability and uptake of interventions for community use (Callahan et al., 2008; McGrath et al., 2009). Collaborating with knowledge users from the outset of the research design process in an integrated KT framework may provide a method to bridge the gap between research and practice (CIHR, 2006). The KT literature overlaps with the implementation science literature (Tomm-Bonde et al., 2013). Both KT and implementation science research focuses on the implementation of knowledge to practice; however, KT research focuses explicitly on the relationship between stakeholders and researchers (Tomm-Bonde et al., 2013). Moreover, numerous terms have emerged to describe implementation and knowledge translation (e.g., knowledge mobilization, knowledge to action, knowledge transfer, knowledge exchange; Graham et al., 2006; McKibbin et al., 2010). In the present dissertation, the terms implementation science and KT are used. Specifically, implementation science is used to refer to the approach to understanding the acceptability, feasibility and fit of a specific school-based social intervention. Integrated KT is used to refer to the framework of seeking input from stakeholders. In the present context of school-based social intervention for ASD, the need is evident for interventions using innovative methods that capture the richness, complexity and demands of school life.

The Dissertation, in Brief

The field of ASD needs collective awareness of the reasons we lack sufficient evidence-based practices at school, knowledge of promising theoretically based models to address this gap, and interventions designed with these factors in mind. The current

dissertation aims to address the research-to-practice gap in social skills interventions for young children with ASD at school.

Peer-Mediated Pivotal Response Treatment (PM-PRT)

The dissertation explores a different form of the most common PRT model (parent delivery) by utilizing a delivery model in which peers are taught to coach children with ASD to improve their social interaction skills (see Chapter 4). Specifically, peer coaches were taught to facilitate the social skill development of children with ASD in natural settings (at school) such as on the playground, in the classroom, at recess, and at lunch. Using these “natural settings” is thought to improve children’s motivation, learning, and ability to apply their skills widely (Openden, Whalen, Cernich, & Vaupel, 2009). PM-PRT aims to help children with ASD to improve their social interaction skills and to make friends. As mentioned, social skills are extremely important for children with ASD in order to make a successful transition to school and to have later school success (Wood et al., 2015). Importantly, by teaching typical peers to be social coaches, a long-term goal of this research program is also to provide cost-effective intervention that can be easily used at school.

However, few studies have examined the use of peers as PRT coaches (Ferraioli & Harris, 2011). Only five studies in the PRT literature have examined the use of peers as intervention agents (Boudreau, Corkum, Meko, & Smith, 2015a; see Chapter 2). This is surprising given PRT’s apparent good fit for school settings. Moreover, peer-mediated interventions (PMI, i.e., TD peers trained to implement an intervention directed toward children with a disability; Chan et al., 2009) aligns very well with key tenets of PRT: (1) *Natural*: Having classmates implement intervention for children with ASD in the school

environment aligns with PRT's naturalistic focus. (2) *Motivation*: For some children with ASD, the increased presence of / interaction with peers may increase their motivation to apply strategies, a key 'pivotal' area in PRT. (3) *Play-Based*: PM-PRT is ideally suited for use in the early school years, given its play-based nature (Koegel, Matos-Fredeeen, Lang, & Koegel, 2012). (4) *Special Interests*: PRT capitalizes upon children's interests to help encourage learning (Koegel & Koegel, 2006). There is even evidence that it can be beneficial to incorporate the intense or perseverative interests of children with ASD into PRT at school (Koegel, Singh, & Koegel, 2010). (5) *Multiple Skills*: When implemented by peers, PRT may target multiple skills at once (e.g., turn-taking and verbal language while simultaneously decreasing behavior problems; Pierce & Schreibman, 1995; Koegel et al., 2011).

The first year of school (hereafter referred to as kindergarten) may be a particularly important time to implement PM-PRT. Children with ASD often have trouble transitioning to the school environment (Forest, Horner, Lewis-Palmer, & Todd, 2004). School is a complex social environment and children with ASD must adapt to new routines and academic demands. Without intervention, children with ASD may display inflexible behavior patterns when adapting to new environments and routines (Fowler, Chandler, Johnson, & Stella, 1988). It is likely that maintenance of early intervention gains depends on the successful transition of children with ASD from preschool to kindergarten (Hanson et al., 2001; Forrest et al., 2004). Moreover, all children are developing peer relationships during this period, creating an opportunity to establish new and lasting connections (Chang, Shih, & Kasari, 2015).

Aims of the Present Dissertation

This dissertation is designed as a series of studies, in a step-wise process based on existing research, with an aim to provide evidence and promote the uptake of a promising evidence-based practice for children with ASD, PM-PRT. First, a detailed systematic review was conducted to examine the extant evidence from PM-PRT studies (Study 1; Chapter 2). No previous review had specifically examined this literature. Next, a qualitative study was conducted to inform a proposed PM-PRT intervention for children with ASD in the first year of school (Study 2; Chapter 3). A research-education partnership was initiated with the local school board at the outset of study design. Perspectives were obtained from educators and early intervention provider (owing to their role in transition/consultation in the first year of school) on the acceptability and feasibility of the proposed intervention. In a separate but related study by our group, Kerr et al., (in progress) obtained perspectives about the acceptability and feasibility of PM-PRT from parents of children with ASD and peer coaches. Finally, knowledge gained from the review and stakeholder input was used to implement an intervention using PM-PRT for children with ASD in the first year of school, and evaluated its effectiveness in a single-subject design case series (Study 3; Chapter 4). Chapter 5 will integrate study findings and present a discussion of theoretical and clinical implications, as well as study limitations and future directions. In summary, the aim of this dissertation was to advance the research base regarding PM-PRT for children with ASD at school. To accomplish this, a research-education partnership was established to support the successful implementation of PM-PRT in school settings. Three integrated, stepwise studies were conducted to advance the PM-PRT research base. Together, these studies refine our

understanding of the peer-implemented PRT literature and methods to improve the acceptability and uptake of this intervention, and the evaluation of this promising intervention at school.

CHAPTER 2. STUDY 1: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS: A SYSTEMATIC REVIEW

The manuscript based on this study is presented below. Readers are advised that Ainsley Boudreau, under the supervision of Dr. Isabel Smith, formulated the review protocol, conducted the literature search, study selection, data extraction, and data analysis. In addition, she wrote the manuscript and revised the manuscript in accordance with suggestions from co-authors, the peer reviewers, and the journal editor. The manuscript has been published in the *Canadian Journal of School Psychology*. The full reference for this manuscript is:

Boudreau, A., Corkum, P., Meko, K., & Smith, I. M. (2015). Peer-mediated Pivotal Response Treatment for young children with autism spectrum disorders: A systematic review. *Canadian Journal of School Psychology, 30*, 218-235. doi: 10.1177/0829573515581156

Abstract

This review examined the effectiveness of peer-mediated Pivotal Response Treatment (PM-PRT) to increase social-communication skills for children with autism spectrum disorders (ASD). A systematic review was conducted of all published studies examining PM-PRT in school-aged children with ASD, based on the Reichow et al. (2008) evaluation criteria. Five PM-PRT studies utilizing single-subject research designs were reviewed, involving 29 participants (8 with ASD and 21 peer coaches). Most studies of PM-PRT observed positive outcomes. However, the existing research base did not meet criteria for classification as promising or established evidence-based practice (EBP) for improving social skill deficits in children with ASD. More research is required in order for PM-PRT to be considered formally as EBP. This review may be used to guide clinical decisions for school psychologists and future research. Our aim was to highlight the rationale for and core aspects of this intervention and discuss school-based applications.

Introduction

The gap in availability and implementation of effective intervention models for children with autism spectrum disorders (ASD) is striking. Although school teams in Canada and elsewhere typically address the academic and behavioural needs of children with ASD, their social and communication needs often remain unmet (Dingfelder & Mandell, 2011; Parson & Kasari, 2013). This is critical because difficulties in social-communication are central in ASD (DSM-5; American Psychiatric Association, 2013) and represent a major barrier for school and vocational functioning (Rao et al., 2008). Moreover, positive peer interactions and social inclusion are among parents' most valued outcomes for their children with ASD (Bellini, Peters, Benner, & Hopf, 2007; Kretzmann, Shih, & Kasari, 2015) and are important predictors of real-world success (Happé, Booth, Charlton, & Hughes, 2006; Mesibov, Shea, & Adams, 2001). Since children spend a large portion of their day at school, it is crucial to identify evidence-based approaches for children with ASD that are acceptable and feasible to school stakeholders such as school psychologists and special educators. School psychologists carry large varied caseloads, and children with ASD usually require individualized programming (Corkum et al., 2014; Jordan, Hinds, & Saklofske, 2009). Peer training approaches offer a logical, face-valid, and cost-effective means of social skill development for children with ASD (Chan et al., 2009). A specific peer-training approach based in Pivotal Response Treatment (PRT; Koegel & Koegel, 2006) holds high heuristic value for implementation in the school system, owing to its emphasis on embedding learning opportunities into everyday contexts and existing routines (Koegel et al., 2012; Stahmer et al., 2011).

Peer-Mediated Intervention Research for Children with ASD

Peer-mediated intervention (PMI) refers to an approach in which typically developing peers are trained to implement an intervention directed toward children with a disability (Chan et al., 2009). This contrasts with traditional intervention approaches for children with ASD in which adults (e.g., parents or clinicians) are the primary intervention agents. Peer-mediated interventions typically target social competence and aims to use socially adept peers as the intervention agents (Locke et al., 2012).

Five previous reviews have examined the evidence-base for PMI for children with ASD in general -- two narrative reviews (Bass, 2007; DiSalvo & Oswald, 2002) and three quantitative reviews using formal evaluation frameworks (Chan et al., 2009; Wang et al., 2011; Zhang et al., 2011). Overall, PMI was found to be highly effective in improving social skills of children with ASD (Cohen's $d = 1.27 - 2.44$; Wang et al., 2011; Zhang et al., 2011). One previous book chapter examined PM-PRT studies (Ferraioli & Harris, 2011) in addition to other treatment approaches designed to increase social awareness and social skills of children with ASD, using a systematic, reliable and rigorous framework (Reichow et al., 2008). However, Ferraioli and Harris (2011) did not review several published PM-PRT studies, and drew no conclusion regarding the status of PRT-based PMI as evidence-based practice (EBP). Moreover, their review lacked sufficient depth on PM-PRT to provide practical guidance for school psychologists. Such is the current focus, reflecting our position that peer-implemented PRT is an intervention approach with excellent potential for implementation in schools. Peer-mediated interventions have been identified as an effective inclusion strategy for children with ASD (Harrower &

Dunlap, 2001). Our aim is to provide evidence to inform intervention decisions for educational teams.

Pivotal Response Treatment (PRT): A promising PMI approach. PRT is a naturalistic behavioural intervention in which “pivotal” areas are targeted that produce collateral changes in other aspects of children’s behaviour (Koegel & Koegel, 2006). Motivation is one such pivotal area. Interventionists use motivating items in children’s environments to provide natural language opportunities (Koegel, Koegel, Harrower, & Carter, 1999), for example, by holding up a preferred and a non-preferred toy and asking, “What do you want?” PRT also focuses on increasing children’s self-initiations, fostering self-management, and encourages responding to multiple cues (Koegel & Koegel, 2006). Teaching opportunities are embedded in the context of everyday life (often in play) to enhance generalization. PRT can be delivered by adults or peers at home, school, the clinic or the community. For more information about PRT procedures, see Koegel and Koegel (2012).

PRT has considerable empirical support (NAC, 2009; Wong et al., 2014) as an effective way to increase functional communication and associated skills for children with ASD (Koegel & Koegel, 2006; I.M. Smith et al., 2010; I.M. Smith, Flanagan, Garon & Bryson, 2015). PRT shares the theoretical underpinnings of the broader field of applied behavioural analysis (ABA). However, PRT’s specific focus is on increasing children’s motivation for learning and communication (Koegel & Koegel, 2006). Most PRT approaches are implemented by parents (Koegel, Koegel, & McNeerney, 2001; Rogers & Vismara, 2008; Suhrheinrich, 2011). In Nova Scotia, parents and clinicians implement a publicly funded intensive PRT-based intervention program for preschoolers with ASD

(i.e., Nova Scotia Early Intensive Behavioural Intervention; NS EIBI; Bryson et al., 2007). Community effectiveness data are promising, with improvements across multiple social, communicative and cognitive domains for children with ASD (I.M. Smith et al., 2010; I.M. Smith et al., 2015), and results that are comparable to those of another preschool ASD intervention model based on the verbal behaviour approach (Stock, Miranda, & Smith, 2013). However, even in Nova Scotia, PRT is infrequently utilized in schools, and when it is utilized it is most often as a component of the Strategies for Teaching based on Autism Research (STAR) approach (Arick et al., 2004).

Like PMI, PRT offers a face-valid, potentially cost-effective intervention approach for children with ASD at school. Unlike discrete-trial-based ASD interventions (Eikeseth et al., 2002; T. Smith, 2001), PRT is designed to be conducted in the context of everyday routines and in natural environments. Several school-based studies in the United States have demonstrated initial efficacy in training teachers or school paraprofessionals such as Teaching Assistants to implement PRT (Dyer, Williams, & Luce, 1991; Robinson, 2011; A. Smith & Camarata, 1999). Stahmer et al. (2011) recently described class-wide application of PRT, and Renshaw and Kuriakose (2011) also provide guidelines for school psychologists to implement PRT within their practice at school. However, none of these authors mentioned peer-mediated PRT. Given PRT's strong evidence base and apparent good fit for school settings, surprisingly few studies have examined the effectiveness of teaching classmates of children with ASD to serve as PRT coaches (Ferraioli & Harris, 2011).

Peer-mediated PRT is also ideally suited to meeting provincially mandated inclusion policies for youth with disabilities (Timmons & Wagner, 2008). For children

with ASD, evidence tells us that inclusion alone is insufficient to increase social skills (Chamberlain, Kasari, & Rotheram-Fuller, 2007; Ferraioli & Harris, 2011; Kasari, Locke, Gulsrud, & Rotheram-Fuller, 2011). Furthermore, discrepancies often exist between provincial inclusion policies and how students with ASD are supported. Peer-mediated PRT fosters social skills in children with ASD while promoting interaction with typically developing classmates. To help school personnel bridge this gap in services, we offer this description of the specific aspects of PM-PRT that suggest its high potential for school-based services and summarize the relevant research literature.

Focus of Present Paper

The purpose of this review is to evaluate systematically the effectiveness of PMI using PRT (Koegel & Koegel, 2006) for facilitating the social-communication behaviour of school-aged children with ASD. Although PMI and PRT are each separately classified as EBP (NAC, 2009; Wong et al. 2014), whether the evidence for the combined approach (i.e., PM-PRT) meets established EBP criteria is unknown. We will address this using the Reichow et al. (2008) criteria for determining EBP in ASD, based on single-subject design studies. An in-depth evaluation of PM-PRT studies is critical to summarizing and interpreting results, to internal validity, and to replication and generalizability of study results (Patterson, Smith, & Mirenda, 2012). Following this analysis, we discuss implications for educational programming, practical information for school psychologists, as well as directions for researchers in educational settings (Campbell, 2013).

Method

Search Procedures

Studies were identified using PsycINFO and PubMed databases using the following key words: (a) autism, autism spectrum, autistic spectrum, pervasive developmental disorder, neurodevelopmental disorder, mental retardation, and learning disorder; (b) peer mediation, peer training, peer mentoring, peer-mediated intervention, and peer support; (c) treatment, intervention, management, and peer training; (d) Pivotal Response Treatment; (e) children, school, and pediatric. Additional articles were sought by hand searching reference lists of all articles retrieved from the search criteria and journals of the articles selected for the present review. Publication year was not restricted; articles were included in this review if they were written in English and reported the results of any study of PM-PRT for school-aged children with ASD. Technical reports, dissertations, and unpublished documents were not included.

Inclusion and Exclusion Criteria

For inclusion in this review, each article had to describe a research study that included provision of PM-PRT with the aim of enhancing social-communication skills for at least one school-aged (4–18-year-old) child with an ASD diagnosis [i.e., autistic disorder, Asperger syndrome or pervasive developmental disorder - not otherwise specified (PDD-NOS), American Psychiatric Association, 2000; or autism or autistic spectrum disorder].

Systematic Review Framework

We evaluated the evidence for efficacy of PMI using PRT with the Evaluative Method for Determining Evidence-Based Practice in Autism (Reichow et al., 2008).

Although ratings are typically used to exclude studies that lack rigour from the review process, we retained all existing studies to achieve a comprehensive examination of the extant small body of literature. A close examination of study characteristics allows us to offer suggestions for future research.

Level-of-Evidence Rating

Five primary quality indicators (participant characteristics, independent variable, dependent variable, baseline condition, and visual analysis) and six secondary indicators (inter-observer agreement, Kappa, fidelity, blind raters, generalization and/or maintenance, and social validity) were examined according to another rubric (Guidelines for the Determination of Research Report Strength) from the Reichow et al. (2008) evaluative framework. This rubric aggregates research into one of three level-of-evidence ratings ('Strong', 'Adequate', or 'Weak').

Data Extraction and Analysis: Coding Quality Ratings

In-depth data were extracted about 5 variables: (a) research methods, (b) participants, (c) intervention, (d) outcome measures, and (e) success estimates. As Wang and Parrilla (2008) and Reichow et al. (2008) recommended, several quality indicators were expanded from the original rating system in order to capture the unique qualities of peer-mediated interventions (e.g., expansion of 'participants' to include peer trainer characteristics, 'study design' to specify types of single-subject research design, and 'intervention type' to focus on specific PRT components).

Inter-Rater Reliability

Inter-rater reliability (IRR) was assessed on 100% of the studies, as coded by the first and third authors. IRR was calculated for the 12 quality indicators as a percentage of

total initial agreements on items coded. Inter-rater agreement was good on all individual indicators (ranged from 80 to 100%), with 90% agreement across all quality indicators (Cohen, 1960).

Level of Evidence-Based Practice

Finally, for an intervention to be classified as an ‘established evidence-based practice’ (Buysse & Wesley, 2006), the body of single-subject research literature must have: (a) a minimum of five single-subject design studies of strong research report strength, (b) studies conducted by at least three different researchers across three or more research sites, and (c) a total of at least 15 participants included in the five or more studies (Reichow et al., 2008). The standards to be classified as ‘promising EBP’ consist of: (a) a minimum of three single-subject studies of at least adequate research report strength, (b) studies conducted by at least two different researchers across at least two different sites, and (c) a total of at least 9 participants in the three or more studies (Reichow et al., 2008).

Results

The systematic literature search produced 36 citations. Three additional articles were examined for potential inclusion after hand searching reference lists of all articles retrieved from the search criteria and journals of the articles selected for the present review. After removal of duplicates and reviews, and the application of inclusion and exclusion criteria, a total of 5 articles was included in the present review.

Literature Synthesis

I. Overview. The included studies form an exhaustive list of the identified literature to date on PM-PRT for individuals with ASD of all ages. Five PM-PRT studies were identified (see Table 1). All studies were conducted in the US.

II. (a) Participants. Two studies examined different outcome measures in the same participants (Pierce & Schreibman, 1997a; 1997b). Accounting for this overlap, five PM-PRT studies examined eight children with ASD and 21 peer coaches. Ratios of peer coaches to target children with ASD varied from 1:1 to 3:1. All studies had participants (e.g., target children with ASD and peer coaches) aged from 7 to 9 years ($M = 8$ years 4 months; see Table 1); no study examined PM-PRT in junior or senior high school students. The intervention was delivered by same-aged classmates in all studies. Teachers participated in one study (Pierce & Schreibman, 1995) by completing a social skills questionnaire about the children with ASD. All participants with ASD were male. Peer coaches included approximately equal numbers of males (52%) and females. No attempts to match peer dyads for gender or other features were indicated. Target children with ASD were most likely to have cognitive functioning in the moderate to borderline intellectual disability range (IQ of 55–85). Diagnoses of autism or ASD were reported for all target children; the means by which these diagnoses were made were not described. Peer coaches were reported to be typically developing in 4 of 5 studies. In the remaining study (Kuhn et al., 2008), peer coaches had diagnoses of mild intellectual disability or learning disability and attended a full-time special education classroom. Peer selection method was specified in 3 of 5 studies (Harper et al., 2008; Pierce & Schreibman, 1995; Pierce & Schreibman, 1997b). In each, peer coaches were selected on the basis of teacher

nomination. Teachers reportedly selected peers who were cooperative, friendly, and had good school attendance.

II. (b) Methods. Generalization and/or maintenance were measured in four studies (Harper et al., 2008; Pierce & Schreibman, 1995; Pierce & Schreibman, 1997a & b). Of those, generalization was measured post-intervention in one or two 10-minute periods in non-training locations and/or with non-trained peers. Three studies (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997a & b) measured generalization under three conditions: (a) in a non-training empty classroom, (b) with novel (non-training) toys, and (c) with non-training peers. Procedural fidelity (Billingsley et al., 1980) was examined in one study (Kuhn et al., 2008) and analyzed using two components of treatment integrity (fidelity of treatment adherence and therapist competence; Perepletchikova & Kazdin, 2005; Reichow et al., 2008). One study (Kuhn et al., 2008) contained measures of treatment adherence and adult trainer competence. Four studies contained measures of peer coach/therapist competence (Harper et al., 2008; Kuhn et al., 2008; Pierce & Schreibman, 1995; Pierce & Schreibman, 1997b). The nature of these measures was specified in only one study that employed a peer competence checklist (Harper et al., 2008). No study measured fidelity across experimental conditions. All five studies met criteria for social validity according to the EBP framework definition (Reichow et al., 2010). For example, all studies displayed a minimum of four features necessary for classification as socially valid (e.g., socially important dependent variables, time- and cost-effective, independent manipulation by people who typically come into contact with the child with ASD, and natural context). However, no study examined consumer satisfaction or comparison of individuals with and without disabilities, which

are other possible aspects of social validity. All studies employed a multiple baseline design across two children; no study documented a functional effect (i.e., demonstration of change at three points of intervention).

II. (c) Outcome measures. Increases in the frequency of social-communication behaviour of the target child with ASD were the most common targeted skills. Specifically, social initiations (e.g., beginning a conversation, approaching a peer to play without a prompt) and social responses (e.g., a verbal, gestural, or physical response to peer prompt) measured using direct behavioural observation were the most common outcome variables. These were measured reliably across all studies (IRRs = 86 - 98%). Two studies (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997b) also examined post-treatment changes in collateral behaviour such as language, joint attention and toy play. One study (Harper et al., 2008) identified individualized goals for the target children with ASD, in addition to common target behaviours measured through direct observation [initiations (i.e., any appropriate verbal or non-verbal attempt to gain a peer's attention to initiate or engage in a play activity) and turn-taking (i.e., a social exchange within a play activity)]. All studies used behavioural coding schemes (video or live coding) to measure dependent variables. However, two studies (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997b) used multiple methods and/or sources of data in addition to observational measures [e.g., teacher questionnaire (Walker- McConnell Scale of Social Competence; Walker & McConnell, 1988) and 10-minute pre-post language samples for target child with ASD].

III. Intervention characteristics. All studies took place at school, usually during recess. All studies used PRT strategies and peer training procedures from a manual, *Kids*

Helping Kids: Teaching Typical Children to Enhance the Play and Social Skills of their Friends with Autism and Other PDDs, developed by Pierce and Schreibman (1995). Two pivotal areas/mechanisms of change were targeted: altering attention and motivation. Peer training followed the same general procedure in all studies: (a) Instruction of the peer coach in PRT techniques without the target child with ASD present; (b) Strategies modeled by adult trainer; (c) Role play strategies with adult; (d) Role play strategies with other peer coaches; and (e) Pair peer coaches with child with ASD, and adult trainer provides intermittent feedback. One study also provided training to peers about managing potential aggressive behaviour of children with ASD (Harper et al., 2008). Most studies (4 of 5) reported that training sessions continued until peer coaches were able to implement strategies with at least 80% mastery. See Table 2 for additional intervention details.

Level of Evidence-Based Practice

The results from the five existing studies were used to determine whether PM-PRT for school-aged children with ASD met the Reichow et al. (2008) criteria for either of two levels of EBP: established and promising. Criteria were not met for either level (i.e., < 30 points on the EBP status formula; see Reichow et al., 2008, Table 4).

Discussion

Our systematic review yielded only five studies that examined PM-PRT for school-aged children with ASD. None of the studies employed an experimental single-case design. However, the level of research rigour is commendable: 4 out of 5 studies of PM-PRT have adequate research rigour. The most common characteristics of these 4 studies were: (a) participants with ASD aged approximately 8 years with IQs of 55–85,

(b) density of at least seven 20-minute intervention sessions across at least 2 weeks, (c) school setting, and (d) use of the Pierce and Schreibman (1995) manual. Owing to the small number of published studies, the intervention does not yet meet criteria for either promising or established EBP. However, given the brevity of treatment (~2 weeks) and the importance of the treatment target (social skills) for children with ASD (Bellini et al., 2007), the initial study results are encouraging.

Our review of the entire body of published PM-PRT literature extends previous social skills intervention reviews (Ferraioli & Harris, 2011; Reichow & Volkmar, 2010) by analyzing the entire PM-PRT literature in depth. Our results were incongruent with those of Chan et al. (2009), who used another synthesis method. For example, we concluded that several PM-PRT studies had adequate research rigour, whereas Chan et al. (2009), using the Certainty of Evidence Framework (Millar et al., 2006), assigned ‘inconclusive’ ratings to several of the same studies. The discrepancy arises from different operational definitions of fidelity. Discrepancies among conclusions across reviews are confusing for key stakeholders (e.g., school psychologists and other practitioners, parents, policy makers). The current review framework utilized an operational definition of fidelity congruent with ASD intervention standards (Reichow et al., 2008). Fidelity is integral to understanding the efficacy of an intervention approach and identifying essential treatment components (Wainer & Ingersoll, 2013). Future research should report additional dimensions of fidelity (e.g., individual strategy and global ratings, treatment exposure details, data throughout all experimental phases).

Limitations of Current Review Framework for Evaluating PMI

As mentioned, we expanded several coding indicators in order to synthesize the PMI literature. Two expanded categories are particularly relevant for summarizing the evidence-base of peer-mediated PRT. 1. *Addition of peer coaches/peer coach selection to the 'participant' category.* Previous syntheses excluded consideration of peer coach participants, and focused exclusively on the characteristics of target children with ASD. This is unfortunate, since as the key intervention agents, peers are presumed to be an active treatment mechanism (Reichow et al., 2010). The omission of information about peer participants across studies and across reviews constrains our ability to draw strong conclusions about the essential characteristics of successful peer implementers (see Locke et al., 2012, for an example from an intervention other than PRT). 2. *More detailed description of intervention characteristics.* PMI reviews should characterize the number of peer training sessions, participant composition of these sessions (e.g., child with ASD, peer coach(s), adult facilitators), specific treatment model (e.g., PRT), location and class composition at school, and intervention strategies. It would also be important to understand the training and experience of adult facilitators (e.g., level of schooling, profession, training in PRT). In the present review, a detailed examination of the interventions revealed that five PRT strategies were common across studies with adequate research rigour (i.e., paying attention, reinforcing attempts, taking turns, narrating play, child choice; Pierce & Schreibman, 1995). Additional aspects to be specified include the reinforcement schedule and reinforcers, or other relevant aspects of the peer training methods (e.g., use and type of prompts, fading schedules). Detailed

review of intervention characteristics is critical for revealing active treatment ingredients and for replication.

Limitations

The current synthesis is limited by the small number of studies and lack of independence among studies (i.e., inclusion of two studies, i.e., Pierce & Schreibman, 1997a & b, with the same participants). Given the paucity of studies, we considered it important to include both and to describe the research in sufficient depth to provide meaningful suggestions. As the literature grows, a more conservative inclusion approach will be warranted.

Areas for Future Research

Teaching same-aged peers to implement PRT strategies to promote the social-communication skills of children with ASD is an emerging area. Although PM-PRT did not meet formal EBP criteria, one additional high-quality single-subject study that demonstrated a treatment effect for one additional child with ASD would move this intervention into the ‘promising’ EBP category according to one evaluation framework (Reichow et al., 2008). Additional research is needed to enlarge the evidence base regarding peer-mediated PRT, as well as to define further the parameters of its effectiveness.

All current studies of PM-PRT use a common treatment manual, that of Pierce and Schreibman (1995). However, this manual targets fewer and different pivotal areas (e.g., motivation and attention) than the manual commonly referenced for adult-facilitated PRT (which includes responsivity to multiple cues, self-management, and social initiations; Koegel & Koegel, 2006). Moreover, Pierce and Scheibman (1995) omit

several widely used PRT strategies (e.g., task variation, interspersing maintenance and acquisition tasks, rewarding attempts), presumably on the basis that these would be difficult to teach to young children. It is unclear how these changes affect the integrity of PRT as an intervention package. Additional research is needed to tease apart this issue. Another noteworthy trend is the narrow age range of existing studies examining peer-mediated PRT. Additional research is needed both in the earliest and later school years; for instance, with an emphasis on critical transitions such as entry to school and adolescence.

PM-PRT has much to offer Canadian schools. PRT has evidence of efficacy for teaching students with ASD (Odom et al., 2010). PRT's use of preferred activities and teaching in the context of naturally occurring routines (e.g., recess or classroom activities), along with the use of an abundant, face-valid resource (i.e., classmates) as interventionists, promotes the social development and generalization of social skills for children with ASD (Koegel et al., 1987). As PRT focuses on pivotal behaviors that produce widespread change, this intervention produces more enduring social skill gains than do some other ABA programs (Mohammadzaheri, Koegel, & Rafiee, 2014). Future research should focus on how to promote the uptake of this intervention approach at school (see Wood et al., 2015, for another PMI example). School psychologists are ideally situated to foster the uptake of EBP, as well as to help teachers adapt individualized program plans to include relevant and measurable social skills goals for children with ASD (Mckenney, Dorencz, Bristol, & Hall, 2015; Renshaw & Kuriakose, 2011). Future research should also examine the effectiveness of PM-PRT as an inclusion strategy.

Conclusion

It is surprising that, 18 years after the first study of peer-mediated PRT, evidence regarding this intervention remains limited. This is particularly striking given the recent growth in PRT research in general (e.g., Verschuur, Didden, Lang, Sigafoos, & Huskens, 2014), and the designation of PRT as an established treatment (NAC, 2009; Wong et al., 2014). A complementary body of literature on peer-mediated interventions has also accumulated impressive empirical evidence of effectiveness (e.g., Reichow et al., 2010). Expanding the body of research combining these approaches (PRT and PMI) in school settings is a logical, feasible and important next step to meet the social inclusion needs of children with ASD. As Canadian children enter school as early as 4 years in some provinces, educators need to adapt to meet the developmental needs of both typically and atypically developing children. As the gap grows between what ASD research tells us and the availability of evidence-based social skills interventions in schools (Dingfelder & Mandell, 2011; Parsons & Kasari, 2013), so too must our understanding of effective, acceptable and feasible intervention modalities and how best to implement them. Additional research is also needed to determine if PM-PRT will meet the ‘promising’ EBP category. EBP classification is increasingly important to school boards and policy makers to guide educational programming decisions (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010; Reichow et al., 2008). Given the importance of social inclusion as an intervention target for children with ASD and their families (Kretzmann, Shih, & Kasari, 2015) and the considerable resources students with ASD require at school, additional research is warranted. Canadian research is also needed to address the unique benefits and challenges of implementing PM-PRT in the context of our educational systems.

School psychologists are critical partners in the applied research disseminating PM-PRT at school.

Table 2.1. Summary and Ratings of the Reviewed Studies.

Reference	Methodological Characteristics				Participant Characteristics				Results	
	Rigour	Design	G/M	Fidelity	<i>n</i>	M, F	Age	Fxn Level	Intervention Density	TSE
Harper et al., 2008	Adequate	Single-subject, MB across participants	G/M	TC	2	2,0	8-9	Medium	20 min 5 X (peers), ~7 sessions total	SI
Kuhn et al., 2008	Adequate	Single-subject, MB across peer coach groups	—	TA, TC	2	2,0	7-8	Lower	20 min 8 X (peers), ~6-8 sessions total	SI
Pierce and Schreibman, 1995	Adequate	Single-subject, MB across participants	G/M	TC	2	2,0	10	Medium	30 min 4 X (peers), ~13 sessions total	SI, SC
Pierce and Schreibman, 1997a	Adequate	Single-subject, MB across peer coaches	G/M	—	2	2,0	7-8	Medium	30 min 4 X (peers), n. c. sessions total	SI, SC
Pierce and Schreibman, 1997b	Weak	Single-subject, MB across children with ASD and peer coach participants	G/M	TC	2	2,0	7-8	Medium	30 min 4 X (peers), n. c. sessions total	SI, SC

Key: MB: multiple baseline design; G/M: generalization and maintenance; G: generalization; M: maintenance;

TA: treatment adherence; TC: therapist competence; M: male; F: female; Fxn level: functioning level (lower: IQ

<55; medium: IQ 55-85; high: >85); TSB: target skills or behaviour; GSS: general social skills; SC: social

communication; SI: social initiations; Success est: success estimate; PRT: pivotal response treatment; n. c.: not

calculated; tx: treatment

Table 2.2 Summary of Intervention Characteristics.

Reference	Intervention Characteristics		
	School Location	Number of Training Sessions	Duration of Individual Training Sessions
Harper et al., 2008	Empty classroom and playground	7 total (5 peer trainer, 2 child with ASD)	20 minutes
Kuhn et al., 2008	Empty classroom	? total (8 peer trainer; ? child with ASD)	20 minutes
Pierce and Schreibman, 1995	Empty classroom	? total (4 peer trainer; ? child with ASD)	30 minutes
Pierce and Schreibman, 1997a	Empty classroom	NS	NS
Pierce and Schreibman, 1997b	Empty classroom	? total (4 peer trainer; ? child with ASD)	30 minutes

Key: *NS*: not specified; *PA*: pay attention; *RA*: reinforce attempts; *TT*: turn taking; *NP*: narrate play; *CC*: child choice; *ExC*: extend conversation; *VA*: Vary activities; *MP*: model play; *EnC*: encourage conversation; *MC*: multiple cues

CHAPTER 3. STUDY 2: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT
FOR CHILDREN WITH AUTISM SPECTRUM DISORDER: PROVIDER
PERSPECTIVES ON ACCEPTABILITY, FEASIBILITY AND FIT AT SCHOOL

The manuscript based on this study is presented below. Readers are advised that Ainsley Boudreau, under the supervision of Dr. Isabel Smith, designed the study, organized and managed participant recruitment, and collected data. In addition, she conducted the data analyses, wrote the manuscript, and revised the manuscript in accordance with suggestions from co-authors. The manuscript is currently under review (revised and resubmitted) at the journal *Autism*. The full reference to the manuscript is:

Boudreau, A., Corkum, P., & Smith, I. M. (2015). Peer-mediated Pivotal Response

Treatment for children with autism spectrum disorder: Provider perspectives on acceptability, feasibility and fit at school. Manuscript submitted for publication.

Abstract

Few effective school-based interventions that target social-communication skills are available for students with autism spectrum disorder (ASD). The growing gap between interventions designed for use in research settings and the school environment is concerning for researchers and clinicians alike. Research methods that incorporate relevant stakeholders (e.g., educators, early intervention providers, EIP) throughout the process from intervention design to implementation help to bridge this gap. This study used content analysis of interview data to evaluate the acceptability and feasibility of a specific peer-mediated intervention (PMI) for school use for young children with ASD. We explored educators' and EIPs' perspectives on evidence-based practice, the components of the proposed intervention (using Pivotal Response Treatment, PRT), and the overall acceptability and feasibility of using the intervention at school, through interviews with 29 participants (24 elementary school educators and 5 EIP serving children with ASD). Results indicated that stakeholders had some knowledge of PRT and found the PMI approach to be acceptable and feasible. Several potential challenges were identified with respect to typically developing peers as intervention agents. We discuss educators' specific recommendations for intervention adaptation and provide a model for researchers and educators to collaborate in promoting optimal use of evidence-based practices at school.

Introduction

Although considerable gains have been made in translating early intervention research into practice for children with ASD (Stahmer, Brookman-Frazee, Lee, Searcy, & Reed, 2011; Schreibman et al., 2015), fewer evidence-based practices (EBP) are available for children with ASD at school (Kasari & Smith; 2013). The lack of EBP for children with ASD at school may indicate poor translation of research to practice (Stahmer, Suhrheinrich, Reed, & Schreibman, 2012), creating a gap that frustrates researchers and educators alike (Stahmer et al., 2012).

In the present study, we adopted an implementation science approach (Bammer, 2005) to understand the acceptability, feasibility and fit of peer-implemented Pivotal Response Treatment (PRT; Koegel, Koegel, Harrower, & Carter; 1999; Koegel & Koegel; 2006) at school. Implementation science is a burgeoning field that systematically examines methods by which research can be translated into clinical practice (Eccles et al., 2009). In the present study, we used a systematic, research-based approach to better understanding why EBP may or may not be favorably adopted, by gathering stakeholders' perceptions of strengths of EBP and barriers to their implementation (Damschroder, Aron, Keith, Alexander, & Lowery, 2009). We incorporated an integrated knowledge translation (IKT) framework (i.e., actively engagement and collaboration with stakeholders throughout the research process; Graham et al., 2006) by seeking input from community stakeholders (Bammer, 2005; Wood, McLeod, Klebanoff, & Brookman-Frazee, 2015).

The Intervention

PRT is an ‘established’ intervention (National Autism Centre, 2015) within the domain of Applied Behavioral Analysis (ABA). PRT embeds social-communication learning opportunities within natural contexts (Koegel et al., 2012; Stahmer et al., 2011). A particular application of PRT uses peers as interventionists (Pierce & Schreibman, 1995). Five published studies have examined peer-mediated (PM)-PRT at school (Boudreau, Corkum, Meko, & Smith, 2015a), with results suggesting that using typically developing (TD) peers as social skill ‘coaches’ is a promising method of PRT delivery (Boudreau, Corkum, Meko, et al., 2015a; Chan et al. 2009; Ferraioli & Harris, 2011). The extant literature suggests that third-grade classmates of children with ASD can learn several PRT strategies and implement them successfully. Across these studies, children with ASD made gains in several domains of social functioning that were maintained at follow-up (Boudreau, Corkum, Meko, et al., 2015a). Given increasingly widespread implementation of PRT with preschool-aged children (e.g., Verschuur, Didden, Lang, Sigafos, & Huskens, 2014) and initial research demonstrating success of PM-PRT at school, PRT-based programs are ripe for school-based adoption (Boudreau, Corkum, Meko, et al., 2015a).

Implementation Science Research in ASD

Implementation science approaches have been widely used in behavioral medicine to influence the uptake of treatments for disorders such as cancer and diabetes, but their influence on the ASD field remains relatively limited (Hess et al., 2008; but see Stahmer et al., 2012, and Locke et al., 2015). Callahan, Henson and Cowan (2008)

recommended exploring acceptability and feasibility (i.e., social validity) among stakeholders during the development of interventions.

Locke et al. (2015) examined barriers to the implementation of a social engagement intervention in a public school setting. Barriers to implementation included interventionists' previous training, school policies, levels of administrative respect and support for teachers and educational program assistants (EPA), and the availability of resources. In a mixed methods study, we previously identified professional development needs of educators of children with ASD in a Canadian inclusive education setting (Corkum et al., 2014). Key barriers were identified: the coordination of education and health services, discrepancies between school policies and children's educational needs, and limited resources and space for programming (Corkum et al., 2014).

Stahmer and her colleagues have taken an implementation science approach to ASD intervention research, including examination of class-wide, teacher-implemented PRT (Stahmer, Suhrheinrich, Reed, Bolduc, & Schreibman, 2010). In a recent qualitative study, Stahmer et al. (2012) identified educators' perceptions of the benefits of and barriers to teacher-implemented PRT for children with ASD. Three focus groups (total N = 13) were conducted with teachers who either had training in PRT (separate groups currently using PRT or not) or no PRT training. All participant groups reported PRT to be a practical intervention for a school setting. However, they also found specific PRT strategies (e.g., turn-taking, multiple cues) challenging to implement in classrooms. No study to date has examined educators' perceptions of PM-PRT for children with ASD at school, despite research support for PMI in general for children with ASD (Reichow et al., 2008) and its heuristic potential for school use. Moreover, no study has examined

stakeholders' perceptions of TD peers as intervention agents for children with ASD (Locke, Rotherman Fuller, & Kasari, 2012). This information can inform the successful adoption and implementation of PM-PRT in educational settings.

Present Study

The primary goal of the present qualitative study was to understand and describe the acceptability and feasibility of a promising yet under-utilized intervention, PM-PRT, in a public school district. Secondly, we aimed to examine stakeholders' recommended potential adaptations of the proposed intervention, to optimize implementation within the first year of school in an inclusive educational system. Specifically, we obtained educators' (e.g., classroom teachers, school administrators, special education teachers) and preschool intervention providers' (owing to their role in transitioning children with ASD to school from a PRT-based early intervention program; Bryson et al., 2007) input regarding the intervention, to facilitate provision of peer-implemented PRT at school.

We addressed four research questions, using semi-structured interviews. Specifically, we sought to understand perceptions of the two stakeholder groups in relation to:

- 1) EBP (in general)
- 2) a specific EBP for ASD, namely PRT
- 3) the proposed PM-PRT social intervention and related components (i.e., use of PMI, role of peer coaches, social skills as target, school-based approach)
- 4) the feasibility of the proposed intervention in the local school environment

Method

We employed a descriptive content analytic approach (Cole, 1988; Elo & Kyngäs, 2008) using semi-structured interviews. In-depth semi-structured interviews are appropriate for exploratory research (Padgett, 1998), and qualitative methods are ideally suited to describe perceptions of intervention in depth. This allows us to evaluate fit within the school context. A key component of the present study was the initiation of a community-research partnership with the local school board, guided by principles articulated by Dingfelder and Mandell (2011) and consistent with IKT and implementation science (Graham et al., 2006).

Intervention

We aimed to obtain an understanding of the acceptability and feasibility of evidence-based interventions and the proposed PMI utilizing PRT. Questions were generated based on the study goals, relevant empirical literature, and IKT guidelines (e.g., CIHR, 2012; Damschroder et al., 2009; Stahmer et al., 2012). The interview guide consisted of an introduction (i.e., an outline of PRT and the proposed intervention) and specific questions about EBP, PRT, and components of the proposed intervention.

Participants

Elementary school staff members and early intervention providers serving children with ASD in an urban centre in Canada (city population approximately 370,000) were invited to participate in semi-structured interviews. Stakeholders were selected from a range of relevant team members, decided jointly with school and early intervention administrators. Specifically, stakeholders were selected based on their possession of

critical information required for the successful implementation of EBP (Dingfelder & Mandell, 2011).

We invited teacher stakeholders to participate by emailing eight school principals (identified by school board administrators), who then recruited via email staff who taught early elementary grades (the period of proposed intervention) or had experience with ASD. School board administrators also invited members of their specialized autism team to participate. Preschool intervention providers from the local ASD-specific team ($n=6$) were invited to participate by in-person and email invitations. These providers were all trained in PRT and, as part of their roles, provided consultation during children's transition from preschool to school.

Thirty-five of 39 potential participants responded [30 elementary school educators and 5 early intervention providers (EIP)]. See Table 1 for a summary of background characteristics of participants. Of those, two educators did not respond to further contacts and three educators declined participation citing time or scheduling constraints. Of the 30 consenting participants, one educator was excluded from analysis, as she could not be reached to complete the interview. We completed semi-structured interviews with 24 elementary school educators from 7 public schools and 5 EIP serving children with ASD (total $N=29$).

Data Collection

We developed an interview guide (see Appendix) to examine participants' perspectives on components of the proposed intervention. We recorded the interviews using a Sony Digital Voice Recorder.

Procedure. Interviews took place in person at each participant's workplace (i.e., school or office). We obtained informed consent, and participants completed a background questionnaire investigating demographics, training, professional experience, experience with children with ASD, and familiarity with intervention approaches. The interviews ranged from 23 to 47 minutes.

The interviewer (first author) followed the interview guide. After introductions, the interviewer asked participants to read the introduction that briefly reviewed the proposed intervention, including a description of PRT. At the end of each interview, the participant was thanked and given \$20 for participation.

Data analysis. Data analysis was guided by the descriptive content analysis method (Cole, 1988; Elo & Kyngäs, 2008). First, one of two research assistants, blind to the purpose of the project, transcribed audio recordings of the interviews. Transcriptions were reviewed by the research team for accuracy. Two of the investigators reviewed the initial transcript codes at a general level, in order to condense the data into analyzable units. Disagreements in assignment or description of codes were resolved through discussion and enhanced definition of codes. The constant comparative method (Glaser & Strauss, 1967) was then used to identify primary themes, and codes were organized into themes. The interview guide questions were used to organize the main themes in a deductive manner. However, responses under each theme were further analyzed using an inductive approach (Boyatzis, 1998; Braun & Clark, 2006). Following initial coding of the interviews, the senior author (IS, not involved in conducting the interviews) provided input on coding decisions. The final list of codes consisted of themes describing opinions of peer-mediated intervention. Finally, as part of the IKT process, we shared results of

the current study with knowledge users and participants, before implementation of the PM-PRT intervention study (Boudreau, Corkum, & Smith, 2015). Themes were validated for content by a peer-debriefing method (Spillett, 2003). To this end, we presented the results to the school district's autism team (participants in the current study; $n=5$) and administrative staff (non-participants; $n=2$), who commented on the themes extracted.

Results

Responses across the groups were organized according to categories identified in the initial aims of the study: (1) evidence-based practice: a) definition, b) importance; (2) PRT: a) definition, b) benefits, c) barriers; (3) importance of peer interaction skills as an intervention target; (4) recommendations for location of training; (5) recommendations for timing of intervention: grade, time of year and time of day; (6) peer intervention agents: a) benefits, b) barriers, c) recommendations for suitable peers; (7) intervention feasibility; (8) overall perceptions of strengths and weaknesses; and (9) overall endorsement. Themes were very similar between educators and EIP for all but 2 themes. Therefore, data for the two groups were collapsed across themes, except those related to (1) EBP and (2) PRT, which remained separated by group. Representative quotes are provided below as descriptive examples of the data.

(1) Evidence-Based Practice

a) Definition.

i) Early intervention providers/school board autism specialist team definition of

EBP. These participants consistently supplied accurate definitions of EBP.

“...it means that those practices or interventions are supported in research that has ... gone through the proper procedures of being peer-reviewed and published.”

ii) *Educator definitions of EBP.* Educators tended to identify any intervention as being evidence-based if it involved individual data collection to track progress before and after intervention.

“Tracking it [target behavior] with data as you are going along so that you have some concrete evidence that yes, he has made some progress.”

b) Importance of EBP. Both educators and EIP unanimously shared that EBP was important. Effective/efficient resource usage was the primary reason endorsed.

“... we hope that it will lead us to effecting change in whatever behavior we’re trying to target sooner rather than later. You know versus sort of a throw something at them, guess at it, maybe measure it, and a lot of time gets wasted. “

“... it makes more sense from a tax payer’s perspective, and you know, we’re asking our school system, or we’re paying our school board to support kids, we want to be having them spend EPA [educational program assistant] time and learning centre time and resource time; ideally that time is spent with children doing what we know is most likely going to benefit the kids based on the research that’s out there, so we’re sort of making an efficient use of our funds.”

(2) PRT

a) Definition of PRT. While most participants had accurate perceptions of PRT, definitions ranged from basic to comprehensive. Educators tended to have a basic behavioral understanding of PRT; not surprisingly, EIP had an in-depth understanding of PRT, as it is the primary treatment modality used within their program.

i) *Educators.* Educators most commonly understood that PRT was based on behavioral principles. They also commonly had heard of PRT in the context of an ASD intervention program used in their school district (i.e., Strategies for Teaching based on Autism Research; Arick, Loos, Falco, & Krug, 2005).
“it is based on the behavior treatment right? The ABA, yes, I think that’s how I’ve heard of it.”

ii) *Early intervention providers.* EIPs had an in-depth understanding of PRT, and could consistently list pivotal intervention targets and specific intervention strategies.
“PRT targets pivotal areas, namely motivation, initiations, and self-management, through child choice, child led activities to try to effect change in less preferred behavior, and try to teach new skill and behavior... it was primarily developed to target verbal communication...it’s actually meant to be used in a child’s natural environment by those who naturally, typically occur in a child’s environment ...”

b) Barriers to the Use of PRT. Educators and EIP reported some barriers to the use of PRT in classrooms. In general, participants reported that it was difficult to find a staff member to implement PRT in the classroom.

“... an adult to do it in the classroom.”

Educators noted that it was challenging to find motivators in the context of an academic classroom.

“Yeah, finding effective motivators ... this is your shortcoming in PRT.”

Educators also reported concerns about finding the time to collect data in the context of the classroom/school.

“What I find is the hardest is collecting any data, because you’re in that moment.”

c) Benefits of PRT. Participants consistently reported that a main PRT target, verbal communication, made sense to them and fit within their goals for students with ASD at school.

“So I think this type of communication really fits well and I think, already, in some schools we’re doing a lot of this. And communication is the over-arching key, I mean it is the umbrella under which everything else falls ...”

Participants reported that PRT also had the benefit of increasing generalization of children’s skills.

“Again, it can be done in a natural environment, it uses the natural reinforcers.”

“... if it’s more context based or real world based for a child then of course the learning would be more influential.”

“PRT... seems to more easily allow the skills to generalize than other forms of therapy”

Themes derived from Educators and EIP are presented together for the remaining categories.

(3) Importance of Peer Interaction Skills as Intervention Target

There was clear consensus that peer interaction skills were an important intervention target for children with ASD at school. Educators and EIP often reported that peer interaction skills were as or more important than academics for children with ASD.

“I would say it is the number one goal of every parent ... parents would rather their child be accepted than they learn all of the academics.”

“ Literacy, numeracy....this is what I focus on, ...but in my heart of hearts I know language, social skills, anxiety, all that stuff is actually probably more of a priority.”

(4) Recommendations for Location of Intervention

Educators and EIP unanimously reported that school was a good location for the intervention. They reported that school was the ideal location for social skills interventions owing to the abundance of peers, opportunities for social interaction and amount of time spent at school.

“School is a social environment, so yes, absolutely. We have the peer groups right there!”

“Schools are social villages and this is where kids spend most of their time.”

“It makes a lot of sense to optimize that naturally occurring group of children, who are going to be with the kid for at least a year...”

Participants also reported several ideal school locations for the intervention including special education classrooms, play-based centres within kindergarten classrooms, and the gym. Other prominent recommendations included provision of intervention in multiple locations, and in individualized locations according to the child’s needs.

“...it’s going to be so individualized based on the individual needs of the students that you’re targeting.”

“I would say, any and all places at school whether that’s the classroom, the lunch room, the gym, outside, recess, the playground.”

Views of the school playground as an intervention location were mixed. Approximately half of the participants thought that the playground (i.e., at recess and lunch time) should

be a respite for both the children and staff, whereas others felt that the playground was a good location/time for social skills intervention.

“... recess environment ... that’s the environment eventually you want to generalize the social skills to but of course with some of our kids with ASD that’s an overwhelming time”

Recess as respite:

“It’s hard because it’s the kids’ break. It’s hard to place a demand on them when it’s their break ... it’s hard to ask their peers because if they’re all split up from their friends ... especially in kindergarten, there are kids that wouldn’t mind, they’d be excited and feel that they were being a helper and stuff”

Recess as an intervention opportunity:

“And even in the playground, because that’s where kids interact the most really and I lucked out this year. I have a fabulous EPA; he just gets it.”

“Well, just because you have access to so many peers”

(5) Recommendations for Timing of Intervention (i.e., Grade, Time of Year, Time of Day)

Kindergarten as the time of intervention. Participants’ opinions were split on whether kindergarten was a good time for the intervention. The main perceived benefits of implementing the intervention in kindergarten were: that the child would start off on the right foot; the fact that children are more adaptable before routines are set; and that kindergarten is a period of emerging friendships.

More adaptable before routines are set:

“Once they get into school routines . . . , it’s hard to change something, so if I haven’t asked them to interact with a peer for a year and a half and all of a sudden I am, that’s a hard behaviour to change”

Period of emerging friendships:

“The longer you let those, you know, our non-ASD kids develop relationships, and get into friendships, and learn how to play with each otherall that social stuff, the longer our [ASD] kids are not a part of it, I think it’s more work to get them to be a part of it, and socialize”

The main expressed drawbacks of beginning social skills intervention in kindergarten were that children and teachers need more time to adjust, and that teacher-parent relationships have not yet formed.

Teachers and children need more time to adjust:

“Sometimes we have students that end up not being able to cope well with classroom environment initially.”

“It’s a busy job for primary teachers in the early part of the year too.”

Teacher-Parent Relationships not yet formed:

“... a new family to the school, not having an opportunity to really build those relationships and trust just yet so again... they just may be a little hesitant to come and get involved.”

Time of year. Participants most commonly reported that either November or immediately after the children begin school were the best times to conduct the intervention. Other prominent themes concerned times during the first year of school *not* to conduct the intervention: September, October, “close to Christmas” and June.

“November... it gives time for everybody to kind of get settled and get to know each other and routines ... to identify which peers are going to be your best students.”

“Definitely not September or not October really, and I’m not leaving you with very many options but I would avoid ... the very end of the school year. That’s a hard time on staff, like report card time ... Or just before Christmas there’s a lot of change in the schedule and a lot of extra sort of activities happening, so just even finding the time to facilitate those situations would be difficult.”

Time of day. Educators and EIP shared common perspectives on the time of day best suited to conducting the intervention, with most participants suggesting morning. The remaining responses were split between two options: all day, or individualized for each child.

“I just think that children, in general, their best time is in the morning, right?”

“when they’re transitioning in that first year, that, by the time one o’clock comes, they’re all ready for a nap. They’d be resting, right, if they were in preschool. ... So morning is definitely the optimal learning time, in my opinion. With both peers and kids with autism.”

(6) Peer Intervention Agents

All EIP thought that using peers as intervention agents was a good idea. This opinion arose from direct clinical experience of success with in vivo coaching of TD peers in preschools.

“It looks different but you can really have a five-year-old doing some pretty good PRT”

Educators were divided on their perceptions of having TD peers as intervention agents for children with ASD. Approximately half of the participants thought that it was a good idea, and others had reservations.

- a) Barriers.** Educators identified the following concerns about TD peers acting as the primary intervention agent: possible creation of a power imbalance between the child with ASD and TD peer (i.e., creating a teacher-student dynamic vs. a peer-peer interaction); possibility that peers may be unable to fulfill their role of providing intervention; and anticipated parental apprehension.

“... provided that there’s not a burden put on the child and ... the responsibility is appropriate for a child of 5 years old to be a peer interventionist or peer mentor or however you phrase it. ”

“Some parents will tell you straight up ... I don’t want my child teaching other kids.”

- b) Benefits.** Educators identified the following primary benefits of using peers as intervention agents: peers are good models (many noted that peers would be better social skill models than adults); use of peers fosters skill generalization and friendships; and peer interaction promotes acceptance of ASD classmates among TD children.

“ They’re better models than we can be, just because they talk in that language ... sometimes we train some of these kids and you can tell when they’ve been trained. I’m always so mindful of that when I work with kids. Oh, I just created a mini-me. ... Didn’t mean to do that ... ”

“... so I think it’s a good way to teach the typically developing child that they’re [child with ASD] not a scary person, and the social interaction at the same time.”

(7) Intervention Feasibility

Educators and EIPs thought that PM-PRT was a feasible intervention for school. However, several factors were recommended to increase intervention feasibility: staff support; respect for the schools' scheduling and time constraints by intervention staff; and appropriate selection of peers.

“The administration sees supporting students that have autism as whatever you need to do to support that student, that’s what we do. It’s not – it’s not an inconvenience or a thing we need to work around, it’s just that’s the way it is ... which is a big help.”

“The principal is really great for encouraging and she’s really involved. In some schools, you get principals who don’t know where the learning centre is, but she’s very involved and knows, you know, everything that goes on. So ... you have the support for sure to be able to do it.”

(8) Overall Perceptions of Intervention Strengths and Weaknesses

Educators and EIP identified several key strengths and limitations of the proposed peer-implemented PRT intervention for students in kindergarten. Participants identified more themes related to strengths than to weaknesses. Proposed weaknesses included uncertainty as to how to train peers, and to the long-term sustainability of this intervention model. Participants identified the following key strengths: ecological validity of the model; the fact that the model fosters generalization; improvement of socialization and potential to foster friendships; promotion of acceptance of disabilities; and cultivation of leadership among peer intervention agents.

(9) Overall Endorsement

We asked participants, “Do you think we should pilot test the proposed intervention in your school board?” Participants responded according to a 5-point scale ranging from ‘Definitely no’ to ‘Definitely yes.’ Most participants (73%) responded ‘Definitely yes’ and the remaining 27% responded ‘Yes with reservations.’ Participants primarily indicated reservations about the potential impact of externalizing behavior problems of children with ASD on peer intervention agents. Educators also requested good communication with the classroom teacher, and training in PRT procedures.

Discussion

This study provides qualitative information on educator and EIP perspectives on how PM-PRT may be implemented at school to improve the social skills of children with ASD. We sought to reveal perspectives on EBP, on specific aspects of PM-PRT, and on the feasibility of PM-PRT at school. Several key findings may guide the effective implementation of PM-PRT at school.

Importance of Intervention Target

First, members of both stakeholder groups (school staff members and EIP) unanimously agreed that EBP was important for children with ASD at school. In addition, peer interaction skills were perceived as a worthy intervention target by both EIP and school providers. This is a notable finding, as schools are often said to prioritize academic goals over socialization goals (Locke et al., 2015). This school board, however, is introducing play-based curricular elements for early elementary students, and supports another social skills initiative for adolescents with ASD. Thus, the perceived importance of social skills may influence intervention uptake at both the individual school and

district-wide levels (Dingfelder & Mandell, 2011). Ideally, social skills instruction should be mandated at a district level for students with ASD. Stakeholders should work together to incorporate evidence-based social skills instruction in the early elementary curriculum, including individualized education programs for children with ASD (Etscheidt, 2003). An interesting avenue for future work is to incorporate the activities of TD peers as intervention agents into curricula (e.g., in the areas of healthy relationships, citizenship, and leadership).

Benefits to the Use of PRT at School

Stakeholders reported that PRT is a valuable intervention for children with ASD at school. The most commonly reported strength was PRT's naturalistic strategies. Participants thought that PRT promotes generalization of social-communication skills, consistent with empirical research (Koegel et al., 2001). PRT's naturalistic methods were considered both a benefit and a barrier in a qualitative study examining perspectives of adult-implemented PRT (Stahmer et al., 2012). In that study, although many teachers viewed PRT's naturalistic features as a benefit at school, some preferred more structured intervention approaches. In contrast, current participants did not express such a preference for structured intervention.

Barriers to the Use of PRT at School

The key potential barriers we identified to the implementation of PRT at school were the time and training resources needed to implement PRT and engage in data collection, and the practical aspects of conducting PRT in the classroom. Barriers were generally consistent with those identified in other qualitative studies. Such studies examined educators' perspectives on adult-implemented PRT (Stahmer et al., 2012), the

education of children with ASD in an inclusive setting (Corkum et al., 2014), and a specific social engagement intervention (Locke et al., 2015). Given that similar barriers have been identified across studies taking place in school districts in different countries, these issues should be systematically investigated so that we might understand how to address them. It is unclear how specific barriers affect the uptake and/or on-going use of PMI (Locke et al., 2015). Training staff in novel applications of EBP in community settings should also take account of the barriers identified here.

Perceptions of the Concept of Peers as Intervention Agents

The uptake and sustained use of PMI in community settings is likely linked to attitudes about the suitability of peers as intervention agents (Chan et al., 2009; Locke et al., 2012). In the current study, perspectives of educators and EIP differed regarding this issue. EIP unanimously endorsed same-aged peers as social skill coaches for children with ASD, whereas educators had mixed feelings about this role for peers (e.g., concerns regarding both peers' ability to provide intervention, and their parents' perceptions). To our knowledge, only one study has examined the impact on TD children, from a quantitative social network perspective, of being a peer coach for children with ASD (Locke et al., 2012). That study suggested that peer intervention agents were equally socially connected to their other classmates after the intervention, compared to beforehand. Our study highlights qualitative perceptions of peers as intervention agents that have not been previously documented. We see these data as illustrating the value of using qualitative research methods and multiple stakeholder perspectives when planning, developing and implementing interventions for community use.

Using Educator Feedback to Inform Adaptations of PM-PRT for School Use

Encouragingly, stakeholders viewed most aspects of the proposed intervention (PM-PRT) positively. They agreed that the intervention should be conducted in the first year of school and that the intervention target (peer interaction skills) was important for children with ASD at school. The barriers that the participants identified prompted modifications of the PM-PRT intervention. Specifically, we followed educators' recommendations for intervention timing (e.g., beginning in November, conducting intervention sessions in the morning). It is also noteworthy that the use of peers as intervention agents was viewed as a promising and pragmatic approach to enhancing the social skills of children with ASD. Specific barriers to the use of peers as intervention agents (e.g., creation of a power imbalance between the child with ASD and TD peer, doubts regarding peers' ability to fulfill the role, and anticipated parental apprehension) were addressed through thorough informed consent procedures, and by spending additional time with educators and parents describing peer roles and dispelling myths. The present study also offered practical considerations for planning and implementing PM-PRT at school. For example, educators valued ample communication with researchers regarding scheduling, and teachers' involvement in the peer selection process. By soliciting stakeholders' viewpoints about PM-PRT, and applying specific adaptations, we aimed to enhance dissemination of PM-PRT and to help address the research-to-practice gap for children with ASD at school (Dingfelder & Mandell, 2011).

Research Directions

The present study represents an important step toward wider dissemination of PM-PRT. We examined attitudes toward EBP and intervention targets, as well as

practical considerations for PM-PRT implementation. Attitudes toward EBP have been shown to influence clinical practice and recommendations (Christon et al., 2015). Future research should examine finer-grained aspects of the treatment, such as the acceptability and feasibility of specific PM-PRT techniques (e.g., gaining attention, narrating play). By further understanding stakeholders' perceptions of techniques, we may better tailor training efforts (Stahmer et al., 2012). We were encouraged that our findings showed agreement between health and education system stakeholders who were engaged in the present study. We examined individual-level staff perspectives on PM-PRT. However, macro-level factors (e.g., school, district, or provincial) may also impact the acceptability, feasibility, and long-term sustainability of PM-PRT. Views of other stakeholders are also relevant. In a forthcoming paper, we will examine perceptions of parents of young children with ASD, parents of TD children (i.e., potential peer coaches), and youth with ASD regarding the use of PM-PRT at school.

Conclusions

Overall, this study represents a promising IKT approach to provision of PRT in a peer-mediated school-based model, incorporating engagement with stakeholders as a critical part of a treatment approach for children with ASD (Wood et al., 2015). The research builds on foundational work examining perceptions of adult-implemented PRT (e.g., Stahmer et al., 2012), and contributes to the literature on PM-PRT. The present study also addresses gaps in understanding perceptions of peers as intervention agents, and in school-based adoption of EBP.

Table 3.1

Participant Demographic Information

Variable	Educators	EIP
	N=24	N=5
Gender		
Male	1	0
Female	23	5
Mean age category	31-40 years	31-40 years
Years of experience		
Field	16	5
Specialty area	11	9
Autism	8	13
Highest degree held		
Bachelor's	6	2
Master's	16	1
Doctorate	1	2

EIP: Early intervention providers

CHAPTER 4. STUDY 3: PEER-MEDIATED PIVOTAL RESPONSE TREATMENT AT SCHOOL FOR CHILDREN WITH AUTISM SPECTRUM DISORDER

The manuscript based on this study is presented below. Readers are advised that Ainsley Boudreau, under the supervision of Dr. Isabel Smith, designed the study, organized and managed participant recruitment, delivered the intervention and collected data. In addition, she conducted the data analyses, wrote the manuscript and revised the manuscript in accordance with suggestions from the co-authors. The manuscript has been submitted to the *Journal of Autism and Developmental Disorders*. The full reference for this manuscript is:

Boudreau, A., Corkum, P., Meko, K., & Smith, I. M. (2015). Peer-mediated Pivotal Response Treatment at school for young children with autism spectrum. Manuscript submitted for publication.

Abstract

The main objective of the present study was to evaluate the efficacy of peer training in PRT for children with ASD in their first year of school. Four 6-year-old boys with ASD and eight TD peers participated in the study. A non-concurrent multiple probe (across participants) baseline design was used. Outcomes were assessed before, immediately after, and 6 to 9 weeks following training. Overall, rates of social initiation and peer engagement increased following training for three of the four children with ASD and were maintained at follow-up. TD peers' fidelity in implementing PRT techniques also improved. The present study suggests that relatively brief peer training in PRT can produce immediate and short-term sustained social-communication skills of children with ASD at school.

Introduction

Children with autism spectrum disorder (ASD) can improve their social functioning as a result of peer-implemented Pivotal Response Treatment (PRT; Koegel, Koegel, & McNERNEY, 2001) delivered at school (see Boudreau, Corkum, Meko, et al., 2015a for a review). Training same-aged typically developing (TD) peers to provide social skills interventions to children with ASD is a potentially efficient and cost-effective method of service delivery (Chan et al., 2009; Reichow, Volkmar, & Cicchetti, 2008). Peer-training approaches are thought to further enhance learning from normative peer models, motivation, and generalization of skills (Chan et al., 2009). PRT is a naturalistic intervention approach that also enhances generalization (Verschuur, Didden, Lang, Sigafos, & Huskens, 2014), and has amassed impressive empirical support for its efficacy with children with ASD (NAC 2015; Wong et al., 2014). However, surprisingly little research has been published on PRT using this promising intervention delivery method (peer training). Moreover, no study has examined peer-implemented PRT during the critical first year of school.

A systematic review of social skills interventions for children with ASD (Reichow & Volkmar, 2010) found that peer training, and interventions based on applied behavior analysis, were the most frequently used types of interventions for school-aged children with ASD (Reichow & Volkmar, 2010). Convincing support for the effectiveness of a peer training approach for 6- to 11-year-old children with ASD at school is provided by a randomized control trial (RCT) (Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012). This study compared a brief peer-mediated intervention (PMI) and a child-assisted intervention (i.e., adult-directed with child interaction opportunities) for

improving the social skills of 60 high-functioning children with ASD ($M = 8.14$ years; $SD = 1.56$) from 30 schools. PMI was superior to non-PMI on several outcomes (e.g., salience in the social network, number of friendship nominations, teacher-reported social skills, and decreased isolation) and gains were maintained 3 months after treatment. Another recent RCT also demonstrated the effectiveness of incorporating peer training into a larger intervention approach for children with ASD (i.e., peer network intervention; a small group of TD children who facilitate the social integration of a child or children with ASD) as early as kindergarten and grade one (Kamps et al., 2014). Despite the evidence base supporting PMI for children with ASD, only five studies to date have investigated PMI using PRT (Harper, Symon, & Frea, 2008; Kuhn, Bodkin, Devlin, & Doggett, 2008; Pierce & Schreibman, 1995, 1997a, 1997b). This is surprising given the growth of research on PRT (e.g., Verschuur, Didden, Lang, Sigafoos, & Huskens, 2014) and the empirical support for both PMI and PRT (Boudreau, Corkum, Meko, et al., 2015a).

Pierce and Schriebman (1995) published a manualized peer-mediated PRT (PM-PRT) program and tested its effectiveness. They found that 10-year-old target children with ASD showed increased language and social interactions with their peers (Pierce & Schreibman, 1995). Subsequently, they extended their work by demonstrating that the social gains of children with ASD generalized to untrained peers (Pierce & Schreibman, 1997a). Moreover, PM-PRT increased the range of toy play of the children with ASD, and improved the quality and frequency of their language use (Pierce & Schreibman, 1997b).

Support for PM-PRT also comes from a school-based study incorporating strategies implemented on the playground during recess (Harper et al., 2008). Children with ASD in third grade ($M = 8.9$ years) demonstrated increased social initiations and turn-taking. In an interesting variant of PMI, Kuhn et al. (2008) provided PRT training to special education classroom peers of children with ASD (7-8 year-olds), resulting in increased social interaction between the students with ASD and their classmates. Since children with developmental delays in that study learned and applied PRT strategies with treatment integrity, perhaps younger TD children also could. Our recent review synthesized the PM-PRT findings in depth (Boudreau, Corkum, Meko, et al., 2015a). We found that 4 of 5 studies demonstrated adequate research rigour, and that the social-communication behavior (e.g., social initiations and responses) of children with ASD improved as a result of participation in PM-PRT. However, owing to the small number of studies, PM-PRT did not meet criteria for evidence-based practice (Reichow et al., 2008).

The present study examined, using a single-case design series, the effects of training TD peers in the first year of school (4- to 6-year-olds) to use PRT strategies when interacting with children with ASD. The primary research question was whether the social behavior of children with ASD, specifically engagement and rate of social initiations with peers, would increase at post-training and at follow-up approximately two months later. As a secondary aim, the study examined whether TD children as young as 4 to 6 years could learn to implement the PRT strategies with fidelity. Finally, we examined what, if any, impact participation in peer training had on peer coaches' own behavior and social skills, as reported by parents and teachers. We also examined whether participation had any effect on peers' self-reported acceptance of disabilities.

Method

Participants

Two main participant groups were involved in this study: children with ASD and TD classmates who served as social skill coaches (hereafter, “peer coaches”). TD classmates who were not trained in PM-PRT served as generalization peers.

Children with ASD. Participants were four children diagnosed with ASD (4 boys; mean age = 6 years, 4 months), recruited based on their previous participation in a publicly funded behavioral intervention program that uses PRT as its primary treatment method (Bryson et al., 2007). Other inclusion criteria were: child aged 4–6 years diagnosed with ASD (described below), with at least phrase speech, enrolled in the first year of public school. We excluded children with externalizing behavior that was judged (by their early intervention providers) to interfere with participation.

All children were diagnosed with ASD by experienced clinical teams (consisting of developmental pediatricians and psychologists) independent of the researchers, using DSM-IV-TR (APA, 2000). Diagnostic assessments included the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 1999) in all four cases, and the Autism Diagnostic Interview – Revised (ADI-R; Lord et al., 1994) in 3 of 4 cases. All children exceeded the ADOS cutoff for ASD. Table 1 summarizes the children’s characteristics at baseline (age, sex, communication, adaptive and cognitive abilities).

Peer coaches. Participants were four TD children (3 males and 1 female; mean age = 5 years, 8 months), each nominated by their teacher based on these inclusion criteria: child aged 4–6 years who was typically developing (TD, according to parent and

school staff reports) and in the same class as a selected child with ASD, and a parent able to understand/read English at a level appropriate for the consent process.

Non-trained generalization peers. Participants were four TD children (3 males and 1 female; mean age = 5 years, 3 months), nominated by their teachers based on the same inclusion criteria as for peer coaches.

Study Design

A non-concurrent multiple-baseline, multiple-probe design was used across participants (Gast & Ledford, 2014). Participants remained in the baseline (pre-training) phase for 1 to 3 weeks. The timing of baseline probes was randomly assigned to baseline lengths of 4, 5, 7, and 9 days. The effects of the intervention were evaluated at both the end of the 3- to 4-week training period (i.e., post-training), and at 6 to 9 weeks following training (i.e., follow-up). The training phase continued until the peer coach implemented PRT with at least 80% fidelity across one probe. We conducted two types of generalization probes, one pairing the child with ASD and peer coach in a non-training location (e.g., another empty room in the building; gathered at post-training and follow-up), and one in which the child with ASD interacted with a non-trained TD peer (probes gathered pre-training, post-training, follow-up).

Peer Education Procedures, Settings and Materials

Peer training sessions. Training of peer coaches by the first author occurred during mornings for a minimum of eight 20-minute training sessions over approximately eight consecutive school days, yielding a total of 2.7 hours of individual training in PRT techniques. The sessions occurred in an empty classroom with a standard set of toys comparable to those used in the literature (Pierce & Schreibman, 1997b). During the first

session, peer coaches were provided with general information and a manual in which each PRT strategy (Paying Attention, Child Choice, Taking Turns, Encourage Conversation, Narrate Play, and Reward/Reinforce Attempts; definitions adapted from Koegel, Schreibman, Good, Cerniglia, Murphy, & Koegel, 1989; Koegel & Koegel, 2006; Pierce & Schreibman, 1995; see Appendix for definitions) was represented in both pictorial and written form (Pierce & Schreibman, 1995). During the first two sessions, peer coaches were introduced to six basic PM-PRT principles and the trainer modeled the techniques for the child. These strategies from the Pierce and Schreibman (1995) manual were the most frequently cited in the existing literature (see Boudreau, Corkum, Meko, et al., 2015a). In the next two sessions, the trainer asked peer coaches to explain each strategy, and to guess whether the trainer demonstrated the strategy correctly or incorrectly during role play. Sessions 5 and 6 involved role-playing the strategies with the trainer. Sessions 7 and 8 involved review and practice of all strategies. Training ended when the child demonstrated PRT strategies with the first author or a research assistant with mastery [i.e., 75% correct demonstration of skills (Koegel & Koegel, 1995; Stahmer & Gist, 2001)] during a 10-minute probe; this was coded in vivo by the trainer or research assistant, and later confirmed by video coding.

Intervention. After training, each TD peer coach was paired with a child with ASD for videotaped 20-minute play sessions. During one 10-minute block, the trainer gave the coach intermittent feedback; no feedback was provided in the other 10-minute blocks. The 10-min block during which feedback was provided alternated from session to session across eight sessions implemented over eight approximately consecutive school days. The first session always began with the feedback block; the following day the no-

feedback block was first. At the outset of each session, the trainer provided brief feedback to peer coaches regarding their performance during the previous session.

Recording of data. Two high-definition digital camcorders with surround-sound microphones were used to collect the video probes. Video data were coded using Noldus: The Observer Video-Pro 5.0 XT software (Noldus Information Technology; Jansen, Wiertz, Meyer, & Noldus, 2003).

Trainer fidelity. A research assistant trained in PRT examined 97% of the video-recorded sessions. One session was lost due to a technical error. An implementation checklist was used to code the trainer's performance (whether or not the trainer implemented core components) and a total percentage correct score was calculated for each session. The mean fidelity score across 8 sessions was 90% (range 86–92%), indicating that the trainer adhered closely to the training protocol (Pierce & Schreibman, 1995, 1997).

Outcome Measures (Children with ASD)

Social-communication. Two measures were used to index changes in children's social-communication. (a) *Percentage of peer engagement.* Following Koegel et al. (2012a, 2012b, 2013), engagement with peers was defined as the child with ASD remaining in proximity to the peer coach (i.e., approximately 5 feet, or as appropriate for the activity) and participating in one of the following social activities: talking, playing a game, creating something together, discussing the activity, or listening to the peer while making appropriate eye contact. After coding the continuous recording, the number of minutes of peer engagement was divided by the total recording time (target of 10 minutes during the non-feedback blocks) and multiplied by 100 to yield a percentage. (b) *Rate of*

social initiations. Ten-minute video segments were also coded for each independent spontaneous verbal communication that the child with ASD directed toward the peer coach. Following Koegel et al. (2012a, 2012b, 2013), appropriate initiations included unprompted requests, questions or comments to TD peers that were relevant and/or elicited additional information pertaining to the current conversational topic. At the end of the session, the total number of tallied initiations was divided by the probe length, to yield a per-minute rate of initiations.

TD comparison data. Four dyads of TD children (peer coaches and non-trained generalization peers; mean age = 5 years, 8 months) provided estimates of the typically expected range for both social-communication variables. TD peer dyad data were recorded in exactly the same manner as the data for the dyads of children with ASD and peer coaches; the sessions occurred in an empty classroom with the same toy set. Four 10-minute probes were aggregated to establish typical comparison data.

Satisfaction. Parents, teachers and children completed a questionnaire assessing their satisfaction with the intervention, created for the purpose of the current study. The parent questionnaire consisted of four statements, each rated on 5-point Likert scale ranging from ‘do not agree at all’ to ‘strongly agree.’ Parents rated items such as: “The program’s target, peer interaction skills, is an important goal for my child” and “I would be interested in learning the program strategies.” The teacher questionnaire consisted of 11 items, also rated on the 5-point Likert scale. Teachers rated statements such as: “The program had a positive impact on ____’s social functioning” and “The research staff respected the classroom routine.” Parent and teacher satisfaction forms were completed following the intervention. A teacher (classroom teacher or special education/resource

teacher) who did not participate in the intervention completed the child satisfaction questionnaire with each child immediately following each session. The child satisfaction form consisted of one item, “Show me how much you liked what you did today.” Children were instructed to point to one of five faces (a 5-point pictorial scale ranging from a sad to a happy face) that best described their experience in the session.

Outcome Measures (Peer Coaches)

Fidelity of PRT implementation. Continuous 1-minute interval coding (ten intervals) was used to measure fidelity of PRT implementation. Each interval was coded as either correct or incorrect for each of the following six techniques: Paying Attention, Child Choice, Taking Turns, Encourage Conversation, Narrate Play, and Reward/Reinforce Attempts (definitions adapted from Koegel, Schreibman, Good, Cerniglia, Murphy, & Koegel, 1989; Koegel & Koegel, 2006; Pierce & Schreibman, 1995). The fidelity of implementation score was computed globally for each probe (across all techniques) by dividing the number correct by the total number of correct plus incorrect and multiplying by 100. The criterion for fidelity of implementation was 75% (Koegel & Koegel, 1995; Stahmer & Gist, 2001).

Attitudes of TD children toward peers with disabilities. Peer coaches’ acceptance of disabilities was measured using the Acceptance Scale for Kindergarten-Revised (ASK-R; Favazza & Odom, 1999). This child-report questionnaire consists of 18 items each rated on 3-point pictorial scale, each response category yielding a score [happy face (for Yes = 2), sad face (for No = 0), ‘half happy face’ (for Maybe = 1)]. Total scores ranged from 0 to 30, with higher scores reflecting more positive attitudes.

Concurrent validity. Two measures of concurrent validity were gathered at pre-training, post-training and follow-up. Parents and teachers of the children with ASD independently completed the (a) *Social Skills Improvement System Rating Scales* (SSIS-RS; Gresham & Elliott, 2008; Gresham, Elliott, & Kettler, 2010). The SSIS-RS assesses social skills, problematic behaviors and academic competence. The Social Skills scale was the focus of this study; social skills are categorized as strengths, acquisition deficits, or performance deficits, with or without competing problem behaviors. The Social Skills domain is comprised of cooperation, assertion, responsibility, empathy, engagement, self-control and communication. Parents also completed the (b) *Child Behavior Checklist Ages 4–18* (CBCL/4-18; Achenbach & Rescorla, 2001) and *CBCL Ages 6–18* (CBCL/6-18; Achenbach & Rescorla, 2001). The CBCL provides a total score indicative of clinical status as well as two broad-band scores (externalizing, internalizing) and sub-scale scores.

Satisfaction. Parents and children completed a questionnaire assessing their satisfaction with the training, created for the purpose of the current study. The parent questionnaire consisted of 4 items rated on 5-point Likert scale ranging from ‘do not agree at all’ to ‘strongly agree.’ Parents rated statements such as: “My child enjoyed taking part in this research study” and “I would recommend this research study to others.” Parent satisfaction questionnaires were completed immediately following the intervention. The child satisfaction form was identical in content and process to that completed by the children with ASD.

Data Collection Procedures

Ten-minute video-recorded probes were collected during pre-training, post-training and at follow-up. In each phase, a research assistant unknown to the children video-recorded the TD peer (coach or generalization peer) interacting with the child with ASD during play with standard toys in a classroom. Research assistants were instructed to record unobtrusively by positioning the tripod in a corner of the room and minimizing interactions with the children. Four to five video probes were collected on separate days during the pre-training phase (ranging from 1 to 3 weeks), and 4–5 probes were collected on separate days during each of the post-training and follow-up phases. Each video probe was coded for the social-communication outcome measures by one of two independent coders, blind to experimental phase. Two additional independent coders blind to experimental phase coded video probes for fidelity of implementation.

Inter-Observer Reliability

Two independent coders (one from of each pair of coders described above), blind to experimental phase, coded 30% of the videos, including equal numbers of randomly selected pre-training, post-training and follow-up videos from different children. For videos coded for the occurrence versus non-occurrence of behavior, inter-observer reliability was calculated per interval using both inter-observer agreement and kappa coefficients (Cohen 1960). Intra-class correlations were calculated for interval/ratio measures. The mean inter-observer agreement was 84%, with kappa of .72 (“good” agreement; Cicchetti, 1994; Watkins & Pacheco, 2000) for fidelity of implementation. For social-communication variables, intra-class correlations were excellent (peer engagement: .99; rate of social initiations: .95).

Analyses

Both visual inspection (Barlow, Nock, & Hersen, 2009) and percentage of non-overlapping data (PND; Scruggs, Mastropieri, & Casto, 1987) were used to evaluate individual differences in the effectiveness of the intervention. Percentage of data points exceeding the median of baseline phase (PEM; Ma, 2006) was also calculated. Given the similar but somewhat higher scores using PEM, we report the more conservative and commonly reported PND approach. This method of analysis calculates the percentage of overlap between baseline and post-intervention phases. A PND greater than 90% is indicative of a “highly effective” intervention, a PND between 70% and 90% reflects “fair effectiveness,” a PND between 50% and 70% is considered of “questionable effectiveness,” and a PND below 50% reflects an “unreliable or ineffective” treatment (Scruggs, Mastropieri, Cook, & Escobar, 1986). For percentage of peer engagement and rate of initiations, individual sets of data were displayed graphically and inspected for changes in level upon introduction of the training (Kazdin, 1982). Peer fidelity-of-implementation data were aggregated across probes and training phases (see Table 5).

Results

As can be seen in Figures 1 and 2, we used a non-concurrent multiple probe baseline (across-participants) design with four dyads, each consisting of a child with ASD and a peer coach (see Table 6 for an overview of global outcomes for children with ASD after intervention).

Outcomes (Children with ASD)

Peer engagement. Figure 1 presents data on engagement between child with ASD – peer coach dyads. During the baseline phase, three children with ASD

(Participants 1, 3 and 4) demonstrated low to moderate levels of engagement. Participant 1 was observed engaging with his peer coach 37% of time throughout the condition (range = 1–58%); similar levels of baseline engagement were observed for Participant 4 ($M = 40\%$; range = 11–65%). Participant 3 was engaged with a typical peer 10% of the time (range = 0–23%). Participant 2 had high baseline levels of engagement ($M = 62\%$; range = 18–95%). Overall, the mean baseline engagement across the four participants was 37% (range = 10–62%).

Following the intervention, three dyads demonstrated an immediate marked improvement in engagement. Participants 1 and 4 achieved mean engagement scores of 96% (range = 86–100%) and 94% (range = 77–100%), respectively. For Participant 2, a mean of 65% (range = 48–98%) was evident, whereas Participant 3 achieved a mean engagement score of 38% (range = 10–73%). Overall, the mean percentage of engagement across the four dyads was 73% (range = 38–96%).

Follow-up data were collected for each dyad six to nine weeks after intervention to assess the maintenance of skills. Percentages of engagement were 91%, 86%, 92% and 78% for Participants 1, 2, 3, and 4, respectively. Overall, the mean percentage of engagement across the four dyads at follow-up was 87% (range = 78–92%). As indicated in Table 2, the PND for percentage of peer engagement suggests a high level of change between baseline and follow-up for Participants 1, 3, and 4. The intervention was of questionable effectiveness for the peer engagement of Participant 2, whose baseline level of peer engagement was high.

Three children with ASD (Participants 1, 3, and 4) demonstrated moderate to high levels of engagement with peer coaches in a non-training location (90%, 61%, and 81%,

respectively), whereas Participant 2 displayed a mean of 44% (range 0–86%). All four children with ASD demonstrated high levels of engagement with their peer coaches in a non-training location at follow-up with a mean score of 87% (range = 79–100%).

The assessment of generalization across non-trained TD peers revealed that three of the four children with ASD were engaged with non-trained peers immediately following intervention. There was no basic effect (i.e., no change between baseline and intervention) for Participant 1 and 3. A strong basic effect is shown for Participant 2. A weak (i.e., variable) basic effect is shown for Participant 4. At follow-up, Participant 1 demonstrated maintenance of engagement levels. Participants 2 and 4 demonstrated maintenance of engagement levels with increased and continued variability, respectively. Participant 3 demonstrated delayed improvement in levels of engagement at follow-up. Participants 1, 2 and 4 had the highest levels of engagement with non-trained peers immediately after intervention (99%, 51%, and 19% respectively), whereas Participant 3 demonstrated no engagement with the non-trained peer (0%). By follow-up, three children with ASD generalized engagement to non-trained peers yielding a mean of 64% (range = 34–99%). Participant 3 continued to have the lowest levels of engagement with a non-trained peer (8%) at follow-up. Of note, however, the TD peer paired with Participant 3 for generalization probes also displayed no engagement with the peer coach during the standardized play probe. Table 2 also displays PND data for the peer engagement of participants with ASD while interacting with generalization peers. Although the Participant 2 - peer coach dyad demonstrated typical levels of engagement at baseline and thus did not show intervention effects, high effectiveness in increasing peer engagement was observed among the other dyads.

Rate of social initiations. Figure 2 presents data on the rate of initiations per minute by children with ASD to peer coaches. During the baseline phase, two children with ASD (Participants 3 and 4) demonstrated few verbal initiations to peer coaches (0.15 and 0.02 initiations per minute, respectively). Participants 1 and 2 had higher baseline rates of initiations (2.13 and 2.70 initiations per minute, respectively). Overall, the mean baseline rate of initiations per minute across the four children with ASD was 1.25 (mean range = 0.02–2.70 initiations per minute).

Following the intervention, two of the children with ASD demonstrated an increase in rate of initiations. Participants 3 and 4 achieved a mean rate of initiations of with scores of 2.45 (range = 0.40–3.30), 0.68 (range = 0.40–1.30), and 2.98 (range = 0.20–5.10), respectively. After intervention, the rate of initiations demonstrated by Participant 1 remained similar to baseline (2.04; range = 0.68–2.80) and the rate of initiations demonstrated by Participant 2 remained stable (2.40; range = 1.80–3.10) within the typical range (TD comparison data: mean = 2.68). Overall, the mean rate of initiations across the four participants was 2.13 (range = 0.68–2.98). Overall, the PND for rate of initiations of children with ASD suggested ineffective-to-high levels of change between baseline and post-training (see Table 2).

Follow-up data were collected six to nine weeks after intervention to assess maintenance. For Participants 1, 2, 3, and 4, average rates of initiations per minute were 4.10, 3.30, 1.94, and 2.82, respectively. Overall, the mean rate of initiations across the four participants at follow-up was 3.04 (range = 1.94–4.10). Overall, the PND for rate of initiations of children with ASD suggested fair-to-high levels of change between baseline

and follow-up (see Table 2). The intervention was ineffective to questionably effective for Participant 2, whose level of initiations was similar at baseline to that of typical peers.

During the assessment of generalization, three children with ASD (Participants 1, 3, and 4) demonstrated rates of initiations in a non-training location (1.65, 2.30, and 2.93, respectively) that were similar to rates displayed in the training location. Participant 2 displayed a mean rate of 0.85 initiations per minute (range 0.00–2.20) in a non-training location, lower than his rate in the training location. All four children with ASD generalized initiation skills to a non-training location at follow-up with a mean of 3.20 initiations per minute (range = 2.30–4.48).

The assessment of generalization to non-trained TD peers revealed that the children with ASD displayed varied rates of initiation immediately following intervention (3.15, 1.98, 0.23, and 0.35, respectively). Although Participant 1 showed a somewhat decreased rate of initiations immediately after intervention (3.15), the rate remained similar to the TD comparison data (2.68). Participant 2 showed an immediate decrease in rate of initiations relative to the last point in baseline, followed by a one-session sharp increase in rate of initiations, prior to returning to near-baseline levels of initiations. Participant 3 showed a modest increase in rates of initiations at onset of intervention before decreasing to near-baseline levels across the remaining intervention sessions. Participant 4 showed a modest increase in rates of initiations with a non-trained TD peer. At follow-up, Participants 1 and 3 with ASD generalized initiations to non-trained peers (i.e., increases above baseline and intervention levels); Participant 4 demonstrated an increase in social initiations above baseline levels at follow-up. Together, the four children with ASD displayed a mean of 2.40 initiations (range = 0.20–5.70) to non-

trained peers. Table 2 also displays PND data for the rates of initiations of participants with ASD while interacting with generalization peers. The Participant 1 - peer coach dyad demonstrated typical levels of initiations at baseline and thus did not show an intervention effect. Ineffective-to-questionable effectiveness was observed for increases in initiations by the other children with ASD to non-trained peers post-training, and ineffective-to-high effectiveness was observed in increasing initiations by the other children with ASD to non-trained peers at follow-up.

Social and Behavioral Outcomes (Questionnaires). As seen in Table 3, teachers' and parents' observations, as measured by the SSIS-RS, indicated generally stable social behavior for all children with ASD. Parents' ratings of overall behavior, as measured by the CBCL, indicated stable or improved behavior for all participants.

Satisfaction.

Parent. Overall, parents of participants with ASD would recommend the program unanimously to others ($M = 5.0$; possible maximum of 5). They rated the program's target, peer interaction skills, as an important goal for their children ($M = 4.75$). Parents also reported that their children with ASD enjoyed the program ($M = 5.0$). Parents indicated they would be interested in learning the strategies used in the program ($M = 5.0$). All comments by parents were very positive. For example, one parent stated the best thing about having their child take part in the research study was "to teach him [child with ASD] how to communicate with other peers. Also to help him gain confidence to be able to approach others and initiate play." **Teacher.** Overall, teachers found the whole training experience at school was acceptable ($M = 5.0$) and had no negative impact on the classroom ($M = 1.0$). Teachers found the program to have a positive impact on the social

functioning of children with ASD ($M = 4.25$), and did not interfere with academic functioning ($M = 1.0$). Teachers also rated they would be interested in learning the strategies used in the program ($M = 5.0$) and would be willing for other students in their classes to participate in this program ($M = 5.0$). All of the teachers' qualitative comments were very positive (e.g., "I was very excited to see [child with ASD] improve from a social perspective."). Additional parent and teacher satisfaction quotations are provided in Appendix C.

Child. Overall, children with ASD were very satisfied with the training experience ($M = 4.54$).

Anecdotal observations (from comment sections of satisfaction forms, verbal reports and video probe data). Participant 1's teacher noted that she observed increased interaction post-intervention on the playground between him and the generalization peer. Participant 3's peer coach was reported to generalize PRT strategies to the classroom/playground with both the target child with ASD and another classmate with developmental delays. Participant 4's teachers (classroom and special education teacher) and parents spontaneously reported positive changes in his functional social-communication. Participants 3 and 4 each received a spontaneous invitation to a birthday party in the context of the study probes (generalization peer invited Participant 3; peer coach invited Participant 4).

Outcomes (TD Peers)

Fidelity of PRT implementation. Table 5 shows that, prior to training, 3 of the 4 peers to be trained as coaches demonstrated low to moderate levels of correct implementation of PRT techniques (implementation of strategies across 11-41% of

intervals). Surprisingly, prior to training, Participant 2's peer coach demonstrated a high level of implementation of PRT techniques (72% average fidelity). After training, when interacting with the child with ASD independently, peer coaches demonstrated correct PRT procedures more often (53–77% average fidelity). By follow-up, peer coaches continued to demonstrate procedures correctly at a higher level than baseline (54-82%). Post-intervention, 3 of 4 peer coaches met a conventional fidelity criterion (i.e., appropriate use of PRT techniques during 75% of intervals; Koegel & Koegel, 1995; Stahmer & Gist, 2001).

Social and Behavioral Outcomes (Questionnaires). Teachers' ratings of peer coaches' social skills, as measured by the SSIS-RS, indicated maintenance or slight increases for all children. Parents' observations measured by the SSIS-RS indicated increased social behavior for three of the peer coaches (Participants 1, 2 and 4). Parent observations' of Participant 3 showed a decline in social behavior from baseline to follow-up phases. Parents' observations of overall behavior, as measured by the CBCL, indicated maintenance or improvement in total behavior. See Table 4 for additional details.

Attitudes toward disabilities. Using the criterion of De Boer et al. (2012), all peer coaches held positive attitudes towards disabilities before intervention (M score of 28; $SD = 0.71$). All peer coaches maintained positive attitudes towards disabilities after intervention (M score of 27.5; $SD = 2.58$). Non-trained generalization peers had a mean attitude score of 23.00 ($SD = 1.59$) before intervention; 2 of 4 generalization peers held positive attitudes towards disabilities (each with a score of 30), whereas two generalization peers held neutral attitudes (score of 11 and 21). After intervention, one

generalization peer maintained neutral attitudes towards disabilities (score of 19), two generalization peers maintained positive attitudes towards disabilities (score of 34 and 32), M score of 27.5; $SD = 1.51$) and the fourth shifted from a neutral to a positive attitude (De Boer et al. 2012).

Satisfaction.

Parent. Overall, parents of peer coaches reported that their children enjoyed the program ($M = 4.25$) and parents would recommend the program to others ($M = 4.5$). Parents reported that the program was a positive experience for their children ($M = 4.5$), and had no negative impact ($M = 1.0$). Parents' qualitative comments were positive. For example, one parent stated the best thing about having their child in the program was "listening to his stories and hearing how proud he was of himself for helping out someone else."

Teacher. Teachers reported no negative impact of program on peer coaches' social ($M = 1.0$; possible maximum of 5) or academic functioning ($M = 1.0$). Examples of parent and teacher satisfaction quotations are provided in Appendix C

Child. Overall, peer coaches were very satisfied with the training experience ($M = 4.64$).

Discussion

This study employed a multiple-probe, multiple-baseline design to determine the efficacy of PM-PRT. Results revealed a moderate functional relationship between the intervention and changes in peer engagement (i.e., three demonstrations of the experimental effect at three different points in time across different participants (Horner et al., 2005). Results also demonstrated a weak functional relationship between the

intervention and changes in social initiations, due to delayed improvement from intervention to follow-up across most baselines. Results did not show a functional effect for generalization to non-trained peers, due to overlap in data from baseline to intervention and follow-up. Whereas data obtained from non-training locations following intervention is promising, we are unable to demonstrate a functional relationship owing to lack of baseline data.

This study adds to the small but promising body of research on PM-PRT. It also contributes to the research literature on efficacious social interventions for young children with ASD at school. It is the first PM-PRT study to conduct an experimental case design. Previous studies have demonstrated basic effects across two children; this study was the first to document a functional effect at three points of intervention (Horner et al., 2005). In the present study, four 6-year-olds with ASD and four TD peer coaches (aged 4 to 6) participated in PM-PRT at school.

Children with ASD became more engaged with same-aged classmates, as well as tending to increase their social initiations toward peers, after a relatively brief school-based intervention. This was true both for participants who were higher functioning and for one whose cognitive and language abilities were more limited (Participant 4). These social-communication outcomes (i.e., initiations and engagement) are important aspects of social competence and promote generalization of skills beyond the intervention (Guralnick, 1990; Kennedy & Itkonen, 1996; Verschuur et al., 2014). Peer engagement is linked with increased friendships in elementary school children with ASD (Kretzmann, Shih, & Kasari, 2015), and verbal initiations are typically difficult to teach but known to produce widespread improvements in social interaction (Koegel et al., 2012a; Zanolli et

al., 1996). Moreover, we found that TD children as young as 4 years learned PRT strategies and implemented these spontaneously with classmates with ASD.

However, the functional effect was stronger for peer engagement than social initiations. Specifically, social initiations improved more gradually across post-training and follow-up phases. This finding is representative of literature that suggests that initiation is a difficult skill to teach children with ASD (Koegel et al., 2012a; Zanolli et al., 1996). An additional consideration may be that as engagement increases between peers and is sustained, the child with ASD has fewer opportunities to initiate. Moreover, it is possible that a delayed effect of increased initiations may have been evident if post-training phases had been extended. High rates of social initiations at follow-up are suggestive of this trend.

The present study findings are consistent with the existing literature demonstrating that PM-PRT may be effective in enhancing social-communication behavior of children with ASD within a relatively short time (Boudreau, Corkum, Meko, et al., 2015a). However, it also extends the currently limited research base in several important ways. (1) This is the first study to examine PM-PRT in the first year of school, specifically. The present study examined the efficacy of this intervention with children who are on average 2 years younger ($M = 6$ years, 1 month) than those reported in the literature ($M = 8$ years, 4 months). These results are promising, as entering school is a critical transition for children with ASD (McIntyre, Blacher, & Baker, 2006) and social networks and friendships are established early in elementary school (Chamberlain, Kasari, & Rotherman-Fuller, 2007; Kasari et al., 2011). Moreover, this is the first study to demonstrate that TD children as young as kindergarten age can learn to implement

PM-PRT. (2) This is also the first PM-PRT study, and one of few PMI studies broadly, to measure treatment fidelity across all experimental stages. Lack of comprehensive fidelity measurement is one of the most common methodological flaws of the PMI literature (Chan et al., 2009), as well as a criticism of the parent training literature (Wainer & Ingersoll, 2013). Interestingly, by measuring fidelity at baseline, we learned that some TD children possess ‘natural’ PRT abilities prior to training. (3) We also measured a range of variables related to the TD peer coaches (rated by the children, as well as their own parents and teachers) before and after intervention. This study provides converging evidence from multiple sources (e.g., parent, teacher, and peer coaches) that peer coaches do not experience negative social or other behavioral effects by participating in PM-PRT. This finding augments the primarily anecdotal evidence in the literature concerning PMI for children with ASD that peer coaches are not negatively affected by participating in the intervention (Chan et al., 2009; but see Carter et al., 2005).

Following intervention, the social-communication skills of children with ASD increased, and were either maintained or increased further 6 to 9 weeks later. These findings point to the potential sustainability of outcomes. The follow-up data support results of previous studies showing that social skill gains were maintained two months following PM-PRT (Pierce & Schreibman, 1995, 1997a). This finding supports the assertion that initiations are pivotal behaviors yielding generalized improvements in functioning (Verschuur et al., 2014). Maintenance of gains was likely further enhanced by the naturalistic training setting and intervention methods (Terpstra et al., 2002).

Our data provide initial evidence that the intervention may generalize to non-training locations at school. However, the children with ASD displayed more variable

levels of generalization of social skills to non-trained peers. Generalization to non-trained peers was also variable in a PM-PRT study with older children (Pierce & Schreibman, 1995). In contrast, when multiple peer coaches have been used for PM-PRT, children with ASD were better able to generalize social-communication skills to non-trained peers (Pierce & Schreibman, 1997a). Training multiple peers may enhance the ability of children with ASD to generalize social behavior to non-trained peers. Characteristics of trained and non-trained peers may also influence generalization effects. Remarkably little research has systematically examined the selection of TD children who serve as coaches and generalization peers, and its effect on intervention outcome (Boudreau, Corkum, Meko, et al., 2015a; Locke et al., 2012). Several studies have examined the characteristics of peer coaches once they have been selected (Jackson & Campbell, 2009; Locke et al., 2012). Teacher-selected peer coaches were most often popular boys who were viewed as prosocial leaders (Jackson & Campbell, 2009; Locke et al., 2012). No other PM-PRT study has examined baseline levels of interventionist fidelity. Our data from Participant 2's peer coach suggests that some TD children show natural PRT-related abilities. However, another observation was that one of the non-trained TD generalization peers in our study did not interact with the child with ASD *or with the TD peer coach* during data probes. This non-trained TD peer met all inclusion criteria. It is possible that children's temperaments and interests may also be important selection or matching criteria. The selection of both peer interventionists and non-trained peers and the implications for determining intervention effectiveness remain important avenues for future research.

Limitations

The present study has several limitations. First, it is unclear whether or how video-recording may have influenced participants' behavior (i.e., for peer coaches or children with ASD). Anecdotal teacher reports of skill generalization at recess suggest that video-recording did not have a negative effect on performance, but less obtrusive data collection across environments might provide more compelling evidence.

Second, one of the participants in the present study had normative levels of peer engagement and initiations at baseline. Although these data indicated that this child was not an ideal candidate for this intervention / the study, we were obliged to provide the research intervention once offered and parents had consented. Further work should explore which participants may best benefit from the intervention and ideal methods of selecting these children.

This is the largest published PM-PRT study to date, but only four children with ASD participated in this single-subject design series. Future work should replicate and extend this research, including the addition of group designs. Adding to the body of PM-PRT research will also be important to permit stronger conclusions about which children benefit most, and which TD children are the most effective coaches.

Future Research

According to our review of PM-PRT research (Boudreau, Corkum, Meko, et al., 2015a), one additional high-quality single-subject study that demonstrated a treatment effect for one additional child with ASD would move this intervention into the “promising” EBP category (Reichow et al., 2008). In the present PM-PRT study, close attention was given to the parameters that define study quality, and three children with

ASD showed systematic improvement in social-communication skills after intervention. Thus, these results bolster the body of PM-PRT evidence, warranting designation as ‘promising EBP’ and possibly stimulating additional research.

Future research should explore the efficacy of this intervention for children with ASD with a wider range of cognitive and language levels. The existing PMI literature has rarely addressed the potential moderating effects of participant characteristics (Ferraioli et al., 2011; Watkins et al., 2014). Most PMI and PM-PRT research has been conducted with students with no-to-moderate intellectual impairment (Boudreau, Corkum, Meko, et al., 2015a; Watkins et al., 2014). Findings from Participant 4 contribute evidence that even children with moderate intellectual impairment may benefit from PM-PRT.

The selection of peer coaches on intervention outcome is another important extension of this work. Few studies have systematically explored how to best select peer coaches (Boudreau, Corkum, Meko, et al., 2015a; Locke et al., 2012). Future research should determine the qualities of optimal peer coaches, as well as considerations for matching to children with ASD (e.g., gender, play interests) and selection methods.

Finally, future research should examine the effectiveness of teaching key community stakeholders (e.g., special education teachers, paraprofessionals such as educational program assistants) to train TD children to implement PM-PRT with their classmates. In addition, best methods of training educators to implement the intervention (e.g., video- or web-based training, workshops, in vivo coaching) should be explored. By training pertinent community practitioners/educators, we potentially increase the frequency and effectiveness of the intervention in an environment where children spend most of their days.

Conclusions

As the number of children identified as having ASD continues to rise [Centers for Disease Control and Prevention (CDC), 2012], educators' time and resources to devote to social skill development are increasingly taxed. Moreover, teachers often feel they do not have the knowledge required to address the social needs of children with ASD (Robertson et al., 2003). PM-PRT is a potentially cost-effective intervention delivery method to help address the needs of children with ASD at school. Moreover, PM-PRT also appears to be a socially valid intervention, according to the present sample of parents, teachers, and children. Qualitative studies by our group (Boudreau, Corkum, et al., 2015; Kerr et al., 2015) also support the social validity of PM-PRT by incorporating key stakeholders (e.g., educators, early intervention providers, parents of children with ASD and TD peer coaches, and youth with ASD) in the research process.

Table 4.1

Characteristics of Participants with ASD at Baseline

Child	Age (yrs;mos)	Sex	VABS ^a Communication SS ^d	VABS ^a Total Adaptive Behavior SS ^d	Estimated Cognitive Abilities (SS; test)
1	6;4	M	108	85	78 WPPSI-IV ^c
2	6;0	M	95	82	106 WPPSI-IV
3	6;3	M	110	101	^e VCI:67 ^f VSI:57
4	6;9	M	54	54	58 DAS-2 ^b

^aVineland-II Adaptive Behavior Scales: Survey Edition (Sparrow, Cicchetti, & Balla, 2005); ^bDifferential Ability Scales, 2nd Edition (Elliot, 1990); ^cWechsler Preschool and Primary Scale of Intelligence, 4th Edition (Wechsler, 2002); ^dSS=standard score; ^eVCI=verbal comprehension index; ^fVSI=visual spatial index.

Table 4.2

Percentages of Peer Engagement and Rates of Social Initiations by Participants with ASD with TD Peers

	Pre-training to post-training		Pre-training to follow-up	
	PPE	RSI	PPE	RSI
<u>Participant 1</u>				
Child with ASD with Peer Coach PND	100	0	100	75
Child with ASD with Generalization Peer PND	50	0	75	50
<u>Participant 2</u>				
Child with ASD with Peer Coach PND	25	0	50	50
Child with ASD with Generalization Peer PND	100	25	100	100
<u>Participant 3</u>				
Child with ASD with Peer Coach PND	75	50	100	100
Child with ASD with Generalization Peer PND	0	25	50	25
<u>Participant 4</u>				
Child with ASD with Peer Coach PND	100	100	75	100
Child with ASD with Generalization Peer PND	50	50	75	100

%; Percent; PPE: Percentage of peer engagement; RSI: Rate of social initiations; PND: Percentage of non-overlapping data* Effect sizes for PND: highly effective: greater than 90%; fair effectiveness: 70% - <90%; questionable effectiveness: 50%-<70%; ineffective: <50%

Table 4.3

Teachers' and Parents' Ratings of Social Skills for Participants with ASD (Social Skills Improvement System Rating Scales) and Problem Behaviour (Child Behavior Checklist Parent Total Behavior T-Scores)

Child	Teacher Social Skills (SS)	Parent Social Skills (SS)	Parent Total Behavior (t)
ASD Child 1			
Before	100	97	44
After	107	102	38
Follow-up	107	100	36
ASD Child 2			
Before	79	85	48
After	85	80	49
Follow-up	85	86	44
ASD Child 3			
Before	71	92	47
After	85	90	44
Follow-up	85	87	44
ASD Child 4			
Before	71	68	58
After	80	76	56
Follow-up	66	83	55

SS: Standard Score; t: T score (*Mean of 50*)

Table 4.4

Teachers' and Parents' Ratings of Peer Coaches' Social Skills (Standard Scores on the Social Skills Improvement Rating System) and Parent Ratings of Problem Behaviour (Child Behavior Checklist Total Behavior T-scores)

Child	Teacher Social Skills (SS)	Parent Social Skills (SS)	Parent Total Behavior (t)
TD Child 1			
Before	118	123	36
After	118	123	26
Follow-up	119	130	31
TD Child 2			
Before	122	123	34
After	125	122	30
Follow-up	123	128	29
TD Child 3			
Before	118	114	28
After	120	105	28
Follow-up	122	99	25
TD Child 4			
Before	121	111	46
After	127	None returned	39
Follow-up	126	124	None returned

SS: Standard Score; t: T score

Table 4.5

Percentage of TD Peer Coaches' Independent Implementation of PRT and Associated Social-Communication Skills

Child	Percentage peer coach's fidelity Average (range)	Percentage engagement with peer coach Average (range)	Rate of initiations per minute Average (range)
TD Child 1			
Pre-training	36 (0-50)	37 (1-58)	2.13 (0-3.5)
Post-training	67 (60-80)	96 (86-100)	2.45 (0.4-3.3)
Follow-up	54 (43-63)	90.5 (75-96)	4.1 (2.2-5.6)
TD Child 2			
Pre-training	72 (18-95)	62.25 (18-95)	2.7 (1.6-3.4)
Post-training	77 (62-90)	64.75 (48-98)	2.4 (1.8-3.1)
Follow-up	82 (58-95)	86 (64-98)	3.3 (2.6-4.0)
TD Child 3			
Pre-training	11 (5-22)	9.5 (0-23)	0.15 (0-0.4)
Post-training	53 (37-80)	38 (10-73)	0.68 (0.4-1.3)
Follow-up	82 (75-88)	91.75 (87-96)	1.94 (1.20-2.60)
TD Child 4			
Pre-training	41 (35-70)	40.25 (11-65)	0.02 (0-0.1)
Post-training	76 (73-78)	93.5 (77-100)	2.98 (0.2-5.1)
Follow-up	72 (60-83)	78.25 (43-100)	2.82 (0.9-3.3)

Table 4.6

Global Outcomes for Children with ASD After Intervention

Child	Percentage engagement with peer coach	Rate of initiations per minute
ASD Child 1		
Post-training	+	-
Follow-up	+	+
ASD Child 2		
Post-training	-	-
Follow-up	+	+
ASD Child 3		
Post-training	+	+
Follow-up	+	+
ASD Child 4		
Post-training	+	+
Follow-up	+	+

+ positive response; - negative response

Percent of Engagement with Typical Peers

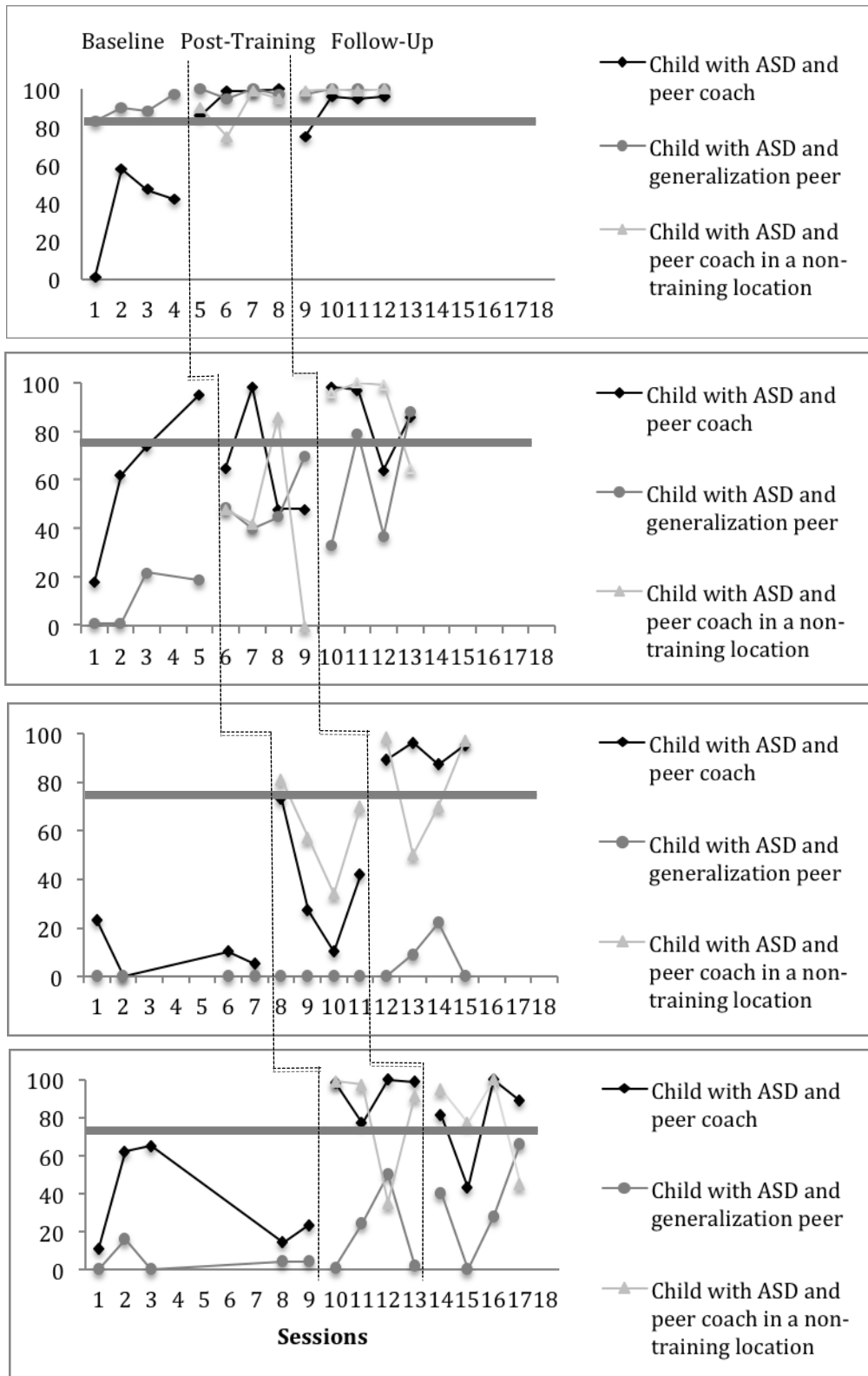


Figure 4.1 Percentage engagement: children with ASD and typical peers; horizontal line represents the normative average for TD peer interaction for dependent variables

Rate of Social Initiations Per Minute

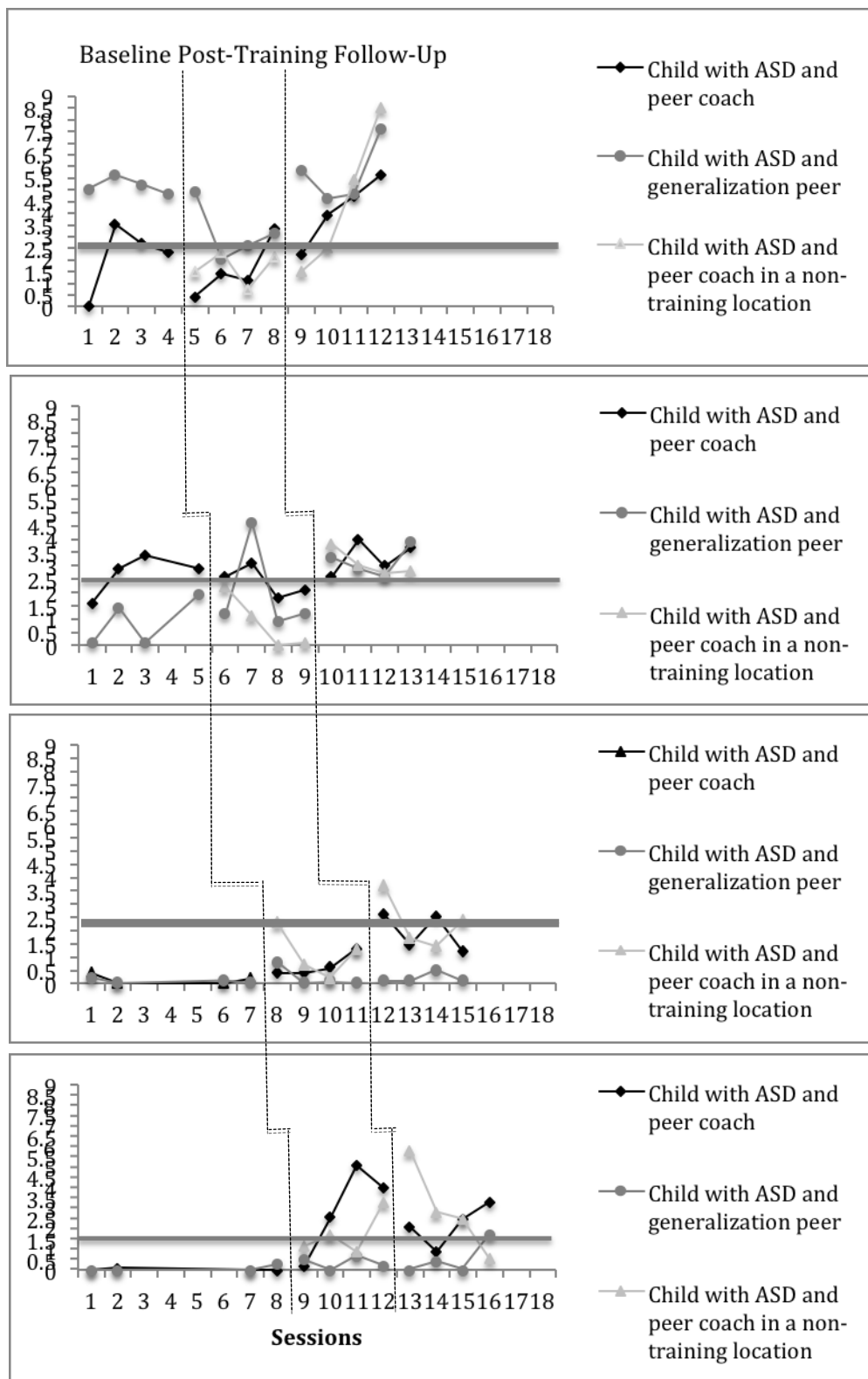


Figure 4.2 Rates of initiations children with ASD made to typical peers; horizontal line represents the normative average for TD peer interaction for dependent variables

CHAPTER 5. GENERAL DISCUSSION

Social impairments are the most prominent and impairing symptoms of ASD in school-aged youth (Rutter, 2005; American Psychiatric Association, 2013). Despite this, there is a striking gap in EBI targeting social skills for children with ASD at school (Parson & Kasari, 2013). Thus, the goal of the present dissertation was to advance the research on the efficacy of a promising intervention model, PM-PRT, targeting social skills for children with ASD in the first year of school. Research aims were to systematically evaluate the PM-PRT literature (Study 1); examine stakeholder (e.g., educators and EIPs owing to their role in supporting the transition to school for children with ASD) perceptions of the acceptability and feasibility of PM-PRT at school (Study 2), and to test the impact of PM-PRT implemented in the first year of school on the social skills (social initiations and peer engagement) of children with ASD in a single-subject design series (Study 3).

This chapter will provide a brief review and integration of the findings of the three studies. Theoretical and clinical implications of these findings will be discussed, as will study limitations and future research directions.

Summary of Findings

Study 1: Peer-Mediated Pivotal Response Treatment for Young Children With Autism Spectrum Disorders: A Systematic Review

Study 1 reviewed the literature on PM-PRT to increase social-communication skills for children with ASD. An in-depth systematic review was conducted of all published studies examining PM-PRT in school-aged children with ASD based on the Evaluative Method for Determining Evidence-Based Practice in Autism (Reichow et al.,

2008). Five PM-PRT studies utilizing single-subject research designs were reviewed, involving 29 participants (8 with ASD and 21 peer coaches). The average age of children with ASD in the PM-PRT literature was 8 years and children had IQs in the 55-85 range. None of the studies employed an experimental single- case design. However, four of five studies of PM-PRT had adequate research rigour and observed positive outcomes. However, the existing research base did not meet formal criteria for classification as “promising” or “established” EBP for improving social skill deficits in children with ASD. One additional high-quality single-subject study that demonstrated a treatment effect for one additional child with ASD would move this intervention into the “promising” EBP category according to the evaluation framework employed (Reichow et al., 2008).

The review (Boudreau, Corkum, Meko, et al., 2015a) highlighted key methodological gaps including lack of clear fidelity measurement throughout all experimental phases, and lack of information regarding both peer coach participants and intervention characteristics. Moreover, the review called for additional research to determine whether PM-PRT will meet the promising EBP category. We also called for future research to address the unique benefits and challenges of implementing PM-PRT in the context of educational systems (Boudreau, Corkum, Meko, et al., 2015a; see Study 2).

Study 2: Peer-Mediated Pivotal Response Treatment for Children with Autism Spectrum Disorder: Provider Perspectives on Acceptability, Feasibility and Fit at School

Results from Study 1 revealed that although existing PM-PRT studies have received positive results, few PM-PRT studies have been conducted. Previous research has suggested that the lack of social validity research in ASD may be contributing to the gap in EBP at school (Callahan et al., 2008, 2015; Wood et al., 2015). Thus, a research-education partnership was forged by incorporating relevant stakeholders (e.g., teachers, principals, autism specialists, EIP) throughout the process from intervention design to implementation (i.e., integrated KT). Specifically, the acceptability and feasibility of PM-PRT for school use for young children with ASD was examined through semi-structured interviews with 29 participants (Boudreau, Corkum, et al., 2015). Results indicated that stakeholders found the PM-PRT approach to be acceptable and feasible. Educators' and EIPs' perspectives on EBP, the components of the proposed intervention (using PRT) and the use of peers as intervention agents were also examined. Results indicated that stakeholders had some knowledge of PRT and perceived EBP to be important for children with ASD at school. The most commonly identified benefit to PRT at school was its use of naturalistic strategies. Key potential barriers to the implementation of PRT at school were the time, training and resources needed. For example, educators identified practical aspects of conducting PRT in the classroom such as data collection as a barrier to implementation. Mixed findings were obtained with respect to stakeholders' perceptions of peers as intervention agents. EIP unanimously endorsed same-aged peers as social skill coaches for children with ASD, whereas educators had mixed feelings about this role for peers (e.g., creation of a power imbalance between the child with ASD and TD peer, doubts regarding peers' ability to fulfill the role, and anticipated parental apprehension).

While stakeholders viewed most aspects of the proposed intervention (PM-PRT) favorably, several findings led to specific adaptations of the proposed intervention that were employed in Study 3. Specifically, educators' recommendations for intervention timing (e.g., beginning in November, conducting intervention sessions in the morning) were followed. Barriers to the use of peers as intervention agents were also addressed through thorough informed consent procedures, and by spending additional time with educators and parents describing peer roles and dispelling myths. An essential aspect of this approach was a collaborative relationship between educators and research staff, as well as a consideration of environmental fit of the proposed intervention from the outset of research design.

Study 3: Peer-Mediated Pivotal Response Treatment at School for Children with Autism Spectrum Disorder

In Study 3, results of Studies 1 and 2 were used to inform and extend the research on PM-PRT. This is the first study to systematically evaluate the efficacy of PM-PRT on the social skills of children with ASD in the first year of school (Boudreau, Corkum, Meko, & Smith, 2015b). A non-concurrent multiple baseline, multiple probe (across 4 participants) design with four dyads (child with ASD and peer coach) was used (Gast & Ledford, 2014). The kindergarten students diagnosed with ASD ranged in cognitive and language ability from mildly impaired to high average range, with half falling in the average range. Peer coaches were same-aged TD youth in the same classes as the children with ASD, selected on the basis of teacher nomination. The primary research question was whether the social behavior of children with ASD, namely social initiations and peer engagement, would improve after play experience with peers who had

completed training in PM-PRT. Study results documented functional effects between PM-PRT and improvements in the rates of social initiation and peer engagement for children with ASD. Specifically, a moderate functional relation was established for peer engagement and a weak functional relation was shown for rate of social initiations. A secondary question of interest was whether the training provided in PM-PRT was sufficient for same-aged peer coaches to implement the strategies with fidelity. These results indicated that TD peer coaches' fidelity in implementing PRT techniques generally improved and was maintained at follow-up. We also examined whether peer training had any effect on peer coaches' self-reported acceptance of disabilities or their own behavior and social skills. Results suggested that participation in PM-PRT did not have any discernable negative impact on peer coaches. In fact, peer coaches, and their parents and teachers, displayed high levels of satisfaction with participating in PM-PRT.

The following discussion integrates these findings with the existing literature and highlights study limitations and areas for future research. An emphasis is placed on clinical/educational implications regarding school-based intervention in ASD and next steps in the implementation of PM-PRT.

Integration of Study Findings

Taken together, results of the three studies support the implementation of a naturalistic, behavioural, social skills treatment for children with ASD at school. First, results support the efficacy of using PM-PRT to increase the social skills of children with ASD in the first year of school who may not otherwise receive EBP targeting these skills. The aim of intervening in the first year of school was to positively affect the social trajectories of youth with ASD. Indeed, follow-up data gathered 6-9 weeks following

treatment suggest that treatment gains were maintained, at least over this relatively short term. Second, findings add to the body of research of PM-PRT such that this intervention can now be considered a ‘promising’ EBP according to the Reichow et al. (2008) evaluative framework. Third, study results support a model of working with community stakeholders to design and implement feasible, effective and presumably cost-effective intervention models. It is important that we design research studies with community use in mind from the outset.

Integrated models of conducting applied intervention research in ASD have been emphasized recently (e.g., Dingfelder & Mandell, 2011; Wood et al., 2015), yet critical questions remain. For example, the long-term impact of research–education partnerships and integrated implementation models is largely unknown. Few researchers have considered how to best measure stakeholder involvement and its impact on treatment fidelity and long-term intervention uptake (Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007). As fidelity is a central issue in ASD intervention research, future implementation science research may consider evaluating promising models from related fields. One innovative implementation model used by the U.S. Centers for Disease Control and Prevention (CDC) in HIV research, Replicating Effective Programs (REP; Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007), combines intervention dissemination strategies that foster both fidelity and the uptake of interventions in community settings. REP Strategies such as outlining core treatment elements in the manual, while also providing options for flexible implementation, fosters fidelity and uptake of interventions (Kelly et al., 2000; Kilbourne et al., 2007). An RCT was conducted examining the effectiveness of three REP dissemination strategies for transferring a research-based HIV prevention

model to the community (e.g., REP manual; REP manual and workshop; REP manual, workshop, and ongoing consultation; Kelly et al., 2000). The HIV prevention services were more frequently adopted when AIDS service organizations were provided workshops and on-going consultation, in addition to a manual. Extrapolating from these findings, future dissemination of PM-PRT to school stakeholders should test multiple training methods (cf. Reaven et al., 2015). An investigation of core PM-PRT elements is also recommended prior to offering suggestions about flexible implementation options in the community. Our work in Study 2 offered practical considerations for planning and implementing PM-PRT at school with school stakeholders. Soliciting stakeholders' viewpoints about the intervention, and applying specific adaptations, facilitated the dissemination of PM-PRT.

Theoretical Implications

This dissertation advances the literature on social skills interventions, PRT, and implementation science approaches in ASD by providing evidence for a feasible, acceptable, and potentially cost-effective social skills intervention at school.

Social skills interventions. PM-PRT advances our theoretical knowledge about how we teach social skill interventions to produce maximum gains for children with ASD. Unlike more didactic social skills intervention models, the naturalistic manner in which PM-PRT is implemented can fit into classroom and playground activities without close adult supervision. Most social skill interventions focus on teaching multiple skills (e.g., turn-taking, starting a conversation) sequentially within a curriculum, whereas PM-PRT targets pivotal areas (i.e., motivation and attention; Pierce & Schreibman, 1997) that have been demonstrated to produce widespread changes in the social-communication of

youth with ASD (Koegel et al., 1999). Increases in one of PM-PRT's targets, social initiations, are thought to improve a wider range of social impairments often seen in ASD (e.g., social responding, nonverbal gestures). In functional terms, initiations may form a large class of social-communication behavior that alters a wide array of other behavior (Koegel & Frea, 1993). Improvements in social initiations have been demonstrated to yield collateral improvements in language, communication and play skills, and decreases in maladaptive behavior (Verschuur et al., 2014). Improvements in initiations are thought to produce collateral gains by increasing the motivation of the child with ASD to interact with others and decreasing dependency on interventionists (Koegel et al., 1999). For example, through acquiring initiations such as asking questions, children with ASD can learn about their surrounding environment without interventionist support, which can produce widespread collateral positive effects on learning (Koegel, Carter, & Koegel, 2003). Although the present study did not specifically measure collateral effects, anecdotal evidence emerged of collateral gains in the children's use of functional verbal utterances and range of toy play. For example, Participant 4's teachers (classroom and special education teacher) and parents spontaneously reported positive changes in his functional social-communication and increased voice volume. Research assistants responsible for videotaping sessions in the present study also made anecdotal comments regarding the improved range of toy play for children with ASD. Future work will examine the video probes for evidence of collateral changes in varied toy play, language and affect level.

PRT. This dissertation also advances the research base on the efficacy of PRT in school-aged youth. Whereas PRT has amassed an impressive empirical basis in

preschoolers with ASD (Verschuur, Didden, Lang, Sigafos, & Huskens, 2014), our knowledge about how to effectively implement PRT at school lags far behind (but see recent work by Stahmer et al., 2010; Koegel et al., 2012, 2013a, 2013b). PM-PRT has been shown to produce important improvements in the social behaviours of youth with ASD at school (Boudreau, Corkum, Meko, et al., 2015a). Moreover, the intervention is an acceptable, feasible and naturalistic method of extending PRT to school (Boudreau, Corkum, et al., 2015). Study 3 advances the PM-PRT evidence base to the ‘promising EBP’ designation, further promoting its use with the aim of stimulating additional research. As all previous PM-PRT studies were quasi-experimental (i.e., used only 2 participants), Study 3’s use of experimental single-case design should also be replicated in future PM-PRT studies.

Importantly, the present dissertation advances our knowledge of PM-PRT through comprehensive fidelity measurement. The lack of direct measurement of treatment fidelity is considered the biggest methodological flaw across peer-mediated treatment models in general, and specifically PM-PRT (Boudreau, Corkum, Meko, et al. 2015a; Chan et al., 2009). In most studies, fidelity is not measured, measured indirectly, or at only one time point (Boudreau, Corkum, Meko, et al. 2015a; Carter et al; 2005; Chan et al., 2009). It was previously unknown whether we can confidently attribute the positive outcomes of children with ASD who participated in PM-PRT to peer coaches’ PRT skills. To address this methodological limitation, in Study 3 peer coach fidelity was measured before, during, and after intervention using well-validated PRT fidelity procedures (Bryson et al., 2007). Encouragingly, Study 3 is the first PM-PRT study to demonstrate that TD children as young as the first year of school can learn PRT strategies with

fidelity, and these gains are generally maintained at 6-9 weeks following intervention (Boudreau, Corkum, Meko, et al., 2015b).

It is important to note that while PM-PRT is an adaptation of PRT, in addition to novel intervention agents, differing components are emphasized. Adult-implemented PRT focuses on four pivotal areas: motivation, responsivity to multiple cues, self-management, and self-initiations (Koegel & Koegel, 2006), whereas peer-implemented PRT focuses on two of these: motivation and attention. Study 3 also used fewer PRT strategies than three of the other five PM-PRT studies conducted to date (Boudreau, Corkum, Meko, et al., 2015b). As Study 3 produced positive social-communication outcomes similar to those seen in studies employing more PRT strategies (Pierce & Schreibman, 1995, Pierce & Schreibman, 1997a, Pierce & Schreibman, 1997b), questions of core elements and active treatment ingredients arise. As few as six intervention strategies (i.e., Paying Attention, Child Choice, Taking Turns, Encourage Conversation, Narrate Play, and Reward/Reinforce Attempts) may be essential elements of PM-PRT. The ASD intervention field is still in its infancy in identifying core treatment elements (Aldred, Green, Emsley, & McConachie, 2012; Lerner, White, & McPartland, 2012). However, in a recent study, Reith et al. (2014) made progress in better understanding a common intervention component across many social interventions for children with ASD, taking turns (i.e., facilitation of back and forth exchanges between intervention agent and child with ASD). Turn-taking is also an intervention component in PM-PRT (Koegel, Schreibman, Good, Cerniglia, Murphy, & Koegel, 1989; Boudreau, Corkum, Meko, et al., 2015a). Teaching of turn-taking is thought to have two sub-components: 1) modeling the correct implementation of the toy/game, and 2) gaining control of the

material(s) and requiring the child with ASD to produce an appropriate social-communication response before gaining access to their turn (i.e., contingency). Reith et al. (2014) analyzed which aspects of turn-taking (e.g., modeling or contingency) were necessary to produce improved communication and play behavior for children with ASD. Results revealed that interventionists' use of contingent responding from children with ASD appears to be especially important for improving the expressive language and play of children with ASD with lower language levels (Reith et al., 2014). In Study 3, as in PRT broadly, both modeling and contingency are encouraged in a turn (Koegel et al., 1989; Reith et al., 2014). Studies such as that of Reith et al. (2014) are important first steps in uncovering core treatment elements of PM-PRT. By distilling effective school-based interventions into core treatment elements, the likelihood is increased that the intervention can be implemented with fidelity (Kilbourne et al., 2007; Reith et al., 2014).

Whereas adult intervention agents are more commonly used in PRT, this study also uniquely contributes to our knowledge of kindergarten peers as the primary intervention agents for children with ASD. Several studies have compared the impacts of different intervention agents in ABA-based ASD interventions. Odom and colleagues (1999) conducted a study comparing the effectiveness of three social interventions (structured play, adult instruction and peer-mediated approaches) for preschoolers with disabilities, including autism. The peer-mediated group had the best outcomes and generalized effects were observed across more settings (Odom et al., 1999). Another study examined the comparative effectiveness of a parent-mediated vs. a peer-mediated approach to targeting social skills of older children with ASD at school (Kasari et al., 2012). The authors found that the peer-mediated intervention approach was superior to

the adult-mediated intervention approach, and was maintained at 3-month follow-up. Future research should extend this work to examine the comparative effectiveness of adult-implemented and peer-implemented PRT. It would also be interesting to understand the relative contribution of a non-specific treatment mechanism, therapeutic alliance (Luborsky et al., 2002) between children with ASD and intervention agents, on intervention outcomes. Therapeutic alliance is defined the concordance between patient and therapist on therapeutic goals (Bordin, 1979); it is often described as the perceived or observed sense of bond or the collaborative relationship between dyads (Horvath, Del Re, Flückiger, & Symonds, 2011). While therapeutic alliance is known to be an important treatment ingredient in psychotherapy research (Flückiger, Del Re, Wampold, Symonds, & Horvath, 2012), virtually no research has examined therapeutic alliance between children with ASD and intervention agents (Anderson & Morris, 2006; Hare & Flood, 2001). This is surprising as alliance has been proposed as a potential mechanism by which psychosocial interventions produce change in the social-communicative functioning of children with ASD (Lerner, White, & McPartland, 2012). Difficulties in the use of traditional self and other alliance measures and the lack of construct validity of those measures for this population have been proposed as reasons for the lack of research in this area (Anderson & Morris, 2006). Lerner and colleagues (2012) recommended examining traditional alliance measures among high-functioning adolescents with autism undergoing individual therapy as a first step. Researchers may also consider exploring proxy measures of alliance among young children with ASD and their peers (e.g., joint attention, positive affect directed to peer) in the absence of validated measures for this age and developmental level.

Implementation science approaches in ASD. This dissertation also advances implementation science with respect to ASD intervention research. A partnership with education stakeholders was initiated and the intervention was conducted in a real-world setting. In another study conducted in our research lab in parallel with Study 2 of this dissertation, our research team examined the perspectives of parents of children with ASD and of TD children, as well as youth with ASD, on the PM-PRT intervention proposed for Study 3 (Kerr et al., 2015). Twenty-two participants (six parents of children with ASD; six parents of TD children; 10 youth with ASD) participated in semi-structured interviews examining the acceptability and feasibility of PMI. Results suggested that parents and older children with ASD perceived peer-mediated social skills interventions as acceptable for kindergarten-aged children with ASD (Kerr et al., 2015). Both parents and youth regarded TD peers as potentially effective intervention agents. Interestingly, youth with ASD preferred same-aged coaches, in contrast to the more common approach of using older children as intervention agents (Zhang & Wheeler, 2011). Since few intervention studies in the ASD literature solicit the perspectives of youth with ASD themselves, these findings highlight the utility of this approach. Taken together, these studies demonstrate a feasible and effective manner to conduct research and promote the uptake of EBP in community settings, specifically schools.

Clinical / Educational Implications

The present findings have important implications for the treatment of social skills for children with ASD at school.

Characteristics of participants with ASD who are well suited for PM-PRT.

PM-PRT is a promising intervention targeting social skills for children with ASD at

school. The present study revealed that PM-PRT may be an effective intervention for children with ASD in early elementary school who have some verbal abilities, minimal behavioral problems, and intellectual functioning in at least the moderate impairment range ($IQ \geq 58$). This intervention is also best suited for children with ASD who display low levels of engagement and few initiations before intervention. However, a recent study revealed that although high-functioning children with ASD may display high levels of initiations, they also displayed lower levels of social reciprocity than comparison participants matched for age ($M = 12.82$), gender and IQ (Usher, Burrows, Schwartz, & Henderson, 2015). Since reciprocity was not a measured outcome in Study 3, it would be informative to retrospectively examine video probes of the participant who displayed high baseline levels of initiations (Participant 2) to determine if there were collateral improvements in social reciprocity after intervention. Future work may also adapt PM-PRT to target social reciprocity in children with ASD displaying relatively high levels of social initiations.

Long-term impact of PM-PRT on social skills of children with ASD at school.

Overall, it is promising that some children with ASD in the first year of school who display little to no interaction with peers can show improved social interactions after such a brief treatment and maintain these gains up to 2 months later. Training peers in PRT may also have a widespread and/or longer-lasting impact on the social skills of children with ASD. Anecdotal reports from a special education teacher noted that Participant 4 and his peer coach continued to play together at school without prompting up to one year after participating in the intervention.

Assessment of social skills. It will be important to consider how to capture anecdotal improvements in social skills (e.g., birthday party invitations, educational program assistant playground observations) over time. It will also be important to consider feasible social skills assessments before and after PM-PRT when implemented in the community. In the present study, considerable research assistant resources were used to ensure accurate video coding of social skills across multiple video probes. We also chose relatively homogenous participants and measured the same outcome variables across all four children. However, educators should consider an individualized approach for measuring the social skills of children with ASD in clinical/educational practice. Moreover, due to resource and time demands, educators need to consider how to efficiently measure the most meaningful intervention targets. In under-resourced schools it may be necessary to target the social skills deficit that interferes most with peer relations. PRT's approach of focusing on pivotal areas that influence multiple domains (Koegel & Koegel, 2006; Renshaw & Kuriakose, 2011) is well aligned with the need for cost-effective and feasible intervention models at school. It is important to note that teachers may need training in how to set social skill goals that are appropriate for children's developmental levels (e.g., social reciprocity versus social initiations; Pierucci, Barber, Gilpin, Crisler, & Klinger, 2015; Usher, Burrows, Schwartz, & Henderson, 2015). Social skills goals could also be addressed formally through IEP objectives. If social skills targets aren't formally documented, teachers may focus exclusively on academic goals (Corkum et al., 2014; Locke et al., 2015).

Potential positive impact on peer coaches. While most PMI does not focus on changes in peer interventionists themselves, this approach has the potential to support the

development of the TD children who serve as peer coaches (DiSalvo & Oswald, 2002). For example, PMIs have been found to improve the self-confidence and attitudes of peer coaches toward academics (Franca, Kerr, Reitz, & Lambert, 1990; Kamps, Barbetta, Leonard, & Delquadri, 1994). Locke and colleagues (2012) examined the social networks of peer coaches before and after PMI; they found that peer coaches remained highly connected to other TD children after intervention and were more highly connected than non-coaches. Peer coaches in Study 3 also maintained their baseline levels of social skills following PM-PRT, as demonstrated by social skills questionnaire ratings by parents and teachers.

Potential positive impact on other youth with disabilities. Training peers in PMI strategies may also promote downstream positive interactions with other youth with disabilities (DiSalvo & Oswald, 2002). Favazza and Odom (1996) noted that increasing the interaction between students with disabilities and TD peers may improve the TD children's acceptance of disabilities. Contact theory (Allport, 1954) suggests that discrimination can be moderated by sustained contact; some research on children's attitudes toward disabilities has supported this theory (Mavropoulou & Sideridis, 2014). TD peers' perceptions of children with ASD may impact whether they exclude children with ASD from social interactions at school (Jones & Frederickson, 2010; Ochs et al., 2001). Previous research has shown that kindergarten-age children's attitudes toward children with ASD can be positively affected by a video vignette featuring descriptive educational information about ASD symptoms (Campbell et al., 2004). In another study, attitudes of 3rd to 6th grade children toward children with ASD did not change when presented with a similar educational video vignette (Swaim & Morgan, 2001). The

intervention described in this dissertation was focused on the early school experience of children with ASD, with the aim of positively influencing the social trajectories of children with ASD, and the beliefs and behaviour of their TD classmates. Peer coaches' attitudes toward disabilities remained stable and positive after PM-PRT in Study 3 (Boudreau, Corkum, Meko, et al., 2015b). Results from Study 2 revealed that educators perceived PM-PRT to have the potential to foster acceptance of differences and develop peer coach leadership skills (Boudreau, Corkum, et al., 2015). Educators also suggested that PM-PRT participation could be captured in the kindergarten curriculum (e.g., under areas of healthy development and relationships). Overall, we still know very little about how TD children's attitudes toward people with disabilities develop, and what interventions support effective inclusion practices (Campbell et al., 2004; Kasari et al., 2011; Nucci & Turiel, 2009).

School as a context for social skills interventions. Another clinical implication of this research is that school appears to be an efficient context in which to implement social skills interventions for children with ASD. Educators and EIP staff in Study 2 agreed that school 'is a social village' and the ideal location for social skill interventions. Moreover, the majority of a child's day is spent at school. Few intervention locations offer a setting with such abundant social opportunities as school. Furthermore, finding suitable adult intervention agents in already over-taxed public school systems has significantly impeded our progress in implementing evidence-based interventions for children with ASD. TD classmates offer an age-appropriate model of social skills, and a partial solution to this dilemma. Moreover, Study 3 demonstrated that peers were satisfied with their participation in PM-PRT.

Importance of research-education partnerships. Finally, the establishment and maintenance of a research-education partnership was instrumental in the successful implementation of the promising EBP in school settings. A critical aspect of this work was embedding a qualitative study that examined the social validity of PM-PRT within the larger research program. We specifically designed Study 3 taking into consideration stakeholder input, including daily school operational considerations. The process of establishing a working alliance between research and education in community settings is time-consuming and requires significant negotiation at the outset. However, the return on investment in later stages of clinical intervention implementation, evaluation and sustained community use can be substantial. Through collaboration, a common working framework is developed that can help promote the use of EBP.

Limitations

Chapters 2, 3, and 4 addressed limitations of each study included in this dissertation. Several of the most prominent limitations across studies are elaborated on here, with additional considerations.

Generalizability of findings. A key limitation of the present dissertation is the generalizability of findings. Limits to generalization with respect to number of participants, research design, participant characteristics and favorable experimental school conditions will each be discussed in turn.

The conclusions of Study 1 are limited by the total number of participants sampled in these studies that were included in the review. Specifically, only 29 participants (8 with ASD) participated in previously published PM-PRT research. While those studies had adequate research rigour, the small number of participants limited the

conclusions regarding EB status. Two of the five studies (Pierce & Schreibman, 1997a; Pierce & Schreibman, 1997b) used the same participants but measured different constructs. Given the paucity of research in this area, both studies were included to describe the research in this area in sufficient depth to provide meaningful suggestions. As the literature grows, a more conservative inclusion approach for systematic reviews will also be warranted.

Study 3 utilized a single-subject experimental design with four participants with ASD. While the sample size was considered *adequate to large* for single-subject research, it is important to note that this sample size and research design neither allows for sweeping conclusions about PM-PRT, nor does it allow the comparison of the effects of this intervention to another. Now that PM-PRT may be considered a ‘promising EBP’, researchers may consider larger group-design studies to provide stronger evidence of efficacy (e.g., exploratory randomized trials comparing PM-PRT to another adult-mediated social skills intervention or to a PMI using a different theoretical approach). However, important insights were gained from a small n design in the present dissertation. The current study design was selected owing its appropriateness for PM-PRT’s stage of clinical outcomes research (i.e., testing a variant of an established intervention (PRT) in a real-world setting; Robey, 2004). Moreover, single-subject multiple-baseline designs control for temporal or developmental effects. They also provide greater depth and detailed information about participants. This is a useful approach for better understanding the type of children who benefit most from this approach as well as well as characteristics of successful peer coaches. Identifying participant characteristics that are associated with good outcomes is a useful approach to

improve the overall literature. For example, evidence from Participant 4 suggests that children whose cognitive and language abilities are more limited can still make large gains in social behavior.

Although results from Participant 4 are a promising first step in demonstrating that PM-PRT may be effective for children with more limited cognitive abilities, this finding needs to be replicated. Furthermore, in Study 3 we excluded children with ASD who had high levels of externalizing symptoms owing in part to educator reservations, as reported in Study 2. We also aimed to test the intervention under ideal circumstances while being sensitive to peer coach safety and satisfaction with their participation. It is unknown whether PM-PRT can be adapted to include children with ASD with externalizing symptoms, as these symptoms play an important role in children's poor reputations among peers (Bierman, 2004; Hinshaw & Melnick, 1995; Milich, McAninch, & Harris, 1992; Mrug et al., 2007).

No previous PM-PRT study indicated whether children have previous exposure to PRT; however, all children with ASD in Study 3 had previous exposure to PRT techniques through their participation in a PRT-based early intervention program. This consistency across treatment methods employed in preschools and schools might be advantageous in the context of this province's early intervention approach. This raises a larger question of whether such consistency is an important factor in children's progress in educational programs. It is unclear whether results would generalize to children with ASD who did not receive preschool PRT.

The present study was also conducted under favorable conditions. Specifically, data probes were taken in dyads in an empty classroom with an enticing set of toys. In

contrast, playgrounds have few toys, more children and may be overwhelming to students with ASD (Auger, 2013). It is possible that findings from the Study 3 may not generalize to other settings such as playgrounds or busy classrooms.

Participating schools were selected based on the presence of highly motivated educators who were eager to have researchers work in their schools. It is possible that less positive results might have been obtained if working with unselected educators. However, the inclusion of child dyads across four schools (from different urban and rural areas of the school district) and a range of family socio-economic backgrounds promotes the generalizability of findings and strengthens study results.

Longer term effects. It is currently unknown whether positive outcomes for children with ASD and maintenance of intervention fidelity for peer coaches would persist following the 6- to 9-week follow-up period in Study 3. Practical challenges of longer follow-up periods at school are acknowledged. The anecdotal reports of continued peer engagement that we received are promising but require empirical validation.

Initiation findings. Study 3 demonstrated a weak functional effect for rate of social initiations for children with ASD. Caution is therefore warranted in interpreting the effects of PM-PRT on social initiations. It is unclear why this finding was weaker than the functional effect for peer engagement, other than the known relative difficulty of teaching initiation skills to children with ASD (use refs from earlier section). While practical challenges of extending training or post-training probes are acknowledged, additional sessions may be required to demonstrate delayed effects on social initiations. High rates of initiations at follow-up may be indicative of a delayed onset of improvement in initiations.

Directions for Future Research

Research design. It is noteworthy that all previous PM-PRT studies were quasi-experimental in nature (i.e., use of 2 participants). Study 3's use of experimental single-case design should be replicated in future PM-PRT studies. It is essential to conduct high quality single-case experimental design studies to move the body of PM-PRT research forward. Recently the What Works Clearinghouse (WWC; Kratochwill et al., 2013) outlined key aspects of designing and implementing high quality single-subject experimental research that will inform this future research.

Training educators. It is encouraging that PM-PRT demonstrated efficacy at school when a doctoral student with relevant ASD/PRT experience trained peer coaches. It is important to consider how to further encourage the implementation of PM-PRT by those who work in schools (e.g., teachers, school psychologists, speech-language pathologists). Few studies have described how to select adult trainers or the 'trainer the trainer' process. To our knowledge, the train-the-trainer process has not been specifically studied for PRT (see Bryson et al., 2007; Suhrheinrich, 2011), let alone PM-PRT. Moreover, no study has examined whether educators can learn to implement PM-PRT with fidelity and whether child outcomes improve following training. In order to continue bridging the gap between research and clinical practice, this part of the process requires systematic study. One potential challenge when implementing EBP in community settings is how to foster a high level of treatment integrity. Educators are faced with multiple responsibilities and often lack basic training in ASD and effective interventions (Simpson, de Boer-Ott, & Smith-Myles, 2003). Mandell et al. (2013) found that teachers in community schools displayed low levels of implementation fidelity using an ABA-

based intervention (e.g., STAR program) despite extensive training. Recently, Stahmer et al. (2015) found that special education teachers could be trained in several EBPs for children with ASD at school with moderate levels of procedural fidelity. Interestingly, these teachers had greater difficulty learning PRT than some other intervention strategies such as discrete trial training (DTT; Lovaas, 1987; Smith, 2001). It remains to be seen whether educators could master a brief PRT model utilizing peers as the primary intervention agent, while yielding high levels of peer PRT fidelity and high teacher treatment integrity.

Peer coach characteristics. Another important avenue of future research for PM-PRT -- and PMI broadly -- is to better understand which children are the most effective peer coaches, how best to select these peer coaches, and how to match characteristics of children with ASD to their peer coaches in order to produce optimal results. Many questions remain with respect to gender and age for children with ASD and peer coaches, and functional levels and associated symptoms of the children with ASD. The present study also highlighted the importance of measuring fidelity across all research stages. One peer coach had natural PRT abilities at baseline. Future work might explore whether particular peers display high baseline levels of interactional strategies consistent with PRT and consider ways to harness and foster this natural ability to benefit peers with developmental disabilities.

Cost-effectiveness. Future work in the development and implementation of PM-PRT should include an examination of its cost-effectiveness. School administrators consider cost-effectiveness when deciding whether to adopt a new intervention (Dingfelder & Mandell, 2011). Moreover, provinces and states will often require cost-

effectiveness data before deciding whether to implement large-scale programs or change health or educational policies (Motiwala, Gupta, Lilly, Ungar, & Coyte, 2006). One study demonstrated that three years of a comprehensive ABA-based intervention was more cost-effective than 18 years of traditional special education for children with autism (Chasson, Harris, & Neely, 2007). It seems reasonable that brief PM-PRT training may be a cost-effective means of promoting greater social inclusion for young children with ASD in schools. A study examining this claim is warranted.

Next steps in a larger-scale implementation of PM-PRT. Overall, this dissertation provides initial data on a promising intervention modality. This work can serve as the foundation for a research program in PM-PRT at school. The larger PM-PRT research program should use a well-validated implementation framework to guide the design of the intervention, as well as the implementation and community uptake process (e.g., Dingfelder & Mandell, 2011; Wood et al., 2015; Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007). Future work should conduct a group-based PM-PRT study that incorporates multiple methods and multiple informants. Specifically, future studies should measure social behavior through playground observations, standardized questionnaires, and peer-based ratings of the social network of individual classrooms (i.e., social network centrality; Cairns & Cairns, 1994; Farmer & Farmer, 1996; Chamberlain et al., 2007; Locke et al., 2010). In vivo behavioral coding (e.g., using mobile coding aids such as Noldus Pocket Observer) on playgrounds would allow for assessment of real-time social interactions, while reducing potential ethical challenges with video-recording, and enhancing the ecological validity of study results. It would also be important to measure impact of the intervention on key constructs over time. For

example, what is the impact of PM-PRT on the social network status of both peer coaches and children with ASD across school years? Future PM-PRT studies should also systematically assess changes in relevant aspects of peer coach behavior (e.g., confidence, leadership, attitude towards disabilities, and exclusion/inclusion behaviors toward youth with disabilities) after participating in the intervention over time. A larger PM-PRT research program could aim to incorporate practical aspects of educational programming into the study design in order to promote community sustainability. For example, PM-PRT social skill objectives could be formally incorporated into both regular curriculum and IEP goals. Finally, larger-scale extensions of PM-PRT should also continue to incorporate stakeholders as an integral component. Partnerships will be critical to improve the likelihood of the widespread implementation of this work and for policy change (Wiltsey Stirman et al., 2012).

Conclusion

In conclusion, this dissertation research contributes to the evidence-base of a promising social skills intervention for children with ASD at school. The present research extends the minimal research on PM-PRT by being the first to systemically evaluate its efficacy in the first year of school; it was also the first to systematically evaluate PRT fidelity at all stages of research design. Knowledge translation was integrated as a key component of overall dissertation design by incorporating stakeholder input. Overall, the results of this dissertation highlight the value of research-education partnerships, conducting clinical outcomes research in the community early in the research process, and the beneficial use of PM-PRT for improving the social behavior of children with ASD at school.

REFERENCES

- Achenbach, T. M., & Rescorla, L. A. (2001). *The manual for the ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.
- Aldred, C., Green, J., Emsley, R., & McConachie, H. (2012). Brief report: Mediation of treatment effect in a communication intervention for pre-school children with autism. *Journal of Autism and Developmental Disorders*, *42*, 447-454. doi: 10.1007/s10803-011-1248-3
- Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.) Arlington, VA: American Psychiatric Publishing. doi:10.1176/appi.books.9780890425596.744053
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author. doi:10.1176/appi.books.9780890423349
- Anderson, S., & Morris, J. (2006). Cognitive behaviour therapy for people with Asperger syndrome. *Behavioural and Cognitive Psychotherapy*, *34*, 1-11. doi:10.1017/S1352465805002651
- Arick, J., Loos, L., Falco, R., & Krug, D. (2005). *The STAR program: Strategies for teaching based on autism research*. USA: Pro-Ed.
- Auger, R. W. (2013). Autism spectrum disorders: A research review for school counselors. *Professional School Counseling*, *16*, 256-268. doi:10.5330/PSC.n.2013-16.256
- Bal, A., Sullivan, A.L., & Harper, J. (2014). A situated analysis of special education disproportionality for systemic transformation in an urban school district. *Remedial and Special Education*, *35*, 3-14. doi: 10.1177/0741932513507754

- Bammer, G. (2005). Integration and implementation sciences: Building a new specialization. *Ecology and Society*, 10, 95-107.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Barlow, D. H., Nock, M. K., & Hersen, M. (2009). *Single-case experimental designs: Strategies for studying behavior change*. New York: Pearson.
- Barwick, M., Phipps, D., Johnny, M., Myers, G., & Coriandoli, R. (2014). Knowledge translation and strategic communications: Unpacking differences and similarities for scholarly and research communications. *Scholarly and Research Communication*, 5, 1-14.
- Bass, J. D., & Mulick, J. A. (2007). Social play skill enhancement of children with autism using peers and siblings as therapists. *Psychology in the Schools*, 44, 727-735. doi:10.1002/pits.20261
- Bellini, S., & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children*, 73, 264-287. doi: 10.1177/001440290707300301
- Bellini, S., Peters, J. K., Benner, L., & Hopf, A. (2007). A meta-analysis of school-based social skills interventions for children with autism spectrum disorders. *Remedial and Special Education*, 28, 153-162. doi: 10.1177/07419325070280030401
- Bierman, K. L. (2004). *Peer rejection: Developmental processes and intervention strategies*. New York: Guilford Press.
- Billingsley, F., White, O. R., & Munson, R. (1980). Procedural reliability: A rationale and an example. *Behavioural Assessment*, 2, 229-241.

- Bordin, E. S. (1979). The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy, 16*, 252-260.
- Boudreau, A. M., Corkum, P., Meko, K., & Smith, I. M. (2015a). Peer-mediated Pivotal Response Treatment for young children with autism spectrum disorders: A systematic review. *Canadian Journal of School Psychology, 30*, 218-235. doi: 10.1177/0829573515581156
- Boudreau, A. M., Corkum, P., Meko, K., & Smith, I. M. (2015b). Peer-mediated Pivotal Response Treatment for young children with autism spectrum disorders at school. Manuscript submitted for publication.
- Boudreau, A., Corkum, P., & Smith, I. M. (2015). Peer-mediated Pivotal Response Treatment for children with autism spectrum disorder: Provider perspectives on acceptability, feasibility and fit at school. Manuscript submitted for publication.
- Boyatzis, R. (1988). *Transforming qualitative information: Thematic analysis and code development*. Thousand Oaks, CA: Sage.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77-101. doi: 10.1191/1478088706qp063oa
- Bryson, S. E., Koegel, L. K., Koegel, R. L., Openden, D., Smith, I. M., & Nefdt, N. (2007). Large scale dissemination and community implementation of pivotal response treatment: Program description and preliminary data. *Research and Practice for Persons with Severe Disabilities, 32*, 142-153. doi:10.2511/rpsd.32.2.142
- Buysse, V., & Wesley, P. W. (2006). Evidence-based practice: How did it emerge and what does it really mean for the early childhood field? *Zero to Three Journal, 27*, 50-55.
- Cairns, R., & Cairns, B. (1994). *Lifelines and risks: Pathways of youth in our time*. New York: Cambridge University Press.

- Callahan, K., Henson, R. K., & Cowan, A. K. (2008) Social validation of evidence-based practices in autism by parents, teachers, and administrators. *Journal of Autism and Developmental Disorders*, *38*, 678-692. doi: 10.1007/s10803-007-0434-9
- Callahan, K., Hughes, H. L., Mehta, S., Nichols, S. M., Wang, H. T., & Kutlu, M. (2015, May). Social validation of evidence-based practices in autism: Investigating the evidence of social validity for empirically demonstrated treatments identified by the National Autism Center and National Professional Development Center on ASD. Poster presented at the International Meeting for Autism Research, Salt Lake City, UT.
- Campbell, J. M. (2013). Commentary on PND at 25. *Remedial and Special Education*, *34*, 20-25. doi: 10.1177/0741932512454725
- Campbell, J. M., Ferguson, J. E., Herzinger, C. V., Jackson, J. N., & Marino, C. A. (2004). Combined descriptive and explanatory information improves peers' perceptions of autism. *Research in Developmental Disabilities*, *25*, 321-339. doi:10.1016/j.ridd.2004.01.005
- Canadian Institutes of Health Research. (2005). About knowledge translation. Retrieved from <http://www.cihr-irsc.gc.ca/e/29418.html>
- Canadian Institutes of Health Research (2012). *Guide to Knowledge Translation Planning at CIHR: Integrated and End-of-Grant Approaches*. Retrieved from http://www.cihr-irsc.gc.ca/e/documents/kt_lm_ktplan-en.pdf
- Carter, E. W., Cushing, L. S., Clark, N. M., & Kennedy, C. H. (2005). Effects of peer support interventions on students' access to the general curriculum and social interactions. *Research and Practice for Persons with Severe Disabilities*, *30*, 15-25. doi: 10.2511/rpsd.30.1.15
- Cecil, S. (2004). Autism interrupted? Baby sibs study holds hope for reversing behaviors before they become embedded. *CAIRN Review*, *1*, 2.
- Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders*, *37*, 230-242.

- Chang, Y. C., Shih, W., & Kasari, C. (2015). Friendships in preschool children with autism spectrum disorder. What holds them back, child characteristics or teacher behavior? *Autism*. Advance online publication. doi: 10.1177/1362361314567761
- Chan, J. M., Lang, R., Rispoli, M., O'Reilly, M., Sigafoos, J., & Cole, H. (2009). Use of peer-mediated interventions in the treatment of autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders, 3*, 876-889. doi: 10.1016/j.rasd.2009.04.003
- Chasson, G. S., Harris, G. E., & Neely, W. J. (2007). Cost comparison of early intensive behavioral intervention and special education for children with autism. *Journal of Child and Family Studies, 16*, 401-413. doi: 10.1007/s10826-006-9094-1
- Christon, L. M., Arnold, C. C., & Myers, B. J. (2015). Professionals' reported provision and recommendation of psychosocial interventions for youth with autism spectrum disorder. *Behavior Therapy, 46*, 68-82. doi: 10.1016/j.beth.2014.02.002
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment, 6*, 284-290. doi:10.1037/1040-3590.6.4.284
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.
- Cole, F. (1988). Content analysis: Process and application. *Clinical Nurse Specialist, 2*, 53-57.
- Corkum, P., Bryson S. E., Smith, I. M., Giffin, C., Hume, K., & Power, A. (2014). Professional development needs for educators working with children with autism spectrum disorders in inclusive school environments. *Exceptionality Education International, 24*, 33-47.
- Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science, 4*, 1-15. doi: 10.1186/1748-5908-4-50

- Dawson, M., Mottron, L., & Gernsbacher, M. A. (2008). Learning in autism. In J. H. Byrne & H. Roediger (Eds), *Learning and memory: A comprehensive reference: Cognitive Psychology* (pp. 759-772). New York, NY: Elsevier.
- De Boer, A. A., Pijl, S. J., & Minnaert, A. E. M. G. (2012). Students' attitudes towards peers with special needs: A review of the literature. *International Journal of Disability, Development and Education*, 59, 379-392.
doi:10.1080/1034912X.2012.723944
- Dingfelder, H. E., & Mandell, D. S. (2011). Bridging the research-to-practice gap in autism intervention: an application of diffusion of innovation theory. *Journal of Autism and Developmental Disorders*, 41, 597-609. doi: 10.1007/s10803-010-1081-0
- DiSalvo, C. A., & Oswald, D. P. (2002). Peer-mediated interventions to increase the social interaction of children with autism consideration of peer expectancies. *Focus on Autism and Other Developmental Disabilities*, 17, 198-207.
doi:10.1177/10883576020170040201
- Dyer, K., Williams, L., & Luce, S. C. (1991). Training teachers to use naturalistic communication strategies in classrooms for students with autism and other severe handicaps. *Language, Speech, and Hearing Services in Schools*, 22, 313-321. doi:10.1044/0161-1461.2201.313
- Eccles, M. P., Armstrong, D., Baker, R., Cleary, K., Davies, H., Davies, S., ... Sibbald, B. (2009). An implementation research agenda. *Implementation Science*, 4, 1-7.
doi:10.1186/1748-5908-4-18
- Eikeseth, S., Smith, T., Jahr, E., & Eledevik, S. (2002). Intensive behavioral treatment at school for 4-7-year-old children with autism: A 1-year comparison controlled study. *Behavior Modification*, 26, 49-68. doi: 10.1177/0145445502026001004
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62, 107-115. doi: 10.1111/j.1365-2648.2007.04569.x
- Etscheidt, S. (2003). An analysis of legal hearings and cases related to individualized education programs for children with autism. *Research and Practice for Persons with Severe Disabilities*, 28, 51-69.

- Farmer, T. W., & Farer, E. M. Z. (1996). Social relationships of students with exceptionalities in mainstream classrooms: Social networks and homophily. *Exceptional Children, 62*, 431-450.
- Favazza, P. C., & Odom, S. L. (1999). *The Acceptance Scale for Kindergarten – Revised*. Boulder, CO: Roots and Wings.
- Favazza, P., & Odom, S. L. (1996). Use of the acceptance scale to measure attitudes of kindergarten-age children. *Journal of Early Intervention, 20*, 232-248. doi: 10.1177/105381519602000307
- Ferraioli, S., & Harris, S. (2011). Treatments to increase social awareness and social skills. In B. Reichow, P. Doehring, D. V. Cicchetti, et al. (Eds), *Evidence-based practices and treatments for children with autism* (pp. 171-195). New York, NY: Springer. doi:10.1007/978-1-4419-6975-0
- Ferster, C. B., & DeMyer, M. K. (1961). The development of performances in autistic children in an automatically controlled environment. *Journal of Chronic Diseases, 13*, 312-345.
- Flückiger, C., Del Re, A. C., Wampold, B. E., Symonds, D., & Horvath, A. O. (2012). How central is the alliance in psychotherapy? A multilevel longitudinal meta-analysis. *Journal of Counseling Psychology, 59*, 10-17. doi:10.1037/a0025749
- Forest, E. J., Horner, R. H., Lewis-Palmer, T., & Todd, A. W. (2004). Transitions for young children with autism from preschool to kindergarten. *Journal of Positive Behavior Interventions, 6*, 103-112. doi: 10.1177/10983007040060020501
- Fowler, S., Chandler, L., Johnson, T., & Stella, E. (1988). Individualizing family involvement in school transitions: Gathering information and choosing the next program. *Journal of the Division for Early Childhood, 12*, 208-216.
- Franca, V. M., Kerr, M. M., Reitz, A. L., & Lambert, D. (1990). Peer tutoring among behaviorally disordered students: Academic and social benefits to tutor and tutee. *Education & Treatment of Children, 13*, 109-128.

- Gast, D. L., & Ledford, J. (2014). Multiple baseline and multiple probe designs. In D. L. Gast (Eds.), *Single subject research methodology in behavioural sciences*. New York: Routledge Publishers.
- Glasgow, R. E., Davis, C. L., Funnell, M. M., & Beck, A. (2003). Implementing practical interventions to support chronic illness self-management. *The Joint Commission Journal on Quality and Patient Safety*, *29*, 563-574.
- Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions*, *26*, 13-24. doi: 10.1002/chp.47
- Gresham, F. M., Cook, C. R., Crews, S. D., & Kern, L. (2004). Social skills training for children and youth with emotional and behavioral disorders: Validity considerations and future directions. *Behavioral Disorders*, *30*, 32-46.
- Gresham, F. M., Elliott, S. N., & Kettler, R. J. (2010). Base rates of social skills acquisition/performance deficits, strengths, and problem behaviors: An analysis of the Social Skills Improvement System-Rating Scales. *Psychological Assessment*, *22*, 809-815. doi: 10.1037/a0020255
- Gresham, F. M., & Elliott, S. N. (2008). *Social skills improvement system: Rating scales*. Bloomington, MN: Pearson Assessments.
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine.
- Guralnick, M. J. (1990). Major accomplishments and future directions in early childhood mainstreaming. *Topics in Early Childhood Special Education*, *10*, 1-17. doi: 10.1177/108835760001500202
- Hanson, M. J., Beckman, P. J., Horn, E., Marquart, J., Sandall, S. R., Grieg, D., & Brennan, E. (2001). Entering preschool: Family and professional experiences in this transition process. *Journal of Early Intervention*, *23*, 279-293. doi: 10.1177/10538151000230040701

- Happé, F., Booth, R., Charlton, R., & Hughes, C. (2006). Executive function deficits in autism spectrum disorders and attention-deficit/hyperactivity disorder: Examining profiles across domains and ages. *Brain and Cognition*, *61*, 25-39. doi:10.1016/j.bandc.2006.03.004
- Hardman, M., Drew, C., & Egan, M. (2008). *Human exceptionality: School, community, and family* (10th ed.). Boston, MA: Allyn & Bacon.
- Hare, D. J., & Flood, A. (2001). Approaching work with people with a diagnosis of Asperger Syndrome: Some notes for the perplexed. *Clinical Psychology Forum*, *148*, 11-16.
- Harper, C. B., Symon, J. B., & Frea, W. D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. *Journal of Autism and Developmental Disorders*, *38*, 815-826. doi:10.1007/s10803-007-0449-2
- Harrower, J., & Dunlap, G. (2001). Including children with Autism in general education classrooms: A review of effective strategies. *Behavior Modification*, *25*, 762-784. doi: 10.1177/0145445501255006
- Hess, K. L., Morrier, M. J., Heflin, L. J., & Ivey, M. L. (2008). Autism treatment survey: Services received by children with autism spectrum disorders in public school classrooms. *Journal of Autism and Developmental Disorders*, *38*, 678-692. doi: 10.1007/s10803-007-0470-5
- Hinshaw, S. P., & Melnick, S. (1995). Peer relationships in boys with attention-deficit hyperactivity disorder with and without comorbid aggression. *Development and Psychopathology*, *7*, 627-647. doi: 10.1017/S0954579400006751
- Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., Wolery, M. (2005). The use of single- subject research to identify evidence-based practice in special education. *Exceptional Children*, *71*, 165-179.
- Horvath, A.O, Del Re, A.C., Flückiger, C., & Symonds, D. (2011). Alliance in individual psychotherapy. *Psychotherapy*, *48*, 9-16. doi:10.1037/a0022186

- Hume, K., Loftin, R., & Lantz, J. (2009). Increasing independence in autism spectrum disorders: A review of three focused interventions. *Journal of Autism and Developmental Disorders, 39*, 1329-1338. doi: 10.1007/s10803-009-0751-2
- Iadarola, S., Hetherington, S., Clinton, C., Dean, M., Reisinger, E., Huynh, L., ... Kasari, C. (2014). Services for children with autism spectrum disorder in three, large urban school districts: Perspectives of parents and educators. *Autism, 19*, 694-702. doi: 10.1177/1362361314548078
- Jackson, J. N., & Campbell, J. M. (2009). Teachers' peer buddy selections for children with autism: Social characteristics and relationship with peer nominations. *Journal of Autism and Developmental Disorders, 39*, 269-277.
- Jansen, R. G., Wiertz, L. F., Meyer, E. S., & Noldus, L. P. J. J. (2003). Reliability analysis of observational data: Problems, solutions, and software implementation. *Behavior Research Methods, Instruments, & Computers, 35*, 391-399. doi:10.3758/BF03195516
- Jones, A. P., & Frederickson, N. (2010). Multi-informant predictors of social inclusion for pupils with autistic spectrum disorder attending mainstream school. *Journal of Autism and Developmental Disorders, 40*, 1094-1103. doi:10.1007/s10803-010-0957-3
- Jordan, J. J., Hines, Y. L., & Saklofske, D. H. (2009). School psychology in Canada: A survey of roles and functions, challenges and aspirations. *Canadian Journal of School Psychology, 24*, 245-264. doi: 10.1177/0829573509338614
- Kamps, D. M., Barbetta, P. M., Leonard, B. R., & Delquadri, J. (1994). Classwide peer tutoring: An integration strategy to improve reading skills and promote peer interactions among students with autism and general education peers. *Journal of Applied Behavior Analysis, 27*, 49-61. doi:10.1901/jaba.1994.27-49
- Kamps, D., Thiemann-Bourque, K., Heitzman-Powell, L., Schwartz, I., Rosenberg, N., Mason, R., & Cox, S. (2014). A comprehensive peer network intervention to improve social communication of children with autism spectrum disorders: A randomized trial in kindergarten and first grade. *Journal of Autism and Developmental Disorders, 45*, 1809-1824. doi: 10.1007/s10803-014-2340-2

- Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without autism. *Journal of Autism and Developmental Disorders*, *41*, 533-544. doi: 10.1007/s10803-010-1076-x
- Kasari, C., Rotheram-Fuller, E., Locke, J., & Gulsrud, A. (2012). Making the connection: randomized controlled trial of social skills at school for children with autism spectrum disorders. *Journal of Child & Psychological Psychiatry*, *53*, 431-439. doi: 10.1111/j.1469-7610.2011.02493.x
- Kasari, C., & Smith, T. (2013). Interventions in schools for children with ASD: Methods and recommendations. *Autism*, *17*, 254-267. doi: 10.1177/1362361312470496
- Kazdin, A. E. (1977). Assessing the clinical or applied importance of behavior change through social validation. *Behavior Modification*, *1*, 427-452.
- Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.
- Kelly, J. A., Heckman, T. G., Stevenson, L. Y., Williams, P. N., Ertl, T., Hays, R. B., ... Neumann, M. S. (2000). Transfer of research-based HIV prevention interventions to community service providers: Fidelity and adaptation. *AIDS Education and Prevention*, *12*, 87-98.
- Kennedy, C. H., & Itkonen, T. (1996). Social relationships, influential variables, and change across the lifespan. In L. K. Koegel, R. L. Koegel, & G. Dunlap (Eds.), *Positive behavioral support* (pp. 287-304). Baltimore: Paul H. Brookes.
- Kerr, M., Boudreau, A., & Smith, I. M. (2015). Using parents' and children's input to inform a peer-mediated intervention for young school-aged children with autism spectrum disorder. Poster presented at the International Meeting for Autism Research, Salt Lake City, UT.
- Kilbourne, A. M., Neumann, M. S., Pincus, H. A., Bauer, M. S., & Stall, R. (2007). Implementing evidence-based interventions in health care: application of the replicating effective programs framework. *Implementation Science*, *2*, 1-10. doi: 10.1186/1748-5908-2-42.

- Koegel, L. K., Carter, C. M., & Koegel, R. L. (2003). Teaching children with autism self-initiations as a pivotal response. *Topics in Language Disorders, 23*, 134-145. doi: 10.1097/00011363-200304 000-2003304000-00006
- Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response intervention I: Overview of approach. *Research and Practice for Persons with Severe Disabilities, 24*, 174-185. doi: 10.2511/rpsd.24.3.174
- Koegel, L. K., & Koegel, R. L. (1995). Motivating communication in children with autism. In E. Schopler & G. B. Mesibov (Eds.), *Learning and cognition in autism* (pp. 73-87). New York: Plenum.
- Koegel, L. K., Singh, A. K., & Koegel, R. L. (2010). Improving motivation for academics in children with autism. *Journal of Autism and Developmental Disorders, 40*, 1057-1066. doi: 10.1007/s10803-010-0962-6
- Koegel, L. K., Vernon, T., Koegel, R. L., Koegel, B., & Paullin, A.W. (2012b). Improving socialization between children with autism spectrum disorder and their peers in inclusive settings. *Journal of Positive Behavioral Intervention, 14*, 220-227. doi: 10.1177/1098300712437042
- Koegel, R. L., Dyer, K., & Bell, L. K. (1987). The influence of child-preferred activities on autistic children's social behavior. *Journal of Applied Behavior Analysis, 20*, 243-252. doi:10.1901/jaba.1987.20-243
- Koegel, R. L., & Frea, W. D. (1993). Treatment of social behavior in autism through the modification of pivotal social skills. *Journal of Applied Behavior Analysis, 26*, 369-377. doi:10.1901/jaba.1993.26-369
- Koegel, R. L., Fredeen, R., Kim, S., Danial, J., Rubinstein, D., & Koegel, L. K. (2012a). Using perseverative interests to improve interactions between adolescents with autism and their typical peers in school settings. *Journal of Positive Behavior Interventions, 14*, 133-141. doi: 10.1177%2F1098300712437043
- Koegel, R. L., Kim, S., Koegel, L. K., & Schwartzman, B. (2013). Improving socialization for high school students with ASD by using their preferred interests. *Journal of Autism and Developmental Disorders, 43*, 2121-2134. doi: 10.1177%2F1098300712437043

- Koegel, R. L., Koegel, L. K., & McNERNEY, E. K. (2001). Pivotal areas in intervention for autism. *Journal of Clinical Child Psychology, 30*, 19-32. doi:10.1207/S15374424JCCP3001_4
- Koegel, R. L., & Koegel, L. K. (2006). *Pivotal Response Treatments for autism: Communication, social & academic development*. Baltimore, MD: Paul H Brookes Publishing.
- Koegel, R. L., & Koegel, L. K. (2012). *The PRT pocket guide: Pivotal Response Treatment for autism spectrum disorders*. Baltimore, MD: Brookes Publishing.
- Koegel, R. L., Matos-Fredeen, R., Lang, R., & Koegel, R. (2012). Interventions for children with autism spectrum disorders in inclusive school settings. *Cognitive and Behavioural Practice, 19*, 401-412. doi: 10.1016/j.cbpra.2010.11.003
- Koegel, R. L., Schreibman, L., Good, A., Cerniglia, L., Murphy, C., & Koegel, L. K. (1989). *How to teach pivotal behaviors to children with autism: A training manual*. Santa Barbara: University of California, Santa Barbara.
- Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education, 34*, 26-38.
- Kretzmann, M., Shih, W., & Kasari, C. (2015). Improving peer engagement of children with autism on the school playground: A randomized controlled trial. *Behavior Therapy, 46*, 20-28. doi: 10.1016/j.beth.2014.03.006
- Kuhn, L. R., Bodkin, A. E., Devlin, S. D., & Doggett, A. (2008). Using pivotal response training with peers in special education to facilitate play in two children with autism. *Education and Training in Developmental Disabilities, 43*, 37-35.
- Lerner, M. D., White, S. W., & McPartland, J. C. (2012). Mechanisms of change in psychosocial interventions for autism spectrum disorders. *Dialogues in Clinical Neuroscience 14*, 307-318.

- Locke, J., Ishijima, E., Kasari, C., & London, N. (2010). Loneliness, friendship quality, and the social networks of adolescents with high-functioning autism in an inclusive school setting. *Journal of Research in Special Educational Needs, 10*, 74-81. doi: 10.1111/j.1471-3802.2010.01148.x
- Locke, J., Olsen, A., Wideman, R., Downey, M. M., Kretzmann, M., Kasari, C. & Mandell, D. S. (2015). A tangled web: The challenges of implementing an evidence-based social engagement intervention for children with autism in urban public school settings. *Behavior Therapy, 46*, 54-67. doi: 10.1016/j.beth.2014.05.001
- Locke, J., Rotheram-Fuller, E., & Kasari, C. (2012). Exploring the social impact of being a typical peer model for included children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 42*, 1895-1905. doi: 10.1007/s10803-011-1437-0
- Lomas, J. (1993). Retailing research: Increasing the role of evidence in clinical services for childbirth. *The Milbank Quarterly, 71*, 439-475.
- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (1999). *Autism Diagnostic Observation Schedule – WPS (ADOS-WPS)*. Los Angeles, CA: Western Psychological Services.
- Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism Diagnostic Interview-Revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism Developmental Disorders, 24*, 659-685.
- Lord, C., Wagner, A., Rogers, S., Szatmari, P., Aman, M., Charman, T., ... Yoder, P. (2005). Challenges in evaluating psychosocial interventions for autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 35*, 695-708. doi: 10.1007/s10803-005-0017-6
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*, 3-9.

- Luborsky, L., Rosenthal, R., Diguier, L., Andrusyma, T. P., Berman, J. S., Levitt, J. T., Seligman, D. A., & Krause, E. D. (2002). The dodo Bird verdict is alive and well - mostly. *Clinical Psychology: Science and Practice*, *9*, 2-12. doi: 10.1093/clipsy.9.1.2
- Ma, H. H. (2006). An alternative method for quantitative synthesis of single-subject researches: Percentage of data points exceeding the median. *Behavior Modification*, *30*, 598-617. doi: 10.1177/0145445504272974
- Mandell, D. S., Stahmer, A. C., Shin, S., Xie, M., Reisinger, E., & Marcus, S. C. (2013). The role of treatment fidelity on outcomes during a randomized field trial of an autism intervention. *Autism*, *17*, 281-295. doi: 10.1177/1362361312473666
- Mastropieri, M., & Scruggs, T. (2010). *The inclusive classroom: Strategies for effective differentiated instruction*. Upper Saddle River, NJ: Pearson.
- Mavropoulou, S., & Sideridis, G. D. (2014). Knowledge of autism and attitudes of children towards their partially integrated peers with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *44*, 1867-1885. doi: 10.1007/s10803-014-2059-0
- McGrath, P. J., Lingley-Pottie, P., Emberly, D. J., Thurston, C., & McLean, C. (2009). Integrated knowledge translation in mental health: Family help as an example. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *18*, 30-7.
- McIntyre, L. L., Blacher, J., & Baker, B. L. (2006). The transition to school: Adaptation in young children with and without intellectual disability. *Journal of Intellectual Disability Research*, *50*, 349-361. doi: 10.1111/j.1365-2788.2006.00783.x
- McKenney, E. L. W., Dorencz, J., Bristol, R. M., & Hall, L. P. (2015). Publishing about autism spectrum disorder in six psychology journals: 2002-2012. *Psychology in the Schools*, *52*, 265-283. doi: 10.1002/pits.21820
- McKibbin, A., Lokker, C., Wilczynski, N.L., Ciliska, D., Dobbins, M., Davis, D.A., Haynes, R.B., & Straus, S.E. (2010). A cross-sectional study of the number and frequency of term used to refer to knowledge translation in a body of health literature in 2006: A tower of babel? *Implementation Science*, *5*, 1-16. doi: 10.1186/1748-5908-5-16

- Mesibov, G. B., Shea, V., & Adams, L. W. (2001). *Understanding Asperger Syndrome and high functioning autism*. Dordrecht, Netherlands: Kluwer Academic Publishers.
- Milich, R., McAninch, C. B., & Harris, M. J. (1992). Effects of stigmatizing information on children's peer relations: Believing is seeing. *School Psychology Review, 21*, 400-409.
- Millar, D. C., Light, J. C., & Schlosser, R. W. (2006). The impact of augmentative and alternative communication intervention on the speech production of individuals with developmental disabilities: A research review. *Journal of Speech, Language, and Hearing Research, 49*, 248-264. doi:10.1044/1092-4388(2006/021)
- Mohammadzaheri, F., Koegel, L. K., Rezaee, & Rafiee, S. M. (2014). A randomized clinical trial comparison between Pivotal Response Treatment and structured Applied Behavior Analysis intervention for children with autism. *Journal of Autism and Developmental Disabilities, 44*, 2769-2777. doi:10.1007/s10803-014-2137-3
- Motiwala, S. S., Gupta, S., Lilly, M. B., Ungar, W. J., & Coyte, P. C. (2006). The cost-effectiveness of expanding Intensive Behavioural Intervention to all autistic children in Ontario. *Health Policy, 1*, 135-151.
- Mrug, S., Hoza, B., Pelham, W. E., Gnagy, E. M., & Greiner, A. R. (2007). Behavior and peer status in children with ADHD: Continuity and change. *Journal of Attention Disorders, 10*, 359-371. doi:10.1177/1087054706288117
- National Autism Center (2009). *The National Autism Center's National Standards Report*. Randolph, MA: National Autism Center.
- National Autism Center (2015). *The National Autism Center's National Standards Report*. Randolph, MA: Author.
- National Institutes of Health (2013). Dissemination and Implementation Research in Health (R21). Retrieved from www.nia.nih.gov/research/funding/2013/01/dissemination-and-implementation-research.

- Nucci, L., & Turiel, E. (2009). Capturing the complexity of moral development and education. *Mind, Brain, and Education, 3*, 151-159. doi: 10.1111/j.1751-228X.2009.01065.x
- Ochs, E., Kremer-Sadlik, T., Solomon, O., & Sirota, K. G. (2001). Inclusion as social practice: Views of children with autism. *Social Development, 10*, 399-419. doi: 10.1111/1467-9507.00172
- Odom, S. L., Boyd, B., Hall, L. J., & Hume, K. (2010). Evaluation of comprehensive treatment models for individuals with autism spectrum disorders. *Journal of Autism and Developmental Disabilities, 40*, 425-437. doi: 10.1007/s10803-009-0825-1
- Odom, S. L., Horn, E. M., Marquart, J., Hanson, M. J., Wolfberg, P., Beckman, P. J., . . . Sandall, S. (1999). On the forms of inclusion: Organizational context and individualized service delivery models. *Journal of Early Intervention, 22*, 185-199. doi: 10.1177/105381519902200301
- Openden, D., Whalen, C., Cernich, S., & Vaupel, M. (2009). Generalization and autism spectrum disorders. In C. Whalen (Ed.), *Real Progress for Children with Autism* (pp. 1-18). Baltimore: Brookes.
- Orsmond, G. I., Krauss, M. W., & Seltzer, M. M (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders, 34*, 245-256.
- Padgett, D. K. (1998). *Qualitative methods in social work research: Challenges and rewards*. Thousand Oaks, CA: Sage Publications.
- Parsons, S., & Kasari, C. (2013). Schools at the centre of educational research in autism: Possibilities, practices and promises. *Autism: The International Journal of Research and Practice, 17*, 251-253. doi:10.1177/1362361313483624
- Patterson, S. Y., Smith, V., & Mirenda, P. (2012). A systematic review of training programs for parents of children with autism spectrum disorders: Single subject contributions. *Autism: The International Journal of Research and Practice, 16*, 498-522. doi:10.1177/1362361311413398

- Perepletchikova, F., & Kazdin, A. E. (2005). Treatment integrity and therapeutic change: Issues and research recommendations. *Clinical Psychology: Science and Practice, 12*, 365-383. doi:10.1093/clipsy.bpi045
- Pierce, K., & Schreibman, L. (1995). Increasing complex social behaviours in children with autism: Effects of peer-implemented Pivotal Response Training. *Journal of Applied Behaviour Analysis, 28*, 285-295. doi: 10.1901/jaba.1995.28-285
- Pierce, K., & Schreibman, L. (1997a). Multiple peer use of Pivotal Response Training to increase social behaviours of classmates with autism: Results from trained and untrained peers. *Journal of Applied Behaviour Analysis, 30*, 157-160. doi: 10.1901/jaba.1997.30-157
- Pierce, K., & Schreibman, L. (1997b). Using peer trainers to promote social behaviour in autism are they effective at enhancing multiple social modalities? *Focus on Autism and Other Developmental Disabilities, 12*, 207-218. doi: 10.1177/108835769701200403
- Pierucci, J. M., Barber, A. B., Gilpin, A. T., Crisler, M. E., & Klinger, L. G. (2015). Play assessments and developmental skills in young children with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities, 30*, 35-43. doi:10.1177/1088357614539837
- Powell, B. J., Proctor, E. K., & Glass, J. E. (2014). A systematic review of strategies for implementing empirically supported mental health interventions. *Research on Social Work Practice, 24*, 192-212. doi: 10.1177/1049731513505778
- Proctor, E. K., Landsverk, J., Aarons, G., Chambers, D., Glisson, C., & Mittman, B. (2009). Implementation research in mental health services: An emerging science with conceptual, methodological, and training challenges. *Administration and Policy in Mental Health, 36*, 24-34.
- Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., ... Hensley, M. (2011). Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. *Administration and Policy in Mental Health, 38*, 65-76.

- Rao, P. A., Beidel, D. C., & Murray, M. J. (2008). Social skills interventions for children with Asperger's syndrome or high-functioning autism: A review and recommendations. *Journal of Autism and Developmental Disorders*, *38*, 353-36. doi:10.1007/s10803-007-0402-4
- Reaven, J., Blakeley-Smith, A., Beattie, T. L., Sullivan, A., Moody, E. J., Stern, J. A., ... Smith, I. M. (2015). Improving transportability of a cognitive-behavioral treatment intervention for anxiety in youth with autism spectrum disorders: Results from a US-Canada collaboration. *Autism*, *19*, 211-222. doi: 10.1177/1362361313518124
- Reichow, B., Volkmar, F. R., & Cicchetti, D. V. (2008). Development of the evaluative method for evaluating and determining evidence-based practices in autism. *Journal of Autism and Developmental Disorders*, *38*, 1311-1319. doi: 10.1177/1362361309348070
- Reichow, B., & Volkmar, F. R. (2010). Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. *Journal of Autism and Developmental Disorders*, *40*, 149-166. doi:10.1007/s10803-009-0842-0
- Reith, S. R., Stahmer, A. C., Suhrheinrich, J., Schreibman, L., Kennedy, J., & Ross, B. (2014). Identifying critical elements of treatment: Examining the use of turn taking in autism intervention. *Focus on Autism and Other Developmental Disabilities*, *29*, 168-179. doi: 10.1177/1088357613513792
- Renshaw, T. L., & Kuriakose, S. (2011). Pivotal Response Treatment for children with autism: Core principles and applications for school psychologists. *Journal of Applied School Psychology*, *27*, 181-200. doi:10.1080/15377903.2011.566166
- Robey, R. R. (2004). A five-phase model for clinical-outcome research. *Journal of Communication Disorders*, *37*, 401-411. doi: 10.1016/j.jcomdis.2004.04.003
- Robinson, S. E. (2011). Teaching paraprofessionals of students with autism to implement Pivotal Response Treatment in inclusive school settings using a brief video feedback training package. *Focus on Autism and Other Developmental Disabilities*, *26*, 105-118. doi:10.1177/1088357611407063

- Rogers, S. J., & Vismara, L. A. (2008). Evidence-based comprehensive treatments for early autism. *Journal of Clinical Child and Adolescent Psychology*, *37*, 8-38. doi:10.1080/15374410701817808
- Rutter, M. (2005). Incidence of autism spectrum disorders: Changes over time and their meaning. *Acta Paediatrica*, *94*, 2-15.
- Schaefer, G. B., & Mendelsohn, N. J. (2013). Clinical genetics evaluation in identifying the etiology of autism spectrum disorders: 2013 guideline revisions. *Genetics in Medicine*, *15*, 399-407. doi: 10.1038/gim.2013.32
- Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., ... Halladay, A. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders*. Advance online publication. doi: 10.1007/s10803-015-2407-8
- Scruggs, T. E., Mastropieri, M. A., Casto, G., & Escobar, C. (1986). Early intervention for children with conduct disorders: A quantitative synthesis of single-subject research. *Behavior Disorder*, *11*, 260-271.
- Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single- subject research: Methodology and validation. *Remedial and Special Education*, *8*, 24-33.
- Simpson, R. L., de Boer-Ott, S. R. D., & Smith-Myles, B. (2003). Inclusion of learners with autism spectrum disorders in general education settings. *Topics in Language Disorders* *23*, 116-133. doi:10.1097/00011363-200304000-00005
- Smith, A. E., & Camarata, S. (1999). Using teacher-implemented instruction to increase language intelligibility of children with autism. *Journal of Positive Behaviour Interventions*, *1*, 141-151. doi: 10.1177/109830079900100302
- Smith, I. M., Flanagan, H. E., Garon, N., & Bryson, S. E. (2015). Effectiveness of community-based early intervention based on Pivotal Response Treatment. *Journal of Autism and Developmental Disorders*. Advance online publication. doi:10.1007/s10803-014-2345-x

- Smith, I. M., Koegel, R. L., Koegel, L. K., Openden, D. A., Fossum, K. L., & Bryson, S. E. (2010). Effectiveness of a novel community-based early intervention model for children with autistic spectrum disorder. *American Journal on Intellectual and Developmental Disabilities, 115*, 504-523. doi:10.1352/1944-7558115.6.504
- Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and Other Developmental Disabilities, 16*, 86-92. doi: 10.1177/108835760101600204
- Spillett, M. A. (2003). Peer debriefing: Who, what, when, why, how. *Academic Exchange Quarterly, 7*, 36-41.
- Stahmer, A. C., Brookman-Frazee, L., Lee, E., Searcy, K., & Reed, S. R. (2011). Parent and multidisciplinary provider perspectives on earliest intervention for children at risk for autism spectrum disorders. *Infants & Young Children, 4*, 1-20. doi:10.1097/IYC.0b013e31822cf700
- Stahmer, A. C., & Gist, K. (2001). The effects of an accelerated parent education program on technique mastery and child outcome. *Journal of Positive Behavior Interventions, 3*, 75-82. doi: 10.1177/109830070100300203
- Stahmer, A., Collings, N. M., & Palinkas, L. A. (2005). Early intervention practices for children with autism: Descriptions from community providers. *Focus on Autism & Other Developmental Disabilities, 20*, 66-79.
- Stahmer, A. C., Reed, S., Lee, E., Reisinger, E. M., Connell, J. E., & Mandell, D. S. (2015). Training teachers to use evidence-based practices for autism: Examining procedural implementation fidelity. *Psychology in Schools, 52*, 181-195. doi:10.1002/pits.21815
- Stahmer, A. C., Suhrheinrich, J., Reed, S., Bolduc, C., & Schreibman, L. (2010). Pivotal Response Teaching in the classroom setting. *Preventing School Failure, 54*, 265-274. doi:10.1080/10459881003800743
- Stahmer, A. C., Suhrheinrich, J., & Reed, S. (2011). *Classroom Pivotal Response Teaching for children with autism*. New York, NY: Guilford.

- Stahmer, A. C., Suhrheinrich, J., Reed, S., & Schreibman, L. (2012). What works for you? Using teacher feedback to inform adaptations of Pivotal Response Training for classroom use. *Autism Research and Treatment*, 2012, 1-11. doi:10.1155/2012/709861
- Stock, R., Mirenda, P., & Smith, I. M. (2013). Comparison of community-based verbal behaviour and Pivotal Response Treatment programs for young children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 7, 1168-1181. doi:10.1016/j.rasd.2013.06.002
- Suhrheinrich, J. (2011). Training teachers to use Pivotal Response Training with children with autism: Coaching as a critical component. *Teacher Education and Special Education*, 34, 339-349. doi: 10.1177/0888406411406553
- Swaim, K. F., & Morgan, S. B. (2001). Children's attitudes and behavioral intentions toward a peer with autistic behaviors: Does a brief educational intervention have an effect? *Journal of Autism and Developmental Disorders*, 31, 195-205. doi: 10.1023/A:1010703316365
- Terpstra, J. E., Higgins, K., & Pierce, T. (2002). Can I play? Classroom based interventions for teaching play skills to children with autism. *Focus on Autism and Other Developmental Disorders*, 17, 119-126. doi: 10.1177/10883576020170020701
- Timmons, V., & Wagner, M. (2008). *Inclusive education knowledge exchange initiative: An analysis of the statistics Canada participation and activity limitation survey*. Retrieved from <http://www.cclca.ca/CCL/Research/FundedResearch/201009TimmonsInclusiveEducation.html>
- Tomm-Bonde, L., Schreiber, R. S., Allan, D. E., MacDonald, M., Pauly, B., & Hancock, T. (2013). Fading vision: Knowledge translation in the implementation of a public health policy intervention. *Implementation Science*, 8, 59. doi: 10.1186/1748-5908-8-59.
- Usher, L. V., Burrows, C. A., Schwartz, C. B., & Henderson, H. A. (2015). Social competence with an unfamiliar peer in children and adolescents with high functioning autism: Measurement and individual differences. *Research in Autism Spectrum Disorders*, 17, 25-39. doi:10.1016/j.rasd.2015.05.005

- Verschuur, R., Didden, R., Lang, R., Sigafoos, J., & Huskens, B. (2014). Pivotal Response Treatment for children with autism spectrum disorders: A systematic review. *Journal of Autism and Developmental Disorders, 1*, 34-61. doi: 10.1007/s40489-013-0008-z
- Wainer, A., & Ingersoll, B. (2013). Intervention fidelity: An essential component for bridging ASD parent training intervention research and practice. *Clinical Psychology: Research and Practice, 20*, 335-357. doi: 10.1111/cpsp.12045
- Walker, H. M. (2004). Commentary: Use of evidence-based interventions in schools: Where we've been, where we are, and where we need to go. *School Psychology Review, 33*, 398-407.
- Walker, H. M., & McConnell, S. R. (1988). *The Walker-McConnell Scale of Social Competence and School Adjustment: A social skills rating scale for teachers*. Austin, TX: Pro-Ed.
- Wang, S., Cui, Y., & Parrila, R. (2011). Examining the effectiveness of peer-mediated and video-modeling social skills interventions for children with autism spectrum disorders: A meta-analysis in single-case research using HLM. *Research in Autism Spectrum Disorders, 5*, 562-569. doi: 10.1016/j.rasd.2010.06.023
- Wang, S., & Parrila, R. (2008). Quality indicators for single-case research on social skill interventions for children with autistic spectrum disorder. *Developmental Disabilities Bulletin, 36*, 81-105.
- Watkins, L., O'Reilly, M., Kuhn, M., Gevarter, C., Lancioni, G. E., Sigafoos, J., & Lang, R. (2015). A review of peer-mediated social interaction interventions for students with autism in inclusive settings. *Journal of Autism and Developmental Disorders, 45*, 1070-1083. doi: 10.1007/s10803-014-2264-x
- Watkins, M. W., & Pacheco, M. (2000). Interobserver agreement in behavioral research: Importance and calculation. *Journal of Behavioral Education, 10*, 205-212. doi: 10.1023/A:1012295615144

- Weisz, J. R., Chu, B. C., & Polo, A. J. (2004). Treatment dissemination and evidence-based practice: Strengthening intervention through clinician-researcher collaboration. *Clinical Psychology: Science and Practice, 11*, 300-307. doi: 10.1093/clipsy.bph085
- Whalen, K. J., Conroy, M. A., Martinez, J. R., & Werch, B. L. (2015). School-based peer-related social competence interventions for children with autism spectrum disorder: A meta-analysis and descriptive review of single case research design studies. *Journal of Autism and Developmental Disorders, 45*, 1513-1531. doi:10.1007/s10803-015-2373-1
- Wiltsey Stirman, S., Kimberly, J., Cook, N., Calloway, A., Castro, F., & Charns, M. (2012). Systematic review: The sustainability of new programs and innovations: a review of the empirical literature and recommendations for future research. *Implementation Science, 7*, 1-17. doi: 10.1186/1748-5908-7-17
- Wolf, M. M., Risley, T. R., & Mees, H. (1964). Application of operant conditioning procedures to the behavioral problems of an autistic child. *Behaviour Research and Therapy, 1*, 305-312.
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11*, 203-214.
- Wong, C., Odom, S. L., Hume, K., Cox, A.W., Fettig, A., Kucharczyk, S., ...Schultz, T. R. (2014). *Evidence-based practice for children, youth, and young adults with autism spectrum disorder*. Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, Autism Evidence-Based Practice Review Group. Available at: <http://fpg.unc.edu/sites/fpg.unc.edu/files/resources/reports-and-policy-briefs/2014-EBP-Report.pdf>
- Wood, J. J., McLeod, B. D., Klebanoff, S., & Brookman-Frazee, L. (2015). Toward the implementation of evidence-based interventions for youth with autism spectrum disorders in schools and community agencies. *Behavior Therapy, 46*, 83-95. doi:10.1016/j.beth.2014.07.003

Zanolli, K., Daggett, J., & Adams, T. (1996). Teaching preschool age autistic children to make spontaneous initiations to peers using priming. *Journal of Autism and Developmental Disorders*, 26, 407-422. doi: 10.1007/BF02172826

Zhang, J., & Wheeler, J. J. (2011). A meta-analysis of peer-mediated interventions for young children with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities*, 46, 62-77.

APPENDIX A

Semi-Structured Interview Guide

Introduction of Topic:

Autism: Children with autism spectrum disorders (ASDs) have differences in the way they talk and interact socially with others, as well as repetitive patterns of behaviors and interests. The term ASD refers to the range of ways these differences present themselves across individuals.

As many as 1 in 88 children have an ASD. Further, the number of school-age children with ASD is rising. Children with ASD pose a large burden on school system resources, yet special education funding continues to decrease. In Nova Scotia, a province-wide early intervention program for preschool-aged children with ASD uses Pivotal Response Treatment (or PRT) in addition to Positive Behavior Support (PBS). Pivotal Response Treatment is one of the most-studied behavioral treatments for ASD. PRT is derived from applied behavioral analysis (or ABA) and is play-based and child-led. Its goals include the development of children's communication, language and positive social behaviors and reducing disruptive behaviors. PRT targets "pivotal" or key areas of a child's development (such as motivation) that can make widespread changes.

Some intervention needs of preschool aged-children are met by the PRT-based early intervention program, but there are less interventions with that have strong research evidence supporting them (e.g., evidence-based-interventions) available for children after they go to school. Research tells us that positive peer interactions and making friends are one of parents' most valued goals for their children with ASD. They are also important skills that are linked with real-world success. Although the academic needs of children with ASD may be met at school, social and communication needs (e.g., social skills) are harder to target in school-aged children.

We have designed a pilot/test study that would look at the effects of a short PRT-based social skills program for young elementary-school-aged children with ASD. The study would use a different form of a more common PRT model (parent delivery) by teaching peers to coach children with ASD to improve their social interaction skills. Peer coaches would be taught to help develop the social skills of children with ASD at school (e.g., on the playground, in classrooms at recess, at lunch). Using these "natural settings" is thought to increase children's motivation, learning, and ability to apply their skills. Our goal: we want to help kids with ASD make a successful transition to school and learn to interact with peers, as well as to encourage peers' acceptance of and ability to interact well with children with developmental differences. Our hope is that if we invest early in children's development during an important transition (into Grade Primary) that we may be able to help to decrease children's levels of difficulty at school and need for intensive supports in later school years.

We think that it is very important to get advice about our proposed intervention from experts who work within the school system. Please give us your honest opinions.

We would like to begin this interview by asking:

PERCEPTIONS OF EVIDENCE-BASED INTERVENTIONS (EBI)

a) What does the term ("evidence-based intervention") mean to you?

[Probe: empirical evidence]

b) How important is it that interventions for children with ASD in the school system are based on research evidence?

PERCEPTIONS OF INTERVENTION

[Pivotal Response Treatment]:

- a) Have you heard of PRT? *If yes: What is your understanding of PRT? If no: repeat definition of PRT from the interview guide introduction above.*
- b) What are the potential benefits to using PRT in schools?
- c) What are the potential barriers to using PRT in schools?

[Intervention Target]:

- 1) Are peer interaction skills an important intervention target for children with ASD?

[Why or why not?; Probe: other priorities]

[Location of Intervention]:

- 2) Do you think the school environment is good place to implement social interventions for children with ASD?

[Why or why not; Probe: locations at school: playground, classroom; time of day]
[Pros/Cons]

[Age/Grade Range for Providing Intervention]:

- 3) Do you think that the first year of school is a good time to provide social interventions to children with ASD? What point during the first year would be optimal?

[Why or why not; better time?]
[Pros/Cons]

[Intervention Agent]:

- 4) Do you think that using same-aged typically developing peers as the primary social skill coach for children with ASD is a good idea?
Would other means of teaching peer interaction skills be preferable?

[Why or why not]
[Pros/Cons]

[Ecological Feasibility]:

Do you think this proposed intervention study could be carried out in your school? In other schools? What are the key factors that might make this possible?

[Why or why not]
[Pros/Cons]

[Putting it all Together: Overall Perceptions]

- b) What do you see as the potential the strengths of this intervention approach?
c) What could be improved?

[Endorsement]:

Overall, would you recommend that this intervention be piloted in HRSB schools?
Please choose the best descriptor:

- Definitely yes
- Yes with reservations
[Probe: reservation]

- No opinion/neutral opinion
- No, but with improvement/revision might be worth consideration
[Probe: revisions]

- Definitely no

APPENDIX B

Definitions of PM-PRT Strategies

Paying Attention: The peer coach must have the attention of the child with ASD prior to presenting an opportunity.

Child Choice: To a large extent, the peer coach being observed should follow the choices of the child with ASD with tasks and activities. The peer coach should assume control if the child with ASD engages in inappropriate activities (e.g., self-stimulation). If child with ASD does not show interest in the current task, the peer coach should attempt to change the activity. However, the adult trainer must assume control if the child with ASD engages in hazardous activities (e.g., self-injury).

Encourage Conversation: The peer coach being observed must ask the child with ASD to talk or try to get the child with ASD to talk for any toy they want. The response of the peer coach being observed (e.g., giving the child a toy) must be dependent upon the child's response (e.g., saying "toy"). The peer coach should also be observed initiating conversation throughout play (appropriate to developmental level of target child) or talking about aspects of the toy during play.

Taking Turns: The peer coach being observed should provide opportunities for turn taking during play and/or sharing the material concurrently with the child with ASD. The peer coach should show the child with ASD examples of how to play and provide opportunities for the child with ASD to talk to get his/her turn back.

Reward/Reinforce Attempts: Any goal-directed attempt to respond to questions, instructions, or play opportunities should be reinforced. Although an attempt does not

necessarily need to be correct, it has to be reasonable. The peer coach should verbally reinforce the child with ASD for a job well done.

Narrate play: The peer coach being observed should verbally describe what they are doing. The peer coach should describe most play actions with short sentences. Not every play action should be narrated.

APPENDIX C

Additional Satisfaction Comments

Children with ASD: Satisfaction.

Parent. One parent stated the best thing about having her child take part in the research study was “to teach him [child with ASD] how to communicate with other peers and also to help him gain confidence to be able to approach others and initiate play.” Another parent said the best thing about having her child participate in PM-PRT was “having the opportunity for my child to continue to have PRT in school with his peers.” One parent appreciated “giving him the opportunity to play with his peers in a controlled supervised setting.”

Teacher. One teacher stated “I was very excited to see [child with ASD] improve from a social perspective.” Another teacher said “I think the overall idea that the program is delivered by students makes total sense.” One teacher said the program was “beneficial to the child with ASD...he [child with ASD] has been interacting more with other students in the class, and especially one of the coaches.”

TD Peers: Satisfaction.

Parent. One parent stated the best thing about having her child in the program was “listening to his stories and hearing how proud he was of himself for helping out someone else.” Another parent said, “she [i.e., peer coach] enjoyed the group and loves helping others”; the same parent reported the only negative comment gathered in the study: “she didn’t like missing journal time” to participate in the program. Another parent said, “Watching our child learn to help another with empathy was one of the best things


about his participation. We loved hearing about the strategies he used and how happy he was doing it.”

Teacher. One teacher said “Not only is it good for the students with ASD, the peer coaches learn a lot too....[peer coach] also got a boost in her confidence with her own interpersonal skills.” The only ‘negative’ comment made by one teacher was regarding the non-trained generalization peer: “[he] was disappointed not to be involved more.” Another teacher said “I find they [peer coach and generalization peer] are more helpful and cooperative towards each other without being asked.” One teacher said “Not only is it good for the students with ASD, the peer coaches learn a lot too.”

APPENDIX D

Copyright Permission

Moran, Eric <eric.moran@sagepub.com>

4:21 PM (7 hours ago) ☆ 

to me 

Hi Ainsley,

Sorry for the delay here, I'm sure it's a hectic time with your submission due so soon. You absolutely have permission to use the manuscript version of your paper in your dissertation and we understand it will be distributed through LAC(NLC). Please let me know if you need anything else.

Best of luck,

Eric

Eric Moran

Director, Social Science Journals

SAGE Publications Inc.

2455 Teller Road

Thousand Oaks, CA 91320

USA

T: [805-410-7764](tel:805-410-7764)

Fax: [805-410-7002](tel:805-410-7002)

www.sagepub.com



Los Angeles | London | New Delhi

Singapore | Washington DC

The natural home for authors, editors and societies

Ainsley Boudreau

To:  dsaklofs@uwo.ca; 

 Reply all | 

Wed 7/29/2015 9:39 AM

Hello, Don-

Along with my co-authors, I had an article recently published in the Canadian Journal of School Psychology:

Boudreau, A.M., Corkum, P., Meko, K., & Smith, I. M. (2015). Peer-mediated pivotal response treatment for young children with autism spectrum disorders: A systematic review. *Canadian Journal of School Psychology*, 30, 218-235. doi: 10.1177/0829573515581156

I am wanting to include it as part of my doctoral dissertation. If you agree, it would be properly cited in my dissertation.

Please let me know if you require any additional information or have questions.

Best,

Ainsley

--

Ainsley Boudreau, MASP
Clinical Psychology PhD Student
Department of Psychology & Neuroscience
1459 Oxford Street
Dalhousie University
Halifax, N.S. B3H 4R2
902.470.7413
ainsley.boudreau@dal.ca

[Ainsley Boudreau <ainsleyboudreau@gmail.com>](mailto:ainsleyboudreau@gmail.com)  | 

To:  Donald Saklofske <dsaklofs@uwo.ca>; Cc:  Ainsley Boudreau;  Sawney, Daniel <daniel.sawney@sagepub.com> ... 

Tue 8/11/2015 1:56 PM

Dear Daniel and Calyx,

I have not heard back from you regarding permission to reprint my paper recently published in the Canadian Journal of School Psychology in my doctoral dissertation. Paper citation below:

Boudreau, A.M., Corkum, P., Meko, K., & Smith, I. M. (2015). Peer-mediated pivotal response treatment for young children with autism spectrum disorders: A systematic review. *Canadian Journal of School Psychology*, 30, 218-235. doi: 10.1177/0829573515581156

Specifically, I am preparing my doctoral thesis for submission to the Faculty of Graduate Studies at Dalhousie University, Halifax, Nova Scotia, Canada. I am seeking your permission to include a manuscript version of the above paper as a chapter in the thesis.

Canadian graduate theses are reproduced by the Library and Archives of Canada (formerly National Library of Canada) through a non-exclusive, world-wide license to reproduce, loan, distribute, or sell theses. I am also seeking your permission for the material described above to be reproduced and distributed by the LAC(NLC). Further details about the LAC(NLC) thesis program are available on the LAC(NLC) website (www.nlc-bnc.ca).

Best,

Ainsley