CULTURAL AND FAMILY FACTORS ON CAREGIVER INVOLVEMENT IN COMMUNICATION INTERVENTIONS FOR CHILDREN WITH AUTISM SPECTRUM DISORDER AND INTELLECTUAL DEVELOPMENTAL DISABILITY: A META-ANALYTIC REVIEW, SYSTEMATIC REVIEW, AND SINGLE-CASE RESEARCH

A Dissertation

by

CHING-YI LIAO

Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Chair of Committee,	Jennifer B. Ganz
Co-Chair of Committee,	Kimberly J. Vannest
Committee Members,	Shanna Hagan-Burke
	Lei-Shih Chen
Head of Department,	Shanna Hagan-Burke

August 2019

Major Subject: Educational Psychology

ABSTRACT

Caregiver involvement, which means the collaboration between caregivers and professionals, plays an important role in the outcomes of communication skills for individuals with autism spectrum disorder (ASD) and intellectual/developmental disability (IDD). However, culturally and linguistically diverse (CLD) families do not receive sufficient culturally- and linguistically- appropriate support due to language and cultural barriers. The purposes of the present research were (a) to conduct a meta-analytic review determining the effects of caregiver involvement for promoting communication skills of children with ASD and IDD; (b) to summarize the characteristics of single-case studies on caregiver involvement in communication interventions for CLD families of children with ASD and IDD for recommendations on culturally responsive practices; and (c) to conduct a single-case experimental design study evaluating the effects of a culturally responsive parent coaching on multimodal communication protocol for CLD parents of children with ASD.

The results of the first article indicated that the overall effect size for family involvement showed a small effect on child communicative outcomes. Also, there were statistically significant differences in child communication outcomes between the different dosage groups. The findings of the second article suggested that caregiver involvement can improve communication behavior in CLD individuals with ASD and IDD; however, there is a need to provide culturally and linguistically appropriate support to CLD caregivers during parent training. Visual and statistical analyses in the third article indicated a functional relation in the effectiveness of the culturally responsive parent coaching, the

improvement of communication skills in children with ASD, and high acceptability of culturally responsive parent coaching on the multimodal communication protocol.

The findings of this research have implications for cultural and family factors on caregiver involvement in improving communication skills for children with ASD and IDD. Some limitations should be considered, including the inclusion of only single case research, the greater focus on intervention characteristics provided to caregiver characteristics, and the inclusion of limited studies published in Asia for the first/second study. Also. small sample size and the inclusion of only Chinese speaking caregiver participants were two major limitations for the third study. Implications for future research and practice were also addressed.

DEDICATION

To my precious parents and brothers – Ming-Hsuan Liao, Yu-Mei Lai, Kun-Hung Liao, and Kun-Lung Liao. I have gotten unconditional love and support and inherited great patience and passion for learning from you. Without you, I could not complete my study in the United States.

ACKNOWLEDGEMENTS

I would like to express my wholehearted thanks to my committee chair and co-chair, Drs. Jennifer Ganz and Kimberly Vannest, for your expert guidance and steadfast support throughout my doctoral program. I was extremely fortunate to have such great advisors, who always spent time caring about me and training me to achieve my professional goals. You have played tremendously important role models in teaching me to become a better researcher and professional now and in shaping my future. Thank you for all the learning opportunities you have given me and for everything you have taught me. I would also like to thank my committee members, Drs. Shannon Hagan-Burke and Lei-Shih Chen for all your encouragement, feedback, and advice that made my dissertation more meaningful. Extra appreciation is extended to Drs. Lisa Bowman-Perrott, Mack Burke, Marcia Montague, Jeffrey Liew, Jui-Chih Chin, and Yu-Chin Huang for all of the thoughtful advice about academia you have given me.

Thanks also go to the parents and children who were willing to participate in the study. This dissertation would not have been possible without their time and commitment. I am grateful for their trust and willingness to share their life and interaction with me.

I would love to thank my cohort members and friends who started this journey with me and provided me emotional support: Sandy Smith, Eun Hye Ko, Martin Mendoza, Christina Gushanas, Sarah Ura, Sanikan Wattanawongwan, April Haas, Marcus Fuller, Mary Rose Sallese, and Cynthia Dong. A special thank you to Sarah Ura, Sanikan Wattanawongwan, Lauren Pierson, Yi-Fan Li, Valeria Yllades, Yan Li, Kristi Morin, Dr.

Ee Rea Hong, and all team members of the Coach to Communicate (C2C) project for your support on participant recruitment and data coding for my dissertation.

Finally, I am tremendously grateful to my family members for their unending love and encouragement, especially my parents, brothers, and sister-in-law, who cherish all my little accomplishments. I also extend my sincere appreciation to my grandparents, uncles, aunts, and cousins for their kindness and support. Mom and Dad, thank you for always listening and believing in me and my dreams. I am so fortunate to have such a wonderful family in my life.

CONTRIBUTORS AND FUNDING SOURCES

This work was supervised by a dissertation committee consisting of Drs. Jennifer Ganz [chair], Kimberly Vannest [co-chair], and Shanna Hagan-Burke of the Department of Educational Psychology and Dr. Lei-Shih Chen of the Department of Health and Kinesiology.

All work conducted for the dissertation was completed by the student under the supervision and advisement of Drs. Jennifer Ganz and Kimberly Vannest of the Department of Educational Psychology.

The work in Chapter 4 was supported in part by grants from the Texas Higher Education Coordinating Board (THECB) Autism Grant Program [Coach to Communicate (C2C): Partnering to Improve Communication for Individuals with Autism. Awards #17108, 20465]. The contents of this study are solely the responsibility of the author and do not necessarily represent the official views or policy of the THECB.

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

CHAPTER I

INTRODUCTION

Autism spectrum disorder (ASD) is a neurological and developmental disorder characterized by challenges with social communication skills, language, repetitive behaviors, and restricted interests. Intellectual/developmental disability (IDD) refers to an individual's growth and development in the sense that delays or impairments exist within developmental domains such as cognitive, communication, social, or motor abilities. Most common IDDs include Down syndrome and intellectual disability (DSM-V; American Psychiatric Association, 2013; Odom, Horner, Snell, & Blacher, 2007). Deficits in social communication are characteristic of ASD and IDD. Children with ASD and IDD often have difficulty communicating their needs and establishing positive relationships with others (American Psychiatric Association, 2013; Dogoe, Banda, & Lock, 2010; National Research Council, 2001). Positive social development provides an essential foundation for cognitive and academic competence (Copple & Bredekamp, 2009). Evidence-based interventions (e.g., parent training) can be used to increase, maintain, and improve the communication skills of children with ASD and IDD (National Autism Center, 2015).

Family members play an critical role in providing support to individuals with ASD and IDD throughout their lifetime. Caregiver involvement refers to the collaboration between caregivers and professionals who work with children with ASD and IDD (Bennett, 2012; Ozonoff & Cathcart, 1998). Caregivers, with coaching and support provided by professionals, are able to correctly implement behaviorally-based strategies and communication interventions to improve understanding of disabilities, parental quality of life, and communication skills in children with ASD and IDD (Bruno & Dribbon, 1998;

Hong, Ganz, Neely, Gerow, & Ninci, 2016; Hsieh, Wilder, & Abellon, 2011; Johnson et al., 2007; Matson, Mahan, & Matson, 2009; Patterson & Smith, 2011; Powers et al., 1992; Preece & Trajkovski, 2017; Tekin-Iftar, 2008). However, few meta-analytic reviews of single-case research have been conducted on the effects of caregiver involvement in communication skills in children with ASD and IDD. In addition, culturally and linguistically diverse (CLD) families usually do not receive culturally- and linguistically-appropriate support from professionals because of language barriers and cultural barriers (Harry & Kalyanpurm, 1994; Huer, Saenz, & Doan, 2001; Wolfe & Durán 2013). There is a lack of research on culturally focused approaches in CLD caregivers of children with ASD and IDD (Goodwin & King, 2002; Hong et al., 2016).

Culturally responsive teaching (CRT) is a learner-centered pedagogy that professionals understand and demonstrate cultural awareness to respond to CLD learners' skill gaps and to develop structured learning environments based on learners' diverse backgrounds (Cartledge & Kourea, 2008; Utley, Obiakor, & Bakken, 2011). CRT can be used in communication interventions for children with ASD and IDD, such as to acquire information for making decisions about appropriate communication interventions for children and their families in accordance with the family's cultural background. Furthermore, culturally responsive parent coaching based on the principles of CRT may provide CLD caregivers the ability to implement interventions for their children, with adequate consideration of cultural factors (Elder, Valcante, Won, & Zylis, 2003; Goodwin & King, 2002). However, CRT have primarily been investigated with students with learning disabilities for instruction in academic outcomes (Cartledge & Kourea, 2008; Yang, Hsiao, & Hsiao, 2014). There are no study and review focused on culturally

responsive approach on communication interventions for CLD families of children with ASD and IDD.

The purpose of this dissertation is to determine cultural and family factors on caregiver involvement in communication intervention for children with ASD and IDD. To address these gaps in the prior research, the first study (Chapter 2) is to determine the effects of caregiver involvement for promoting communication skills of children with ASD and IDD via a meta-analytic review of single-case research. In the second study (Chapter 3), a systematic review is conducted to summarize the characteristics of caregiver involvement in communication interventions for CLD families with children with ASD and IDD. Finally, in the third study (Chapter 4), a single case study is reported, investigating the effects of culturally responsive parent coaching on a multimodal communication protocol for CLD parents of children with ASD. The research questions in each study of this dissertation are listed as follows.

Study 1:

1. What are the overall effects of caregiver involvement for promoting communication skills of children with ASD and IDD?
2. Do these effects differ by child age?
3. Do these effects differ by settings of delivering services to caregivers?
4. Do these effects differ by delivery formats of services provided to caregivers?
5. Do these effects differ by different dosages of services provided to caregivers?

Study 2:

1. What are the participant characteristics (i.e., races of caregivers and children, languages of caregivers and children, caregivers' relationships with children, and

children's age and diagnosis) in the studies that address caregiver involvement in communication outcomes for CLD families with children with ASD and IDD?

2. What are the characteristics of interventions (i.e., setting, service delivery formats, and dosage) provided to CLD caregivers with children with ASD and IDD?
3. What are the culturally responsive practices provided to CLD caregivers with children with ASD and IDD?
4. What are the outcomes of interventions with caregiver involvement in CLD families with children with ASD and IDD?

Study 3:

1. Is there a functional relation between culturally responsive parent coaching and parents' implementation of components of a multimodal communication intervention?
2. Is the improvement of the children's communication behaviors correlated with an increase in parent implementation of the multimodal communication intervention components?
3. To what extent is culturally responsive parent coaching on multimodal communication protocol acceptable to parents?

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5 ®).* American Psychiatric Pub.

Bennett, A. (2012). *Parental involvement in early intervention programs for children with autism* (master's thesis). St. Catherine University & University of St. Thomas. Retrieved from: http://sophia.stkate.edu/cgi/viewcontent.cgi?article=1113&context=msw_papers

Bruno J. & Dribbon M. (1998). Outcomes in AAC: Evaluating the effectiveness of a parent training program, *Augmentative and Alternative Communication, 14*(2), 59-70.

Cartledge, G., & Kourea, L. (2008). Culturally responsive classrooms for culturally diverse students with and at risk for disabilities. *Exceptional Children, 74*(3), 351-371.

Copple, C., & Bredekamp, S. (2009). *Developmentally appropriate practice in early childhood programs* (3rd ed.). Washington, DC: NAEYC.

Dogoe, M. S., Banda, D. R., & Lock, R. H. (2010). Acquisition and generalization of the picture exchange communication system behaviors across settings, persons, and stimulus classes with three students with autism. *Education and Training in Autism and Developmental Disabilities, 45*(2), 216-229.

Elder, J. H., Valcante, G., Won, D., & Zylis, R. (2003). Effects of in-home training for culturally diverse fathers of children with autism. *Issues in Mental Health Nursing, 24*, 273-295.

Goodwin, A. L., King, S. H. (2002). *Culturally responsive parental involvement: Concrete understandings and basic strategies.* Washington, DC: AACTE.

Harry, B., & Kalyanpur, M. (1994). Cultural underpinnings of special education: Implications for professional interactions with culturally diverse families. *Disability and Society, 9*(2), 145-165.

Hong, E. R., Ganz, J. B., Neely, L., Gerow, S., & Ninci, J. (2016). A review of the quality of primary caregiver-implemented communication intervention research for children with ASD, *Research in Autism Spectrum Disorders, 25*, 122-136.

Hsieh, H-. H., Wilder, D. A., & Abellon, O. E. (2011). The effects of training on caregiver implementation of incidental teaching. *Journal of Applied Behavior Analysis, 44*(1), 199-203.

Huer, M. B., Saenz, T. I., & Doan, J. H. D. (2001). Understanding the Vietnamese American community: Implications for training educational personnel providing services to children with disabilities. *Communication Disorders Quarterly, 23*(1), 27-39.

Johnson, C. R., Handen, B. L., Butter, E., Wagner, A., Mulick, J., Sukhodolsky, D. G., ... Smith, T. (2007). Development of a parent training program for children with pervasive developmental disorders. *Behavioral Interventions, 22,* 201–221

Matson, J. L., Mahan, S., & Matson, M. L. (2009). Parent training: A review of methods for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 3,* 868-875.

National Autism Center. (2015). *Findings and conclusions: National standards project, phase 2*. Randolph, MA: Author.

National Research Council (2001). *Educating children with autism.* Committee on Educational Interventions for Children with Autism. Division of Behavioral and social Sciences and Education. Washington DC: National Academy Press.

Odom, S. L., Horner, R. H., Snell, M. E., & Blacher, J. B. (2007). *Handbook of developmental disabilities*. New York: Guilford Publications.

Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program Intervention for young children with autism. *Journal of Autism and Developmental Disorders, 28*(1), 25-32.

Patterson, S. Y. & Smith, V. (2011). The experience of parents of toddlers diagnosed with autism spectrum disorder in the more than words parent education program. *Infants & Young Children, 24*(4), 329-343.

Powers, L. E.,Singer, G. H., Stevens, T., & Sowers, J.-A. (1992). Behavioral parent training in home and community generalization settings. *Education & Training in Mental Retardation, 27*(1), 13-27.

Preece, D. & Trajkovski, V. (2017). Parent education in autism spectrum disorder - A review of the literature. *Croatian Review of Rehabilitation Research, 53*(1), 128-138.

Tekin-Iftar, E. (2008). Parent-delivered community-based instruction with simultaneous prompting for teaching community skills to children with developmental disabilities. *Education and Training in Developmental Disabilities, 43*, 249-265.

Utley, C. A., Obiakor, F. E., & Bakken, J. P. (2011). Culturally responsive practices for culturally and linguistically diverse students with learning disabilities. *Learning Disabilities: A Contemporary Journal, 9*(1), 5-18.

Wolfe, K., & Durán, L. K. (2013). Culturally and linguistically diverse parents' perceptions of the IEP process: A review of current research. *Multiple Voices for Ethnically Diverse Exceptional Learners, 13*(2), 4-18.

Yang, S. L., Hsiao, Y. J., & Hsiao, H. C. (2014). Culturally responsive teaching with new Taiwanese children: Interviews with class teachers in elementary schools. *Asia Pacific Journal of Education, 34*(3), 288-304.

CHAPTER II

A META-ANALYTIC REVIEW OF SINGLE-CASE RESEARCH ACROSS CULTURES ON CAREGIVER INVOLVEMENT IN COMMUNICATION SKILLS FOR INDIVIDUALS WITH ASD AND IDD

Autism spectrum disorder (ASD) is characterized by impairments in social interaction, language, and communication as well as restricted interests and repetitive behaviors. Intellectual/developmental disability (IDD; or intellectual disability) is characterized by intellectual and adaptive functioning deficits in conceptual, social, and practical domains (DSM-V; American Psychiatric Association, 2013). One of the common defining features of ASD and IDD is a functional limitation in communication and social participation like initiations, joint attention, capacity for vocal communication, and symbol use (American Psychiatric Association, 2013; Greenspan & Wieder, 1999; Sappok, Brooks, Heinrich, McCarthy, & Underwood, 2017; National Research Council, 2001). Children with ASD and IDD often fail to develop abilities to initiate conventional communication and to establish and maintain social reciprocity for daily needs across different contexts like home, school, and community (Dogoe, Banda, & Lock, 2010). Communication abilities such as making requests are important for life outcomes. Interventions that are designed for improving communication skills are important for children with ASD and IDD when deficits in communication are present (Goldstein, 2002; Warren, 2000). There is an increase in children with ASD and IDD who start to receive interventions before 3 years old, so more and more caregivers have been participated in the service delivery system to collaborate with professionals for years before their children

receiving education at school (Garbacz, McIntyre, & Santiago, 2016; Matson, Mahan, & Matson, 2009).

The deficits in communication and social interaction are generally evident in individuals with ASD before 3 years old (Individuals with Disabilities Education Act, IDEA, 2004). Children with ASD and IDD do not communicate at their current age level. However, communication skills in children with ASD improve with age in verbal and non-verbal communication skills when they receive training and treatments from professionals (e.g. teachers and therapists) (Ando & Yoshimura, 1979; Vicker, 2009) or from caregivers at home and community settings (Chaabane, Alber-Morgan, & DeBar, 2009; Gerow, Rispoli, Ninci, Gregori, & Hagan-Burke, 2017; Koegel, Symon, & Koegel, 2002; Lee, 2015; Zimmer, 2013). The focus on early behavioral interventions provided to young children with ASD and IDD is the most common, so most studies aimed to investigate communication outcomes of young children with ASD and IDD (Hong et al., 2016).

Caregiver Involvement

Collaborating with caregivers and family in the intervention is very important for children with ASD and IDD (Mackintosh, Goin-Kochel, & Myers, 2012; Tzanakaki et al., 2012). In natural environments, it is critical that caregivers provide more opportunities, richer environment, and great life experience to children with ASD and IDD (Houwer, 1998). Caregiver involvement is an individual-centered connection between caregivers at home and professionals in school settings (e.g., teachers, therapists, service providers) who share responsibility for the development of individuals with ASD and IDD (Garbacz, McIntyre, & Santiago, 2016; Johnson, Butter, & Scahill, 2018). The goal of caregiver involvement is to provide knowledge, parenting skills, and support to caregivers for

promoting and maintaining the improvements of communication and behaviors in children with ASD and IDD (Johnson, Butter, & Scahill, 2018; Matson, Mahan, Matson, 2009). Six types of parent involvement include (a) providing parenting skills and knowledge to caregivers, (b) communicating with caregivers, (c) involving families as volunteers, (d) involving caregivers and children learning at home, (e) including caregivers as participants in educational decision making, and (f) collaborating with the community (Epstein & Salinas, 2004; Epstein, et al., 2002). Common types of caregiver involvement for caregivers of individuals with ASD and IDD include caregiver-implemented intervention, caregiver training, education, and coaching in which caregivers learn know-how and expertise from professionals in an attempt to put them into practice when they work their children (Brown & Woods 2015; Powers, Singer, Stevens, & Sowers, 1992; Robertson, 2016; Schreibman et al., 2015; Wacker et al., 2005).

Caregiver-implemented intervention in natural environments is characterized as highly flexible, easily generalized, and low-cost (Brown & Woods 2015; Powers, Singer, Stevens, & Sowers, 1992; Robertson, 2016; Schreibman et al., 2015; Wacker et al., 2005). After receiving training from professionals, caregivers with limited experience are able to implement behaviorally-based strategies (e.g., modeling and prompting) and communication interventions (e.g., AAC and PECS), and to use more language facilitative forms. Children receiving caregiver-implemented intervention also show a significant increase in social utterances and a decrease in inappropriate communication behaviors (e.g., repetitive speech) in natural contexts (Becker-Cottrill, McFarland, & Anderson, 2003; Binger, Kent-Walsh, Berens, Del Campo, & Rivera, 2008; Bruno & Dribbon, 1998; Goldstein, 2002; Hong, et al., 2016; Hsieh, Wilder, Abellon, 2011; Johnson et al., 2007;

Matson, Mahan, & Matson, 2009; Patterson & Smith, 2011; Powers et al., 1992; Tekin-Iftar, 2008). With caregiver involvement, children with ASD and IDD gain more opportunities to practice communication and generalize learned skills to different settings, activities, and with different communication partners (Dogan et al., 2017; Douglas, Kammes, & Nordquist, 2018; Hansen, Raulston, Machalicek, & Frantz, 2018; Liu, Moore, & Anderson, 2015; Wright & Kaiser, 2017). However, most reviews and studies regarding family involvement with children with ASD and IDD have focused on how children's backgrounds (e.g., age, diagnosis, severity, communication mode), components of interventions (e.g., settings, education delivery, and duration of interventions) provided to children, and parent stress affect outcomes in children with ASD and IDD (Hayes & Watson, 2013; Nevill, Lecavalier, & Stratis, 2018; Strauss, Mancini, the SPC Group, & Fava, 2013; Preece & Trajkovski, 2017).

Compared with other countries in Asia, an increased prevalence of ASD was reported in Japan and China (Suna & Allison, 2010). In Asia, caregiver involvement in the implementation of intervention for communication outcomes of children with IDD (e.g., parent training, parent-implemented intervention) is a new field in recent decades (Guan, 2002). Although some studies concerning caregiver involvement in children with ASD and IDD have been published in Chinese and Japanese, literature-based discovery regarding family involvement in individuals with ASD and IDD remains poorly understood in Asia. A dearth of studies and reviews across cultures are carried out based on the components of services (e.g., settings of delivering services, delivery formats of services provided to caregivers, and dosage of services) that are provided to caregivers of individuals with ASD and IDD. Since caregivers play a critical role in family involvement, there is an urgent

need to probe into how these components of service delivery influence caregiver implementation and children communication outcomes.

Single-Case Research and Effect Size

Single-case research is a methodology of scientific research widely applied in the field of special education to evaluate the effectiveness of educational practice (Horner et al., 2005; Kratochwill et al., 2013). Visual analysis is one method used to interpret data from single-case experimental studies. There are 6 elements for evaluating causality in single-case studies, including (a) level, (b) variability, (c) trend in the data path, (d) overlap of data points between phases, (e) immediacy of effects, and (f) consistency across similar phases. When using these elements, researchers should check data within and between phases, compare data across phases, and then integrate the information from all phases (Kennedy, 2005; Vannest, 2016). Recent studies have increased the objectivity of single case research by conducting data analysis, visual analysis, and effect sizes altogether. Tau-U is a quantitative approach that not only combines non-overlap between phases with the trend of intervention phases but also controls a baseline trend (Parker, Vannest, Davis, & Sauber, 2011). In meta-analysis, effect sizes can be used to compare intervention effects across studies and moderators. Since previous single-case studies were mostly conducted to evaluate the effects of caregiver involvement in children with ASD and IDD, the information of components of caregiver involvement and service delivered to caregivers can be extracted from these studies. Thus, a comprehensive review should be conducted to have a better understanding of the support and services provided to caregivers of individuals with ASD and IDD for family involvement.

Purpose of the Current Study

A meta-analysis was conducted to determine the effects of caregiver involvement for promoting communication skills of children with ASD and IDD. The purpose of the current meta-analysis is to address:

1. What are the overall effects of caregiver involvement for promoting communication skills of children with ASD and IDD?
2. Do these effects differ by child age?
3. Do these effects differ by settings of delivering services to caregivers?
4. Do these effects differ by delivery formats of services provided to caregivers?
5. Do these effects differ by different dosages of services provided to caregivers?

Method

To achieve the goal of the current meta-analysis, the following procedures based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Moher, Liberati, Tetzlaff, Altman, The PRISMA Group, 2009) were conducted, including article identification, data extraction, and inter-rater reliability (See Appendix A for the flow of searching process of selecting eligible studies).

Article Identification

Search strategy. This review included studies in English, Chinese, and Japanese. The groups of search terms combined to search within each database were as follows: (a) parent-mediated, parent-based, parent-implemented, parent-directed, parent-involve, caregiver-mediated, caregiver-implemented, caregiver-involve, family-mediated, family-based, family-implemented, family-involve; (b) communicat*, social*, language, and (c) autism spectrum disorder, asd, autism, autistic symptoms, autis*, Asperger*, pervasive

developmental disorder not otherwise specified, PDD-NOS, childhood disintegrative disorder, CDD, Rett, intellectual dis*, developmental dis* (See Appendix B). Also, all English search terms were reviewed and translated separately to Chinese and Japanese counterparts by a Chinese native speaker and a Japanese speaker to confirm the accuracy of translation (See Appendices C and D). Harvested synonyms for each group were combined with OR, and all three concept lists were combined using AND.

Eight English electronic databases were searched for articles and dissertations, including Academic Search Complete, Education Resources Information Center (ERIC), Education Full Text, Medline, Professional Development Collection, Psyc INFO, Social Sciences Full Text, and Proquest Dissertations & Theses Global. Also, to include studies conducted across different countries, 6 additional Chinese databases were searched for journal articles, grant reports, and dissertations in Chinese, including National Applied Research Laboratories' Patent and Research Paper platform Search System, PPSEARCH (國家實驗研究院-專利與學術文獻檢索系統), Government Research Bulletin (政府研究資訊系統), PerioPath Index to Taiwan Periodical Literature System (臺灣期刊論文索引), National Digital Library of Theses and Dissertations in Taiwan (臺灣博碩士論文知識加值系統), China Academic Journals Full-text Database (中國期刊全文數據庫), China Doctoral Dissertations Full-text Database (中國博士學位論文全文數據庫). Also, 2 Japanese databases (i.e., CiNii - NII 学術情報ナビゲータ, サイニィ and CiNii Dissertations - 日本の博士論文) were searched for journal articles and dissertations in Japanese. The combinations of search terms varied due to the limitation of each search system (e.g., length of search terms). The searches resulted in 2076 records in English, 2295 records in Chinese and 342 in Japanese, for a total of 4713 records in the initial

search. Then, after identifying records through searching the electronic databases and removing duplicates, all titles and abstracts of the articles were screened for further evaluation.

Title and abstract review. For the title and abstract review, duplicates were removed among these records. Rayyan is a free web application for systematic reviews and meta-analysis. Due to the limitation of Chinese and Japanese databases, records from English databases were exported to Rayyan, and records from Chinese and Japanese databases were exported to an Excel document for evaluation. The title or abstract inclusion criteria included the following. (a) At least one participant was diagnosed with ASD (e.g., autism, ASD, autistic symptoms, Asperger syndrome, pervasive developmental disorder not otherwise specified [PDD-NOS], Rett's Disorder, or childhood disintegrative disorder [CDD], and Kanner's Syndrome) or IDD (e.g., intellectual and developmental disabilities, global developmental disability, Down syndrome, and cerebral palsy), which were redefined in the DSM-V and other developmental disabilities in the DSM-IV (American Psychiatric Association, 2013). (b) The study included an intervention about family involvement in which caregivers (e.g., parent, caregiver, family, father, mother, and grandparent) received training, coaching, education to implement intervention (e.g., parent training, parent coaching, parent-implemented, parent-directed, and parent-mediated). (c) At least one dependent variable was relevant to child communication skills. (d) The research design was a single-case experimental study. (e) The document was written in English, Chinese, or Japanese. When the title and abstract review was not able determine if the record meet the inclusion criteria, the full-text review of that document was conducted.

Full text review. The full text of the records was reviewed to identify the included records after the title and abstract review. Several inclusion criteria were used to review and screen the full text of each article. First, the article was written in English, Chinese, or Japanese. Second, research design in each article was single-case experimental design with at least one of the time series graphs with AB contrast about communication outcomes in children with ASD and IDD. Third, at least one child participant in each study was diagnosed as ASD or IDD. Fourth, the independent variable had to include family involvement in which parents, caregivers, and families collaborated with professionals to work with their children with ASD and IDD. The interventions that parents learned during the intervention phase must be evidence-based practices. Fifth, the dependent measures were related to children communication skills. Communication skills were defined as skills related to expressive language (e.g., initiations, response, or commenting), linguistic changes (e.g., target morpheme, mean length of the utterances, or language samples), or social play. After reviewing the full text of each study and excluding 5 duplicate studies, 46 records were included for methodological quality.

Methodological quality standard review. The methodological quality standard reviews were conducted to evaluate if these 46 included studies meet the standards for reservations. A set of methodological quality criteria for the single-case experimental study proposed by previous studies was utilized to develop the current quality standards (Council for Exceptional Children, 2014; Ganz & Ayres, 2018; Horner, et al., 2005, Kratochwill, et al., 2013, Maggin, Briesch, & Chafouleas, 2013; Reichow, Volkmar, & Cicchetti, 2008; U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse, 2016). This quality standard included the following criteria: (a) basic

methodological standards: independent variable, inter-observer agreement, experimental control, number of data points per phase; (b) extended methodological standards: description of participant, setting, material, interventionist, dependent variable, baseline and intervention, maintenance data, generalization data, procedural integrity, and social validity; and (c) additional standards for multiple probe designs. After methodological quality standard review, 5 duplicate studies were excluded. Twenty-six studies met the basic methodological standards for reservations, and 15 studies did not meet the basic methodological quality standards.

First author, ancestral, and forward review. To obtain more comprehensive information from studies regarding family involvement for individuals with ASD and IDD across different cultures, this meta-analysis included all 41 records to conduct the first author search and ancestral search. However, forward searches were conducted only on 26 studies that meet the basic standards or met them with reservations, indicating only studies that met basic methodological quality standards were cited from the search articles. First author, ancestral, and forward searches were conducted by using Scopus after identifying the included articles in methodological quality standard review. Each included record was searched on Scopus for (a) other studies of the first authors of papers that were included after methodological review (i.e., first author search), (b) studies on reference lists of the included articles (i.e., ancestral search), and (c) other articles cited in the included records (i.e., forward search), Then, 1424 records were exported from the search to conduct the title and abstract review, full-text review, and methodological quality review. There were 2 additional articles included in this meta-analysis after first author, ancestral, and forward review.

Moderator Coding

After all procedures of searching and screening for identification, there were 43 studies included in this meta-analysis. A coding system was developed by the researcher for coding and data analysis. All 43 included articles were reviewed and coded to collect required information about moderator variables for effect size calculation. Each study was reviewed and coded by each experiment for information required to calculate effect sizes and information related to the following four major moderators, including (a) publication characteristics, (b) child age, (c) settings where professionals delivered services to caregivers, (d) delivery formats of services provided to caregivers, and (e) dosages of services provided to caregivers (see Table 2.1 for the code and description of moderator). The moderator coding produced 170 records.

Table 2. 1

Moderator Coding and Description

Moderator		Coding	Description
Publication Characteristics	First author's last names		First author's last name
	Year of publication		Publication year
	Type of publication	• Journal article • Book or chapter • Dissertation • Technical report • Conference paper • Others	
	Country of publication	• United States • Taiwan • China • Japan • Other countries	
Participant Characteristics	Child Age	• 1-3 years old • 4-6 years old • >7years old	Age of each child participant
Intervention Characteristics	Setting	• Home • Clinic/hospital/center • Community settings • More than 2 settings • Not reported	Settings that professionals delivered services to caregivers
	Delivery Format	• In person • Tele-practice/Online • Not reported	Types of coach/training/services provided to caregivers
	Dosage	• 1-3 sessions • 4-6 sessions • 7-9 sessions • >10 sessions	How many coach/training/service sessions provided to parents

Data Extraction

Plot Digitizer, a free Java program, was used to extract data points from all X-Y type scatter or line plots of included articles. Each graph was scanned in JPEG format and saved to an excel sheet tab organized by each article. Digitized values of data points in

baseline and intervention phases of each phase contrast retrieved from Plot Digitizer were exported, organized, and saved in an excel document for each of these 170 records.

Data Analysis

Tau-U is a non-parametric effect size to combine nonoverlap data across different phases that can correct a baseline trend. Compared to other non-parametric effect sizes, the advantages of Tau-U used in single-case research include the use of all data points, the ability to control for trend, high sensitivity, and ease of calculation (Parker, Vannest, & Davis, 2011). The current meta-analysis used Tau-U to calculate an effect size for each AB phase of the included studies. After coding moderator variables, a free online Tau-U calculator (Vannest, Parker, Goen, & Adiguzel, 2016) was used to calculate the effect size for each baseline-intervention contrast for each participant in each moderator. All effect sizes in one study were combined in the Tau-U calculator to produce one effect size for each included experiment to evaluate which characteristics of participants or interventions improve communication outcomes in individuals with ASD and IDD. Tau-U scores ranged from -1.0 to 1.0 with the positive scores meaning improvement and the negative scores meaning deterioration of the data (Parker et al., 2011). Tau-U was interpreted based on the size of effect, meaning 0.93 to1.00 for large effects, 0.80 to 0.92 for medium effects, and smaller than 0.79 for small effects, as benchmarked across AAC interventions for individuals with IDD (Ganz et al., 2017). Then, Stata® (StataCorp, 2017) was used to create the forest plot.

In addition, the Kruskal-Wallis H test was used to evaluate the statistical significance for potential moderator. The Kruskal-Wallis H test is a rank-based non-parametric one-way analysis of variance (ANOVA) to evaluate statistical significance

between two or more independent variables (Kruskal & Wallis, 1952). The current study conducted the Kruskal-Wallis H test for each moderator group to evaluate if there was a significant difference between different groups in a moderator. Also, a Dunn post hoc test was conducted to examine pair-wise combinations across sub-groups if a statistical significance was founded (Dunn 1964; Hong et al., 2016).

Inter-Rater Reliability

Inter-rater reliability (IRR) for each procedure of identification and screen during the initial search involved four doctoral students in special education trained to review. A minimum of 50% of the included studies in the title and abstract review and moderator coding, as well as each procedure of the initial search and first author, ancestral, and forward search were independently coded twice. Also, at least 50% of the included articles were evaluated to ensure the inter-rater reliability of moderator coding and data extraction.

All raters received coding training provided by the author to understand the procedures of coding and the coding system. Before independent coding, each coder coded one study and then discussed the coding results. Retraining was provided if the percentage of agreement was lower than 80%. Each included article was coded by the author, and a second coder independently used the same procedures to code the included articles chosen at random. The results of each article were then compared, and then disagreement was discussed and ultimately reconciled by a third trained coder. Also, to examine IRR for data extraction, IRR was calculated on the agreement of data extraction for each article. The coders discussed the results if there was disagreement on data extraction between two raters. IRR was calculated by dividing the total number of agreements by the total number

of agreements plus disagreements and multiplying the sum by 100 to obtain a percentage (Hong, et al., 2016; Morin, et al., 2018).

All search terms were used to search each database, resulting in 100% agreement of the search results. In title and abstract review, IRR was collected on 51% of the included records to get 93.93% of agreement. In full-text review, 68.19% of the included records were reviewed by the author and one of the coders, thus obtaining 94.43% of agreement. Then, 65.12% of the included studies were reviewed by the author and one of the coders, and the average percent agreement of methodological quality was 88.67%. Regarding IRR for data extraction, the author and 2 raters independently extracted 39.53% of the included studies, obtaining 93.64% of agreement. For moderator coding, 69.76% of the included studies were coded, obtaining 89.12% of agreement (See Table 2.2 for articles coded/databases searched and average percent agreement for inter-rater reliability).

Table 2. 2

Articles Coded/ Databases Searched and Average Percent Agreement for Inter-Rater Reliability

	Percentage of Articles Coded/Databases Searched	Percentage of Agreement
Initial Search in Databases	100% of databases	100%
Title and Abstract Review	51%	93.93%
Full-Text Review	68.19%	94.43%
Methodological Quality Review	65.12%	88.67%
First Author, Ancestral, and Forward Search	100%	100%
Data Extraction	39.53%	93.64%
Moderator Coding	69.76%	89.12%

Results

Overall Effects

A total of 43 studies with 170 AB phase contrasts across 149 caregiver-child dyads/triads were included (See Appendix E). Effect sizes were separately calculated and then aggregated to omnibus effect size for each included study. The overall effects of caregiver involvement on communication skills of children with ASD and IDD, the overall effect of caregiver involvement in communication for individuals with ASD and IDD was 0.74 with a 95% confidence interval of 0.70 to 0.78 for 170 AB contrasts, which means that family involvement had a small effect of 0.74 on child communicative outcomes (See Figure 2.1 and Table 2.3). The effects of the studies ranged from -0.40 to 1.00. The lowest 20% of effect sizes fell below a Tau-U of 0.34, and the top 20% of studies fell between 0.88 and 1.00 improvement. Forty-one of the 43 included studies showed positively skewed with a high number of positive behavior changes. However, one study (Robertson, Wehby, & King, 2013) showed negative behavior changes, and one study (Hsueh, Sun, & Wu, 2013) showed no behavior change.

Table 2. 3

Results of Tau-U Effect Sizes of Each Study

First Author	Year	Participants (Dyads/Triads)	AB Phase Contrasts	Tau-U	95% LCI	95% UCI	P-Value
Benson	2017	2	2	0.6022	0.1963	1	0.0036
Bradshaw	2017	3	6	0.8828	0.5104	1	0
Brown	2015	6	6	0.6416	0.4478	0.8353	0
Bucio	2016	3	6	1	0.7158	1	0
Chaabane	2009	2	6	0.9794	0.6959	1	0
Christensen-Smith	2014	4	4	0.7368	0.4231	1	0
Dogan	2017	3	3	0.6666	0.2036	1	0.0048
Douglas	2018	3	3	0.75	0.26	1	0.0027
Foster-Sanda	2013	5	5	0.6926	0.4889	0.8963	0
Gerow	2017	3	3	1	0.6257	1	0
Gillett	2007	3	3	0.7822	0.4037	1	0.0001
Hagimori	2004	1	1	0.2	-0.7468	1	0.6788
Hansen	2018	3	3	0.6286	0.305	0.9522	0.0001
Hemmeter	1994	3	3	0.753	0.4583	1	0
Hong	2014	4	4	0.2074	-0.1027	0.5174	0.19
Hsueh	2013	1	2	0	-1	1	1
Iacono	1998	5	5	0.5779	0.2557	0.9001	0.0004
Ingersoll	2013	8	8	0.4209	0.2271	0.6147	0
Kaiser	2000	6	6	0.6635	0.4546	0.8724	0
Kashinath	2006	5	5	0.5967	0.343	0.8505	0
Koegel	2006	5	5	0.9514	0.4685	1	0.0001
Law	2018	3	3	0.1262	-0.1121	0.3645	0.2991
Lee	2015	4	4	0.9622	0.6376	1	0
Levinger	2012	3	3	0.6686	0.2559	1	0.0015
Liou	2005	4	4	0.2296	-0.0527	0.5119	0.1109
Liu	2015	1	2	0.8635	0.3449	1	0.0011
Loughrey	2014	1	1	0.2051	-0.3232	0.7334	0.4466
McCathren	2010	1	1	0.8435	0.4417	1	0
McDuffie	2016	3	3	0.9956	0.6989	1	0
Meadan	2016	3	3	0.6035	0.1604	1	0.0076
Meadan	2014	5	5	0.3369	0.0763	0.5975	0.0113
Musashi	2003	1	1	0.8815	0.3994	1	0.0003
Nunes	2007	1	4	0.6762	0.3564	0.9961	0
Radley	2014	5	5	0.4098	0.0873	0.7323	0.0128
Reagon	2009	3	3	0.9573	0.6032	1	0
Robertson	2013	2	2	-0.4018	-0.8125	0	0.0551
Simacek	2017	3	9	0.7801	0.6111	0.9491	0
Strain	1995	3	3	0.8076	0.5912	1	0

Table 2. 3 Continued

First Author	Year	Participants (Dyads/Triads)	AB Phase Contrasts	Tau-U	95% LCI	95% UCI	P-Value
Vismara	2012	9	9	0.7172	0.5225	0.9119	0
Vogler-Elias	2009	7	7	0.4962	0.2853	0.707	0
Wright	2017	4	4	0.2066	-0.0666	0.4798	0.1382
Yang	2015	1	1	0.8549	0.6169	1	0
Zimmer	2013	4	4	1	0.6114	1	0

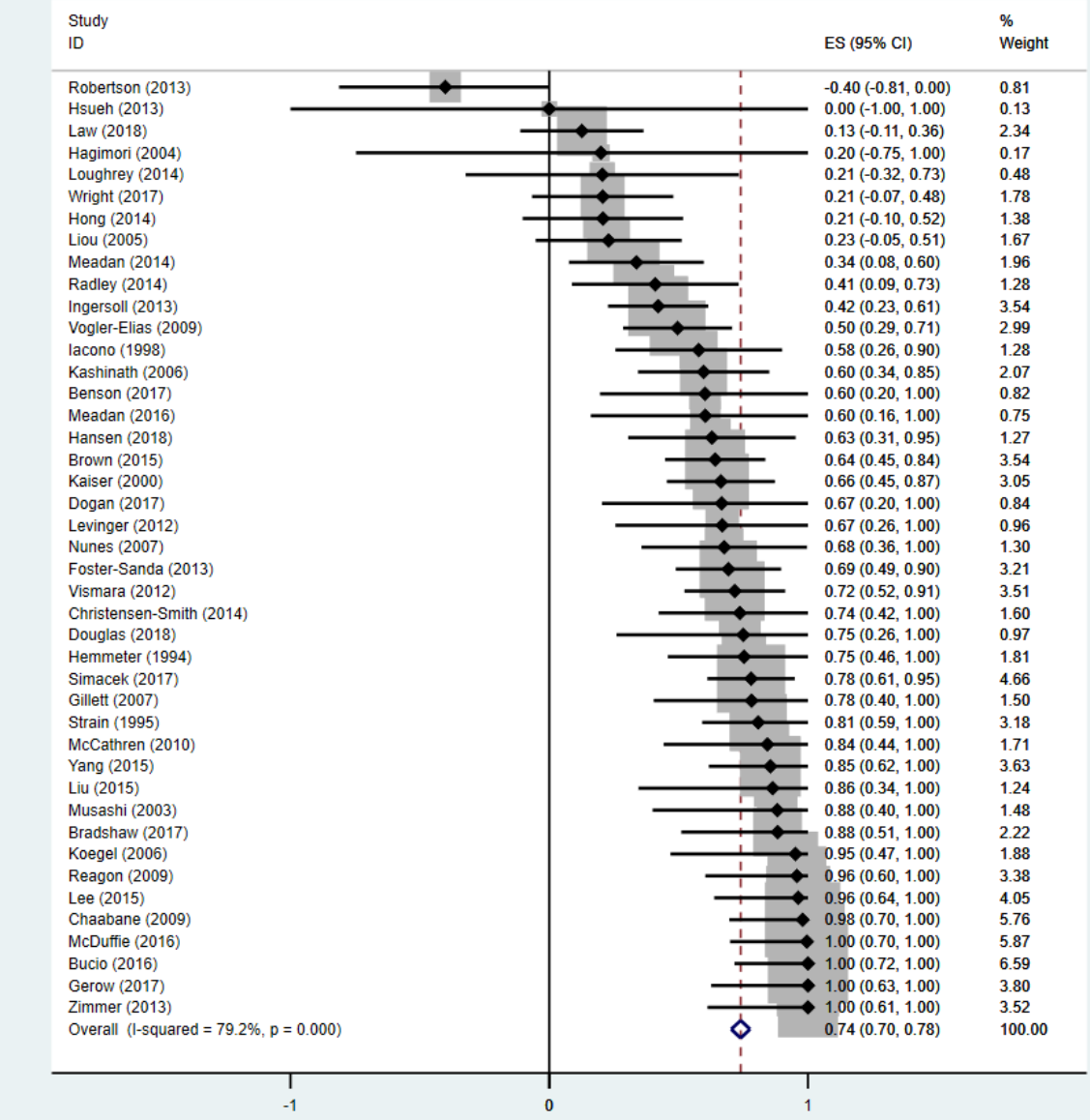


Figure 2. 1. Forest Plots and Effect Size Data for Included Studies

Table 2. 4

Results of Tau-U Effect Sizes and Kruskal-Wallis Test for the Moderators

Moderator	Sub-Groups	Number of Studies	AB Phase Contrasts	Number of Participants (Dyads/Triads)	Number of Pairwise Comparison	Tau (95%CI)	p-values	Kruskal-Wallis
Age						0.6390 (0.5880, 0.6900)		$\chi2(2) = 0.920$, p = 0.6312
	1-3 years	28	89	82	10281	0.6287 (0.5625, 0.6950)	0	
	4-6 years	21	54	45	5676	0.6424 (0.5507, 0.7340)	0	
	> 7 years	11	27	22	2423	0.6900 (0.5288, 0.8511)	0	
Setting						0.6360 (0.5830, 0.6880)		$\chi2(2) = 4.494$, p = 0.1057
	Home	25	104	87	12247	0.6686 (0.6032, 0.7340)	0	
	Clinic/Hospital/Center	8	36	36	3341	0.5721 (0.4592, 0.6850)	0	
	Multiple Settings	8	26	22	2542	0.5825 (0.4438, 0.7212)	0	
Delivery Formats						0.6280 (0.5760, 0.6810)		$\chi2(1) = 1.284$, p = 0.2572
	In Person	36	135	120	14504	0.6017 (0.5422, 0.6613)	0	
	Tele-Practice	7	34	28	3807	0.7156 (0.6081, 0.8231)	0	
Dosage						0.6250 (0.5740, 0.6760)		$\chi2(3) = 17.239$, p = 0.0006
	1-3 sessions	5	15	13	1864	0.7170 (0.5065, 0.9275)	0	
	4-6 sessions	13	24	23	1856	0.7361 (0.5964, 0.8758)	0	
	7-9 sessions	8	29	22	2822	0.7574 (0.6380, 0.8768)	0	
	>10 sessions	24	87	84	11209	0.5530 (0.4882, 0.6179)	0	

Child Age

To investigate the moderating effect of child age for the effect of caregiver involvement on communication skills of children with ASD and IDD, there was a total of 149 dyads/triads and 170 AB phase contrasts included. Eighty-two child participants were 1-3 years old, 45 children were 4-6 years old, and 22 children were higher than 7 years old. The results showed that child age had a small effect of 0.639 CI95 [0.588, 0.690] on children's communication outcomes. The results showed small effects ranged from 0.690 CI95 [0.529, 0.851] for ages more than 7 years, 0.642 CI95 [0.551, 0.734]) for ages 4-6 years, to 0.629 CI95 [0.563, 0.695] for ages 1-3 years. Also, the Kruskal-Wallis H test was conducted to determine if children's communication outcomes were different at different ages. The results showed that no statistically significant difference in children's communication outcomes among the three age groups, $\chi 2\ (2) = 0.920$, $p = 0.631$ (Table 2.4 and Figure 2.2).

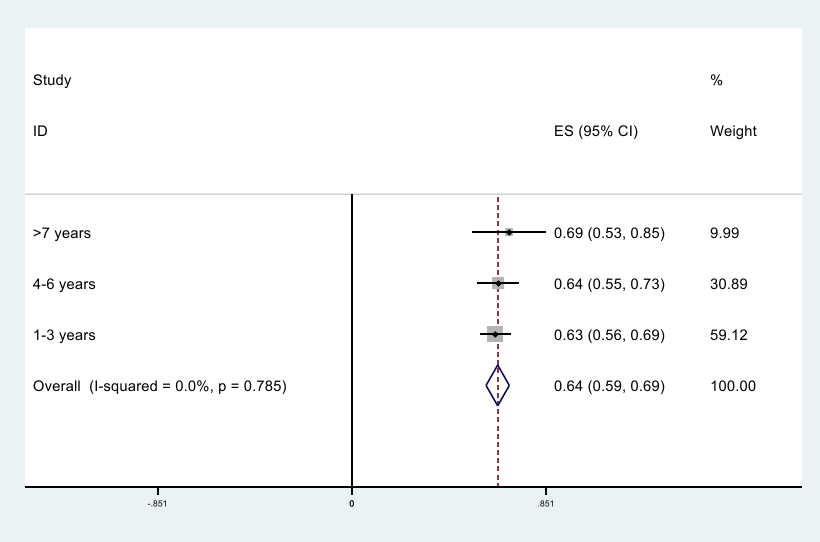


Figure 2. 2. Forest Plots and Effect Size Data for Moderators in Child Age

Settings

Regarding the third question about different setting(s) of services provided to caregivers, there was a total of 145 dyads/triads and 166 AB phase contrasts were included. Eighty-seven caregiver participants received serviced at home, 36 caregivers at clinic or center settings, and 22 caregivers at multiple settings. The results showed that setting(s) had a small effect of 0.636 CI95 [0.583, 0.688] on child communication outcomes. The settings resulted in small effects for caregiver involvement in prompting communication on individuals with ASD and IDD (ES = 0.669 CI95 [0.603, 0.734] for home setting; ES = 0.583 CI95 [0.444, 0.721] for multiple settings; ES = 0.572 CI95 [0.459, 0.685] for clinic/hospital/center setting; Figure 2.3). Also, the Kruskal-Wallis H test was conducted to determine if children's communication outcomes were different at different settings. The results showed that no statistically significant difference in children's communication outcomes among the three groups, $\chi 2$ (2) = 4.494, p = 0.106 (Table 2.4).

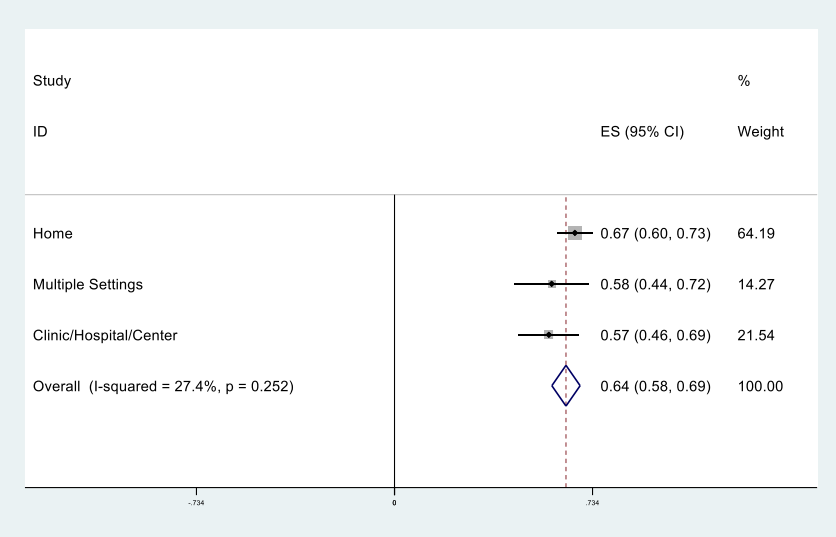


Figure 2. 3. Forest Plots and Effect Size Data for Moderators in Settings

Service Delivery Formats

The effect of different delivery formats of services provided to caregivers on caregiver involvement for communication skills of children with ASD and IDD demonstrated a statistically significant difference. A total of 148 dyads/triads and 169 AB phase contrasts were included among the 43 studies. One hundred and twenty caregiver participants received services from professionals in person, and 28 caregivers received services via tele-practice. The results of delivering services to caregivers had a small effect of 0.628 CI95 [0.576, 0.681] on child communication outcomes (See Figure 2.4). The delivery formats of services resulted in small effects for delivering services via tele-practice (ES = 0.716 CI95 [0.608, 0.823]) and for delivering services in person (ES = 0.602 CI95 [0.542, 0.661]). Also, the Kruskal-Wallis H test was conducted to determine if children's communication outcomes were different at different delivery formats. The results showed no statistically significant difference in children's communication outcomes between the two groups, $\chi 2$ (1) = 1.284, p = 0.257 (Table 2.4).

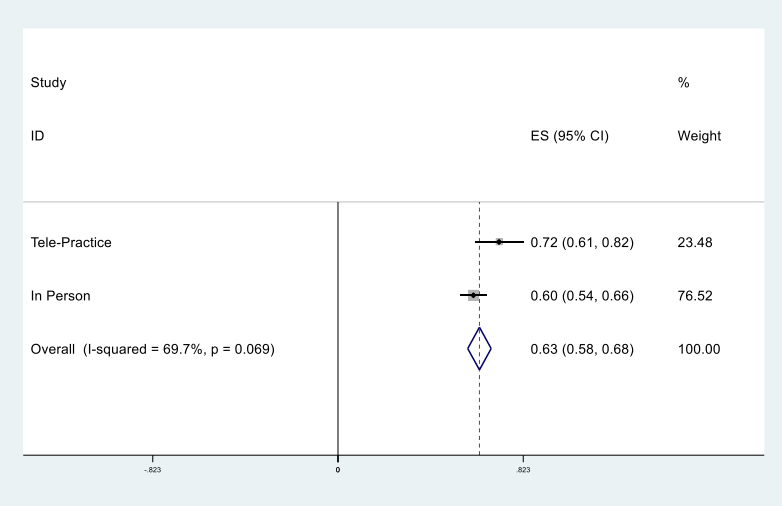


Figure 2. 4. Forest Plots and Effect Size Data for Moderators in Delivery Formats of Services

Dosages

As for the fifth question concerning the effects of different dosages of services provided to caregivers on caregiver involvement for communication skills of children with ASD and IDD, a total of 142 dyads/triads and 155 AB phase contrasts were included. Thirteen caregiver participants received services from professionals for 1-3 sessions, 23 parents for 4-6 sessions, 22 parents for 7-9 sessions, and 84 parents for more than 10 sessions. The dosage of delivering services to caregivers had a small effect of 0.625 CI95 [0.574, 0.676] on child communication outcomes (See Figure 2.5). Tau effect sizes ranged from 0.757 CI95 [0.638, 0.877] for 7-9 sessions, 0.736 CI95 [0.596, 0.876] for 4-6 sessions, 0.717 CI95 [0.507, 0.928] for 1-3 sessions, to 0.553, CI95 [0.488, 0.617] for more than 10 sessions.

The Kruskal-Wallis H test was conducted to determine if children's communication outcomes were different at four dosage groups (a) 1-3 sessions (n = 15), (b) 4-6 sessions (n = 24), (c) 7-9 sessions (n = 29), and (d) more than 10 sessions (n = 87). The results showed a statistically significant difference in children's communication outcomes among the four groups, $\chi 2$ (3) = 17.239, p = 0.0006 (Table 2.4). The Dunn's post hoc test was conducted to find that the group that caregivers receiving more than 10 sessions was statistically significantly different from the other three dosage groups in child communication outcomes (p = 0.0033, 0.0043, and 0.0009).

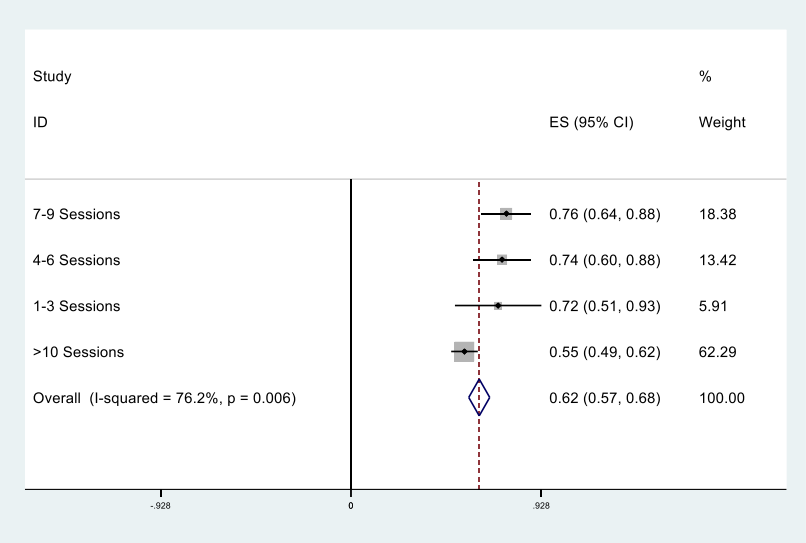


Figure 2. 5. Forest Plots and Effect Size Data for Moderators in Dosage

Discussion

This meta-analytic review investigated single-case research published in English, Chinese, and Japanese on caregiver involvement in communication skills for individuals with ASD and IDD. After analyzing 43 studies in the form of single-case experimental design with 170 AB phase contrasts across 149 caregiver-child dyads/triads, the overall effect size for family involvement had a small effect on child communicative outcomes, as well as on child ages, settings, delivery formats, and dosages of services provided in caregiver involvement in communication skills of children with ASD and IDD. A statistically significant difference in children's communication outcomes between the four dosage groups was found.

Regarding child age, children's age showed a small effect on their communication behaviors. The effect size of the adult group was higher than that of the child group and the preschool group, which is corresponds to the research finding that the receptive and

expressive language of children with ASD significantly improved with age (Ando & Yoshimura, 1979). Older individuals with ASD and IDD have better skills in comprehension and conversation. However, very few studies (n = 3) included adolescent and adults with ASD and IDD. Empirical studies about family involvement in improving communication skills of individuals with ASD and IDD are lacking. The results of this meta-analytic review correspond to the findings of the related studies that caregivers are able to correctly implement interventions for the improvement of children's communication skills in natural contexts (Bruno & Dribbon, 1998; Goldstein, 2002; Hong, et al., 2016; Patterson & Smith, 2011; Powers et al., 1992; Tekin-Iftar, 2008). However, the effect sizes across three age groups (i.e., 1-3 years, 4-6 years, and more than 7 years) showed that children's ages had low effects on child communicative outcomes. Only 9 adolescent and adults with ASD and IDD aged more than 7 years were included in this meta-analysis, which correspond to a related fact that most studies investigated communication outcomes of young children with ASD and IDD (Hong et al., 2016).

Caregiver involvement has shown reductions in caregivers' stress and anxiety and improvement in caregiver-child interaction, parental quality of life, the understanding of ASD and IDD, and communication skills of individuals with ASD and IDD. This study expanded the reviews about caregiver implementation and involvement to improve communication outcomes of children with ASD and IDD. The results showed that settings, dosage, and formats of delivering services (e.g., parent coaching, parent education, and parent training) had low effects on communication outcomes of individuals with ASD and IDD. Furthermore, difference of child communication outcomes among different dosages was statistically significant. More dosage (e.g., more parent coaching sessions) provided to

caregivers did not indicate more improvements in communication outcomes of individuals with ASD and IDD. Some caregivers in the included studies did not complete all training sessions. The reasons for high dropout rates from parent training include low satisfaction, low socioeconomic status, the contents of parent training, and the achievement of treatment goals (Forehand, Middlebrook, Rogers, & Steffe, 1983; Matson, Mahan, & Matson, 2009). It is not necessary for caregivers to receive training for more than 10 sessions for correctly implementing intervention strategies for their children with ASD and IDD. Instead of a specific number of sessions provided to caregivers, setting fidelity criteria may be another option of evaluating the amount of dosage provided to caregivers.

Although caregivers' characteristics were not included as a moderator, the current study found that most of the included studies reported very limited information regarding caregiver characteristics. Most experimental studies and reviews focused more on child characteristics and outcomes. Thus, it is hard to evaluate how caregiver characteristics affect child communication performance of individuals with ASD and IDD. However, understanding the backgrounds of caregivers is important for practitioners to provide more appropriate services and support to meet the unique needs of each family (Patterson, Smith, & Mirenda, 2011). Experimental studies providing more information of participant characteristics would be helpful in explaining research results and benefitting at the level of policy and practice.

There are some limitations on the current review and suggestions, which await future investigation. First, this review included only single case research. However, some studies with the use of group design and mixed methods research were found during the search procedures. Future meta-analyses might include different research designs to

evaluate the comprehensive effects of caregiver involvement. Second, this review focused more on intervention characteristics provided to caregivers. Future research might include the characteristics of caregivers (e.g., age, educational backgrounds, socioeconomic status) to understand how caregiver's backgrounds affect the outcomes of the implementation of intervention and child communication outcomes. Third, although this review attempted to include studies published in Asia, very few articles were included during the procedures of screening. Thus, it was hard to evaluate how cultural differences affect family involvement. Future researchers might use different methods (e.g., systematic review) or revise inclusion and exclusion criteria to include more studies across different cultures for a better understanding in caregiver involvement in the improvement of communication outcomes for children with ASD and IDD across different cultural contexts. Lastly, based on the results of this meta-analysis, the included studies did not provide details on the characteristics of service delivery for caregivers of individuals with ASD and IDD (e.g., the types of services provided to caregivers). Since delivery, content, and contexts have been considered as issues to affect parent education in children with ASD (Preece & Trajkovski, 2017), future single-case research may provide more details of service delivery to caregivers for developing the most appropriate protocol about service provision to caregivers who have children with ASD and IDD. Also, few adolescents and adults with ASD and IDD participated in the included single-case studies. There is an inevitable need to conduct more single-case studies to evaluate the effects on caregiver involvement in communication outcomes of adolescents and adults with ASD and IDD.

References

*Indicates studies included in the meta-analysis.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5 ®)*. American Psychiatric Pub.

Ando, H. & Yoshimura, I. (1979). Effects of age on communication skill levels and prevalence of maladaptive behaviors in autistic and mentally retarded children, *Journal of Autism and Developmental Disorders, 9*(1), 83-93.

Becker-Cottrill. B., McFarland. J., & Anderson, V. (2003). A model of positive behavioral support for individuals with autism and their families: The family focus process, *Focus on Autism and Other Developmental Disabilities, 18*(2), 110–120.

*Benson, S. S., Dimian, A. F., Elmquist, M., Simacek, J., McComas, J. J., & Symons, F. J. (2018) Coaching parents to assess and treat self-injurious behaviour via telehealth, *Journal of Intellectual Disability Research, 62*, 1114-1123.

Binger, C., Kent-Walsh, J., Berens, J., Del Campo, S., & Rivera, D. (2008). Teaching Latino parents to support the multi-symbol message productions of their children who require AAC, *Augmentative* and *Alternative Communication, 24*, 323–338.

*Bradshaw, J., Koegel, L. K., & Koegel, R. L. (2017). Improving functional language and social motivation with a parent-mediated intervention for toddlers with autism spectrum disorder, *Journal of Autism and Developmental Disorders, 47*, 2443-2458.

*Brown, J. A., & Woods, J. J. (2015). Effects of a triadic parent-implemented home-based communication intervention for toddlers. *Journal of Early Intervention, 37*(1), 44-68.

Brown, J. A., Woods, J. J. (2016). Parent-implemented communication intervention: Sequential analysis of triadic relationships. *Topics in Early Childhood Special Education, 36*(2), 115-124.

Bruno J., & Dribbon M. (1998). Outcomes in AAC: Evaluating the effectiveness of a parent training program, *Augmentative and Alternative Communication, 14*(2), 59-70.

*Bucio, M. O. (2016). *Improving conversational communication in Mexican-American children with autism in their native language via parent-implemented self-management* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 10194211)

*Chaabane, D. B. B., Alber-Morgan, S. R., & DeBar, R. M. (2009). The effects of parent-implemented PECS training on improvisation of mands by children with autism. *Journal of Applied Behavior Analysis*, *42*(3), 671-677.

Charlop, M., & Trasowech, J. E. (1991). Increasing autistic children's daily spontaneous speech. *Journal of Applied Behavior Analysis*, *24*, 747-761.

Charlop-Christy, M., & Carpenter, M. (2000). Modified incidental teaching sessions: A procedure for parents to increase spontaneous speech in their children with autism. *Journal of Positive Behavioral Interventions, 2,* 98-112.

*Christensen-Smith, S. (2014). *A parent-implemented social-communication intervention for infants and toddlers at risk for a diagnosis of autism living in poverty* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3632934)

Council for Exceptional Children (2014). *Council for Exceptional Children standards for evidence-based practices in special education*. Retrieved from http://www.cec.sped.org/Standards/Evidence-Based-Practice-Resources-Original

De Houwer, A. (1999). Two or more languages in early childhood: Some general points and practical recommendations. *ERIC Clearinghouse on Languages and Linguistics,* Washington, DC.

*Dogan, R. K., King, M. L., Fischetti, A. T., Lake, C. M., Mathews, T. L., & Warzak, W. J. (2017). Parent-implemented behavioral skills training of social skills. *Journal of Applied Behavior Analysis, 50*(4), 805-818.

Dogoe, M. S., Banda, D. R., & Lock, R. H. (2010). Acquisition and generalization of the picture exchange communication system behaviors across settings, persons, and stimulus classes with three students with autism. *Education and Training in Autism and Developmental Disabilities, 45*(2), 216-229.

*Douglas, S. N., Kammes, R., & Nordquist, E. (2018). Online communication training for parents of children with autism spectrum disorder. *Communication Disorders Quarterly, 39*(3), 415-425.

Dunn, O. J. (1964). Multiple contrasts using rank sums. *Technometrics, 6*(3), 241-252.

Elder, J. H., Donaldson, S. O., Kairalla, J., Valcante, G., Bendixen, R., Ferdig, R., Self, E., Walker, J., Palau, C., & Serrano, M. (2011). In-home training for fathers of children with autism: A follow up study and evaluation of four individual training components. *Journal of Child and Family Studies, 20,* 263-271.

Epstein, J. L., & Salinas, K. C. (2004). Partnering with families and communities, *Educational Leadership, 61*(8), 12-18.

Epstein, J. L., Sanders, M. G., Simon, B. S., Salinas, K. C., Jansorn, N. R., & Van Voorhis, F. L. (2002). *School, family, and community partnerships: Your handbook for action* (2nd ed.). Thousand Oaks, CA: Corwin.

Forehand, R., Middlebrook, J., Rogers, T., & Steffe, M. (1983). Dropping out of parent training. *Behavior Research and Therapy, 21*, 663-668

*Foster-Sanda, S. (2014). *Enhancing the play and commenting abilities of toddlers with autism spectrum disorders through caregiver-implemented teaching of play* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3730183)

Ganz, J. B. (2015). AAC interventions for individuals with autism spectrum disorders: State of the science and future research directions. *Augmentative and Alternative Communication, 31*(3), 203-214.

Ganz, J. B., & Ayres, K. M. (2018). Methodological standards in single-case experimental design: Raising the bar. *Research in Developmental Disabilities, 79*, 3-9.

Ganz, J. B., Earles-Vollrath, T. L., Heath, A. K., Parker, R., Rispoli, M. J., & Duran, J. (2012). A meta-analysis of single case research studies on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(1), 60-74.

Ganz, J. B., Morin, K., Foster, M. J., Vannest, K. J., Tosun, D. G., Gregori, E., & Gerow, S. (2017). High-technology augmentative and alternative communication for individuals with intellectual and developmental disabilities and complex communication needs: A meta-analysis. *Augmentative and Alternative Communication, 33*(4), 224-238.

Garbacz, S. A., McIntyre, L. L., & Santiago, R. T. (2016). Family involvement and parent-teacher relationships for students with autism spectrum disorders. School psychology quarterly: the official journal of the Division of School Psychology, *American Psychological Association, 31*(4), 478-490.

*Gerow, S., Rispoli, M., Ninci, J., Gregori, E. V., & Hagan-Burke, S. (2018). Teaching parents to implement functional communication training for young children with developmental delays. *Topics in Early Childhood Special Education, 38*(2), 68-81.

*Gillett, J. N. & LeBlanc, L. A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*, 247-255.

Goldstein, H. (2002). Communication intervention for children with autism: A review of treatment efficacy. *Journal of Autism and Developmental Disorders, 32*, 373-396.

Greenspan, S. l., & Wieder, S. (1999). A functional developmental approach to autism spectrum disorders. *Journal of the Association for Persons with Severe Handicaps, 24*(3), 147-161.

Guan, Y-. W. (2002). *The parent-focused language intervention program: An action research approach* (Unpublished master's thesis). Kaohsiung Normal University, Kaohsiung, Taiwan.

*Hagimori, S. (2004). Early attempts of AAC method for children with severe intellectual disability: A case of using AAC with caregivers, *The Japanese Association of Special Education, 42*(3), 225-235.

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

*Hemmeter, M. L., & Kaiser, A. P. (1994). Enhanced milieu teaching: Effects of parent-implemented language intervention. *Journal of Early Intervention, 18*(3), 269-289.

Hong, E. R., Ganz, J. B., Neely, L., Boles, M., Gerow, S., Davis, J. L. (2016). A meta-analytic review of family implemented social and communication interventions for individuals with developmental disabilities. *Review Journal of Autism and Developmental Disabilities, 3*, 125-136.

Hong, E. R., Ganz, J. B., Neely, L., Gerow, S., & Ninci, J. (2016). A review of the quality of primary caregiver-implemented communication intervention research for children with ASD, *Research in Autism Spectrum Disorders, 25*, 122-136.

*Hong, E. R., Ganz, J. B., Gilliland, W., & Ninci, J. (2014). Teaching caregivers to implement an augmentative and alternative communication intervention to an adult with ASD. *Research in Autism Spectrum Disorders, 8*(5), 570-580.

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.

Hsieh, H-. H., Wilder, D. A., & Abellon, O. E. (2011). The effects of training on caregiver implementation of incidental teaching. *Journal of Applied Behavior Analysis, 44*(1), 199-203.

*Hsueh, M-. L., Sun, M-. L., & Wu, C-. C. (2013). The research of communication effect on assistive technology for children with autism, *Special Education Forum, 14*, 57-75.

Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and

without autism spectrum disorder. *Journal of Autism and Developmental Disorders, 43*(3), 629- 642.

*Iacono, T. A., Chan, J. B., & Waring, R. E. (1998). Efficacy of a parent-implemented early language intervention based on collaborative consultation. *International Journal of Language & Communication Disorders, 33*(3), 281-303.

Individuals with Disabilities Education Act (IDEA). (2004). Sec. 300.8 Child with a disability. Retrieved from https://sites.ed.gov/idea/regs/b/a/300.8Ingersoll, B., & Dvortcsak, A. (2006). Including parent training in the early childhood special education curriculum for children with autism spectrum disorders. *Journal of Positive Behavior Interventions, 8*(2), 79-87.

*Ingersoll, B., & Wainer, A. (2013). Initial efficacy of project ImPACT: A parent-mediated social communication intervention for young children with ASD. *Journal of Autism and Developmental Disorders, 43*(12), 2943-2952.

Johnson, C. R., Butter, E. M., & Scahill, L. (2018). *Parent training for autism spectrum disorder: Improving the quality of life for children and their families.* Washington, DC: American Psychological Association.

Johnson, C. R., Handen, B. L., Butter, E., Wagner, A., Mulick, J., Sukhodolsky, D. G., ...& Smith, T. (2007). Development of a parent training program for children with pervasive developmental disorders. *Behavioral Interventions, 22*(3), 201-221

*Kaiser, A. P., Hancock, T. B., & Nietfeld, J. P. (2000). The effects of parent-implemented enhanced milieu teaching on the social communication of children who have autism. *Early Education and Development, 11*(4), 423-446.

Kaiser, A. P., & Roberts, M. Y. (2013). Parent-implemented enhanced milieu teaching with preschool children who have intellectual disabilities. *Journal of Speech, Language and Hearing Research, 56*(1), 295-309.

*Kashinath, S., Woods, J., & Goldstein, H. (2006). Enhancing generalized teaching strategy use in daily routines by parents of children with autism. *Journal of Speech, Language, and Hearing Research, 49*(3), 466-485.

Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston: Allyn and Bacon.

*Koegel, R. L., Symon, J. B., & Koegel, L. K. (2002). Parent education for families of children with autism living in geographically distant areas. *Journal of Positive Behavior Interventions, 4*(2), 88-103.

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.

Kruskal, W.H., & Wallis, W.A. (1952). Use of ranks in one criterion variance analysis. *Journal of the American Statistical Association, 47*, 583-621.

Law, J., Garrett, Z., & Nye, C. (2004). The efficacy of treatment for children with developmental speech and language delay/disorder: A meta-analysis. *Journal of Speech, Language, and Hearing Research, 47*(4), 924-943.

*Law, G. C., Neihart, M. & Dutt, A. (2018). The use of behavior modeling training in a mobile app parent training program to improve functional communication of young children with autism spectrum disorder. *Autism, 22*(4), 424-439.

*Lee, H-. L. (2015). *The effects of home-based parent training on joint attention of young children with autism*. Retrieved from Taiwan Citation Index - Humanities and Social Sciences.

*Levinger, K. J. (2012). *Parent-implemented video self-management targeting nonverbal pragmatics in children with autism* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3545112)

*Liou, W-. Y., Lin, C-. S., & Pan, H-. M. (2005). The influence of caregivers' responsive interaction on autistic children's communicative behavior, *Bulletin of Special Education and Rehabilitation, 14*, 85-102.

*Liu, Y., Moore, D. W., & Anderson, A. (2015). Improving social skills in a child with autism spectrum disorder through self-management training. *Behaviour Change, 32*(4), 273-284.

*Loughrey, T. O., Contreras, B. P., Majdalany, L. M., Rudy, N., Sinn, S., Teague, P., . . . Harvey, A. C. (2014). Caregivers as interventionists and trainers: Teaching mands to children with developmental disabilities. *Analysis of Verbal Behavior, 30*(2), 128-140.

Mackintosh, V., Goin-Kochel, R., & Myers, B. (2012). "What do you like/dislike about the treatments you're currently using?": A qualitative study of parents with children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 27*(1), 51-60.

Maggin, D. M., Briesch, A. M., & Chafouleas, S. M. (2013). An application of the What Works Clearinghouse standards for evaluating single-subject research synthesis of the self-management literature base. *Remedial and Special Education, 34*, 44-58.

Matson, M. L., Mahan, S., & Matson, J. L. (2009). Parent training: A review of methods for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 3,* 868-875.

*McCathren, R. B. (2010). Case study: Parent-implemented prelinguistic milieu teaching with a high risk dyad. *Communication Disorders Quarterly, 31*(4), 243-252.

*McDuffie, A., Machalicek, W., Bullard, L., Nelson, S., Mello, M., Tempero-Feigles, R., Castignetti, N., & Abbeduto, L. (2016). A spoken language intervention for school-aged boys with fragile X syndrome. *American Journal on Intellectual and Developmental Disabilities, 121*(3), 236-265.

*Meadan, H., Angell, M. E., Stoner, J. B., & Daczewitz, M. E. (2014). Parent-implemented social-pragmatic communication intervention: A pilot study. *Focus on Autism and Other Developmental Disabilities, 29*(2), 95-110.

*Meadan, H., Snodgrass, M. R., Meyer, L. E., Fisher, K. W., Chung, M. Y., & Halle, J. W. (2016). Internet-based parent-implemented intervention for young children with autism: A pilot study. *Journal of Early Intervention, 38*(1), 3-23.

Moher D, Liberati A, Tetzlaff J, Altman DG, the PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med 6*(7): e1000097.

Morin, K. L., Ganz, J. B., Vannest, K. J., Haas, A. N., Nagro, S. A., Peltier, C. J., … & Ura, S. K. (2018). A systematic review of single-case research on video analysis as professional development for special educators. *The Journal of Special Education, 53*(1), 3-14.

*Musashi, H., & Takahata, S. (2003). Family-school collaboration in positive behavior support for problem behaviors in students with intellectual disabilities: Using the support tool "praise diary", *The Japanese Association of Special Education, 40* (5), 493-503.

National Autism Center. (2015). *Findings and conclusions: National standards project, phase 2*. Randolph, MA: Author.

Nevill, R. E., Lecavalier, L. & Stratis, E. A. (2018). Meta-analysis of parent-mediated interventions for young children with autism spectrum disorder, *Autism, 22*(2), 84-98.

*Nunes, D., & Hanline, M. F. (2007). Enhancing the alternative and augmentative communication use of a child with autism through a parent-implemented naturalistic intervention. *International Journal of Disability, Development and Education, 54*(2), 177-197.

Odom, S. L., Brown, W. H., Frey, T., Karasu, N., Smith-Canter, L. L., & Strain, P. S. (2003). Evidence-based practices for young children with autism: Contributions for single-subject design research. *Focus on Autism and Other Developmental Disabilities, 18*(3), 166-175.

Parette, H. P., & Marr, D. D. (1997). Assisting children and families who use augmentative and alternative communication (AAC) devices: Best practices for school psychologists. *Psychology in the Schools, 34*, 337-346.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy, 42*, 284-299.

Patterson, S. Y., & Smith, V. (2011). The experience of parents of toddlers diagnosed with autism spectrum disorder in the more than words parent education program. *Infants and Young Children, 24*(4), 329-343.

Preece, D. & Trajkovski, V. (2017). Parent education in autism spectrum disorder - A review of the literature. *Croatian Review of Rehabilitation Research, 53*(1), 128-138.

*Radley, K. C., Jenson, W. R., Clark, E., & O'Neill, R. E. (2014). The feasibility and effects of a parent-facilitated social skills training program on social engagement of children with autism spectrum disorders. *Psychology in the Schools, 51*(3), 241-255.

*Reagon, K. A., & Higbee, T. S. (2009a). Parent-implemented script fading to promote play-based verbal initiations in children with autism. *Journal of Applied Behavior Analysis, 42*(3), 659-664.

Reichow, B., Volkmar, F. R., & Cicchetti, D. V. (2008). Development of the evaluative method for evaluating evidence-based practices in autism. *Journal of Autism and Developmental Disorders, 38,* 1311-1319.

*Robertson, R. E., Wehby, J. H., & King, S. M. (2013). Increased parent reinforcement of spontaneous requests in children with autism spectrum disorder: Effects on problem behavior. *Research in Developmental Disabilities, 34,* 1069-1082.

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2016, September). *What Works Clearinghouse: Procedures and Standards Handbook* (Version 3.0). Retrieved from http://whatworks.ed.gov

Parker, R. I., Vannest, K. J., & Davis, J. L. (2011). Effect size in single-case research: A review of nine nonoverlap techniques. *Behavior Modification, 35*(4), 303-322.

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, 16*(5), 498-522.

Powers, L. E., Singer, G. H., Stevens, T., & Sowers, J.-A. (1992). Behavioral parent training in home and community generalization settings. *Education & Training in Mental Retardation, 27*(1), 13-27.

Rieth, S. R., Haine-Schlagel, R., Burgeson, M., Searcy, K., Dickson, K. S., & Stahmer, A. C. (2018). Integrating a parent-implemented blend of developmental and behavioral intervention strategies into speech-language treatment for toddlers at risk for autism spectrum disorder. *Seminars* in *Speech* and *Language, 39*(2), 114-124.

Robertson, R. E. (2016). Effectiveness and acceptability of parent-implemented behavior interventions for children with autism in three African American families. *Education and Training in Autism and Developmental Disabilities, 51*(2), 107-121.

Sappok, T., Brooks, W., Heinrich, M., McCarthy, J., & Underwood, L. (2017). Cross-Cultural Validity of the Social Communication Questionnaire for Adults with Intellectual Developmental Disorder. *Journal of autism and developmental disorders, 47*(2), 393-404.

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, 45*(8), 2411-2428.

*Simacek, J., Dimian, A. F., & McComas, J. J. (2017). Communication intervention for young children with severe neurodevelopmental disabilities via telehealth. *Journal of Autism and Developmental Disorders, 47*(3), 744-767.

StataCorp. (2017). *Stata statistical software: Release 15*. College Station, TX: StataCorp LLC.

*Strain, P. S., & Danko, C. D. (1995). Caregivers' encouragement of positive interaction between preschoolers with autism and their siblings. *Journal of Emotional and Behavioral Disorders, 3*(1), 2-12.

Suna X. & Allison C. (2010). A review of the prevalence of autism spectrum disorder in Asia, *Research in Autism Spectrum Disorders, 4*(2), 156-167.

Tekin-Iftar, E. (2008). Parent-delivered community-based instruction with simultaneous prompting for teaching community skills to children with developmental disabilities. *Education and Training in Developmental Disabilities, 43*(2), 249-265.

Tzanakaki, P., Grindle, C., Hastings, R., Hughes, C., Kovshoff, H., Remington, B. (2012). How and why do parents choose early intensive behavioral intervention for their young child with autism?, *Education and Training in Autism and Developmental Disabilities, 47*(1), 58-71.

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2016, September). *What Works Clearinghouse: Procedures and Standards Handbook* (Version 3.0). Retrieved from http://whatworks.ed.gov

Vannest, K. J. (2016). *Quality of a study and visual analysis guidelines* [PowerPoint Slides], TX, College Station: Department of Educational Psychology, Texas A&M University.

Vannest, K. J., Parker, R. I., Gonen, O., & Adiguzel, T. (2016). *Single case research: Web-based calculators for SCR analysis*. (Version 2.0) [Web-based application]. College Station, TX: Texas A&M University. Available from www.singlecaseresearch.org

Vismara, L. A., McCormick, C., Young, G. S., Nadhan, A., & Monlux, K. (2013). Preliminary findings of a telehealth approach to parent training in autism. *Journal of Autism and Developmental Disorders, 43*, 2953-2969.

*Vismara, L. A., Young, G. S., & Rogers, S. J. (2012). Telehealth for expanding the reach of early autism training to parents. *Autism Research & Treatment,* 1-12.

*Vogler-Elias, D. (2009). *A parent-implemented shared storybook reading intervention for preschoolers with autism spectrum disorders* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3356090)

Wacker, D. P., Berg, W. K., Harding, J. W., Barretto, A., Rankin, B., & Ganzer, J. (2005). Treatment effectiveness, stimulus generalization, and acceptability to parents of functional communication training. *Educational Psychology, 25*(2-3), 233-256.

Warren, S. F. (2000). The future of early communication and language intervention. *Topics in Early Childhood Special Education, 20*(1), 33-37.

*Wright, C. A., & Kaiser, A. P. (2017). Teaching parents enhanced milieu teaching with words and signs using the teach-model-coach-review model. *Topics in Early Childhood Special Education, 36*(4), 192-204.

Vicker, B. (2009). *Social communication and language characteristics associated with high functioning, verbal children and adults with autism spectrum disorder*.

Bloomington, IN: Indiana University, Indiana Institute on Disability and Community.

*Yang, Y., & Ge, X. (2015). A case study of the intervention of the family-centered positive behavior support on the screaming behavioral of children with autism, *A Journal of Modern Special Education*, *16*, 38-43.

* Zimmer, K. (2013). *Efficacy of caregiver training to establish joint attention of children with autism* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3586657)

CHAPTER III

A SYSTEMATIC REVIEW OF CAREGIVER INVOLVEMENT IN COMMUNICATION INTERVENTION FOR CULTURALLY AND LINGUISTICALLY DIVERSE FAMILIES WITH INDIVIDUALS WITH ASD AND IDD

Child growth and development is influenced by their unique everyday environment. Bronfenbrenner's ecological systems theory suggested that childhood development is directly impacted by microsystem (e.g., family and school) and is also indirectly affected by macrosystem (e.g., cultural context) (Bronfenbrenner, 1977, 1979). An environment developed by context, culture, and history is related to a child's knowledge and development. Cultural values affect families, and family events influence child development. Based on cultural differences and the diversity of families, each family and individual develops their unique values and has their specific needs (Bronfenbrenner, 1986; Chuang & Zhu, 2018; Darling, 2007; Paat, 2013). For example, communication behaviors in individuals with ASD and IDD affect the family unit and other siblings (Recklein, 2013). Family members, service providers, communities, universities, the larger society, and cultures provide the context to facilitate or impede the development of individuals with ASD and IDD (Cuvo & Vallelunga, 2007). Therefore, for children with ASD and IDD, individualization is one main characteristic of intervention plans. When collaborating with parents, professionals should consider several levels of ecological systems to develop individualized intervention plans to meet the unique needs of each family (Cuvo & Vallelunga, 2007; Dunlap, Kern, & Worchester, 2001; Klingner et al., 2015). Family and cultural factors affect parents' decision making, implementation of

interventions, and assessments for children with ASD and IDD (Parette & Marr, 1997; Hetzroni & Harris, 1995; Parette & Marr, 1997).

Culturally and Linguistically Diverse Population

Culturally and linguistically diverse (CLD) refers to individuals from racial, ethnic, or linguistic minority groups and those who speak native languages other than English, including limited English proficient (LEP) and English language learners (ELL). Briefly, individuals with CLD are bilingual individuals because they are learning at least two languages in the U.S. schools (Garcia & Cuéllar, 2006; Sullivan, 2011). CLD students show an increasing percentage of the U.S. student population (Sullivan, 2011). Previous studies reported that the population of ELLs increased from 3.8 million to 4.5 million between 2000 and 2005, and that the population of LEP students will constitute 40% of the students in public education by 2030 (Klingner & Soltero-Gonzalez, 2009; Thomas & Collier, 2002). More and more young children are in an increasingly diversified and multilingual world where people speak more than one language (Kindler, 2002).

CLD populations have being growing the fastest in the U.S. over the past decades. Further, about 7.6% of the CLD populations have a disability. These students are called culturally and linguistically diverse exceptional (CLDE) learners who usually do not receive sufficient and appropriate education and services due to barriers in language, lack of insurance, different cultural beliefs, illegal immigration status, mistrust, and illiteracy (Hoover & deBettencourt, 2017; Juckett, 2013). CLDE children is more likely to be overrepresented in special education classroom (Klingner et al., 2015). There are two major educational reasons for overrepresentation. First, general education teachers lack the ability to identify the reasons behind children's underachievement, such as disability or

other reasons (e.g., culture clashes with CLDE children that lead to low expectations by teachers). Second, educational diagnosticians are not able to make the same distinction within the context of the comprehensive assessments (Chamberlain, 2005). Therefore, although children's cultural repertoires and backgrounds affect their learning, school progress, and behavior in the classroom, CLDE children are not provided with the services and support they need to achieve success (Artiles & Ortiz, 2002).

Barriers in CLD Children

Language is a fundamental part of a child's environment. Children use language to communicate, establish relationships, exchange information, and interact with others (Harding-Esch & Riley, 2003; Paradis, Nicoladis, Crago, & Genesee, 2011). No evidence suggests that bilingual language use is detrimental to the social, cognitive and linguistic development in children with ASD and IDD (Hambly & Fombonne, 2014; Lund et al., 2017; Reetzke, Zou, Sheng & Katsos, 2015). On average, CLD children spend one to three years in leaning the second language to reach appropriate levels of conversational proficiency with their peers (Cummins, 2000). This impacts acculturation, in which CLD children have more opportunities for understanding traditional cultural values and attitudes by way of their native language. However, many children with CLD are not encouraged by educational personnel to use their native language in their daily life (Huer, Saenz, & Doan, 2001; Yu, 2009). The general practice of offering bilingual programs in the U.S. schools is only in the primary grades before transitioning students to all-English academic settings (Chamberlain, 2005).

The diversity of teachers in either general education or special education has decreased (Rosenberg et al., 2007; Sullivan, 2011). Most teachers and educational

professionals are white (Euro-American), monolingual English speakers, and female (Chamberlain, 2005). The composition of service providers (e.g., teachers and therapists) does not reflect the changing ethnic and language composition of CLDE individuals in urban and rural school districts. In the past two decades, the important role as ethnic minority teachers and professionals in supporting CLDE children has been well-established; however, the growth in the number of ethnic minority service providers does not equal that of CLDE students in the U.S. (Boe & Cook, 2006). Special educators and service providers know how to recognize cultural variability if they are able to provide a culturally responsive education to CLDE children and to rectify inappropriate service provision for CLD children who have been inappropriately identified for special education services (Chamberlain, 2005).

Family Involvement for CLD Children

Caregiver involvement is an individual-centered relationship between caregivers at home and professionals in school settings to support individuals with ASD and IDD, meaning that professionals provide parenting strategies and knowledge via parent training and parent education for caregivers to implement learned skills for improving outcomes of their children with ASD and IDD across different contexts (Brown & Woods 2015; Garbacz, McIntyre, & Santiago, 2016; Johnson, Butter, & Scahill, 2018; Powers, Singer, Stevens, & Sowers, 1992; Robertson, 2016). Common types of caregiver involvement include parent-mediated intervention, parent-implemented intervention, and parent support groups (Bradshaw, Koegel, & Koegel, 2017; Brown & Woods, 2015; Bucio, 2016; Dogan et al., 2017; Gillett & LeBlanc, 2007; Levinger, 2012; Mandell & Salzer, 2007; Meadan, Angell, Stoner, & Daczewitz, 2014, 2016; Nunes & Hanline, 2007; Robertson, 2016).

To understand CLDE children's cultures and special needs, collaborating with parents is an important component of a successful special education program (Klingner et al., 2015). However, CLDE children and their families who speak native languages other than English usually do not receive the sufficient and appropriate services and supports (Artiles & Ortiz, 2002). Common difficulties reported by CLD families include language barriers, cultural barriers, and insufficient information (Huer, Saenz, & Doan, 2001; Wolfe & Durán 2013). When working with CLD families, professionals report three aspects of misunderstandings between parents and professionals: the methods used in diagnosing disability, the power accorded to professionals' expertise, and the commitment to the decontextualized language of objective science (Harry & Kalyanpurm, 1994). Because of these difficulties and misunderstandings between parents and professionals, professionals and CLD caregivers often have dissonance in parenting styles, education goals, family and community concerns, and the pragmatics of communication in the procedures of developing intervention plans and service provisions for children with disabilities (Harry & Kalyanpurm, 1994; Huer, Saenz, & Doan, 2001). However, there are a paucity of resources and specific strategies to address the above issues. To be more specific, very few studies and reviews were conducted on CLD caregiver involvement in children with ASD and IDD, and most of these studies focused on challenging behaviors rather than communication skills (Butler & Titus, 2015). Thus, there is a need to incorporate cultural factors into the investigation of the important intervention components of CLD caregiver involvement in improving communication skills of children with ASD and IDD.

Culturally Responsive Approach

The culturally responsive approach is a foundational concept of multicultural education, including diagnosing students' needs, learning materials and context, classroom climate, student-teacher relationships, counseling and guidance, instructional strategies and techniques, and performance assessments (Gay, 2000, 2002). One of the important principles of culturally responsive teaching (CRT) is cultural competence (Cartledge & Kourea, 2008; Gay, 2002). It requires general and special educators to create structured learning environments, develop and implement supportive environments, and provide access to opportunities and resources to facilitate the acquisition of new knowledge and skills, as well as support achievement outcomes for CLDE students with different cultural and linguistic backgrounds (Cartledge & Kourea, 2008; Utley et al., 2011). A very important component of CRT is the need of integrating multicultural approaches with strategic instruction that supports the development of students' critical thinking skills and self- regulated learning (Trent, 2003). Although no specific procedures about CRT were identified, the components of CRT included the considerations of (a) native language, (b) cultural background, (c) family involvement and (d) community culture of the CLD populations. Ideally, professionals should provide each CLD learner with services based on these four components (Gay, 2000, 2002; Yang et al., 2014). However, CRT is usually provided to CLDE children with learning disabilities for their academic outcomes; by contrast, CLD caregiver coaching has seldom been applied for the evaluation of children with ASD and IDD.

Research Questions

Although previous reviews investigated caregiver-implemented interventions to promote social and communicative behaviors for children with ASD and IDD, very few published studies or reviews delved into CLD caregiver involvement in children with ASD and IDD. Thus, there is a need for a review to pinpoint important components with sufficient evidence to warrant its use within CLDE populations. The purpose of this review is to summarize the characteristics of the studies on caregiver involvement in communication interventions for CLD families of children with ASD and IDD for recommendations on culturally responsive practices. The research questions are:

1. What are the participant characteristics (i.e., races of caregivers and children, languages of caregivers and children, caregivers' relationships with children, and children's age and diagnosis) in the studies that address caregiver involvement in communication outcomes for CLD families with children with ASD and IDD?
2. What are the characteristics of interventions (i.e., setting, service delivery formats, and dosage) provided to CLD caregivers with children with ASD and IDD?
3. What are the culturally responsive practices provided to CLD caregivers with children with ASD and IDD?
4. What are the outcomes of interventions with caregiver involvement in CLD families with children with ASD and IDD?

Method

Article Identification

The article identification included (a) initial search (i.e., searching English, Chinese, and Japanese studies in 8 English electronic databases, 6 Chinese databases, and 2 Japanese databases), (b) title and abstract review, (c) full-text review to identify if the study included participants with ASD and IDD, family involvement, child communication skills as dependent variables, single-case experimental study as research design, and English, Chinese, or Japanese publications, (d) methodological quality standard review to evaluate if these included studies met the standards for reservations, and (e) first author, ancestral, and forward review to obtain additional studies. More details were described in the Chapter 2.

After all the procedures of the search and review for the meta-analytic review, the included articles about caregiver involvement in communication skills for individuals with ASD and IDD were reviewed to determine if the full-text of the records meet inclusion criteria. To be included in the current review, an additional inclusion criterion was to include at least one CLD participant in the study. CLD participant in this review refers to individuals from (a) racial or ethnic minority groups and linguistic minority groups such as Native Americans, Puerto Ricans, African Americans, native-born Mexican Americans (Ogbu, 1992; Ogbu & Simons, 1998), Latinos, Hispanic (Juckett, 2013), Asian Americans (Paik et al., 2017) or (b) those who speak native languages other than the official language of the participant's country of residence (e.g., bilingual families, caregiver in the US speaking other languages). Articles that did not include at least one CLD participant were excluded (See Appendix F).

Data Extraction and Analysis

The included studies were summarized in the following categories: (a) participant characteristics (i.e., total number of dyads in each study, races/ethnicities and language(s) of CLD caregivers and children, caregiver relationship with the child, and child participants' age and diagnosis, (b) intervention characteristics (i.e., setting(s), delivery formats, dosage, types of research design), (c) culturally responsive practices (i.e., if the service delivery gave consideration to CLD participants' native language, cultural background, family involvement, and community culture), and (d) intervention outcomes (i.e., measures, parent outcomes, and child communication outcomes). Communicative functions were used to categorize children's communication outcomes, including (a) expression of needs and wants, (b) social closeness, (c) exchanging information, (d) social etiquette, and (e) response to others (Light, 1989). Data was summarized in a table and saved in an excel document. In the process of article identification in one of the included studies (Liou, Lin, & Pan, 2005), two of the four parent participants from China and Indonesia were reported to have immigrated due to marriage, but no further information was provided for verification. After contacting the author to identify the participants, one parent participant who met the inclusion criteria was included in the current review.

Inter-Rater Reliability

The coders of inter-rater reliability (IRR) for this systematic review were 4 doctoral students in the special education doctoral program. During the database search and the study identification, the 4 trained coders independently conducted at least 50% of the included articles to ensure the inter-rater reliability of the coding procedure (see Inter-Rater Reliability section in the chapter 2 for more details). After identifying the included

studies in the initial search, a total of 43 studies were independently reviewed by the author, in which 59.52 % of studies were reviewed by 3 coders so as to identify if CLD populations were included in each study. The author coded each included article, from which the second coder independently coded the included articles that were chosen at random. The native Chinese coders independently coded all the included Chinese studies. The definitions of CLD populations were provided by the author. The disputed articles were discussed until 100% agreement was achieved. Afterwards, the results were then compared for each article, and the number of disagreements was recorded. The percentage of agreement as to whether the study should be included or excluded was 91.95%.

After identifying the included studies for this systematic review, the author and other 3 coders independently extracted information from each included study to a summary table about research design, the total number of parent-child dyads, caregiver race/ethnicity, caregiver language(s), caregiver's relationship with the child, child's race/ethnicity, child language(s), child's age, child's diagnosis, setting(s), delivery format(s), dosage, and measures. Then, IRR was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying the sum by 100 to obtain a percentage. IRR was collected on 75% of the included records to get 86.75% of agreement.

Results

This systematic review aims to summarize the characteristics of CLD caregiver involvement in communication interventions for children with ASD and IDD. A total of 14 single-case studies with 24 CLD dyads were reviewed, including 12 multiple baseline design studies and 2 multiple probe design studies (Table 3.1). One study was published in

Chinese (Liou, et al., 2005), and others were published in English. The components were detailed in this section: the characteristics of the CLD participants, features of the intervention provided to CLD caregivers, culturally responsive practices, and research results across studies. These components were compared, contrasted, and summarized in Table 3.1 for the characteristics of the participants, in Table 3.6 for intervention characteristics, in Table 3.10 for culturally responsive practices, and in Table 3.11 for outcomes.

Table 3. 1

Participant Characteristics

Author(s)	Design	Total # Dyads	Caregiver	Caregiver Race/Ethnicity	Caregiver Language(s)	Relationship	Child	Child Race/Ethnicity	Child Language(s)	Child Age	Diagnosis
Bradshaw, et al. (2017)	MBD	3	Parent 1	European American	Non-English	Parent	Child 1	European American	English	1-3 years	ASD
Brown & Woods (2015)	MBD	9	PM	NR	Luganda, English	Mother	Peter	African American	Luganda, English	1-3 years	ASD
			MM	NR	English, Spanish	Mother	Mila	Hispanic	English, Spanish	1-3 years	ASD
Bucio (2016)	MBD	3	Parent 1	Mexican American	Spanish	Mother	Marco	Mexican American	Spanish, English	10y4m	ASD
			Parent 2	Mexican American	Spanish	Mother	Alejandra	Mexican American	Spanish, English	>7 years	ASD
			Parent 3	Mexican American	Spanish	Mother	Eduardo	Mexican American	Spanish, English	>7 years	ASD
Dogan, et al. (2017)	MBD	4	Hana	African American	NR	Mother	Carter	NR	NR	>7 years	ASD
Douglas, et al. (2018)	MPD	3	Anna	Caucasian (North African)	Arabic, English	Mother	Adam	Caucasian	English	4-6 years	ASD
			Bridget	Caucasian	English	Mother	Ben	Caucasian, African American	English	4-6 years	ASD, IDD
			Catherine	African American	English	Mother	Charlie	African American	English	4-6 years	ASD
Gillett & LeBlanc (2007)	MBD	3	GM	NR	NR	Mother	Garrett	Asian American	NR	4-6 years	ASD
			MM	NR	NR	Mother	Marcus	African American	NR	4-6 years	ASD
Ingersoll & Wainer (2013)	MBD	8	Mother 2	NR	NR	Mother	Child 2	African American	NR	1-3 years	ASD
			Mother 6	NR	NR	Mother	Child 6	Caucasian, Hispanic	NR	4-6 years	ASD
Levinger (2012)	MBD	3	Parent1	European American	NR	Mother	Child1	European American	English	>7 years	ASD
			Parent2	Hispanic	NR	Mother	Child2	Hispanic, European American	English	>7 years	ASD
			Parent3	European American	NR	Father	Child3	Asian American	English	>7 years	ASD
Liou, et al. (2005)	MBD	4	BM	Asian (Indonesia)	Chinese	Mother	Child B	Asian	Chinese	1-3 years	ASD
Meadan, et al. (2014)	MBD	4	MK	Caucasian	NR	Mother	KK	African American	NR	1-3 years	ASD, IDD
Meadan, et al. (2016)	MBD	3	Mediha	Caucasian (Middle Eastern)	NR	Mother	Ali	Caucasian (Middle Eastern)	NR	1-3 years	ASD
Nunes & Hanline (2007)	MBD	1	Julia	African American	NR	Mother	Jason	NR	NR	4-6 years	ASD
Vismara, et al. (2012)	MBD	9	Parent	Hispanic	NR	Parent	Child	NR	NR	1-3 years	ASD
Zimmer (2013)	MPD	4	JM1	NR	English	Mother	Jon	Hispanic	English	1-3 years	ASD
			JM3	NR	English	Mother	Jay	Hispanic	English	1-3 years	ASD

Note. MBD = multiple baseline design; MPD = multiple probe design; ASD = autism spectrum disorder; DD = intellectual/developmental disability; NR = not reported

Participant Characteristics

To answer the first research questions about the participant characteristics of caregiver involvement in communication outcomes for CLD families with children with ASD and IDD, child's age and diagnosis, race/ethnicity and language(s) of caregiver and child participants, and caregiver's relationship with the child were summarized in Table 3.1. A total of 61 dyads were included in these studies, and 24 of these 61 dyads were identifies as CLD populations. Regarding caregiver's relationship with the child, 21 caregiver participants were the child's mother (87.50%), with only 1 caregiver as the child's father (4.17%), and with 2 caregivers reported as the child's parent (8.33%).

Age and diagnosis. As for the child's age, 10 child participants aged 1-3 years (41.67%), 7 children aged 4-6 years (29.17%), and 7 children aged more than 7 years (29.17%). The majority of CLD children who participated in the included studies were 1-3 years old. In addition, all child participants with a diagnosis of ASD and DD were included in the included studies. Specifically, 2 CLD child participants in 2 studies were diagnosed with ASD and IDD (Douglas, et al., 2018; Meadan, et al., 2014), and other 22 child participants in 13 studies were diagnosed with ASD (Bradshaw, et al., 2017; Brown & Woods, 2015; Bucio, 2016; Dogan, et al., 2017; Douglas, et al., 2018; Gillett & LeBlanc, 2007; Ingersoll & Wainer, 2013; Levinger, 2012; Liou, et al., 2005; Meadan, et al., 2016; Nunes & Hanline, 2007; Vismara, et al., 2012; Zimmer, 2013).

Race and ethnicity. Regarding the CLD caregiver participant race and ethnicity, 3 caregiver participants were African Americans (12.50%), 1 caregiver participant was Asian (4.17%), 7 caregivers were Caucasian (29.17%), 5 caregivers were Hispanic (20.83%), and 8 caregivers were not reported about their races (See Table 3.2). Regarding

the CLD child participant race and ethnicity, 5 children were African Americans (20.83%), 3 children were Asian (12.50%), 3 children were biracial (12.50%), 4 children were Caucasian (16.67%), 6 children were Hispanic (25.00%), and 3 child participants were not reported about their races (See Table 3.3). The majority of the caregiver participants were Caucasian immigration from other countries, and the majority of child participants were Hispanic.

Table 3. 2

Results of CLD Caregiver Participant Race/Ethnicity

Race/Ethnicity	Numbers	Percentage of Caregiver Race/Ethnicity
African American	3	12.50%
Asian	1	4.17%
Caucasian	7	29.17%
Hispanic	5	20.83%
Not Reported	8	33.33%

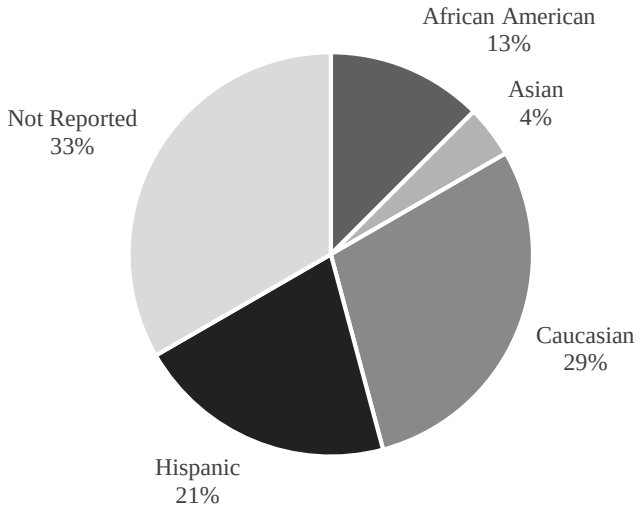
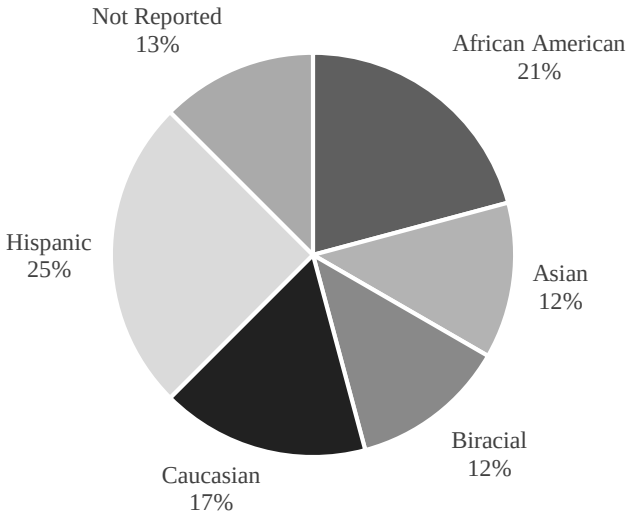


Table 3. 3

Results of CLD Child Participant Race/Ethnicity

Race/Ethnicity	Numbers	Percentage of Child Race/Ethnicity
African American	5	20.83%
Asian	3	12.50%
Biracial	3	12.50%
Caucasian	4	16.67%
Hispanic	6	25.00%
Not Reported	3	12.50%



Language. About the CLD caregiver participant language(s), the majority of CLD caregivers spoke English (n=4, 16.67%). Also, 3 caregivers spoke Spanish (12.50%), 1 caregiver spoke Chinese (4.17%), and 3 caregivers spoke more than one language (12.50%). One caregiver was reported as non-English speaker (4.17%), and 12 caregivers were not reported about their language use (See Table 3.4). The majority of the caregiver participants were not reported about their language use. In addition, about the CLD child participants' language use, 9 child participants spoke English (37.50%), 1 child spoke Chinese (4.17%), and 5 children spoke more than one language (20.83%). Nine of the 24

included children were not reported about their language use (See Table 3.5). The majority of the child participants spoke English or did not reported their language use.

Table 3. 4

Results of CLD Caregiver Language(s)

CLD Caregiver Language(s)	Numbers	Percentage of Caregiver Language(s)
Bilingual	3	12.50%
Chinese	1	4.17%
English	4	16.67%
Non-native English speaker	1	4.17%
Spanish	3	12.50%
Not Reported	12	50.00%

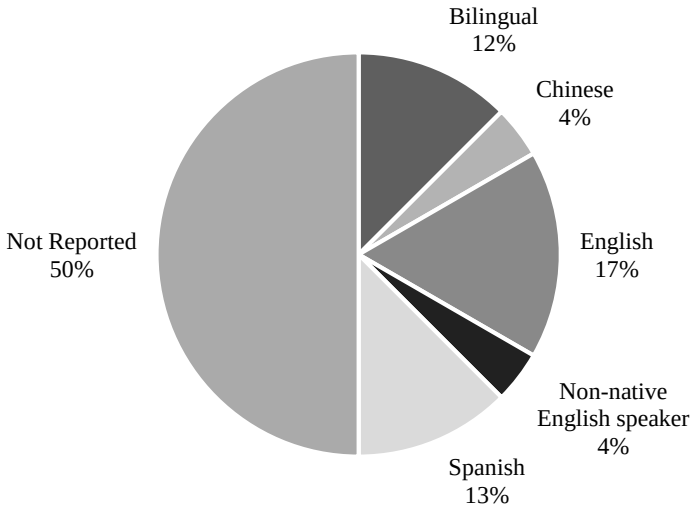
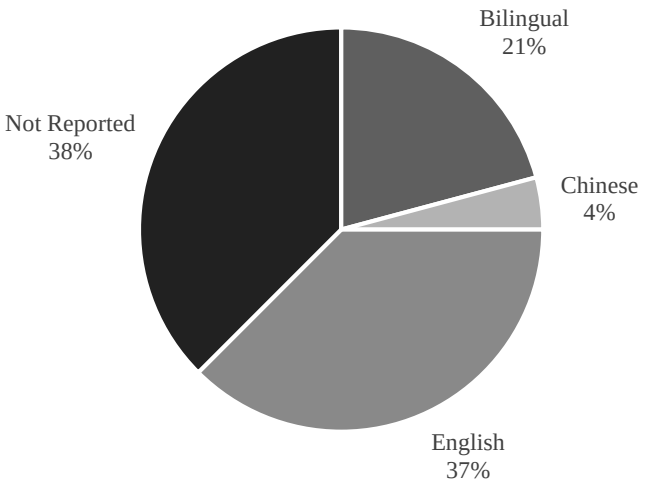


Table 3. 5

Results of CLD Child Language(s)

CLD Child Language(s)	Numbers	Percentage of Child Language(s)
ilingual	5	20.83%
Chinese	1	4.17%
English	9	37.50%
Not Reported	9	37.50%



Intervention Characteristics

To answer the second research question regarding the characteristics of the intervention provided to CLD caregivers, settings, delivery formats, and dosage that caregivers received were summarize and analyzed (See Table 3.6).

Table 3. 6

Characteristics of Intervention

	Participants		Intervention Characteristics		
Author(s)	Caregiver	Child	Setting	Delivery Format	Dosage (Sessions)
Bradshaw, et al. (2017)	Parent 1	Child 1	Multiple Settings	In Person	7-9
Brown & Woods (2015)	PM	Peter	Multiple Settings	In Person	7-9
	MM	Mila	Multiple Settings	In Person	7-9
Bucio (2016)	Parent 1	Marco	Home	NR	7-9
	Parent 2	Alejandra	Home	NR	7-9
	Parent 3	Eduardo	Home	NR	7-9
Dogan, et al. (2017)	Hana	Carter	Home	In Person	1-3
Douglas, et al. (2018)	Anna	Adam	Home	Tele-Practice	4-6
	Bridget	Ben	Home	Tele-Practice	4-6
	Catherine	Charlie	Home	Tele-Practice	4-6
Gillett & LeBlanc (2007)	GM	Garrett	Home	In Person	NR
	MM	Marcus	University	In Person	NR
Ingersoll & Wainer (2013)	Mother 2	Child 2	University	In Person	>10
	Mother 6	Child 6	University	In Person	>10
Levinger (2012)	Parent1	Child1	Multiple Settings	In person	4-6
	Parent2	Child2	Home	In person	>10
	Parent3	Child3	Home	In person	4-6
Liou, et al. (2005)	BM	Child B	Home	In Person	>10
Meadan, et al. (2014)	MK	KK	Home	In Person	>10
Meadan, et al. (2016)	Mediha	Ali	Home	Tele-Practice	>10
Nunes & Hanline (2007)	Julia	Jason	Home	In Person	NR
Vismara, et al. (2012)	Parent	Child	Home	Tele-Practice	>10
Zimmer (2013)	JM1	Jon	Home	In Person	4-6
	JM3	Jay	Home	In Person	4-6

Note. NR = Not reported

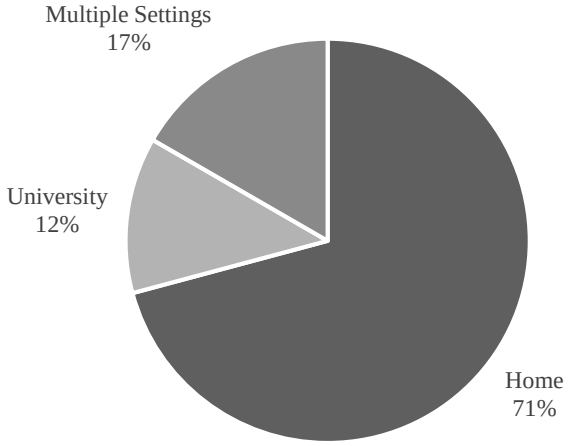
Setting. Interventions with caregiver involvement were most commonly implemented in the participants' homes (n=17, 70.83%; Table 3.7). Four of the participants received services from professionals at university settings or research laboratories (n=3, 16.67%; Gillett & LeBlanc, 2007; Ingersoll & Wainer, 2013). Also, interventions with caregiver involvement of 3 included studies were conducted in multiple settings (Bradshaw, et al., 2017; Brown & Woods, 2015; Levinger, 2012), including 3 CLD participants at home and

community settings (Bradshaw, et al., 2017; Brown & Woods, 2015) and 1 CLD participant at home and university settings (Levinger, 2012).

Table 3. 7

Results of Settings

Setting(s)	Numbers	Percentage of Settings
Home	17	70.83%
University	3	16.67%
Multiple Settings	4	12.50%

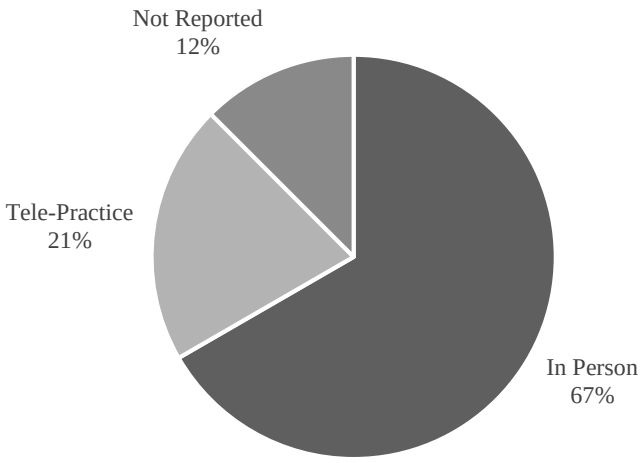


Delivery format. The results of service delivery formats in CLD caregivers were listed in Table 3.8. Interventions with caregiver involvement were most primarily in person to CLD participants (n=16, 66.67%). Five CLD participants received parent training and parent education via telepractice (Douglas, et al., 2018; Meadan, et al., 2016; Vismara, et al., 2012). One study did not report the service delivery format of the 3 caregiver participants (Bucio, 2016).

Table 3. 8

Results of Delivery Format

Delivery Format	Numbers	Percentage of Delivery Formats
In Person	16	66.67%
Tele-Practice	5	20.83%
Not Reported	3	12.50%

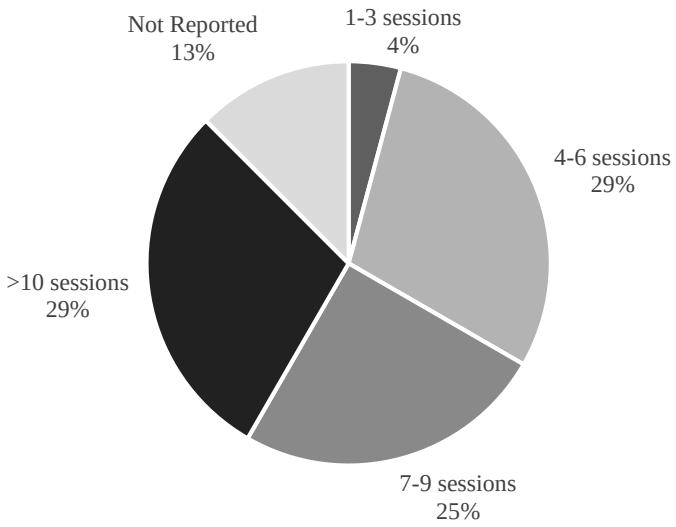


Dosage. The results of the dosage (i.e., sessions) provided to CLD caregivers were listed in Table 3.9. Interventions with caregiver involvement were most commonly implemented to CLD participants for either 4-6 sessions (n=7, 29.17%) or more than 10 sessions (n=7, 29.17%). However, 2 included studies did not report the information of dosage provided to the 3 included caregivers (Gillett & LeBlanc, 2007; Nunes & Hanline, 2007).

Table 3. 9

Results of Dosage

Dosage	Numbers	Percentage of Dosage
1-3 sessions	1	4.17%
4-6 sessions	7	29.17%
7-9 sessions	6	25.00%
>10 sessions	7	29.17%
Not Reported	3	12.50%



Culturally Responsive Practices

Four components of CRT were employed to evaluate if the interventions in each included study considered each CLD participant's (a) native language, (b) cultural background, (c) family involvement, and (d) community culture. Due to the inclusion criteria of the current review, all CLD participants in the included studies received culturally responsive practices in family involvement. Three of the 24 CLD dyads (1.25%) within one study reported that the coach provided parent training in caregivers' native language (i.e., Spanish; Bucio, 2016). However, no participants received culturally

responsive practices under the consideration of their cultural backgrounds or community cultures (Table 3.10).

Table 3. 10

Culturally Responsive Practices

Author (Year)	CLD Participants		Culturally Responsive Practices			
	Caregiver	Child	Native Language	Cultural Background	Family Involvement	Community Culture
Bradshaw, et al. (2017)	Parent 1	Child 1	N	N	Y	N
Brown & Woods (2015)	PM	Peter	N	N	Y	N
	MM	Mila	N	N	Y	N
Bucio (2016)	Parent 1	Marco	Y	N	Y	N
	Parent 2	Alejandra	Y	N	Y	N
	Parent 3	Eduardo	Y	N	Y	N
Dogan, et al. (2017)	Hana	Carter	N	N	Y	N
Douglas, et al. (2018)	Anna	Adam	N	N	Y	N
	Bridget	Ben	N	N	Y	N
	Catherine	Charlie	N	N	Y	N
Gillett & LeBlanc (2007)	GM	Garrett	N	N	Y	N
	MM	Marcus	N	N	Y	N
Ingersoll & Wainer (2013)	Mother 2	Child 2	N	N	Y	N
	Mother 6	Child 6	N	N	Y	N
Levinger (2012)	Parent1	Child1	N	N	Y	N
	Parent2	Child2	N	N	Y	N
	Parent3	Child3	N	N	Y	N
Liou, et al. (2005)	BM	Child B	N	N	Y	N
Meadan, et al. (2014)	MK	KK	N	N	Y	N
Meadan, et al. (2016)	Mediha	Ali	N	N	Y	N
Nunes & Hanline (2007)	Julia	Jason	N	N	Y	N
Vismara, et al. (2012)	Parent	Child	N	N	Y	N
Zimmer (2013)	JM1	Jon	N	N	Y	N
	JM3	Jay	N	N	Y	N
% of CLD dyads receiving culturally responsive practices			1.25%	0%	100%	0%

Note. Y = Caregivers received related culturally responsive practices; N = Caregivers did not receive related culturally responsive practice.

Outcomes

To answer the third research question about the outcomes in caregiver involvement for CLD families with children with ASD and IDD, measures, parent outcomes, and child communication outcomes were summarized (See Table 3.11).

Measures. Regarding measures, 7 of the 14 studies utilized frequency to calculate the number of occurrences of target behaviors (Bradshaw, et al., 2017; Brown & Woods, 2015; Douglas, et al., 2018; Liou, et al., 2005; Nunes & Hanline, 2007; Vismara, et al., 2012; Zimmer; 2013). Also, 7 of the 14 studies employed rate to calculate the number of occurrences of target behaviors per a set amount of time (Bucio, 2016; Dogan, et al., 2017; Gillett & LeBlanc, 2007; Ingersoll & Wainer, 2013; Levinger, 2012; Meadan, et al., 2014, 2016).

Parent outcomes. Regarding parent outcomes, 2 of the 14 studies did not evaluate caregivers' outcomes (Gillett & LeBlanc, 2007; Zimmer; 2013). The results of these studies showed that caregiver had an improvement in the fidelity of implementation (Bradshaw, et al., 2017; Dogan, et al., 2017; Ingersoll & Wainer, 2013; Vismara, et al., 2012), in learned communication intervention strategy use (Brown & Woods, 2015; Meadan, et al., 2014, 2016; Nunes & Hanline, 2007), in leading conversational opportunities (Bucio, 2016; Douglas, et al., 2018), in responses to child communication (Douglas, et al., 2018; Liou, et al., 2005), and in parent confidence ratings (Levinger, 2012).

Child communication outcomes. All included studies reported child communication outcomes. Thirteen studies reported the increase in children’s communication outcomes. Five communicative functions were used to code children's communication outcomes,

including (a) expression of needs and wants, (b) social closeness, (c) exchanging information, (d) social etiquette, and (e) response to others (Light, 1989). Nine children had an increase in the expression of needs and wants (37.50%; Bradshaw, et al., 2017; Brown & Woods, 2015; Dogan, et al., 2017; Douglas, et al., 2018; Nunes & Hanline, 2007; Vismara, et al., 2012), 7 children had an increase in exchanging information (29.17%; Bucio, 2016; Meadan, et al., 2014, 2016; Zimmer, 2013), and 7 children had an increase in responses (29.17%; Gillett & LeBlanc, 2007; Levinger, 2012; Meadan, et al., 2014, 2016). Yet, 2 children had no changes in responses (8.33%; Bradshaw, et al., 2017; Nunes & Hanline, 2007). Two included studies did not specify the communication functions of the 3 CLD child participants but just reported that children had an increase in spontaneous language (Ingersoll & Wainer, 2013) or had a decrease in social and communication behaviors (Liou, et al., 2005).

Table 3. 11

Outcomes

	Participants		Outcomes		
Author(s)	Caregiver	Child	Measures	Parent Outcomes	Child Communication Outcomes
Bradshaw, et al. (2017)	Parent 1	Child 1	Frequency; 10-mins interval	Increase in language opportunities for fidelity of implementation	Increase in expression of needs and wants; No changes in responses
Brown & Woods (2015)	PM	Peter	Frequency; 10-mins interval	Increase in communication intervention strategy use	Increase in expression of needs and wants
	MM	Mila			
Bucio (2016)	Parent 1	Marco	Rate; 15-sec interval	Increase in leading statement conversational opportunities	Increase in exchanging information
	Parent 2	Alejandra			
	Parent 3	Eduardo			
Dogan, et al. (2017)	Hana	Carter	Rate; 10 mins	Increase in correct teaching and required steps	Increase in expression of needs and wants
Douglas, et al. (2018)	Anna	Adam	Frequency; 5-sec interval	Increase in parent communication opportunities; increase in parent responses to child communication	Increase in expression of needs and wants
	Bridget	Ben			
	Catherine	Charlie			
Gillett & LeBlanc (2007)	GM	Garrett	Rate; 1-min interval	NR	Increase in responses
	MM	Marcus			
Ingersoll & Wainer (2013)	Mother 2	Child 2	Rate; 1-min interval	Increase in parent fidelity	Not categorize; Increase in spontaneous language
	Mother 6	Child 6			
Levinger (2012)	Parent1	Child1	Rate; 15-sec interval	Increase in parent confidence ratings	Increase in responses
	Parent2	Child2			
	Parent3	Child3			
Liou, et al. (2005)	BM	Child B	Frequency; 20-sec interval	Increase in responsiveness	Not categorize; Decrease in social and communication
Meadan, et al. (2014)	MK	KK	Rate; communication opportunity	Increase in the use of teaching strategies	Increase in exchanging information and responses
Meadan, et al. (2016)	Mediha	Ali	Rate; communication opportunity	Increase in the strategy use	Increase in exchanging information and responses
Nunes & Hanline (2007)	Julia	Jason	Frequency; 3 mins	Increase in environmental arrangement, mands, comments with AAC; No change in model	Increase in expression of needs and wants; No change in responses
Vismara, et al. (2012)	Parent	Child	Frequency; 10 mins	Increase in parent ESDM fidelity	Increase in expression of needs and wants
Zimmer (2013)	JM1	Jon	Frequency; 1 min	NR	Increase in exchanging information
	JM3	Jay			

Discussion

This systematic review identified 14 single-case studies with 24 CLD dyads that conducted caregiver involvement in communication outcomes for CLD families with

children with ASD and IDD. The summaries of these studies suggested that caregiver involvement could be a method to improve communication behaviors in CLD families with individuals with ASD and IDD. Given the limited included studies and CLD participants, the results of this systematic review are preliminary.

Caregiver involvement has been primarily conducted to improve communication skills in CLD individuals with ASD and IDD. In the current review, the majority of the participants within the studies were mothers who implemented the learned intervention strategies with young children with ASD and IDD, in keeping with the existing related review (Schultz, Schmidt, & Stichter, 2011). However, compared to parenting fathers, mothers were at an increased risk of parenting stress when teaching and educating children with ASD and IDD (Dabrowska & Pisula, 2010). Although there was very limited research in this area, sufficient resources (e.g., parent coaching and education from professionals and support from other family members) are required for caregivers to avoid negative outcomes (e.g., parenting stress).

The culturally responsive approach is another issue in the included studies. Twenty-four CLD dyads within 14 studies were identified in this review, including English language learners, bilingual families, immigrants, and diverse ethnic groups. However, only one researcher provided parent training based on caregivers' native language and culture (Bucio, 2016). Other studies either excluded non-native English speakers when recruiting participants or used interventions conducted in English. Parent training protocol based on cultural factors may need further consideration and evaluation in these studies.

Regarding culturally responsive practices provided to CLD caregivers of children with ASD and IDD, 4 components of CRT were used to evaluate if the interventions under

careful consideration of each CLD participant's native language, cultural background, family involvement, and community culture. Although all included studies expounded family involvement due to the inclusion criteria of the current review, only one study provided culturally responsive practices with the caregivers' native language. Furthermore, no studies included CLD participants' cultural backgrounds and community cultures in the interventions. Although CLD populations participated in these studies, no comprehensive culturally responsive practice was included in the procedures of developing and implementing the intervention of family involvement for CLD participants, which may affect the results of the outcomes and social validity.

Although the results of the included studies showed that caregiver participants had an improvement in the implementation of the learned intervention strategies, children communication outcomes were varied. CLD children in 2 included studies showed no change in responses (Bradshaw, et al., 2017; Nunes & Hanline, 2007), verbalizations and vocalizations, gestures and manual signs (Nunes & Hanline, 2007). Only 1 CLD child had a decrease in social and communication behaviors (Liou, et al., 2005). It is difficult to identify the reasons (e.g., procedures of parent training, caregiver background, the severity of ASD) that resulted in these outcomes. Thus, more details on participants' backgrounds and caregiver involvement would be needed to clarify the provision of services delivered to these caregivers. Furthermore, it would be more comprehensive if culturally sensitive assessments were developed to evaluate the outcomes of CLD caregivers and children.

The current systematic review added the knowledge of caregiver involvement in CLD caregivers who had children with ASD and IDD. However, there are still some limitations on this review. First, although the effort was made into capturing all the potential studies

pertaining to caregiver involvement in communication behaviors for CLD families with children with ASD and IDD, limited CLD participants were included in this review. Second, because including only single-case studies, some relevant studies with other research designs still remained unidentified. Third, although this study reviewed the characteristics of service provided to caregivers, there was a lack of details on services provided to CLD participants. Fourth, since the same procedures of interventions and measures targeted CLD dyads and other dyads in each included study, there were not additional culturally responsive practices in the procedures of interventions and evaluations provided to CLD participants. It is hard to identify how cultural factors affect parent implementation of the learned skills and children's communication outcomes.

To address the limitations on the current review, there are some suggestions for the future review. First, given the limited number of studies, future research may put more studies with varying study designs under scrutiny. Second, to have a better understanding of the interventions provided to CLD caregivers, future reviews may put more emphasis on studies related to cultural adaptation and implementation with CLD families. Furthermore, due to the limited studies on caregiver involvement in children communication outcomes for CLD caregivers with individuals with ASD and IDD, future reviews may expand to different children's outcomes and on CLD caregivers with individuals across different disabilities.

References

*Indicates studies included in the systematic review.

Artiles, A. J., & Ortiz, A. A. (2002). *English language learners with special education needs: Identification, assessment, and instruction*. McHenry, IL: Center for Applied Linguistics and Delta Systems.

Boe, E. E., & Cook, L. H. (2006). *The chronic and increasing shortage of fully certified teachers in special and general education*. Retrieved from http://repository.upenn.edu/gse_pubs/147

*Bradshaw, J., Koegel, L. K., & Koegel, R. L. (2017). Improving functional language and social motivation with a parent-mediated intervention for toddlers with autism spectrum disorder, *Journal of Autism and Developmental Disorders, 47*, 2443-2458.

Bronfenbrenner, U. (1977). Experimental toward an Ecology of Human Development. *American Psychologist, 32*, 513-531.

Bronfenbrenner, U. (1979) *The ecology of human development: Experiments by nature and design*, Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development research perspectives. *Developmental Psychology, 22,* 723-742.

*Brown, J. A., & Woods, J. J. (2015). Effects of a triadic parent-implemented home-based communication intervention for toddlers. *Journal of Early Intervention, 37*(1), 44-68.

*Bucio, M. O. (2016). *Improving conversational communication in Mexican-American children with autism in their native language via parent-implemented self-*

management (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 10194211)

Butler, A. M., & Titus C. (2015). Systematic review of engagement in culturally adapted parent training for disruptive behavior. *Journal of Early Intervention, 37*(4), 300-318.

Cartledge, G., & Kourea, L. (2008). Culturally responsive classrooms for culturally diverse students with and at risk for disabilities. *Exceptional Children, 74*(3), 351-371.

Chamberlain, S. P. (2005). Recognizing and responding to cultural differences in the education of culturally and linguistically diverse learners. *Intervention in School and Clinic*, *22*(4), 195-211.

Chuang, S. S., & Zhu, M. (2018). Where are you daddy?: An exploration of father involvement in Chinese families in Canada and Mainland China. In S. S. Chuang & C. L. Costigan (Eds.), *Parental roles and relationships in immigrant families: An international approach* (pp. 11-30). AG: Springer.

Cummins, J. (2000). *Language, power and pedagogy: Bilingual children in the crossfire. Clevedon*, UK: Multilingual Matters.

Cuvo, A. J., & Vallelunga, L. R. (2007). A transactional systems model of autism services. *The Behavior Analyst, 30*(2), 161-180.

Dabrowska, A., & Pisula, E. (2010). Parenting stress and coping styles in mothers and fathers of preschool children with Down syndrome. *Journal of Intellectual Disabilities Research, 54,* 266-279.

Darling, N. (2007). Ecological systems theory: The person in the center of the circles, *Research in Human Development, 4*(3-4), 203-217.

*Dogan, R. K., King, M. L., Fischetti, A. T., Lake, C. M., Mathews, T. L., & Warzak, W. J. (2017). Parent-implemented behavioral skills training of social skills. *Journal of Applied Behavior Analysis, 50*(4), 805-818.

*Douglas, S. N., Kammes, R., & Nordquist, E. (2018). Online communication training for parents of children with autism spectrum disorder. *Communication Disorders Quarterly, 39*(3), 415-425.

Dunlap, G., Kern, L., & Worcester, J. (2001). ABA and academic instruction. *Focus on Autism and Other Developmental Disabilities, 16,* 129-136.

Garbacz, S. A., McIntyre, L. L., & Santiago, R. T. (2016). Family involvement and parent-teacher relationships for students with autism spectrum disorders. School psychology quarterly: the official journal of the Division of School Psychology, *American Psychological Association, 31*(4), 478-490.

Garcia, E. E., & Cuéllar, D. (2006). Who are these linguistically and culturally diverse students? *Teachers College Record, 108*(11), 2220-2246.

Gay, G. (2000). *Culturally responsive teaching: Theory, research, and practice*. New York: Teachers College Press.

Gay, G. (2002). Culturally responsive teaching in special education for ethnically diverse students: Setting the stage. *International Journal of Qualitative Studies in Education, 15*(6), 613-629.

*Gillett, J. N. & LeBlanc, L. A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*, 247-255.

Hambly, C., & Fombonne, E. (2014). Factors influencing bilingual expressive vocabulary size in children with autism spectrum disorders. *Research in Autism Spectrum Disorder, 8*, 1079-1089.

Harding-Esch, E., & Riley, P. *(*2003*). The bilingual family: A handbook for parents. Cambridge:* Cambridge University Press.

Harry, B., & Kalyanpur, M. (1994). Cultural underpinnings of special education: Implications for professional interactions with culturally diverse families. *Disability and Society*, *9*(2), 145-165.

Hetzroni, O. E., & Harris, O. L. (1995). Cultural aspects in the development of AAC users. *Augmentative and Alternative Communication, 12*, 52-58.

Hoover, J. J., & deBettencourt, L. U. (2017). Educating culturally and linguistically diverse exceptional learners: The need for continued advocacy. *Exceptionality, 26*(3), 176-189.

Huer, M. B., Saenz, T. I., & Doan, J. H. D. (2001). Understanding the Vietnamese American community: Implications for training educational personnel providing services to children with disabilities. *Communication Disorders Quarterly, 23*(1), 27-39.

*Ingersoll, B., & Wainer, A. (2013). Initial efficacy of project ImPACT: A parent-mediated social communication intervention for young children with ASD. *Journal of Autism and Developmental Disorders, 43*(12), 2943-2952.

Johnson, C. R., Butter, E. M., & Scahill, L. (2018). *Parent training for autism spectrum disorder: Improving the quality of life for children and their families.* Washington, DC: American Psychological Association.

Juckett, G. (2013). Caring for Latino Patients, *American Family Physician, 87*(1), 48-54.

Kindler, A. L. (2002). *Survey of the states' limited English proficient students and available educational programs and services: 2000-2001 summary report*. National Clearinghouse for English Language Acquisition and Language Instruction Education Program, Washington, DC.

Klingner, J., & Soltero-Gonzalez, L. (2009). Culturally and linguistically responsive literacy instruction for English language learners with learning disabilities. *Multiple Voices for Ethnically Diverse Exceptional Learners, 12*(1), 4-20.

Klingner, J., Moore, B., Davidson, A. O., Boelé, A., Boardman, A., Figueroa, R., Annamma, S. A., & Sager, N. (2015). Cultural and linguistic diversity in special education. In B. Bateman, J. W. Lloyd & M. Tankersley (Eds.), *Enduring issues in* special education*: Personal perspectives* (pp. 110–131). New York, NY: Routledge.

*Levinger, K. J. (2012). *Parent-implemented video self-management targeting nonverbal pragmatics in children with autism* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3545112)

*Liou, W-. Y., Lin, C-. S., & Pan, H-. M. (2005). The influence of caregivers' responsive interaction on autistic children's communicative behavior, *Bulletin of Special Education and Rehabilitation, 14,* 85-102.

Lund, E. M., Kohlmeier, T. L., & Durán, L. K. (2017). Comparative language development in bilingual and monolingual children with autism spectrum disorder: A systematic review. *Journal of Early Intervention, 39*(2), 106-124.

Mandell, D. S., & Salzer, M. S. (2007). Who joins support groups among parents of children with autism?. *Autism, 11*(2), 111–122.

*Meadan, H., Angell, M. E., Stoner, J. B., & Daczewitz, M. E. (2014). Parent-implemented social-pragmatic communication intervention: A pilot study. *Focus on Autism and Other Developmental Disabilities, 29*(2), 95-110.

*Meadan, H., Snodgrass, M. R., Meyer, L. E., Fisher, K. W., Chung, M. Y., & Halle, J. W. (2016). Internet-based parent-implemented intervention for young children with autism: A pilot study. *Journal of Early Intervention, 38*(1), 3-23.

*Nunes, D., & Hanline, M. F. (2007). Enhancing the alternative and augmentative communication use of a child with autism through a parent-implemented naturalistic intervention. *International Journal of Disability, Development and Education, 54*(2), 177-197.

Ogbu, J. U. (1992). Understanding Cultural Diversity and Learning. *Educational Researcher, 21*(8), 5-14.

Ogbu, J. U & Simons, H. D. (1998). Voluntary and involuntary minorities: A cultural-ecological theory of school performance with some implications for education, *Anthropology & Education Quarterly, 29*(2), 155-188

Paat, Y. (2013). Working with immigrant children and their families: An application of Bronfenbrenner's Ecological Systems Theory. *Journal of Human Behavior in the Social Environment, 23*(8), 954-966.

Paik, S. J., Rahman, Z., Kula S. M., Saito L.E., & Witenstein, M. A. (2017). Diverse Asian American families and communities: Culture, structure, and education (Part 1: why they differ), *School Community Journal, 27*(2), 35-66.

Parette, H. P., & Marr, D. D. (1997). Assisting children and families who use augmentative and alternative communication (AAC) devices: Best practices for school psychologists. *Psychology in the Schools, 34*, 337-346.

Recklein, A. J. (2013). *Disability: Effects on the ecological theory and social interaction theory*, Research Papers, Southern Illinois University Carbondale.

Reetzke, R., Zou, X., Sheng, L. & Katsos, N. (2015). Communicative development in bilingually exposed Chinese children with autism spectrum disorders. *Journal of Speech, Language, and Hearing Research, 58*, 813-825.

Paradis, J., Nicoladis, E., Crago, M., & Genesee, F. (2011). Bilingual children's acquisition of the past tense: A usage-based approach. *Journal of Child Language, 38*, 554-578.

Powers, L. E., Singer, G. H., Stevens, T., & Sowers, J.-A. (1992). Behavioral parent training in home and community generalization settings. *Education & Training in Mental Retardation, 27*(1), 13-27.

Robertson, R. E. (2016). Effectiveness and acceptability of parent-implemented behavior interventions for children with autism in three African American families. *Education and Training in Autism and Developmental Disabilities, 51*(2), 107-121.

Rosenberg, M. S., Boyer, K. L., Sindelar, P. T., & Misra, S. K. (2007). Alternative route programs for certification in special education: Program infrastructure instructional delivery, and participant characteristics. *Exceptional Children, 73*(2), 224-241.

Schultz, T. R., Schmidt, C. T., Stichter, J. P. (2011). A review of parent education programs for parents of children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 26*(2), 96-104.

Sullivan, A. L. (2011). Disproportionality in special education identification and placement of English language learners. *Exceptional Children, 77*(3), 317-334.

Thomas, W., & Collier, V. (2002). *A national study of school effectiveness for language minority students' long-term academic achievement.* Retrieved April 1, 2018, from http://escholarship.org/uc/crede_finalrpts

Trent, S. C., Kea, C. D., & Oh, K. (2008). Preparing preservice educators for cultural diversity: How far have we come?. *Exceptional Children, 74*(3), 328–350.

Utley, C. A., Obiakor, F. E., & Bakken, J. P. (2011). Culturally responsive practices for culturally and linguistically diverse students with learning disabilities. *Learning Disabilities: A Contemporary Journal, 9*(1), 5-18.

*Vismara, L. A., Young, G. S., & Rogers, S. J. (2012). Telehealth for expanding the reach of early autism training to parents. *Autism Research & Treatment,* 1-12.

Wolfe, K., & Durán, L. K. (2013). Culturally and linguistically diverse parents' perceptions of the IEP process: A review of current research. *Multiple Voices for Ethnically Diverse Exceptional Learners, 13*(2), 4-18.

Yang, S. L., Hsiao, Y. J., & Hsiao, H. C. (2014). Culturally responsive teaching with new Taiwanese children: Interviews with class teachers in elementary schools. *Asia Pacific Journal of Education, 34*(3), 288-304.

Yu, B. (2009*). Talking with bilingual Chinese-American immigrant parents of children with autism spectrum disorders about intergenerational language practices (*Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3411177)

* Zimmer, K. (2013). *Efficacy of caregiver training to establish joint attention of children with autism* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (UMI Number: 3586657)

CHAPTER IV

CULTURALLY RESPONSIVE PARENT COACHING IN MULTIMODAL COMMUNICATION INTERVENTION FOR CULTURALLY AND LINGUISTICALLY DIVERSE CAREGIVERS OF CHILDREN WITH AUTISM SPECTRUM DISORDER

The culturally and linguistically diverse (CLD) population of the U.S. has been growing steadily for decades (Klingner & Soltero-Gonzalez, 2009; Sullivan, 2011; Thomas & Collier, 2002). This overall growth may be a factor in the overrepresentation of culturally and linguistically diverse exceptional (CLDE) children in the high-incidence disabilities and lower academic performance. This overrepresentation may be related to cultural, social, and linguistic knowledge of the mainstream in the classroom rather than true deficiencies (Estrem & Zhang, 2010; Salend & Garrick Duhaney, 2005; Schon, Shaftel, & Markham, 2008; Waitoller, Artiles, & Cheney, 2010). For CLDE children with autism spectrum disorder (ASD) and intellectual/developmental disability (IDD), in particular, it is clear that the service provision from professionals does not meet their unique needs well (Estrem & Zhang, 2010; Rosenberg, Boyer, Sindelar, & Misra, 2007).

Parental decision-making is a critical component in the provision of services for children with ASD and IDD. Parents' awareness of ASD affects their children's utilization of special education and services (Estrem & Zhang, 2010; Wei, Wagner, Christiano, Shattuck, & Yu, 2014). Decisions made exclusively by professionals may decrease parental involvement in their children's intervention because such interventions may be not culturally appropriate. (Anthony & Banks-Joseph, 2010; Mcleod, 2012). Additionally, English-speaking families may have more opportunities to access non-school services and support as compared to CLD families (Estrem & Zhang, 2010). Therefore, a culturally

appropriate approach is needed for CLD families. As such, professionals must have the knowledge and abilities to consider each family's cultural context and ensure the cultural appropriateness of resources and services provided (Smith, O'Grady, Cubillo, & Cavanagh, 2017).

Culturally Responsive Approaches for CLD Populations

The term "culturally responsive" refers to the dynamic or synergistic relationship between family, school, and community cultures (Ladson-Billings, 2007). Culturally responsive teaching is a foundational concept of multicultural education for professionals working with CLD learners, with educators connecting course content to each CLD learner's cultural context (Klingner et al., 2005). There are four main components of culturally responsive teaching: native language, understanding of history and cultures, family involvement, and community culture (Cartledge & Kourea, 2008; Gay, 2000, 2002). Culturally responsive teaching emphasizes that professionals improve cultural awareness to respond to learners' skill gaps, prevent and minimize disabilities, and provide opportunities and resources to facilitate the acquisition of skills and achievement outcomes for CLD learners (Cartledge & Kourea, 2008; Utley et al., 2011; Yang et al., 2014). Previous studies provided strategies or methods to promote CLDE students through the procedure of skills acquisition and learning based on their preferences in cultures and languages (e.g., listening and responding styles, interaction patterns, and verbal and nonverbal communication; Klingner & Soltero-Gonzalez, 2009; Salend & Garrick Duhaney, 2005).

Culturally Responsive Parent Coaching in Communication Outcomes

Parent coaching is a positive intervention for families of children with ASD, leading to reduced parenting stress, improved parent-child interaction, improved understanding of ASD, and improved parental quality of life (Preece & Trajkovski, 2017). Based on the principles of culturally responsive teaching, culturally responsive parent coaching was developed to provide parents with the abilities needed to implement interventions for CLDE children in consideration of family and cultural factors (Elder, Valcante, Won, & Zylis, 2003; Goodwin & King, 2002; Powell, Zambrana, & Silva-Palacios, 1990). When providing culturally responsive parent coaching to CLD families, major strategies include involving family members in planning the data collection, adapting the protocol based on the family routines, and examining the appropriateness of plans (Dennis & Giangreco, 1996; Salend & Taylor, 2002). When parents are educated to provide culturally appropriate interventions as a therapist within a defined program, they show high acceptability and satisfaction and they demonstrate a willingness to continue using learned strategies with their children (Cheremshynski, Lucyshyn, & Olson, 2012).

Culturally responsive approaches can be also used in communication interventions for children with ASD and IDD (Parette & Marr, 1997; Travis & Geiger, 2010). For example, high-context cultures (e.g. Asian and native Hispanic) focus more on the amount of information transmitted through the context of situations, the relationship of communicative partners, and physical cues. Euro-American families typically use direct and concise verbal communication with family members (Parette & Marr, 1997). Professionals with cultural awareness and understanding are able to provide appropriate services and suggestions to children with ASD and IDD from various ethnic and cultural

backgrounds, as well as their families (Hetzroni & Harris, 1995; Parette & Marr, 1997). Besides communication intervention selection, professionals can further use culturally responsive approaches to coach CLD caregivers in how to implement communication interventions with their children. For example, professionals conduct assessments and interviews to understand each family's native language, history, and culture, subsequently developing and implementing treatment plans based on the information provided. However, the assessment tools and related resources for practitioners are limited.

Evaluation for CLD Populations

The components of assessments for CLD populations include the degree of bilingual proficiency, the extent of acculturation, and the basic quality of assessments. For example, when assessing and observing CLD children, professionals include the child's native language rather than using only the child's second language (Javier, 2007; Valdés & Figueroa, 1994). Previous studies suggested methods to understand interviewees' family and cultural background in CLD families, including direct observation, video recording, parent interview (e.g., ethnographic interview), and cultural fit evaluation (e.g., Stephenson Multigroup Acculturation Scale) (Bagnato & Neisworth, 1991; Banerjee & Guiberson, 2012; Cheng, 1991; Cheremshynski, Lucyshyn, & Olson, 2012; Spradley, 1979; Stephenson, 2000). In data coding and analysis, various strategies can be used to analyze data from CLD families, including utilizing the skills of native speakers to translate data into the interviewee's native language, reviewing the responses or transcripts from the interviewee for accuracy, translating the responses or transcripts into English, and reviewing the translations for accuracy and rating of the agreement by professionals who are fluent in both English and the interviewee's native language (Lo, 2008).

When conducting a family interview or assessment for understanding family and cultural backgrounds, respectful and culturally sensitive data collection strategies should be used to collect cultural information from parents (Dennis & Giangreco, 1996; Salend & Taylor, 2002). Culturally sensitive approaches include seeking support from cultural interpreters to determine whether the interview protocol fits the family and community cultures, understanding the literacy and language status of family members, including family members in interviews, previewing the interview with family members, being flexible and responsive to the family's interaction style, meeting the needs of the family, and examining the nature of the interview or assessment questions (Dennis & Giangreco, 1996). Although studies have been conducted with CLD families, previous research did not collect data on family and cultural backgrounds from CLD caregivers in order to develop interventions.

Research Questions

The purpose of the current study is to evaluate the effects of culturally responsive parent coaching on a multimodal communication protocol for CLD parents of children with ASD. The research questions include the following:

1. Is there a functional relation between culturally responsive parent coaching and parents' implementation of components of a multimodal communication intervention?
2. Is the improvement of the children's communication behaviors correlated with an increase in parent implementation of the multimodal communication intervention components?

3. To what extent is culturally responsive parent coaching on multimodal communication protocol acceptable to parents?

Method

Participants

The participants were four children with ASD and their mothers. Families were eligible for the study if they had a child who (a) was 0 to 22 years old; (b) had an ASD diagnosis, as confirmed by the parent; and (c) had a family that experienced more than one culture or spoke two or more languages at home. Families were recruited by the author from an existing state funded project sample pool. Written informed consent was approved by Institutional Review Board (IRB) and obtained from all parent participants prior to participation.

The parent participants, aged 34 to 51 years, were primary caregivers of their children. All parent participants lived in the United States for more than 10 years. Each possessed a Master's degree and had received previous short-term parent training or participated in ASD related parent meetings. Three families spoke both English and Chinese with children at home, and one mother spoke only English with the child (Dyad C).

Dyad A was Ming and Kun. Kun was an Asian boy with a diagnosis of ASD and was 8 years old at the beginning of the study. Kun's mother, Ming, was a 40-year-old Asian female with two children (1 daughter and 1 son). She earned a Master's degree and did not work outside of the home. Dyad B included Hsuan and Hung. Hung was a 9-year Asian boy with a diagnoses of ASD. Hung's mother, Hsuan, was a 51-year-old Asian female with 3 children (1 daughter and 2 sons). She had a full-time job outside of the home

and had a Master's degree. Dyad C was Yu and Jing. Jing was a biracial girl with a diagnosis of ASD and intellectual disability and was 2 years 6 months old at the beginning of the study. Yu was a 34-year-old Asian female with 2 daughters. She was a stay-at-home mother with a master's degree. Dyad D included Mei and Lung. Lung was an Asian boy with a diagnosis of ASD and intellectual disability and was 5 years 6 months old. Mei, was a 38-year-old Asian female with 1 child. She had a master's degree and did not work outside of the home. Before the current study, Kun, Hung, and Lung received special education and speech therapy, and Hung, Jing, and Lung received ABA therapy. See Table 4.1 for participant characteristics.

Table 4. 1

Description of Participant Characteristics

	Dyad A	Dyad B	Dyad C	Dyad D
Parent Participants				
Name	Ming	Hsuan	Yu	Mei
Relationship with the Child	Mother	Mother	Mother	Mother
Age	40	51	34	38
Gender	Female	Female	Female	Female
Race	Asian	Asian	Asian	Asian
Native Languages	Simplified Chinese	Traditional Chinese	Simplified Chinese	Traditional Chinese
Second Language	English	English	English	English
Educational Background	Master	Master	Master	Master
Parent Experiences with individuals with ASD	Short-term parent training	Parent education seminar	Individual parent meeting with therapists	Short-term parent training
Child Participants				
Name	Kun	Hung	Jing	Lung
Age	8	9	2.5	5.5
Gender	Boy	Boy	Girl	Boy
Race	Asian	Asian	Biracial	Asian
Native Languages	English	English	English	English
Second Language	Chinese	Chinese (Only listening)	N/A	Chinese (Only listening)
Communication Modes	Speech	Speech	Speech	Gestures, sign language, speech generating devices (Proloquo2go)

Note. The difference between Traditional Chinese and Simplified Chinese are two different versions of the written Chinese. The coach provided written instruction and feedback based on each parent's preferred version of the written Chinese.

Before the baseline phase, diagnosis of ASD was conferred by independent evaluators and confirmed via record review. Additional confirmatory support for diagnosis, social functioning, communication skills, and communication needs was obtained by having the parents complete a parent interview and three formal child assessments, including the *Autism Spectrum Rating Scale* (ASRS; Goldstein & Naglieri, 2009), *Social Communication Questionnaire* (SCQ; Rutter, Bailey, & Lord, 2003), *Vineland Adaptive Behavior Scales* (Vineland-II; Sparrow, Balla, & Cicchetti, 2005). All the four children met the cut-off scores on ASRS and had significant deficits indicating limited repertoire in communication and socialization domains on the Vineland-II; however, SCQ scores of Hung and Lung fell below the cutoff for autism spectrum symptoms. Kun, Hung, and Jing had limited abilities to successfully communicate and interact with others in speech. Lung had limited verbal repertoire, only using of gestures, sign language, and speech generating devices. See Table 4.2 for detailed assessment results for each child participant.

In addition to assessments of child communication functioning, the Acculturation and Cultural Background Survey (Appendix G) was adapted from the Transcultural Nursing Assessment Guide (Andrews & Boyle, 2016) and the Stephenson Multigroup Acculturation Scale (SMAS; Stephenson, 2000) to understand participants' and families' cultural acculturation and affiliations, communication, and autism-related beliefs and practices. Parents completed the survey before the baseline phase. Further discussions were conducted during the parent interview to understand and clarify parents' responses in the survey.

Table 4. 2

Summary of Formal Assessment Results for Participants

	Dyad A: Kun (age 9)			Dyad B: Hung (age 9)			Dyad C: Jing (age 3)			Dyad D: Lung (age 6)		
Test& Domain	Standard Scores[a]	Percentile/ Age Equivalent	Descriptor	Standard Scores[a]	Percentile/ Age Equivalent	Descriptor	Standard Scores[a]	Percentile/ Age Equivalent	Descriptor	Standard Scores[a]	Percentile/ Age Equivalent	Descriptor
ASRS[b] Total	74	99	v. elevated	62	88	Slightly elevated	73	99	very elevated	69	97	Elevated
ASRS Social Communication	78	99	v. elevated	65	93	Elevated	77	99	Very elevated	74	99	very elevated
SCQ[d] Total	21	-	> ASD cut-of	14	-	< ASD cut-off	25	-	> ASD cut-off	12	-	< ASD cut-off
Vineland-3[c] Communication	86	18	Low	77	6	Low	75	5	Low	45	<1	Low
Vineland-3 Socialization	75	5	Low	70	2	Low	71	3	Low	58	<1	Low

Note. [a]Scores on the ASRS are T-scores, Vineland-3 are V-scale Scores; [b]ASRS- Autism Spectrum Rating Scale (Goldstein & Naglieri, 2009); [c]Vineland Adaptive Behavior Scales-II (Sparrow, Cicchetti, & Saulnier, 2016), [d]SCQ- Social Communication Questionnaire (Rutter, Bailey, & Lord, 2003)

Settings, Materials, and Implementer

All parents completed an online module and then received online individualized parent coaching sessions via WebEx in each participant's home by using their home computers, web-cameras, and internet connections. During intervention and maintenance phases, video recording took place in varied places in the home that were selected by the coach and parents based on the targeted behaviors, each family's routines, and the children's activities of interests. In addition, a communication application on the iPad (i.e., Proloquo2Go, AssistiveWare, 2017) was utilized for Dyad D for augmentative and alternative communication (AAC).

The parent coach was an advanced doctoral student in the special education program who held Master's degrees in early childhood education and special education and had approximately 7 years of experience working with individuals with ASD and their families. She received training in the implementation of the intervention components to complete a single-case experimental study before this study and was supervised by a Board Certified Behavior Analyst-Doctoral level to provide the coaching sessions to parent participants. The coach did not have any relationship to participants before the current study.

Design

Experimental control was demonstrated using a multiple-probe design across the four parent-child dyads for parent implementation of the multimodal communication intervention on children's improvement in communication behaviors (Horner & Baer, 1978; Kennedy, 2005). This design was selected because it controlled for threats to internal validity and was a best fit for the experimental research question and intervention (Horner

& Baer, 1978; Gast & Ledford, 2014). Phase change decisions were made based on the stability of baseline measures and the demonstration that the prior level's parent improved in the targeted intervention strategies (Gliner, Morgan, & Harmon, 2000). Each dyad began the intervention when they had a stable baseline with a need for behavior change. Dyad B, C, and D did not start the intervention phase until the prior dyad showed an increase in the target behaviors. Baseline, intervention, and maintenance phases were included in each level. Generalization data were collected across all three phases as well. See Figure 4.1 for procedures and measures.

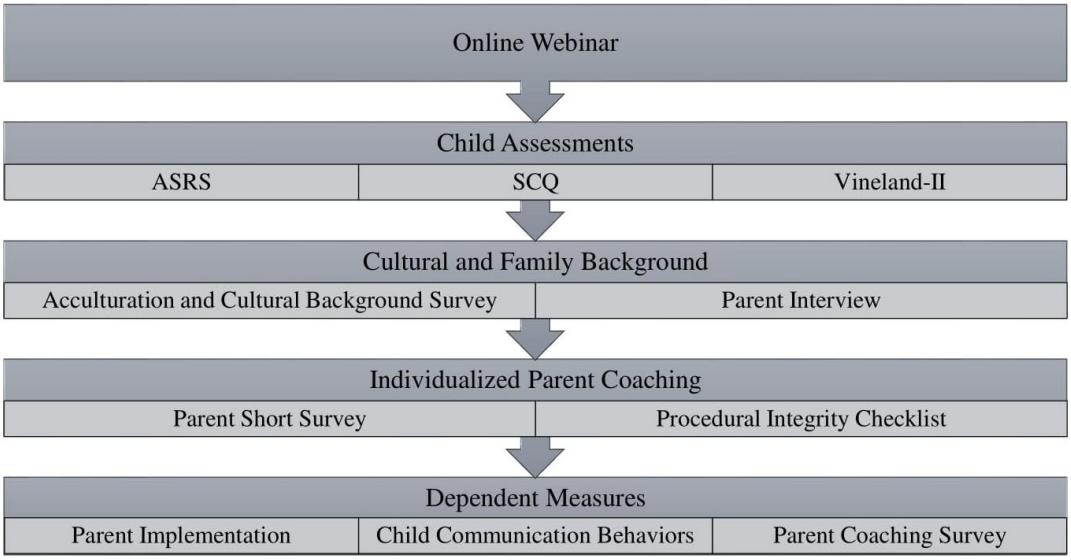


Figure 4. 1. Procedures and Measures

Dependent Measure

The dependent variables included both parent and child behaviors. Parent behaviors were operationally defined as the accurate implementation of the intervention components, including incentivizing communication, modeling, prompting, and expanding. The coach

chose the target behaviors for each parent participant based on their baseline data and their contexts of communication with their children. Incentivizing communication was targeted for all parents, as well as modeling for Yu and Mei, and prompting for Ming and Hsuan. In addition, child communicative behaviors were operationalized as child participants' performance of targeted communication behaviors, which included asking questions for Kun and Hung, comments for Kun, Hung, and Jing, answering questions for Jing, and making requests for Lung (See Table 4.3 for the operational behavioral definitions).

Table 4. 3

Operational Behavioral Definitions

Parent Behaviors	
Incentivizing Communication (All dyads)	• Preparing the natural environment for more opportunities or new items to teach communication. • Using rewards, providing social praise, or affirming the child's communication behaviors. • Communicative temptations or routine interruptions
Modeling (Dyad C and D)	Verbally or physically modeling communication.
Prompting (Dyad A and B)	Verbally, gesturally, or physically prompt or redirect to use the appropriate communication skill.
Expanding	Verbally or physically modeling new vocabulary, longer sentences or phrases, or conversational turns.
Child Behaviors	
Ask Questions (Dyad A and B)	The child asks context appropriate question and pause for about 2-3 seconds or long enough for the other person to speak.
Comments (Dyad A, B, and C)	• The child has spontaneous comment and pause for about 2-3 seconds or long enough for the other person to speak. • The child has context appropriate statement.
Answer Questions (Dyad C)	The child correctly answered yes/no questions.
Make Requests (Dyad D)	The child uses at least one word to make requests verbally or using AAC for the item he wants.

Procedures

Baseline Phase. Each parent was asked to have a conversation or play with their children as they normally would in the setting that they usually have conversations or play with their children. The coach did not teach or provide any instructions or feedback regarding performance to parent participants. Each parent was instructed to record baseline videos for at least 3.5 minutes. Three to seven baseline data points were collected from each dyad.

Intervention Phase. The online webinar and the individualized parent coaching sessions were provided to parents in the intervention phase. Based on the results of the child assessments, the Acculturation and Cultural Background Survey, and the parent

interview, the coach developed an intervention plan for each dyad and discussed with parents before the first parent coaching session. Parent received the 1-hour online module first to understand the basic information of communication, communicative functions, and specific strategies for teaching communication via lecture, scenario analysis, and practice activities.

Next, in the individualized parent coaching, parents were instructed to implement learned intervention components throughout the following week and to record a video of themselves implementing the intervention with their children for at least 3 minutes and 30 seconds before each weekly parent coaching meeting. The four intervention components targeted (Table 4.3) were incentivizing communication (i.e., natural environment preparation, reinforcement, communicative temptations, and routine interruptions), modeling (i.e., modeling communication skills), prompting (e.g., prompting or redirecting appropriate communication skills), and expanding (e.g., modeling new vocabulary or longer sentences). During each weekly parent coaching meeting, the coach provided written feedback regarding performance on the last video, delivered verbal feedback by watching the video, and explained graphs for the overall performance of each parent and child. Written instruction and feedback were provided by the coach based on each parent's preferred version of written Chinese in Traditional Chinese or Simplified Chinese. Verbal instructions about the written feedback and graph were provided in each parent participant's native language. The coach modeled skills and conducted role play with parents to practice how to correctly implement strategies as well. After each individualized parent coaching session, parent participants completed, the Parent Coaching Short Survey (Appendix H) was completed by each parent participant once after each individualized

parent coaching session for the coach to understand the parents' acceptance and understanding of the intervention components and alignment of session contents and discussion to the family's cultural background, family routines, and parents' priorities of the child's communication behaviors. Results of the short survey allowed the coach to revise the ways and examples used to explain the intervention components for subsequent coaching sessions. Twelve intervention data points were collected from each dyad.

Maintenance Phase. The maintenance phase followed the same procedure as the intervention phase. Based on each family's schedule, three maintenance sessions were conducted for each dyad in at least 2, 4, and 6 weeks after the final intervention session.

Generalization Phase. Generalization probes were conducted at each participant's home across the baseline, intervention, and maintenance phases. All parents were instructed to have a conversation or play games with the child as they usually do in another setting or other activities and record generalization videos for at least 3.5 minutes. The coach did not provide further feedback on participants' generalization performance. Generalization data points were collected on 37.5% of the baseline data, on 25% of the intervention data, and for 33% of the maintenance data.

Data Analysis

Visual analysis, effect size calculations, and correlations were used for data analysis. Regarding the visual analysis, parent implementation of the intervention components and child communicative behaviors were evaluated on level, trend, and variability across all participants and phases (Byun, Hitchcock, & Ferron, 2017; Gliner, Morgan, & Harmon, 2000). Two outside reviewers who were both BCBA-Ds, blind to the current study, and demonstrated no conflict of interest were asked to complete an

anonymous google survey to evaluate the result figures for visual analysis. They first evaluated whether three demonstrations of effect were present between baseline and intervention considering level, immediacy, trend and variability. Reviewers then determined whether data demonstrated a functional relation.

In addition, Tau-U scores in effect size calculations were assessed by using an online single-case research program (Vannest, Parker, Gonen, & Adiguzel, 2016) for the degree of effects between baseline and intervention phases on parent and children target behaviors. The interpretation of Tau-U values included 0.93 to1.00 for large effects, 0.80 to 0.92 for medium effects, 0.65 to 0.79 for small effects, and smaller than 0.64 for very small to no effects, as benchmarked across AAC interventions (Ganz et al., 2017). For correlations, Pearson's correlation coefficient in Stata® (StataCorp, 2017) was used to determine correlations between parent implementation of the intervention components and child's communication behaviors. The interpretation of the correlation strength included 0.00 - 0.19 for very weak, 0.20 - 0.39 for weak, 0.40 - 0.59 for moderate, 0.60 - 0.79 for strong, and 0.80 - 1.0 for very strong (Evans, 1996).

Reliability

The coach served as the primary data collector throughout the study to allow for timely feedback to the parents. Two trained independent raters, a doctoral student in special education and a Master's student from the applied behavior analysis certificate program, recorded reliability data from videotaped recordings on the dependent variables for at least 20% of sessions distributed across each condition of the study. Before independent coding, both raters received a coding training provided by the coach to understand operational behavioral definitions, watch one video of each phase for each

participant, and discussed the coding results. Retraining was provided if the percentage of agreement was lower than 80%. Inter-observer agreement (IOA) was collected on 32% of the baseline data (33% from Dyad A, Dyad B, and from Dyad C, 29% from Dyad D), on 33% of the intervention data from each dyad), and on 33% of the maintenance data (33% from each dyad). Percent agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements, then multiplying by 100. Average percent agreement of parent implementation accumulated across all parent participants was 89% - 97%. For target communication behaviors in children, average percent agreement cumulated across all child participants was 93% - 97%. See Table 4.4 for session coded, average percent agreement, and ranges for each dependent measure.

Table 4. 4

Sessions Coded and Average Percent Agreement for Reliability

		Triad A	Dyad B	Dyad C	Dyad D
% of Sessions Coded in Each Phase	Baseline	33%	33%	33%	29%
	Intervention	33%	33%	33%	33%
	Maintenance	33%	33%	33%	33%
Parent Behavior	Incentivizing Communication	94% (Range =83-100)	92% (Range =89-100)	89% (Range =83-100)	92% (Range =83-94)
	Model	N/A	N/A	90% (Range =83-100)	91% (Range =83-94)
	Prompt	97% (Range =94-100)	92% (Range =83-100)	N/A	N/A
Child Behavior	Ask Questions	97% (Range =94-100)	93% (Range =83-100)	N/A	N/A
	Comments	96% (Range=89-100)	94% (Range=89-100)	97% (Range=83-100)	N/A
	Answer Questions	N/A	N/A	95% (Range =89-100)	N/A
	Make Request	N/A	N/A	N/A	96% (Range=83-100)

Procedural Integrity

Two independent observers evaluated if the coach conducted individual parent coaching correctly by following the procedural integrity checklists that included specific steps for the baseline, intervention, and maintenance phases for each dyad (see Appendices J and K). For example, observers watched videos recorded in the baseline phase and evaluated whether the coach taught or provided any instructions or feedback regarding performance to caregivers. Procedural integrity data were collected for 23% of baseline sessions, 25% of intervention sessions, and 33% of maintenance sessions. Also, IOA data were collected in procedural integrity as well. IOA data collection on procedural integrity were for the same percentage of the procedural integrity data points collected. The mean procedural integrity score and the IOA on procedural integrity score across all participants and phases were 100%.

Social Validity

Two surveys were developed and conducted to evaluate social validity. As mentioned, after each individualized parent coaching session, the Parent Coaching Short Survey (Appendix H) was completed by the parent to understand the parent's acceptance of culturally responsive parent coaching and understanding of the intervention components. Parents also completed the Parent Coaching Survey (Appendix I) adapted from the Treatment Evaluation Inventory Short Form (TEI-SF; Kelley, Heffer, Gresham, & Elliott, 1989) and Parent Satisfaction Survey (Washburn, 2012). The online survey was sent to parents to complete and return anonymously at the completion of individualized parent coaching to evaluate parents' acceptability and satisfaction with the parent coaching.

Results

Parent Implementation of Intervention Components

Results for parent implementation of intervention components are shown in Figure 4.2. All parent participants were able to learn the target intervention components. A functional relation between culturally responsive parent coaching and parent implementation of intervention components was found via visual analysis of the data. Additionally, visual analysis conducted by both the author and the blind reviewers reliably demonstrated a functional effect of the multi-component intervention, as well as a functional relation.

Dyad A. Target behaviors for Ming focused on increasing implementation of the incentivizing communication and prompting components. Compared with the baseline phase, the percentage of intervals engaged in the intervention components showed an

increasing trend and a higher level, with a range of 33–78% in the intervention and maintenance phases. Regarding incentivizing communication, visual analysis of the graphs revealed an increase in the level of the percentage of intervals engaged in incentivizing communication. Ming used few incentivizing communication strategies, with a decreasing trend in the baseline phase. The trend was increasing in the intervention phase and remained constant in the maintenance phase. Regarding prompting, Ming used few prompting strategies in the baseline phase. The trend of intervals engaged in prompting slightly increased in the intervention phase with little variability, and there was an increase at the end of the intervention phase and in the maintenance phase. Ming's generalization data demonstrated low levels in the baseline phase but an increase in the intervention and maintenance phases.

Dyad B. Target behaviors for Hsuan focused on increasing implementation of the incentivizing communication and prompting strategies. In comparison to the baseline phase, the percentage of intervals engaged in the intervention components increased in both level and trend during the intervention and maintenance phases, with a range of 28–94%. Furthermore, the level of Hsuan's use of incentivizing communication showed low rates, with a slightly decreasing trend in the baseline phase. Data in the intervention and maintenance phases showed an increasing trend, with low variability. In addition, Hsuan used a few prompting strategies in the baseline phase. The trend was increasing, with low variability, in the intervention and maintenance phases. Hsuan's generalization data showed low levels in the baseline phase but an increase in the intervention and maintenance phases as well.

Dyad C. Target behaviors for Yu focused on increasing implementation of incentivizing communication and modeling. The percentage of intervals engaged in the intervention components increased in level and trend during the intervention and maintenance phases, with a range of 50–94% compared with the baseline phase. The level of data of incentivizing communication showed moderate rates and a decreasing trend in the baseline phase. Data in the intervention phase showed an increased level, an increasing trend, and moderator variability. The high level of incentivizing communication remained constant in the maintenance phase. Regarding modeling, Yu used few modeling strategies in the baseline phase, with the level and trend subsequently increasing in the intervention phase. At the last intervention session and in the maintenance phase, Yu's use of modeling was decreased because of fading. Generalization data demonstrated low levels in the baseline phase, with an increase in the intervention and maintenance phases.

Dyad D. Target behaviors for Mei focused on increasing implementation of the incentivizing communication and modeling as well. Compared with the baseline phase, the percentage of intervals engaged in the intervention components showed an increasing trend and higher level with a range of 33– 100% in the intervention and maintenance phases. Regarding incentivizing communication, Mei had a low rate of incentivizing communication strategies in the baseline phase. The trend was acutely increased in the intervention phase and remained constant in the maintenance phase. Also, Mei used a few modeling strategies in the baseline phase. The trend of intervals engaged in prompting increased in the intervention phase, with moderate variability. Data in the maintenance phase demonstrated an increase in level and trend, with moderate variability. Her generalization data showed low levels in the baseline phase and an increase in intervention and maintenance phases.

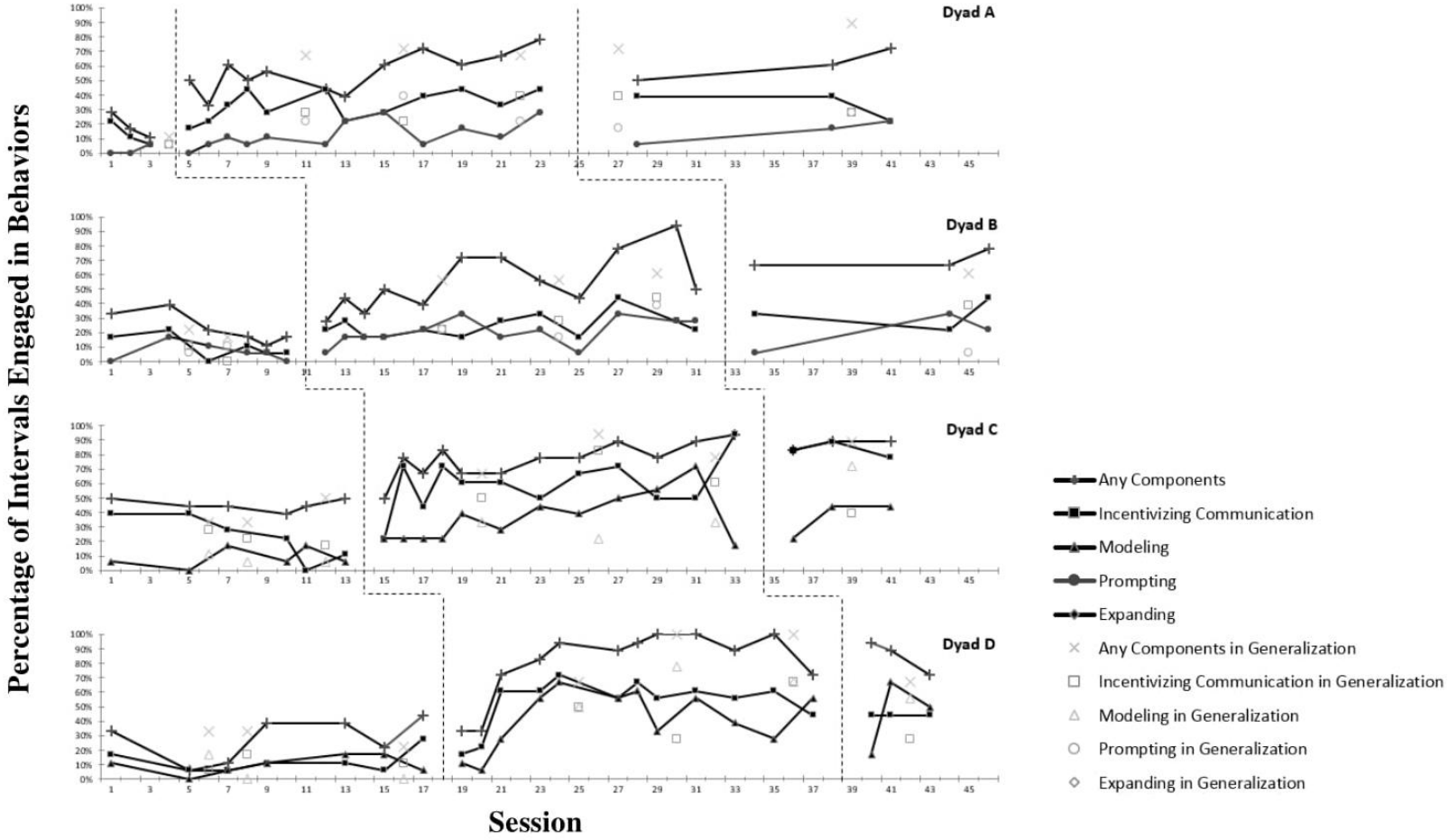


Figure 4. 2. Parent Implementation of Intervention Components

Effect Size Calculation. Effect sizes were calculated for the use of each intervention component by parents. Parent implementation showed a medium effect of 0.881 in communication incentives, a small effect of 0.759 in modeling, and very small effects of 0.633 in prompting and 0.108 in expanding. Further, there were statistically significant differences in incentivizing communication, modeling, and prompting. The effect on incentivizing communication was stronger than the effects on modeling, prompting, and expanding (See Table 4.5).

Table 4. 5

Effect Sizes for Intervention Component Use in Parents and Target Behaviors in Children

Omnibus Effects	**Tau-U**	***p*-value**	**CI 90%**
		Parents	
Incentivizing Communication	0.881	0.000	0.620 - 1.000
Modeling	0.759	0.000	0.497 - 1.000
Prompting	0.633	0.000	0.371 - 0.894
Expanding	0.108	0.498	-0.154 - 0.369
		Children	
Dyad A	0.611	0.006	0.246 - 0.977
Dyad B	0.824	0.000	0.542 - 1.000
Dyad C	0.667	0.000	0.385 - 0.948
Dyad D	0.810	0.000	0.482 - 1.000

Child Communicative Behaviors

Results for child outcomes are shown in Figure 4.3. Visual analysis reviewed by the author and the blind reviewers revealed that all child participants had an increase in target communicative behaviors. Visual inspection of the data indicated that an apparent correlation between parent implementation of the intervention components and children's communicative behaviors. Because the child behaviors were distal measures, a

correlational analysis was conducted, and no determination of the presence of a functional relation is provided.

Dyad A. Kun's target behaviors were to improve on asking questions and making comments. In the baseline phase, the percentage of intervals engaged in prompted question asking and comments were at low levels, with a flat trend and low variability. Data in the intervention and maintenance phases gradually increased in trend and level with moderate variability. His independent use of questions and comments showed a low level, flat trend, and low variability in the baseline phase, gradually increasing in trend and level, with moderate variability in the range of 17–78% in the intervention and maintenance phases. His generalization data for prompted or independent target behaviors demonstrated a low level in the baseline phase but an increase in the intervention and maintenance phases.

Dyad B. Target behaviors for Hung were to improve on asking questions and making comments. Hung's prompted communicative behaviors were at low levels, with a flat trend and moderate variability, in the baseline phase. However, in the intervention and maintenance phases, data on prompted target behaviors were at a high rate, with a flat trend, and moderate variability. His independent use of questions and comments showed at low levels, with a flat trend and low variability, in the baseline phase, but increased to a moderate rate, with moderate variability in the range of 39–94% in the intervention and maintenance phases. His data on prompted and independent use of target behaviors in the generalization phase demonstrated a low level in the baseline phase and increased to a moderate rate during the intervention and maintenance phases.

Dyad C. Target behaviors for Jing were to improve on answering questions and making spontaneous comments. Her prompted target communication behaviors showed

medium levels, with a decreasing trend and moderate variability, in the baseline phase. Data on prompted target behaviors were at a moderate rate, with a flat trend and low variability, in the intervention and maintenance phases. Her independent answering of questions and making spontaneous comments were at a medium level, with a decreasing trend and moderate variability, in the baseline phase. Data in the intervention and maintenance phases gradually increased at a moderate rate, with a moderate variability in the range of 17–72%. During the generalization context, Jing demonstrated the use of either prompted or independent communicative behaviors at medium levels and with an increasing trend in the baseline and intervention phases, as well as a high level during the maintenance phase.

Dyad D. Target behaviors for Lung were to improve on making requests. Lung's prompted communicative behaviors were at low levels, with a flat trend and moderate variability. During the intervention and maintenance phases, his data on prompted request making increased at a high rate, with high variability. In generalization, Lung showed prompted request making at a low level in the baseline phase and at moderate to high levels in the intervention and maintenance phases. Regarding his independent request making, his data were at low levels, with a flat trend and a low amount of variability, in the range of 6–67% in the baseline phase. Data in the intervention and maintenance phases increased at a moderate rate, with moderate variability, in making requests independently. Lung’s generalization data demonstrated request making at a low level in the baseline phase and at moderate levels in the intervention and maintenance phases.

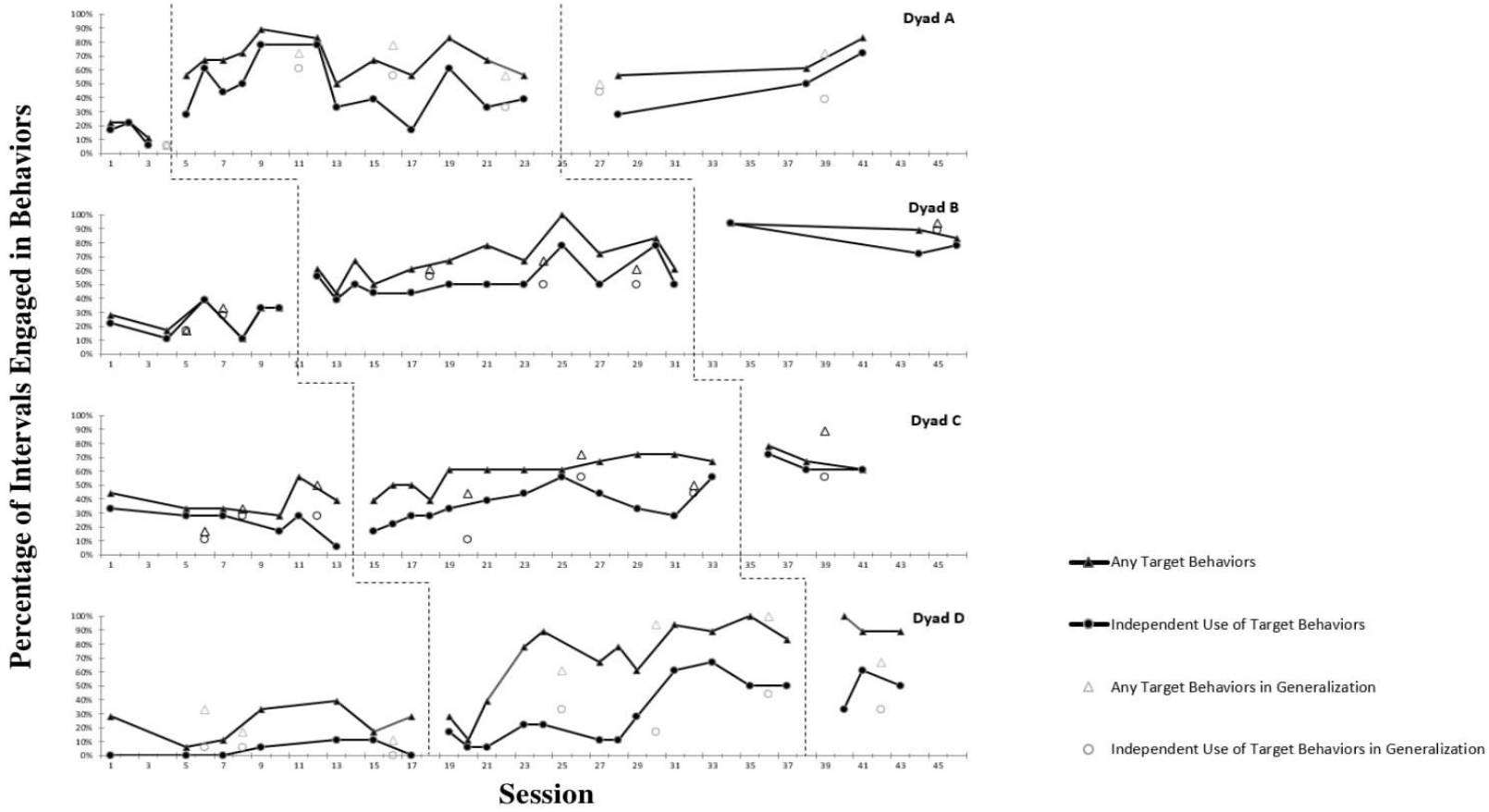


Figure 4. 3. Child Communicative Behaviors

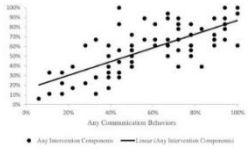
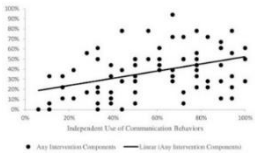
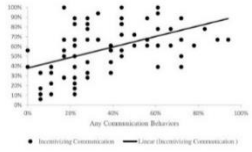
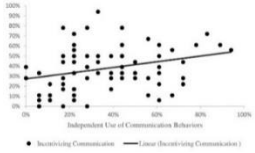
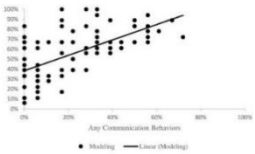
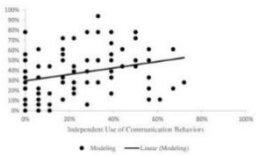
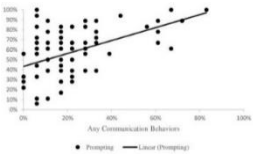
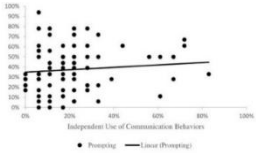
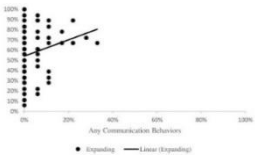
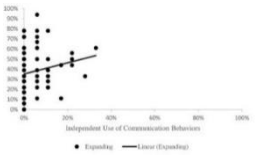
Effect Size Calculation. Effect sizes were calculated for the target communicative behaviors in each child participant. Results showed statistically significant differences between baseline and intervention phases for child target communication across all child participants. Child target communication behaviors demonstrated medium effects of 0.824 in Dyad B and 0.810 in Dyad D, a small effect of 0.667 in Dyad C, and a very small effect of 0.611 in Dyad A (See Table 4.5).

Correlations between Parent Implementation and the Children's Communication Behaviors

Correlations between parent implementation of the intervention components and children's communication behaviors were evaluated. Positive, statistically significant correlations were found between all parent implementation of intervention components and children's communicative behaviors except for the correlations between parent use of promoting and expanding and child use of independent target behaviors (See Table 4.6).

Table 4. 6

Pearson's Correlations between Parent Implementation and Child Target Behaviors

	Children's Use of Any Target Behaviors	Children's Use of Independent Target Behaviors
Any components		
	r = 0.731*** (Strong Correlation)	*r* = 0.399*** (Weak Correlation)
Incentivizing Communication		
	r = 0.491*** (Moderate Correlation)	*r* = 0.281* (Weak Correlation)
Modeling		
	r = 0.620*** (Strong Correlation)	*r* = 0.279* (Weak Correlation)
Prompting		
	r = 0.495*** (Moderate Correlation)	*r* = 0.099 (Very Weak Correlation)
Expanding		
	r = 0.229* (Weak Correlation)	*r* = 0.173 (Very Weak Correlation)

Social Validity

Two parent surveys were conducted to evaluate all parent participants' acceptability and satisfaction with parent coaching. Parents completed the Parent Coaching

Short Survey (Appendix H) once after each individualized parent coaching session. The results showed an average score of 4.94 out of 5.00 for the individualized parent coaching. The parent participants chose "strongly agree" or "agree" to the survey questions and spent an average of 4.8 hours weekly using learned skills/strategies with their children (Table 4.7). In addition, parents completed the Parent Coaching Survey (Appendix I) when they completed all individual parent coaching sessions. The results show an average score of 4.82 out of 5.00 for the parent coaching. The average of each question is higher than 4, which means that the parent participants chose “strongly agree” or “agree” to these survey questions (Table 4.8). Also, three of the four parents chose that they would like to continue the parent coaching in the survey. Parents mentioned that they like most on “modeling skills” and “specific target on child’s problem” during parent coaching, as well as narrative comments like “the coach is patient and helpful,” “very practical,” and “very good training” in the survey.

Table 4. 7

Results of Parent Coaching Short Survey

Question	Mean
The content and discussion in this parent-coaching session were suitable for my family and cultural background.	4.90
The content and discussion in this parent-coaching session were related to my family routines.	4.90
The content and discussion in this parent-coaching session were based on my priorities for my child's communication.	4.94
The strategies/skills I learned in this coaching session were easy to use at home with my child.	4.98
I understood the content, feedback, and discussion in this parent coaching session.	4.98

Table 4. 8

Results of Parent Coaching Survey

Question	Mean
The information/knowledge I learned from the webinar was easy to understand.	5.00
I feel the length of the webinar sessions (2 hours) was enough to learn about the basic information and	4.75
The strategies/skills I learned in this project were easy to use at home with my child.	5.00
I have received sufficient guidance, feedback, and suggestions on each strategy from my therapist.	5.00
The strategies/skills I learned in this project helped me to interact better with my child.	4.75
I find the procedures and the treatment used in this project to be an acceptable way of improving my child's communication skills.	4.75
I believe it would be acceptable to use the treatment with individuals who cannot choose treatments for themselves.	4.75
I will be willing to continue to use these strategies/skills if I want to improve his/her communication skills	4.75
I feel the length of the individual training sessions (1 hour) was enough to learn about and practice the strategies.	4.75
I feel the total sessions I received were enough to learn about, practice, and receive feedback on the use of the strategies.	4.75
Overall, I have received good opportunities and experience to learn about different strategies/skills to work with my child through this project.	4.75
Overall, I feel using these strategies/skills I learned in this project had a positive impact and improvement on my child’s and my behaviors.	4.75
Overall, I have a positive reaction to this project.	5.00

Discussion

Overall results showed a functional relation in the demonstrations of effects in the culturally responsive parent coaching. The children's communication behaviors were improved with the increase in parent implementation of the multimodal communication intervention components. Through culturally responsive parent coaching, all four parents learned the strategies for accurately implementing intervention components, resulting in increases in the communicative behaviors of their children with ASD. In addition, the culturally responsive parent coaching on the multimodal communication protocol was acceptable to all parent participants. The parent survey indicated that parents felt the parent coaching and learned strategies easy to understand and implement, felt that learned strategies were beneficial for their children, and were willing to use these strategies in the future.

The results support the findings of the previous studies (Elder, Valcante, Won, & Zylis, 2003; Powell, Zambrana, & Silva-Palacios, 1990) by indicating that culturally responsive parent coaching that gives consideration to family and cultural factors can improve parents' abilities to correctly implement interventions for the improvement of children's outcomes. During individualized parent coaching, parent participants indicated that they felt more comfortable and found the contents of parent coaching easier to understand by using their native language, as well as having an improved understanding of the intervention plan and the examples developed based on their cultural and family backgrounds.

Parent implementation of the intervention components was correlated with improvements in the children's communicative behaviors. Parent implementation of

intervention components showed weak to strong correlations with children's prompted communication behaviors, as well as very weak to weak correlations with children's prompted communication behaviors. Although it is clear that parents' modeling and prompting results in a stronger effect on children's prompted communication behaviors than on their independent communication behaviors, it is not clear why incentivizing communication had the same results. All child participants, however, had increases in the target communicative behaviors in the intervention and maintenance phases. Specifically, Kun and Hung showed increases in the number and types of questions and comments. Yu also reported that Jing was able to correctly answer yes/no questions in different activities 5 months after the last maintenance sessions.

This study expanded research about parent implementation of intervention components and considering cultural factors in parent training to improve the use of multimodal communication for children with ASD. The coach included the four components of culturally responsive teaching (i.e., native language, history and cultures, family involvement, and community culture; Cartledge & Kourea, 2008; Gay, 2000, 2002) to develop culturally responsive parent coaching in the current study. Before the intervention, the coach conducted the assessments and parent interviews to evaluate each family's acculturation and cultural background, communication styles between parents and children, and autism-related attitudes and beliefs of family members and their cultural groups. Based on the information provided by each parent, the coach developed a plan for each family and conducted the parent coaching short survey immediately after each parent coaching session to understand if the content and discussion in the parent-coaching session were suitable for their cultural background. Additionally, all parent interview and coaching

sessions were conducted in the parents' native language (i.e., Chinese). The results of social validity in the current study showed high parent satisfaction. After all parent coaching sessions, parent participants mentioned that they were willing to continue to use learned strategies to improve their children's communication skills and would like to continue the parent coaching. These results support the research finding that CLD parents show high acceptability and satisfaction and demonstrate a willingness to continue using learned strategies with their children with ASD when culturally appropriate interventions are provided by professionals (Cheremshynski, et al., 2012). Furthermore, with the increase of parent implementation of the intervention components, the children's communication behaviors may be improved. For example, 4 months after the final maintenance sessions, the coach observed that Lung was able to make requests via speech and AAC. He was able to say the word "water" instead of "wawa" to ask for water. His mother told the coach that she continued using all learned strategies for Lung's various communication behaviors after the parent coaching.

There are some limitations to the current study. First, the sample size was small. Second, since the coach's native language is Chinese, the current study included only native Chinese-speaking parents. Third, parent participants mentioned that they enjoyed culturally responsive parent coaching but are not able to continue culturally and linguistically appropriate support from other professionals and service providers after the current study.

Based on the research limitations, future research might include more participants to further evaluate the effects of culturally responsive parent coaching. Also, future research might expand generalization across different contexts, cultures, and languages.

Finally, more research methods might be developed to evaluate how cultural factors affect parent coaching. Since culturally responsive approaches in parent coaching is an area requiring further investigation, further studies on culturally responsive parent coaching for children with ASD as well as other disabilities are required.

References

Andrews, M.M., & Boyle, J.S. (2016). *Transcultural concepts in nursing care.* Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins

Anthony, P. J., Banks-Joseph, S. R. (2010). Indian families in the U.S. who have children with disabilities: Implications for inclusive and culturally responsive practices. *Multiple Voices for Ethnically Diverse Exceptional Learners, 12*(2), 21-32.

AssistiveWare. (2017). Proloquo2Go (Version 5.1) [Mobile application software]. Retrieved from: http://download.assistiveware.com/proloquo2go/helpfiles/5.1/en/assets/Proloquo2Go%20Manual.pdf

Banerjee, R., & Guiberson, M. (2012). Evaluating young children from culturally and linguistically diverse backgrounds for special education services. *Young Exceptional Children, 15*, 32-44. doi: 10.1177/1096250611435368

Bagnato, S.J., & Neisworth, J.T. (1991). *Assessment for early intervention: Best practices for professionals*. NY: Guilford.

Cartledge, G., & Kourea, L. (2008). Culturally responsive classrooms for culturally diverse students with and at risk for disabilities. *Exceptional Children, 74*(3), 351-371.

Cheng, L. L. (1991). *Assessing Asian language performance: Guidelines for assessing LEP students* (2nd ed.). Oceanside, CA: Academic Communication Associates.

Cheremshynski, C., Lucyshyn, J. M., & Olson, D. L. (2012). Implementation of a culturally appropriate positive behavior support plan with a Japanese mother of a child with autism: An experimental and qualitative analysis. *Journal of Positive Behavior Interventions,15,* 242-253.

Dennis, R. E., & Giangreco, M. F. (1996). Creating conversation: Reflections on cultural sensitivity in family interviewing. *Exceptional Children, 63*(1), 103-116.

Elder, J. H., Valcante, G., Won, D., & Zylis, R. (2003). Effects of in-home training for culturally diverse fathers of children with autism. *Issues in Mental Health Nursing, 24*, 273-295.

Estrem, T. L., & Zhang, S. (2010). Prevalence and disproportionality of autism spectrum disorders among English language learners in Minnesota. *Multiple Voices for Ethnically Diverse Exceptional Learners, 12*, 5-20.

Evans, J. D. (1996). *Straightforward statistics for the behavioral sciences*. Pacific Grove, CA: Brooks/Cole Publishing.

Gast, D. L., & Ledford, J. R. (Eds.). (2014). *Single case research methodology: Applications in special education and behavioral sciences*, 2nd ed. New York, NY, US: Routledge/Taylor & Francis Group.

Gay, G. (2000). *Culturally responsive teaching: Theory, research, and practice*. New York: Teachers College Press.

Gay, G. (2002). Culturally responsive teaching in special education for ethnically diverse students: Setting the stage. *International Journal of Qualitative Studies in Education (QSE), 15*(6), 613-629. doi: 10.1080/0951839022000014349

Gliner, J. A., Morgan, G. A., & Harmon, R. J. (2000). Single-subject designs. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*, 1327–1329.

Goldstein, S., & Naglieri, J. A. (2009). *Autism spectrum rating scales: ASRS*. North Tonawanda, NY: Multi-Health Systems, Inc.

Goodwin, A. L., King, S. H. (2002). *Culturally responsive parental involvement: Concrete understandings and basic strategies.* Washington, DC: AACTE.

Hetzroni, O. E., & Harris, O. L. (1995). Cultural aspects in the development of AAC users. *Augmentative and Alternative Communication, 12*, 52-58.

Horner, R. D., & Baer, D. M. (1978). Multiple probe technique: A variation of the multiple baseline. *Journal of Applied Behavior Analysis, 11*, 189-196.

Javier, R. A. (2007). *The bilingual mind: Thinking, feeling, and speaking in two languages*. New York; London: Springer.

Kelley, M. L., Heffer, R. W., Gresham, F. M., & Elliott, S. N. (1989). Development of a modified treatment evaluation inventory. *Journal of Psychopathology and Behavioral Assessment, 11*(3), 235-247.

Kennedy, C. H. (2005). *Single-case designs for educational research.* Boston, MA: Pearson/Allyn & Bacon.

Klingner, J., & Soltero-Gonzalez, L. (2009). Culturally and linguistically responsive literacy instruction for English language learners with learning disabilities. *Multiple Voices for Ethnically Diverse Exceptional Learners, 12*(1), 4-20.

Klingner, J., Moore, B., Davidson, A. O., Boelé, A., Boardman, A., Figueroa, R., Annamma, S. A., & Sager, N. (2015). Cultural and linguistic diversity in special education. In B. Bateman, J. W. Lloyd & M. Tankersley (Eds.), *Enduring issues in* special education*: Personal perspectives* (pp. 110–131). New York, NY: Routledge.

Ladson-Billings, G. (2007). Culturally responsive teaching: Theory and practice. In J. A. Banks & C. A. McGee Banks (Ed.), *Multicultural education: Issues and perspectives* (6th ed., pp. 221-245). Hoboken, NJ: John Wiley & Sons.

Lo, L. (2008). Expectations of Chinese families of children with disabilities towards American schools. *School Community Journal*, *18*(2), 73-90.

McLeod, S. (2012). Translation to practice: Creating sampling tools to assess multilingual children's speech. In S. McLeod & B. A. Goldstein (Eds.), *Multilingual aspects of speech sound disorders in children* (pp. 144-153). Bristol, United Kingdom: Multilingual Matters.

Parette, H. P., & Marr, D. D. (1997). Assisting children and families who use augmentative and alternative communication (AAC) devices: Best practices for school psychologists. *Psychology in the Schools, 34*, 337-346.

Preece, D. & Trajkovski, V. (2017). Parent education in autism spectrum disorder - A review of the literature. *Croatian Review of Rehabilitation Research, 53*(1), 128-138.

Powell, D., Zambrana, R. E., & Silva-Palacios, V. (1990). Designing culturally responsive parent programs: A comparison of low-income Mexican and Mexican-American mothers' preferences. *Family Relations, 39*, 298-304.

Rutter, M., Bailey, A., & Lord, C. (2003). *The social communication questionnaire: Manual*. Los Angeles, CA: Western Psychological Services.

Rosenberg, M. S., Boyer, K. L., Sindelar, P. T., & Misra, S. K. (2007). Alternative route programs for certification in special education: Program infrastructure instructional delivery, and participant characteristics. *Exceptional Children, 73*(2), 224-241.

Salend, S. J. & Garrick Duhaney, L. M. (2005). Understanding and addressing the disproportionate representation of students of color in special education. *Intervention in School and Clinic, 40*(4), 213-221.

Salend, S. J., & Taylor, L. S. (2002). Cultural perspectives: Missing pieces in the functional assessment process. *Intervention in School and Clinic, 38*(2), 104-112.

Schon, J., Shaftel, J., Markham, P. (2008). Contemporary issues in the assessment of culturally and linguistically diverse learners. *Journal of Applied School Psychology, 24*(2), 163–189.

Smith, S., O'Grady, L., Cubillo, C., & Cavanagh, S. (2017). Using culturally appropriate approaches to the development of KidsMatter resources to support the social and emotional wellbeing of Aboriginal children, *Australian Psychologist, 52*(4), 299-305.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (2005). *Vineland-II adaptive behavior scales*. Circle Pines, MN: AGS Publishing.

Spradley, J. P. (1979). *The Ethnographic Interview.* New York: Harcourt Brace Jovanovich College Publishers.

Stephenson M. (2000). Development and validation of the Stephenson Multigroup Acculturation Scale (SMAS), *Psychological Assessment 12*(1), 77-88.

Sullivan, A.L. (2011). Disproportionality in special education identification and placement of English language learners. *Exceptional Children, 77*(3), 317-334.

Thomas, W., & Collier, V. (2002). *A national study of school effectiveness for language minority students' long-term academic achievement.* Retrieved April 1, 2018, from http://escholarship.org/uc/crede_finalrpts

Travis, J., & Geiger, M. (2010). The effectiveness of the picture exchange communication system (PECS) for children with autism spectrum disorder (ASD): A south African pilot study. *Child Language Teaching and Therapy, 26*(1), 39-59.

Utley, C. A., Obiakor, F. E., & Bakken, J. P. (2011). Culturally responsive practices for culturally and linguistically diverse students with learning disabilities. *Learning Disabilities: A Contemporary Journal, 9*(1), 5-18.

Valdés, G., & Figueroa, R.A. (1994). *Bilingualism and testing: A special case of bias*. Norwood, N.J.: Ablex.

Vannest, K. J., Parker, R. I., Gonen, O., & Adiguzel, T. (2016). *Single case research: Web-based calculators for SCR analysis.* (Version 2.0) [Web-based application]. College Station, TX: Texas A&M University. Available from: www.singlecaseresearch.org

Waitoller, F. R., Artiles, A. J., & Cheney, D. A. (2010). The miner's canary: A review of overrepresentation research and explanations. *Journal of Special Education, 44*(1), 29-49.

Washburn, J. (2012). *Parent evaluation of a parent training program of positive behavior interventions*. Retrieved from: https://digitalcommons.usu.edu/gradreports/148/

Wei, X., Wagner, M., Christiano, E. R. A., Shattuck, P., & Yu, J. W. (2014). Special education services received by students with autism spectrum disorders from preschool through high school, *The Journal of Special Education, 48*(3), 167-179.

Yang, S.L., Hsiao, Y.J., & Hsiao, H.C. (2014). Culturally responsive teaching with new Taiwanese children: Interviews with class teachers in elementary schools. *Asia Pacific Journal of Education, 34*(3), 288-304.

CHAPTER V

SUMMARY AND CONCLUSIONS

This dissertation aimed to determine cultural and family factors on caregiver involvement in communication intervention for individuals with autism spectrum disorder (ASD) and intellectual/developmental disabilities (IDD) through a meta-analytic review, a systematic review, and single-case research. The first study reported the results of a meta-analysis of single-case research across cultures on family involvement in communication skills for individuals with ASD and IDD. The second study summarized and reported the characteristics of caregiver involvement in communication interventions for culturally and linguistically diverse (CLD) families with children with ASD and IDD. The third study reported the results of a single-case experimental design study that was conducted to evaluate the effects of culturally responsive parent coaching in the use of a multimodal communication protocol for CLD parents of children with ASD.

The first study was a meta-analysis to determine the effects of caregiver involvement for promoting communication skills of children with ASD and IDD. The purpose of the meta-analysis was to address the overall effects of caregiver involvement for promoting communication skills of children with ASD and IDD and determine if these effects differ by child age, settings, delivery formats, and dosages of services provided to caregivers. After analyzing 43 single-case experimental design studies with 170 AB contrasts across 149 caregiver-child dyads/triads, the results of Tau-U analyses (Parker et al., 2011) indicated that the overall effect size for family involvement showed a low effect on child communicative outcomes. Also, there were statistically significant differences in child communication outcomes between the different dosage groups. Caregivers receiving

either 1-3 sessions, 4-6 sessions, or 7-9 sessions produced higher children communication outcomes than caregivers receiving services for more than 10 sessions.

The second study was a systematic review to summarize the characteristics of caregiver involvement in communication interventions for CLD families with children with ASD and IDD. The review was conducted to understand the participant characteristics, the intervention characteristics, and the outcomes of caregiver involvement in communication outcomes for CLD families with children with ASD and IDD. A total of 14 single-case studies with 24 CLD caregiver-child dyads were reviewed in this review, including 12 multiple baseline design studies and 2 multiple probe design studies. One study was published in Chinese, and others were published in English. The summaries of these studies suggested that caregiver involvement can be a method to improve communication behavior in CLD families with individuals with ASD and IDD. Although all included studies involved family involvement and CLD families, only one study provided linguistically appropriate support to caregiver participants during parent training.

The third study employed a single-case, multiple-probe design across four CLD parent-child dyads to evaluate the effects of a culturally responsive parent coaching on multimodal communication protocol for CLD parents of children with ASD. The research was to investigate (a) if there was a functional relation between culturally responsive parent coaching and parents' implementation of multimodal communication intervention; (b) if the improvement of the children's communication behaviors were concurrent with an increase in parent implementation of the multimodal communication intervention components; and (c) if the culturally responsive parent coaching on multimodal communication protocol was acceptable to CLD parents. By using visual analysis, effect

sizes, and correlations, the results showed that (a) there was a functional relation in the demonstration of effects of the culturally responsive parent coaching; and (b) the children's communication behaviors were improved with the increase in parent implementation of the multimodal communication intervention components. Also, the results of the parent survey indicated that culturally responsive parent coaching on the multimodal communication protocol was acceptable to all parent participants.

Implicates for Practice

Several implications for practice were revealed from the results of these studies. First, family involvement produced positive results in children's communication outcomes of individuals with ASD and IDD. The statistically significant difference was not found only between the subgroups of child age, setting, and delivery format besides dosage moderator. These results suggest that family involvement is an effective method to improve communication skills in children with ASD and IDD across different age ranges. Second, although CLD caregivers' implementation of learned strategies showed positive outcomes, communication outcomes were varied in children with ASD and IDD. There is a need to consider culturally and linguistically appropriate support for CLD families of children with ASD and IDD. Third, the results of the single-case study revealed that culturally and linguistically parent coaching support parent implementation and children's communication outcomes. With culturally responsive parent coaching, CLD parents are willing to implement learned strategies with their children with ASD and IDD across different contexts after coaching sessions.

Limitations

There are some limitations of the meta-analysis. First, the review included only single case research. Second, this review focused more on intervention characteristics provided to caregivers rather than the characteristics of caregivers. Third, it was difficult to determine how cultural factors affected family involvement due to limited included studies published in Asia, therefore preventing adequate comparisons or evaluations of that literature.

Regarding the limitations to the systematic review about caregiver involvement with CLD caregivers who have children with ASD and IDD, limited CLD participants were included in the review. Further, it was difficult to summarize the characteristics of services provided to CLD caregivers and identify how cultural factors affect parent and children outcomes due to a lack of details on service provision by the authors of the included studies.

In the single-case study, one of the limitations was the small sample size. Another limitation was that the study included only native Chinese-speaking parents because the coach's native language was Chinese. In addition, beyond the culturally responsive parent coaching provided in the study, parents were not able to continue receiving culturally and linguistically appropriate support from other professionals and service providers.

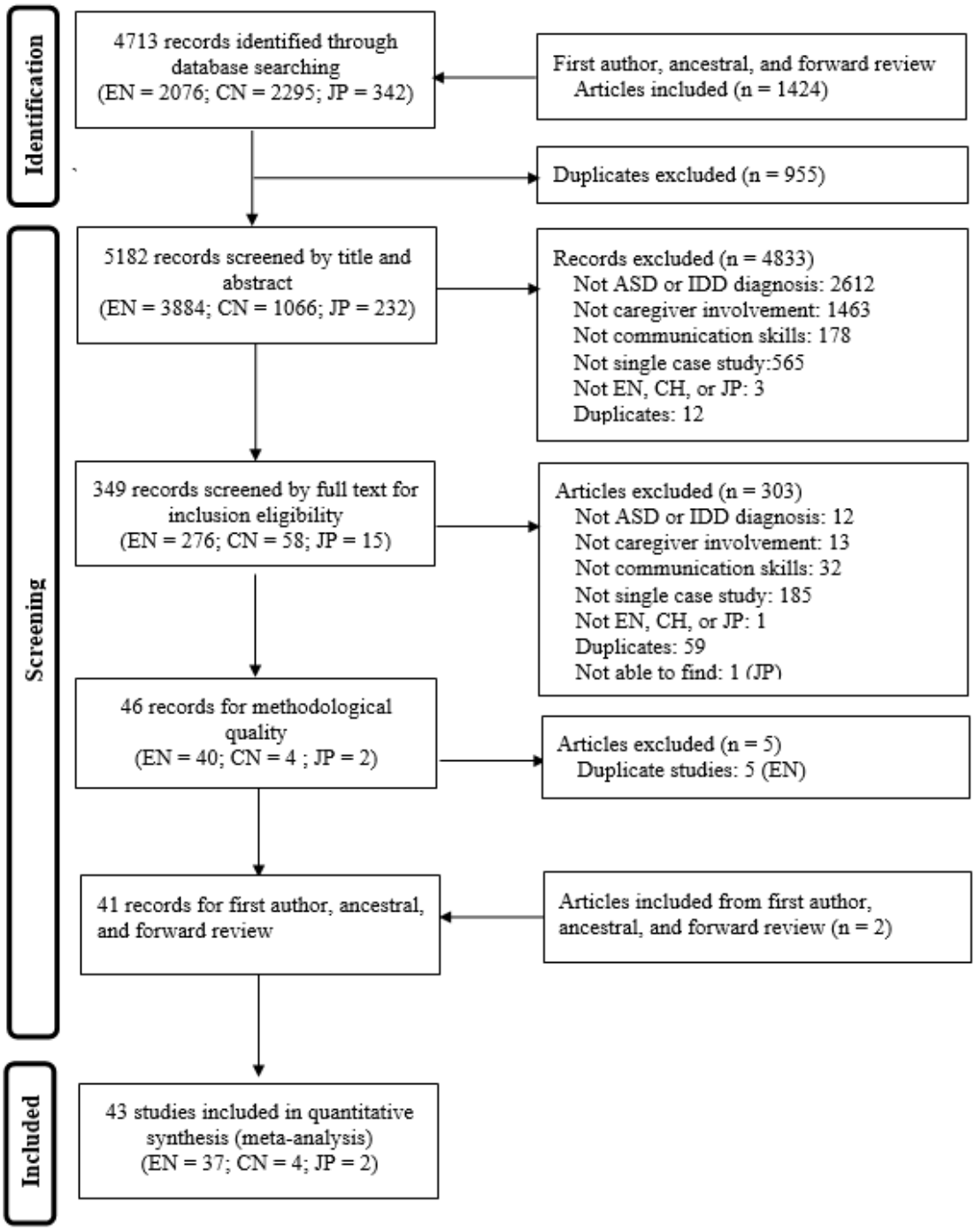
Future Research

There are suggestions for future research that may be drawn from this work. First, future research may expand to studies with different study designs, participants from various backgrounds, different outcomes of caregivers and children, and across different cultures. Second, future reviews may focus on studies related to cultural adaptation and

implementation with CLD families to identify family and cultural factors in family involvement, as well as major characteristics of services provided to CLD caregivers. More studies about culturally responsive approaches will be needed in the future for the development of a service protocol for CLD families with children with ASD and IDD.

APPENDIX A

PRISMA FLOW DIAGRAM OF THE SEARCH PROCESS



Note. EN: English; CN: Chinese; JP: Japanese

APPENDIX B

DATABASES AND SEARCH TERMS FOR ARTICLE IDENTIFICATION IN ENGLISH STUDIES

Database	Keywords
Academic Search Complete, Education Resources Information Center (ERIC), Education Full Text, Medline, Professional Development Collection, Psyc INFO, Social Sciences Full Text	(parent-mediated OR parent-based OR parent-implemented OR parent-directed OR parent-involve OR caregiver-mediated OR caregiver-implemented OR caregiver-involve OR family-mediated OR family-based OR family-implemented OR family-involve) AND (communicat* OR social* OR language) AND (autism spectrum disorder OR asd OR autism OR autistic symptoms OR autis* OR Asperger* OR pervasive developmental disorder not otherwise specified OR PDD-NOS OR childhood disintegrative disorder OR CDD OR Rett OR intellectual dis* OR developmental dis*)
Proquest Dissertations and Theses Global	

APPENDIX C

DATABASES AND SEARCH TERMS FOR ARTICLE IDENTIFICATION IN CHINESE STUDIES

Database	Keywords
National Applied Research Laboratories' Patent and Research Paper platform Search System, PPSEARCH (國家實驗研究院-專利與學術文獻檢索系統)	(家長 OR 家庭) AND (溝通 OR 語言) AND (自閉 OR 發展障礙)
Government Research Bulletin (政府研究資訊系統)	(家長 OR 家庭) AND (溝通 OR 語言) AND (自閉 OR 發展障礙)
PerioPath Index to Taiwan Periodical Literature System (臺灣期刊論文索引)	家長 AND 溝通 AND 自閉
	家長 AND 溝通 AND 發展障礙
	家庭 AND 溝通 AND 自閉
	家庭 AND 溝通 AND 發展障礙
	家長 AND 語言 AND 自閉
	家長 AND 語言 AND 發展障礙
	家庭 AND 語言 AND 自閉
	家庭 AND 語言 AND 發展障礙
National Digital Library of Theses and Dissertations in Taiwan (臺灣博碩士論文知識加值系統)	家長 AND 溝通 AND 自閉
	家長 AND 溝通 AND 發展障礙
	家庭 AND 溝通 AND 自閉
	家庭 AND 溝通 AND 發展障礙
	家長 AND 語言 AND 自閉
	家長 AND 語言 AND 發展障礙
	家庭 AND 語言 AND 自閉
	家庭 AND 語言 AND 發展障礙
China Academic Journals Full-text Database (中國期刊全文數據庫)	(家长 OR 家庭) AND (沟通 OR 语言) AND (自闭 OR 发展障碍)
China Doctoral Dissertations Full-text Database (中國博士學位論文全文數據庫)	(家长 OR 家庭) AND (沟通 OR 语言) AND (自闭 OR 发展障碍)

APPENDIX D

DATABASES AND SEARCH TERMS FOR ARTICLE IDENTIFICATION IN JAPANESE STUDIES

Database	Keywords
CiNii (NII 学術情報ナビゲータ, サイニィ)	親 AND 通信 AND 自閉症
	保護者 AND 通信 AND 自閉症
	家族 AND 通信 AND 自閉症
	親 AND 言語 AND 自閉症
	保護者 AND 言語 AND 自閉症
	家族 AND 言語 AND 自閉症
	親 AND 言葉 AND 自閉症
	保護者 AND 言葉 AND 自閉症
	家族 AND 言葉 AND 自閉症
	親 AND 通信 AND 発達障害
	保護者 AND 通信 AND 発達障害
	家族 AND 通信 AND 発達障害
	親 AND 言語 AND 発達障害
	保護者 AND 言語 AND 発達障害
	家族 AND 言語 AND 発達障害
	親 AND 言葉 AND 発達障害
	保護者 AND 言葉 AND 発達障害
	家族 AND 言葉 AND 発達障害
	親 AND 通信 AND 知的障害
	保護者 AND 通信 AND 知的障害
	家族 AND 通信 AND 知的障害
	親 AND 言語 AND 知的障害
	保護者 AND 言語 AND 知的障害
	家族 AND 言語 AND 知的障害
	親 AND 言葉 AND 知的障害
	保護者 AND 言葉 AND 知的障害
	家族 AND 言葉 AND 知的障害

Database	Keywords
CiNii Dissertations (日本の博士論文)	親 AND 通信 AND 自閉症
	保護者 AND 通信 AND 自閉症
	家族 AND 通信 AND 自閉症
	親 AND 言語 AND 自閉症
	保護者 AND 言語 AND 自閉症
	家族 AND 言語 AND 自閉症
	親 AND 言葉 AND 自閉症
	保護者 AND 言葉 AND 自閉症
	家族 AND 言葉 AND 自閉症
	親 AND 通信 AND 発達障害
	保護者 AND 通信 AND 発達障害
	家族 AND 通信 AND 発達障害
	親 AND 言語 AND 発達障害
	保護者 AND 言語 AND 発達障害
	家族 AND 言語 AND 発達障害
	親 AND 言葉 AND 発達障害
	保護者 AND 言葉 AND 発達障害
	家族 AND 言葉 AND 発達障害
	親 AND 通信 AND 知的障害
	保護者 AND 通信 AND 知的障害
	家族 AND 通信 AND 知的障害
	親 AND 言語 AND 知的障害
	保護者 AND 言語 AND 知的障害
	家族 AND 言語 AND 知的障害
	親 AND 言葉 AND 知的障害
	保護者 AND 言葉 AND 知的障害
	家族 AND 言葉 AND 知的障害

APPENDIX E

SUMMARY TABLE

First Author	Year	Caregiver	Child	Child Age	Setting(s)	Delivery Format	Dosage
Benson	2017	CM	Connor	> 7	Home	Tele-Practice	>10 sessions
		NM	Nick	4-6	Home	Tele-Practice	>10 sessions
Bradshaw	2017	Parent 1	Child 1	1-3	Multiple Settings	In Person	7-9 sessions
Bradshaw	2017	Parent 2	Child 2	1-3	Multiple Settings	In Person	>10 sessions
Bradshaw	2017	Parent 3	Child 3	1-3	Multiple Settings	In Person	>10 sessions
Brown	2015	KM	Kailee	1-3	Multiple Settings	In Person	7-9 sessions
		CM	Charlotte	1-3	Multiple Settings	In Person	7-9 sessions
		EM	Emerson	1-3	Multiple Settings	In Person	7-9 sessions
		PM	Peter	1-3	Multiple Settings	In Person	7-9 sessions
		MM	Mila	1-3	Multiple Settings	In Person	7-9 sessions
		WM	Wyatt	1-3	Multiple Settings	In Person	7-9 sessions
Bucio	2016	Parent 1	Marco	> 7	Home	Not report	7-9 sessions
		Parent 2	Alejandra	> 7	Home	Not report	7-9 sessions
		Parent 3	Eduardo	> 7	Home	Not report	7-9 sessions
Chaabane	2009	CM	Cliff	4-6	Home	In Person	Not report
		MM	Myles	4-6	Home	In Person	Not report
Christensen-Smith	2014	Dana	Sam	1-3	Home	In Person	4-6 sessions
		Kris	Natesha	1-3	Home	In Person	7-9 sessions
		Landa	George	1-3	Home	In Person	7-9 sessions
		Jackie	Kevin	1-3	Home	In Person	7-9 sessions
Dogan	2017	Hana	Carter	> 7	Home	In Person	1-3 sessions
		Abby	Eric	> 7	Home	In Person	1-3 sessions
		Kathy	Sam	> 7	Home	In Person	1-3 sessions
Douglas	2018	Anna	Adam	4-6	Home	Tele-Practice	4-6 sessions
		Bridget	Ben	4-6	Home	Tele-Practice	4-6 sessions
		Catherine	Charlie	4-6	Home	Tele-Practice	4-6 sessions
Foster-Sanda	2013	JM	John	1-3	Home	In Person	>10 sessions
		EM	Edward	1-3	Home	In Person	>10 sessions
		VM	Vincenzo	1-3	Home	In Person	4-6 sessions
		BP	Brent	1-3	Home	In Person	>10 sessions
		TP	Travis	1-3	Home	In Person	>10 sessions
Gerow	2017	MF	Michael	1-3	Home	In Person	7-9 sessions
		LM	Luis	1-3	Home	In Person	4-6 sessions
		CM	Cameron	1-3	Home	In Person	7-9 sessions
Gillett	2007	CM	Caleb	4-6	Clinic/Hospital/Center	In Person	Not report
		GM	Garrett	4-6	Home	In Person	Not report
		MM	Marcus	4-6	Clinic/Hospital/Center	In Person	Not report

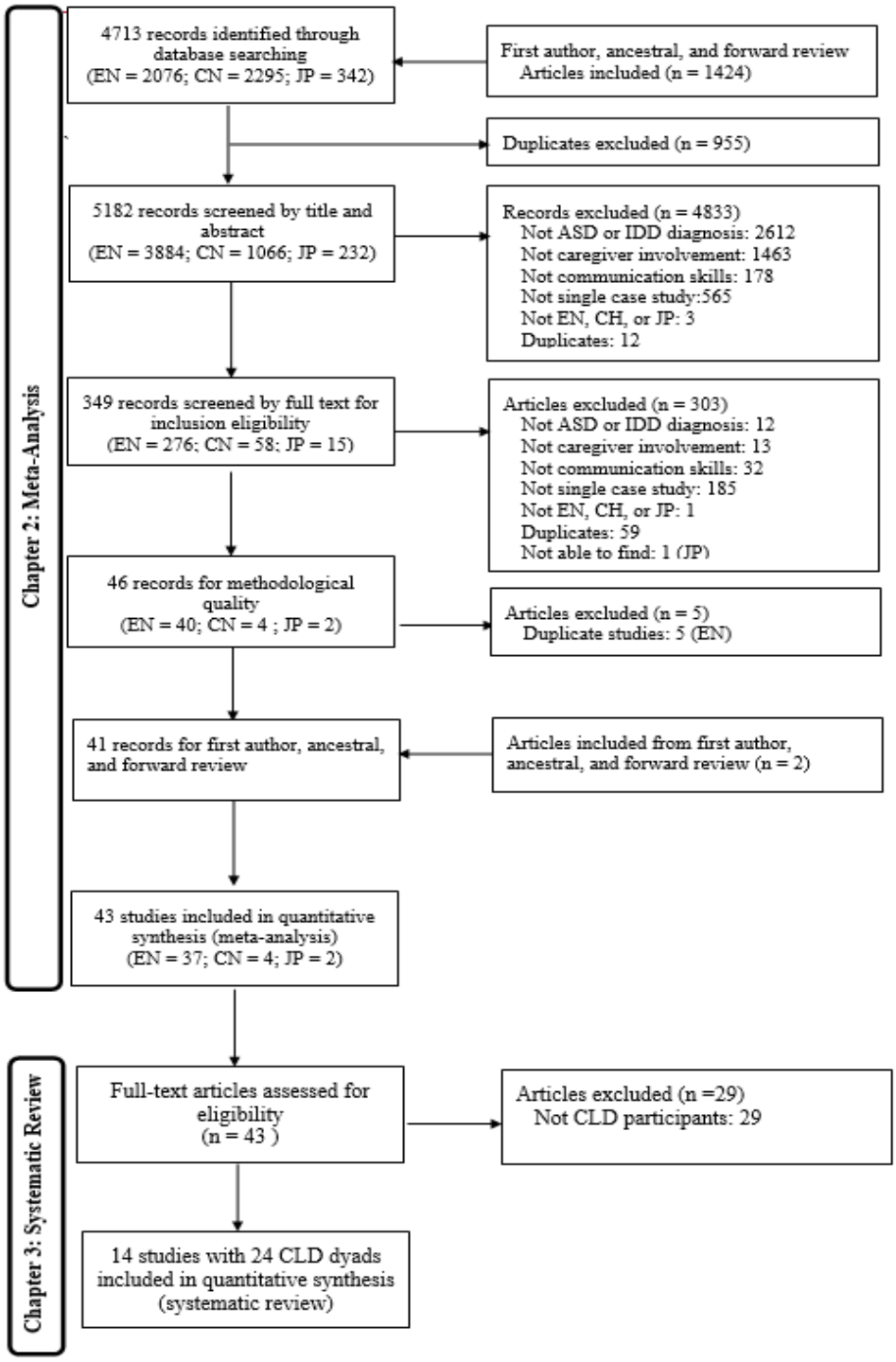
First Author	Year	Caregiver	Child	Child Age	Setting(s)	Delivery Format	Dosage
Hagimori	2004	Caregiver	Child	1-3	Not report	In Person	>10 sessions
Hansen	2018	ZM	Zoe	4-6	Clinic/Hospital/Center	In Person	4-6 sessions
		SM	Sam	1-3	Clinic/Hospital/Center	In Person	4-6 sessions
		JG	Josh	4-6	Clinic/Hospital/Center	In Person	4-6 sessions
Hemmeter	1994	AF	Child A	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		CM	Child C	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		DM	Child D	4-6	Clinic/Hospital/Center	In Person	>10 sessions
Hong	2014	Joshua	Ryan	> 7	Clinic/Hospital/Center	In Person	>10 sessions
		Carol	Ryan	> 7	Clinic/Hospital/Center	In Person	>10 sessions
		Jared	Ryan	> 7	Clinic/Hospital/Center	In Person	>10 sessions
		Troy	Ryan	> 7	Clinic/Hospital/Center	In Person	>10 sessions
Hsueh	2013	YP	Yu	> 7	Home	In Person	Not report
Iacono	1998	BM1	Bob	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		NM	Nell	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		BM2	Brian	1-3	Clinic/Hospital/Center	In Person	4-6 sessions
		JM	Jon	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		TM	Tim	1-3	Clinic/Hospital/Center	In Person	4-6 sessions
Ingersoll	2013	Mother 1	Child 1	4-6	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 2	Child 2	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 3	Child 3	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 4	Child 4	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 5	Child 5	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 6	Child 6	4-6	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 7	Child 7	4-6	Clinic/Hospital/Center	In Person	>10 sessions
		Mother 8	Child 8	4-6	Clinic/Hospital/Center	In Person	>10 sessions
Kaiser	2000	AM	A	4-6	Clinic/Hospital/Center	In Person	>10 sessions
		BM	B	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		CM	C	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		DM	D	1-3	Clinic/Hospital/Center	In Person	>10 sessions
		EM	E	4-6	Clinic/Hospital/Center	In Person	>10 sessions
		FM	F	4-6	Clinic/Hospital/Center	In Person	>10 sessions
Kashinath	2006	RM	Ron	1-3	Home	In Person	>10 sessions
		AM	Andy	4-6	Home	In Person	>10 sessions
		KM	Kody	1-3	Home	In Person	>10 sessions
		GM	Georgia	1-3	Home	In Person	>10 sessions
		TM	Theo	1-3	Home	In Person	>10 sessions
Koegel	2006	CFM	Christopher	4-6	Clinic/Hospital/Center	In Person	1-3 sessions
		JM	Julie	4-6	Clinic/Hospital/Center	In Person	1-3 sessions
		EMGM	Elisa	4-6	Clinic/Hospital/Center	In Person	1-3 sessions
		DFM	Debra	4-6	Clinic/Hospital/Center	In Person	1-3 sessions
		BFM	Barry	1-3	Clinic/Hospital/Center	In Person	1-3 sessions

First Author	Year	Caregiver	Child	Child Age	Setting(s)	Delivery Format	Dosage
Law	2018	Mother 1	Child 1	4-6	Home	In Person	>10 sessions
		Mother 2	Child 2	1-3	Home	In Person	>10 sessions
		Mother 3	Child 3	1-3	Home	In Person	>10 sessions
Lee	2015	YM	Yuan	1-3	Home	In Person	>10 sessions
		MM	Mang	1-3	Home	In Person	>10 sessions
		RM	Ru	1-3	Home	In Person	>10 sessions
		YM	Yi	1-3	Home	In Person	>10 sessions
Levinger	2012	Parent1	Child1	> 7	Multiple Settings	In Person	4-6 sessions
		Parent2	Child2	> 7	Home	In Person	>10 sessions
		Parent3	Child3	> 7	Home	In Person	4-6 sessions
Liou	2005	AGM	Child A	1-3	Home	In Person	>10 sessions
		BM	Child B	1-3	Home	In Person	>10 sessions
		CM	Child C	1-3	Home	In Person	>10 sessions
		DM	Child D	4-6	Home	In Person	>10 sessions
Liu	2015	AM	Abby	> 7	Multiple Settings	In Person	4-6 sessions
Loughrey	2014	Sam	Franklin	1-3	Multiple Settings	In Person	>10 sessions
McCathren	2010	Jacobs	Julie	1-3	Home	In Person	>10 sessions
McDuffie	2016	AM	Allen	> 7	Home	Tele-Practice	>10 sessions
		SM	Sam	> 7	Home	Tele-Practice	>10 sessions
		JM	Jay	> 7	Home	Tele-Practice	>10 sessions
Meadan	2014	MK	KK	1-3	Home	In Person	>10 sessions
		WM	JM	4-6	Home	In Person	>10 sessions
		AH	AH	4-6	Home	In Person	>10 sessions
		KC	GC	1-3	Home	In Person	>10 sessions
		LM	HM	4-6	Home	In Person	>10 sessions
Meadan	2016	Mediha	Ali	1-3	Home	Tele-Practice	>10 sessions
		Karen	George	1-3	Home	Tele-Practice	>10 sessions
		Melissa	Wendy	4-6	Home	Tele-Practice	>10 sessions
Musashi	2003	caregiver	child	> 7	Multiple Settings	In Person	>10 sessions
Nunes	2007	Julia	Jason	4-6	Home	In Person	Not report
Radley	2014	Parent1	Child1	4-6	Multiple Settings	In Person & Tele-Practice	7-9 sessions
		Parent2	Child2	> 7	Multiple Settings	In Person & Tele-Practice	7-9 sessions
		Parent3	Child3	4-6	Multiple Settings	In Person & Tele-Practice	7-9 sessions
		Parent4	Child4	4-6	Multiple Settings	In Person & Tele-Practice	4-6 sessions
		Parent5	Child5	4-6	Multiple Settings	In Person & Tele-Practice	7-9 sessions
Reagon	2009	Julia	Collin	4-6	Not report	In Person	1-3 sessions
		Cami	Brandon	1-3	Not report	In Person	1-3 sessions
		Andrea	Jake	1-3	Not report	In Person	1-3 sessions
Robertson	2013	NM	Nicholas	1-3	Home	In Person	1-3 sessions
		JM	Jeff	4-6	Home	In Person	4-6 sessions

First Author	Year	Caregiver	Child	Child Age	Setting(s)	Delivery Format	Dosage
Simacek	2017	EP	Ella	1-3	Home	Tele-Practice	7-9 sessions
		LM	Lily	4-6	Home	Tele-Practice	1-3 sessions
		SP	Sidney	1-3	Home	Tele-Practice	7-9 sessions
Strain	1995	NP	North	4-6	Home	In Person	4-6 sessions
		BP	Broderick	4-6	Home	In Person	4-6 sessions
		JPS	Jarred	1-3	Home	In Person	7-9 sessions
Vismara	2012	Parent 1	Child 1	1-3	Home	Tele-Practice	>10 sessions
		Parent 2	Child 2	1-3	Home	Tele-Practice	>10 sessions
		Parent 3	Child 3	1-3	Home	Tele-Practice	>10 sessions
		Parent 4	Child 4	1-3	Home	Tele-Practice	>10 sessions
		Parent 5	Child 5	1-3	Home	Tele-Practice	>10 sessions
		Parent 6	Child 6	1-3	Home	Tele-Practice	>10 sessions
		Parent 7	Child 7	1-3	Home	Tele-Practice	>10 sessions
		Parent 8	Child 8	1-3	Home	Tele-Practice	>10 sessions
		Parent 9	Child 9	1-3	Home	Tele-Practice	>10 sessions
Vogler-Elias	2009	Parent A	Child A	4-6	Home	In Person	>10 sessions
		Parent B	Child B	4-6	Home	In Person	>10 sessions
		Parent C	Child C	4-6	Home	In Person	>10 sessions
		Parent D	Child D	4-6	Home	In Person	>10 sessions
		Parent E	Child E	1-3	Home	In Person	>10 sessions
		Parent F	Child F	4-6	Home	In Person	4-6 sessions
		Parent G	Child G	1-3	Home	In Person	>10 sessions
Wright	2017	Annie	Ryan	1-3	Multiple Settings	In Person	>10 sessions
		Tara	Erin	1-3	Multiple Settings	In Person	>10 sessions
		Lilah	Jay	1-3	Multiple Settings	In Person	>10 sessions
		Grant	Gretchen	1-3	Multiple Settings	In Person	>10 sessions
Yang	2015	TM	Tzi	> 7	Home	In Person	>10 sessions
Zimmer	2013	JM1	Jon	1-3	Home	In Person	4-6 sessions
		JM2	Jess	1-3	Home	In Person	4-6 sessions
		DM	Dave	1-3	Home	In Person	4-6 sessions
		JM3	Jay	1-3	Home	In Person	4-6 sessions

APPENDIX F

PRISMA FLOW DIAGRAM OF THE SEARCH PROCESS



Note. EN = English; CN = Chinese; JP = Japanese

APPENDIX G

ACCULTURATION AND CULTURAL BACKGROUND SURVEY

	False	Partly False	Partly True	True	N/A
1. I understand English, but I am not fluent in English.					
2. I am informed about current affairs in the United States.					
3. I speak my native language with my friends and acquaintances from my country of origin.					
4. I have never learned to speak the language of my native country.					
5. I feel totally comfortable with American people.					
6. I eat traditional foods from my native culture.					
7. I have many American acquaintances.					
8. I feel comfortable speaking my native language.					
9. I am informed about current affairs in my native country.					
10. I know how to read and write in my native language.					
11. I feel at home in the United States.					
12. I attend social functions with people from my native country.					
13. I feel accepted by Americans.					
14. I speak my native language at home.					
15. I regularly read magazines of my ethnic group.					
16. I know how to speak my native language.					
17. I know how to prepare American foods.					
18. I am familiar with the history of my native country.					
19. I regularly read an American newspaper.					
20. I like to listen to the music of my ethnic group.					
21. I like to speak my native language.					
22. I feel comfortable speaking English.					
23. I speak English at home.					
24. I speak my native language with my spouse or partner.					
25. If I pray or worship, I use my native language.					
26. I attend social functions with American people.					
27. I think in my native language.					
28. I stay in close contact with family members and relatives in my native country.					
29. I am familiar with important people in American history.					
30. I think in English.					
31. I speak English with my spouse or partner.					
32. I like to eat American foods.					

Cultural Affiliations

- Where were you born?
- Where was your child born?
- How long have you been living in the US?
- Do you and your child share the same cultural identity? Yes No
- Do you and your child share the same customs/traditions? Yes No
    - If yes, do you and your child place the same importance on these traditions?
    - If no, how are your traditions different from your child's?
- Do you and your child share the same values? Yes No
    - How are they the same or different?

Communication

- What is your fluency level in English?
- What is the fluency level of your family members?
- What are the rules and style (formal or informal) of communication (e.g., verbal conversation or nonverbal interaction) in your family (e.g., the preferred terms for greeting)?
- What is the style of communication between you and your child (e.g., tempo of conversation, eye contact, sensitivity to topical taboos, norms of confidentiality, and style of explanation)?
- What is the style of communication between your child and other family members (e.g., tempo of conversation, eye contact, sensitivity to topical taboos, norms of confidentiality, and style of explanation)?
- How do members of your family communicate without the use of words?

Autism-Related Beliefs and Practices

- What are your attitudes, values, and beliefs about your child's autism?
    - Do family members have similar values and beliefs?
        - If no, what is the difference?
    - Do they affect your decision to choose special education and other services for your child?
- How do your family and cultural group view autism spectrum disorder?
- What accommodations do family members make to provide caregiving to the child?

Note. This survey was adapted from Andrews & Boyle (2016) and Stephenson (2000).

APPENDIX H

PARENT COACHING SHORT SURVEY

Thank you for participating in the Parent-directed Treatment Project. Your feedback on this survey can help us understanding your learning during coaching sessions and improve it. Please tick the appropriate box for each question indicate your views and offer your views and comments. Your feedback is very important to us. All responses will be treated in confidence.

Coaching Date: _____

Individual Parent Coaching

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The content and discussion in this parent-coaching session were suitable for my family and cultural background.	○	○	○	○	○
The content and discussion in this parent-coaching session were related to my family routines.	○	○	○	○	○
The content and discussion in this parent-coaching session were based on my priorities for my child's communication.	○	○	○	○	○
The strategies/skills I learned in this coaching session were easy to use at home with my child.	○	○	○	○	○
I understood the content, feedback, and discussion in this parent coaching session.	○	○	○	○	○

Besides video recording, approximately how much time did you spend using learned skills/strategies with your child since the last parent coaching session?

- ○ 0-3 hours
- ○ 4-6 hours
- ○ 7-9 hours
- ○ More than 10 hours

Please let us know if any other comments you would like to make.

APPENDIX I

PARENT COACHING SURVEY

Thank you for participating in the study. The team members aim to provide high-quality coaching to meet different needs of families. Your evaluation of this survey can help us make this. Please tick the appropriate box for each question indicate your views and offer your views and comments. Your feedback is very important to us. All responses will be treated in confidence.

Webinar	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The information/knowledge I learned from the webinar was easy to understand.	○	○	○	○	○
I feel the length of the webinar sessions (2 hours) was enough to learn about the basic information and knowledge of communication strategies.	○	○	○	○	○
Individual Parent Coaching	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The strategies/skills I learned in this project were easy to use at home with my child.	○	○	○	○	○
I have received sufficient guidance, feedback, and suggestions on each strategy from my coach.	○	○	○	○	○
The strategies/skills I learned in this project helped me to interact better with my child.	○	○	○	○	○
I find the procedures and the treatment used in this project to be an acceptable way of improving my child's communication skills.	○	○	○	○	○
I believe it would be acceptable to use the treatment with individuals who cannot choose treatments for themselves.	○	○	○	○	○
I will be willing to continue to use these strategies/skills if I want to improve his/her communication skills	○	○	○	○	○
I feel the length of the individual coaching sessions (1 hour) was enough to learn about and practice the strategies.	○	○	○	○	○
I feel the total sessions I received were enough to learn about, practice, and receive feedback on the use of the strategies.	○	○	○	○	○
Overall, I have received good opportunities and experience to learn about different strategies/skills to work with my child through this project.	○	○	○	○	○
Overall, I feel using these strategies/skills I learned in this project had a positive impact and improvement on my child’s and my behaviors.	○	○	○	○	○

Overall, I have a positive reaction to this project.	○	○	○	○	○

I would like to learn more about communication strategies to work with my child. Please let me know if any spots are still available.

- ○ Yes
- ○ Maybe
- ○ No

What did you like most about the parent coaching?

What aspects of the parent coaching could be improved?

Please let us know if any other comments you would like to make.

Note. This survey was adapted from Kelley, Heffer, Gresham, & Elliott (1989) and Washburn (2012).

APPENDIX J

PROCEDURAL INTEGRITY CHECKLIST FOR BASELINE PHASE

Caregiver Coaching Procedures
Culturally Responsive Parent Coaching in Parent-directed Multimodal Communication Instruction Spring 2018

Implementer: Participant (initials):
Reviewer: Date:
Session # (if multiple recorded): BL

Criteria	Yes(+)/No(-)/Not Applicable(N/A)
<u>All Videos:</u> Not teach or provide any instructions or feedback regarding performance to caregivers.	
Required for baseline video:	
Tell parents to record baseline videos for at least 3.5 minutes.	
Tell parents to record videos in the setting that they usually stay to have a conversation or play games with the child.	
Tell parents to have a conversation/play games with the child in the way they usually do.	
Required for generalization video:	
Tell parents to record generalization videos for at least 3.5 minutes.	
Tell parents to have a conversation/play games with the child in another setting or other activities.	
Tell parents to have a conversation/play games with the child in the way as they usually do.	

Total number of yes (+): _____

Percentage (%): _____

APPENDIX K

PROCEDURAL INTEGRITY CHECKLIST FOR INTERVENTION/MAINTENANCE

PHASE

Caregiver Coaching Procedures
Culturally Responsive Parent Coaching in Parent-directed Multimodal Communication Instruction Spring 2018

Implementer: Participant (initials):
Reviewer: Date:
Session # (if multiple recorded): Generalization: Y N

Criteria	Yes(+)/No(-)/Not Applicable(N/A)
Provide written feedback regarding performance on last session/video, highlighting pointers for how to better implement some/all of the protocol steps (environmental arrangement, model, prompt, errorless learning, time delay, expand)	
Give verbal instructions regarding the written feedback.	
Model how to perform the skills highlighted in feedback.	
Role play how to perform the skills.	
Provide performance feedback during the role play, if needed.	

Total number of yes (+) : _____

Percentage (%): _____