TELEHEALTH AS A MODEL FOR BEHAVIOR ANALYTIC SERVICES TARGETING SKILL ACQUISITION IN CHILDREN WITH AUTISM: A SYSTEMATIC REVIEW

by

STEPHANIE BEHNKE

(Under the Direction of Kevin Ayres)

ABSTRACT

Telehealth has become a necessary tool for delivery of behavior analytic services in light of the COVID-19 pandemic. Eleven studies were included for review in order to assess the gains in skill acquisition made by children with autism spectrum disorder (ASD) using the telehealth modality. Results suggest that parent and therapist fidelity to implementation procedures are maintained and generalized at higher levels when a behavior analytic professional is available for consultation throughout training and follow-up. Children with ASD make equal gains via telehealth delivery.

INDEX WORDS: autism spectrum disorder, telehealth, skill acquisition, applied behavior analysis

TELEHEALTH AS A MODEL FOR BEHAVIOR ANALYTIC SERVICES TARGETING SKILL ACQUISITION IN CHILDREN WITH AUTISM: A SYSTEMATIC REVIEW

by

STEPHANIE BEHNKE

BA, San Jose State University, 2019

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2020

TELEHEALTH AS A MODEL FOR BEHAVIOR ANALYTIC SERVICES TARGETING SKILL ACQUISITION IN CHILDREN WITH AUTISM: A SYSTEMATIC REVIEW

by

STEPHANIE BEHNKE

Major Professor:	Kevin Ayres
Committee:	Rachel Cagliani
	Alicia Davis

Electronic Version Approved:

Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
December 2020

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

Introduction

The coronavirus pandemic and its corresponding illness (i.e. COVID-19) created a worldwide need for social distancing measures to slow the spread of the virus (Center for Disease Control and Prevention, 2020). Among the measures to ensure social distancing, behavior analytic services were largely suspended or transitioned to an online format (Crockett et al., 2020). Applied behavior analysis (ABA) is a field of science that has been identified as best practice for autism spectrum disorder intervention (Reichow et al., 2018). Such services and the teaching methods based upon ABA principles are evidence-based procedures (EBP) for teaching new skills to children with developmental disabilities, such as autism spectrum disorder (ASD; Wong et al., 2014). Telehealth is the delivery of services via an online format, including: videoconferencing, online modules, and shared recorded sessions between client and practitioner. While behavior analytic services via telehealth has been suggested as a solution to providing services to children with ASD in rural areas, as well as a less costly means of service delivery, the emergence of a pandemic has increased the need for such services (Rooks-Ellis et al. 2020).

This mass transition to a telehealth model has impacted the children and families receiving behavior analytic services. Parents and caregivers have largely become responsible for delivering intervention typically provided in schools and clinical settings (Grover et al., 2020). Clients who exhibit severe aggressive or self-injurious behaviors are at an especially high need when it comes to providing in-home solutions due to safety concerns. Many studies have

implemented and assessed behavior reduction programs via telehealth, but few specifically acknowledged teaching new skills to children with ASD (Bearss et al., 2018; Scheiltz et al., 2018; Knowles et al., 2017). Children with ASD may benefit specifically from telehealth services by limiting gaps in service delivery and by allowing multiple service providers to work with an individual without the need for travel (Solomon & Soares, 2020).

Early intensive behavioral intervention (EIBI) is treatment for young children (under the age of 5) based upon the science of ABA (Klintwall & Eikeseth, 2014). EIBI is recommended for 20 to 40 hours per week for several years (Reichow et al., 2018). Outcomes rely on intervention beginning as early as possible (Granpeesheh et al.,2009). With this in mind, delayed access to treatment and lower intensity of treatment may be mitigated by the shift to a telehealth model of service delivery.

Previous reviews have evaluated the efficacy of telehealth services, parent-training programs to increase ABA knowledge and fidelity of treatment delivery for behavior reduction (Ferguson et al. 2018; Unholz-Bowden et al. 2020; Heitzman-Powell et al. 2014). There are no reviews at this point that have assessed child outcomes in skill acquisition programs delivered via telehealth. Several studies have confirmed parents are able to implement procedures with fidelity, but few studies have assessed the gains children with ASD make and whether these gains are comparable to in-person services. The purpose of this review is to assess parent and therapist training via telehealth and the associated child outcomes.

CHAPTER 2

Method

A systematic search was conducted in September 2020. The search was conducted using the following databases: APA PsycInfo, CINAHL, Education Research Complete, MEDLINE, and Psychology and Behavioral Sciences Collection. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist was used to evaluate studies for inclusion through the search of literature. Studies were screened by title and abstract followed by a full-text screen. Additional studies were included after conducting a manual search of previous reviews. Figure 1 shows the process through which articles were collected and screened. Results were not restricted by year because ability to provide behavior analytic services virtually is relatively new.

Search Terms

Search terms used in this review were: skills AND telehealth or telemedicine or telepractice or teletherapy AND behavior AND autis*.

Inclusion and Exclusion Criteria

Articles were examined for inclusion based on the following criteria: (1) peer-reviewed, from an academic journal (2) inclusion of a child with ASD, parent of a child with ASD, or a behavior analytic practitioner, (3) use of telehealth and consultation from an interventionist for the purposes of training or teaching skills, and (4) measured child outcomes via direct researcher-collected data.

Studies were excluded from this review if they met the following exclusion criteria: (1) the article was a review of literature, (2) intervention focused on behavior reduction rather than skill acquisition, (3) telehealth was not a required piece of training or teaching skills, and (4) child outcomes were reported qualitatively by parents.

Data Extraction

Selected studies were reviewed and information was extracted based on the following categories: (1) participants, (2) research design, (3) targeted skills, (4) training provided, (5) measures, and (6) outcomes.

Inter-Rater Agreement

A second graduate student conducted the same search using the procedure and terms described above. Inter-rater agreement was obtained by dividing the smaller number of acquired articles by the larger number of acquired articles and multiplying by 100. Inter-rater agreement was determined to be 94.2%.

Quality Assessment

Single-case design studies included within this review were assessed for rigor and quality using Single-Case Analysis and Review Framework (SCARF) as outlined by Ledford et al. (2016). Each study is assessed on primary outcomes, generalized outcomes, and maintained outcomes. Primary outcomes are described as the consistency of effects across the demonstrations (i.e. consistency of effect across participants/behaviors). Generalized outcomes are the extent to which generalization is measured as it relates to the independent variable. Maintained outcomes are the extent to which maintenance of the intervention is measured post-treatment.

CHAPTER 3

Results

Based on the inclusion criteria, 11 studies were included in this review, as outlined in Table 1. The following sections provide a detailed description of the coded variables.

Participants

Parents

Seventy-three percent of studies included parent participants (Boutain et al. 2017; Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Subramaniam et al. 2016; Vismara et al. 2018; Vismara et al. 2013; Wainer & Ingersoll 2013). A total of 77 parents were included in the selected 11 studies. Each parent had at least one child diagnosed with ASD and no previous training in administering ABA therapy. Of those parents, 67 participated in a telehealth program and 54 were actively engaged in a telehealth program that involved consultation with a behavior analytic professional (i.e. behavior therapist, board certified behavior analyst). The remaining parents served as controls, meaning they did not receive telehealth-based training (Vismara et al. 2018). Gender of parents was reported in six studies, of which 96% of parent participants were female (Boutain et al. 2017; Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Subramaniam et al. 2016; Vismara et al. 2013). Age of parent participants was reported in three studies (Boutain et al. 2017; Guðmundsdóttir et al. 2019; Subramaniam et al. 2016). Of those reported, all parents fell between 29-43 years old. Only 37.5% (n=3) reported both gender and age of parent participants (Boutain et al. 2020; Guðmundsdóttir et al. 2019; Subramaniam et al. 2016).

Interventionists

The remaining three studies included therapists as participants (Barkaia et al. 2017; Ferguson et al. 2020; Vismara et al. 2009). A total of 14 behavior analytic professionals were included among the 11 studies. Two of the studies reported interventionist gender (4 females) (Barkaia et al. 2017; Ferguson et al. 2020). One study reported interventionist age (24-32 years old) (Barkaia et al. 2017). One study did not report age or gender of interventionists (Vismara et al. 2009).

Children

All included studies had child participants diagnosed with ASD. Children were recruited from agencies already providing behavior analytic services to each child, respectively. A total of 114 children participated in the studies. Gender was reported in 73% (n = 8) of studies (Barkaia et al. 2017; Boutain et al. 2020; Ferguson et al. 2020; Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Subramaniam et al. 2016; Vismara et al. 2018). Of the studies that included gender data, 77% (n=56) of children were male. Age was reported in 91% (n=10) of studies (Barkaia et al. 2017; Boutain et al. 2020; Ferguson et al. 2020; Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Subramaniam et al. 2016; Vismara et al. 2018; Vismara et al. 2013; Wainer & Ingersoll 2013). Children fell within 1.5-7 years old with one outlier at 11 years old (Subramaniam et al. 2016).

Research Design

Three of the eleven studies (Ingersoll et al. 2016; Vismara et al. 2009; Vismara et al. 2018) used randomized control trials (RCT) to compare treatment modalities. The remaining

eight studies employed single-case design, with 100% of those studies employing a multiple-baseline design. 75% (n = 6) of the multiple-baseline designs were conducted across participants (Barkaia et al. 2017; Boutain et al. 2020; Ferguson et al. 2020; Subramaniam et al. 2016; Vismara et al. 2013; Wainer & Ingersoll 2013), and 25% (n = 2) were conducted across skills targeted (Guðmundsdóttir et al. 2019; Meadan et al. 2016).

Targeted Skill(s) for Acquisition

Studies included in this review were selected for their focus on skill acquisition training. The following skills were targeted for training and implementation: communication (mands, commenting, responding), self-care skills (washing hands, washing face, and applying lotion), tacting, joint attention, and imitation. Communication was targeted by 64% (n= 7) of the included studies (Barkaia et al., 2017; Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Vismara et al. 2009; Vismara et al., 2013; Vismara et al., 2018). Self-care skills were targeted by one study with three child-parent dyads (Boutain et al. 2020). Tacting, or labelling, of common objects, letters, shapes, and superheroes was targeted by two studies with a total of 10 child participants (Ferguson et al. 2020; Subramaniam et al. 2016). Joint attention was targeted by three studies across 35 children (Guðmundsdóttir et al. 2019; Vismara et al. 2013; Vismara et al. 2018). Imitation with motor movement and vocalizations was targeted by 36% (n = 4) studies across 42 children (Barkaia et al. 2017; Vismara et al. 2009; Vismara et al. 2013; Vismara et al. 2018).

Training and Measures

Parents

Parents were trained to implement teaching procedures using self-directed programs, direct telehealth training with coaching and feedback, and hybrid programs that used both online

programs and direct training with feedback. Self-care skills teaching procedures via graduated guidance were taught to three parents using behavior skills training (BST; Boutain et al. 2020). Implementation of social communication programs was taught to parents via Sunny Starts, ImPACT Online, and iPiCS, respectively (Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016). Thirty-two parents were trained in the parent model for Early Start Denver Model (P-ESDM) for the purpose of teaching communication and joint attention (Vismara et al. 2013; 2018). Each of these programs using naturalistic teaching strategies to promote communication in young children. Discrete trial instruction (DTI) of academic targets was taught to four mothers during in-vivo BST and assessed by behavior analytic professionals via videoconferencing (Subramaniam et al. 2016). Reciprocal imitation training (RIT) was taught to five parents for the purposes of teaching young children imitation during social interactions with an adult (Wainer & Ingersoll 2015). Each study measured parent fidelity to the teaching procedures outlined by a fidelity checklist associated with each program, as collected by each respective research team.

Interventionists

Behavior analytic therapists were trained to teach mands and echoics to children with ASD using both didactic training (spoken and written instructions) and video conferencing with coaching from the first author under the supervision of a licensed psychologist (Barkaia et al. 2017). In Vismara et al. (2009), interventionists were trained to implement ESDM with child clients. Following completion of implementation with high fidelity, the interventionists trained parents to implement the same procedures and were able to do so with high fidelity according to the ESDM fidelity checklist (Vismara et al. 2009).

Outcomes

Parents

In Boutain et al. (2020), BST was used for training parents in implementation of self-care skills programs. All three parents were able to implement graduated guidance with at least 90% fidelity across all three skills after receiving the online BST training package (Boutain et al. 2020). Boutain et al. (2020) did not assess for maintenance of parent implementation of self-care instruction.

Social communication skills were targeted in 63% (n= 5) of studies with parent participants. Across studies that targeted social communication, all parents who consulted with a behavior analytic professional met and maintained fidelity of implementation at post-test and follow-up at higher levels than their self-directed counterparts (Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Vismara et al. 2013; Vismara et al. 2018).
Joint attention was targeted in three of the eight parent training studies. Fidelity criteria of implementation was reached by all parent participants and was maintained by most parents at 1-month and 3-month follow-ups (Guðmundsdóttir et al. 2019; Vismara et al. 2013; Vismara et al. 2018).

DTI for academic skills was targeted in one study and parents were able to maintain high levels of fidelity of implementation several months after initial training (Subramaniam et al. 2016). RIT was also targeted by one study and parents were able to maintain fidelity of implementation at 1-month and 3-month follow-ups (Wainer & Ingersoll 2015).

Interventionists

Two studies focused training on therapists and assessed therapist and child outcomes (Barkaia et al. 2017; Vismara et al. 2009). In both studies, therapists significantly improved in

delivering instruction for the purpose of skill acquisition in social communication. Vismara et al.. (2009) found that distance learning and in-person training of therapists was equally effective and that children made significant gains in both modalities.

Children

Child outcomes were reported for all studies. Children that received social communication intervention showed improved echoics and mands and increased use of verbal and non-verbal language when parents and clinicians served as the therapist (Guðmundsdóttir et al. 2019; Ingersoll et al. 2016; Meadan et al. 2016; Vismara et al. 2013; Vismara et al. 2018; Barkaia et al. 2017; Vismara et al. 2009). Children also learned self-care skills when taught by parents with at least 85% independence across three skills (Boutain et al. 2020). Children exposed to ESDM and P-ESDM made significant gains in imitation (Vismara et al. 2009; Vismara et al. 2018). In addition, children taught tact relations by a therapist via telehealth were able to maintain tact relations and show generalization post-treatment (Ferguson et al. 2020).

Quality Assessment

Figure 2 shows the results of SCARF for the included single-case design studies. Of the eight included studies 87.5% fell within the range of high-quality, positive effects, and one study fell within the range of high-quality with minimal effects. Four studies included maintenance measurement, of which only 2 showed evidence of high-quality, positive effects. Of the three studies that included measurement of generalization, only 2 fell in the range of high-quality, positive effects while the remaining study showed low quality or minimal negative effects.

Chapter 4

Discussion

The present review sought to evaluate behavior analytic services delivered via telehealth for the purposes of skill acquisition in children with ASD. Overall, the current research provides support for providing ABA services via telehealth when implemented by both parents and therapists to teach new skills to children with ASD. In all studies that targeted social communication skills, participants showed improvements and increases in requests, responses, labelling, and echoics. Academic skills were also mastered when using ABA principles to teach letter sounds, letter identification, shape identification, color identification, and number identification as evidenced by Subramaniam et al. (2016). Parents and therapists were able to maintain fidelity in implementation of teaching procedures across studies. Interventionists and caregivers were able to maintain higher levels of fidelity and generalize teaching procedures when provided access to consultation with a behavior analytic professional. This provides evidence for the need of continued support from behavior analytic professionals for maintenance of skill acquisition made by clients.

Limitations

While some level of parent involvement is required for successful skill acquisition, there were only two studies in which a therapist provided direct telehealth services to a child with ASD. This presents a major gap in the literature about the efficacy of telehealth as a sole means of intervention. While most of these studies provide positive evidence of skill acquisition via telehealth modality, there remains the question of whether a virtual platform has potential to

replace traditional, in-person ABA therapy. To date there is not sufficient evidence that behavior analytic services for skill acquisition can be delivered solely through telehealth and that the definition of a telehealth program is too broadly defined within the field of ABA. Some studies made use of a practitioner-to-client model, but most implemented parent training and monitoring as a means of implementation. Based on the quality assessment, most studies failed to assess for maintenance and generalization of the acquired skills.

Future Direction

Future research should assess rate and maintenance of skill acquisition when clients receive instruction via telehealth with a therapist in comparison to in-person service delivery. Comparative studies of in-person vs virtual delivery of behavior analytic services for skill acquisition are required to determine whether the online format is capable of replacing in-person instruction altogether. While such a model will assist in extending services to more rural or underserved areas, more evidence is required to affirm that parents are not only capable of teaching new skills to their children, but also that they are trained and prepared to generalize those skills across environments and other people. In addition, some skills may be more easily taught in a telehealth format than others. The range of skills assessed across the included studies was wide and the efficacy of this format across different skills areas (i.e. communication, joint attention, pre-academic skills, self-care skills) and participant characteristics is yet to be determined without further research and comparison between interventions.

References

Barkaia, A., Stokes, T. F., & Mikiashvili, T. (2017). Intercontinental telehealth coaching of therapists to improve verbalizations by children with autism. *Journal of Applied Behavior Analysis, 50*(3), 582-589. 10.1002/jaba.391

Bearss, K., Burrell, T.L., Challa, S.A., Postorino, V., Gillespie, S.E., Crooks, C., & Scahill, L. (2018). Feasibility of parent training via telehealth for children with autism spectrum disorder and disruptive behavior: A demonstration pilot. *Journal of Autism and Developmental Disorders, 48,* 1020-1030.

Boutain, A. R., Sheldon, J. B., & Sherman, J. A. (2020). Evaluation of a telehealth parent training program in teaching self-care skills to children with autism. *Journal of Applied Behavior Analysis, 53*(3), 1259-1275. 10.1002/jaba.743

Crockett, J. L., Becraft, J. L., Phillips, S. T., Wakeman, M., & Cataldo, M. F. (2020). Rapid conversion from clinic to telehealth behavioral services during the COVID-19 pandemic. *Behavior Analysis in Practice*, 1–11. Advance online publication.

Centers for Disease Control and Prevention (2020). CDC COVID-19 global response. https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/

Ferguson, J. L., Majeski, M. J., McEachin, J., Leaf, R., Cihon, J. H., & Leaf, J. B. (2020). Evaluating discrete trial teaching with instructive feedback delivered in a dyad arrangement via telehealth. *Journal of Applied Behavior Analysis,* 10.1002/jaba.773

Fisher, W. W., Luczynski, K. C., Blowers, A. P., Vosters, M. E., Pisman, M. D., Craig, A. R., Hood, S. A., Machado, M. A., Lesser, A. D., & Piazza, C. C. (2020). A randomized clinical trial of a virtual-training program for teaching applied-behavior- analysis skills to

parents of children with autism spectrum disorder. *Journal of Applied Behavior Analysis,* 10.1002/jaba.778

Fisher, W. W., Luczynski, K. C., Hood, S. A., Lesser, A. D., Machado, M. A., & Piazza, C. C. (2014). Preliminary findings of a randomized clinical trial of a virtual training program for applied behavior analysis technicians. *Research in Autism Spectrum Disorders, 8*(9), 1044-1054. 10.1016/j.rasd.2014.05.002

Granpeesheh, D., Dixon, D.R., Tarbox, J., Kaplan, A.M., & Wilke, A.E. (2009). The effects of age and treatment intensity on behavioral intervention outcomes for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 3*(4), 1014-1022.

Grover, S., Goyal, S.K., Mehra, A., Sahoo, S., & Goyal, S. (2020). A survey of parents of children attending the online classes during the ongoing COVID-19 pandemic. *The Indian Journal of Pediatrics*.

Guðmundsdóttir, K., Ala'i-Rosales, S., & Sigurðardóttir, Z. G. (2019). Extending Caregiver Training Via Telecommunication for Rural Icelandic Children With Autism. *Rural Special Education Quarterly, 38*(1), 26-42. 10.1177/8756870518783522

Heitzman-Powell, L., Buzhardt, J., Rusinko, L. C., & Miller, T. M. (2014). Formative evaluation of an ABA outreach training program for parents of children with autism in remote areas. *Focus on Autism & Other Developmental Disabilities, 29*(1), 23-38. 10.1177/1088357613504992

Ingersoll, B., Wainer, A., Berger, N., Pickard, K., & Bonter, N. (2016). Comparison of a Self-Directed and Therapist-Assisted Telehealth Parent-Mediated Intervention for Children with ASD: A Pilot RCT. *Journal of Autism & Developmental Disorders, 46*(7), 2275-2284. 10.1007/s10803-016-2755-z

Klintwall L., Eikeseth S. (2014) Early and Intensive Behavioral Intervention (EIBI) in Autism. In: Patel V., Preedy V., Martin C. (eds) Comprehensive Guide to Autism. Springer, New York, NY.

Knowles, C., Massar, M., Raulston, T.J., & Machalicek, W. (2017). Telehealth consultation in a self-contained classroom for behavior: A pilot study. *Preventing School Failure. 61*(1), 28-38.

Ledford, J. R., Lane, J. D., Zimmerman, K. N., Chazin, K. T., & Ayres, K. A. (2016, April). Single case analysis and review framework (SCARF). Retrieved from: http://ebip.vkcsites.org/scarf/

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

Reichow, B., Hume, K., Barton, E. E., & Boyd, B. A. (2018). Early intensive behavioral intervention (EIBI) for young children with autism spectrum disorders (ASD). *The Cochrane database of systematic reviews*, *5*(5), CD009260.

Rooks-Ellis, D.L., Howorth, S.K., Boulette, S., Kunze, M., & Sulinski, E. (2020). Effects of a parent training using telehealth: Equity and access to early intervention for rural families. *Journal of Childhood, Education & Society, 1*(2), 141-166.

Schieltz, K.M., Romani, P.W., Wacker, D.P., Suess, A.N., Huang, P., Berg, W.K., Lindgren, S.D., & Kopelman, T.G. (2018). Single-case analysis to determine reasons for failure of behavioral treatment via telehealth. *Remedial and Special Education, 39*(2), 95-105.

Solomon, D., & Soares, N. (2020). Telehealth Approaches to Care Coordination in Autism Spectrum Disorder. *Interprofessional Care Coordination for Pediatric Autism Spectrum Disorder: Translating Research into Practice*, 289–306.

Subramaniam, S., Brunson, L., Cook, J., Larson, N., Poe, S., & St. Peter, C. (2017). Maintenance of Parent-Implemented Discrete-Trial Instruction during Videoconferencing. *Journal of Behavioral Education, 26*(1), 1-26. 10.1007/s10864-016-9258-z

Unholz-Bowden, E., McComas, J. J., McMaster, K. L., Girtler, S. N., Kolb, R. L., & Shipchandler, A. (2020). Caregiver training via telehealth on behavioral procedures: A systematic review. *Journal of Behavioral Education, 29*(2), 246–281.

Vismara, L. A., Young, G. S., Stahmer, A. C., Griffith, E. M., & Rogers, S. J. (2009). Dissemination of evidence-based practice: can we train therapists from a distance? *Journal of Autism & Developmental Disorders, 39*(12), 1636-1651. 10.1007/s10803-009-0796-2

Vismara, L. A., McCormick, C. E. B., Wagner, A. L., Monlux, K., Nadhan, A., & Young, G. S. (2018). Telehealth parent training in the Early Start Denver Model: Results from a randomized controlled study. *Focus on Autism and Other Developmental Disabilities, 33*(2), 67-79. 10.1177/1088357616651064

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 & Developmental Disorders, 43*(12), 2953-2969. 10.1007/s10803-013-1841-8

Wainer, A. L., & Ingersoll, B. R. (2015). Increasing Access to an ASD Imitation Intervention Via a Telehealth Parent Training Program. *Journal of Autism and Developmental Disorders, 45*(12), 3877-3890. 10.1007/s10803-014-2186-7

Table 1. Descriptive Information of Selected Studies

Study	Participants	Research Design	Targeted Skill(s)	Training	Measures	Outcomes
Barkaia (2017)	Interventionists: three female therapists (Age 24-32). Participants with ASD: three males (Age 4-6)	Single-case design: multiple-baseline design across participants to evaluate the effects of the intervention	Mand and echoics	Naturalistic teaching, Didactic training: spoken and written instructions describing mand and echoic operants, practice exercise to discriminate. Coaching: video conferencing for mand training, contingencies, and prompting	Interventionist: fidelity/correct implementation of feedback. ASD Participant: mands and echoic responses	Therapists demonstrated improvements in correct command sequences and positive consequences. The children demonstrated improvements with echoics and mands
Boutain (2020)	Three children with ASD (age 4-5 years), two boys and one girl, and their parents	Single case Design: nonconcurrent multiple baseline design across parent–child dyads and across	Self-care skills (i.e., washing hands, washing face, and applying lotion	BST Parent Training using FaceTime on a iPad mini	Parent participants: correct implementation of the graduated guidance procedures. Child participants:	Detailed written instructions alone initially not sufficient to teach parents graduated guidance with

	participated	self-care skills within parent–child dyads was used to evaluate the effectiveness of the telehealth parent training program			independent completion of self-care skill steps	acceptable levels of fidelity. Parents implemented procedures with at least 90% fidelity after BST program. All children learned to complete self-care skills.
Ferguson (2020)	Six children independently diagnosed with ASD (age 3-7), organized into dyads	Single-case design: A nonconcurrent multiple baseline design across dyads used to assess the effects of DTT with instructive feedback delivered via telehealth on the acquisition of tact relations	Tact relations. Stimuli targeting superheroes and their corresponding superpowers. Stimuli were taught to each participant in pairs for a total of four stimuli per dyad.	None	Correct primary responses (name of superhero); Correct secondary responses (hero's power)	Primary Responses: mastered by each dyad in a mean of 5 sessions. Secondary Responses: mastered by each dyad in an average of 3 sessions. Across maintenance probes, all participants responded correctly during 100% of trials for their primary responses and

						demonstrated high levels of responding for secondary responses
Guðmundsdóttir (2019)	Three families with a child diagnosed with ASD (age 3-6)	Single-case design, multiple baseline experimental design across child's skills	Social Attending and Requesting	Parent training program, Sunny Starts. The Teaching "DANCE"	Behavioral measures were based on the Sunny Starts observation code	A brief in-situ training and ongoing telecommunication training increased parent skills and had a positive effect on the children's' skills, especially social attending.
Ingersoll (2016)	Twenty-eight families of a child with ASD (age 19-73 months)	RCT- self-directed vs therapist-assisted	Expressive Language	Parent self-directed and therapist-assisted delivery models of ImPACT Online	Parent behavior was scored for correct use of the intervention using the Project ImPACT fidelity checklist. Parents completed the MCDI at pre and post as a measure of their child's	Improvement in child language use over time. There was a significant main effect of time for parent fidelity, such that parents were rated higher on their use of the intervention

					expressive vocabulary. VABS-II at pre and posttraining	at post-treatment. The therapist-assisted group made greater gains in fidelity than the self-directed group
Meadan et al. (2016)	Three mother–child dyads. Children ages 2-4, diagnosed with ASD.	Single-case design: multiple-baseline design across strategies within each family	Child communication behaviors: (a) initiating a communication exchange or (b) responding to a parent's communication act	Parent Training: Internet-Based Parent-Implemented Communication Strategies (i-PiCS) with additional coaching and feedback from practitioners	Coded five random consecutive minutes using a coding manual that detailed the parent and child behaviors: (a) the naturalistic teaching strategies, (b) rating the quality or how well the parent implemented the teaching strategies (from 1 = low to 4 = high), and (c) the child's communicative behavior (i.e.,	Mothers: coaching has the largest impact on the combined measure of quality and rate of strategy use (clear on all nine occasions); however, a potential sequence effect needs to be considered. Third, although all three mothers' performance scores clearly diminished between the coaching and maintenanc

					initiating and responding).	e phases, their performance in maintenance outpaced that of baseline . Children: parents reported (a) increased involvement in family activities, (b) increased positive interactions, and (c) improved verbal and nonverbal communication.
Subramaniam et al. (2016)	Four rural mother–child dyads with no previous training in DTI or applied behavior analysis participated. Mothers (age 29-43), Children with ASD (ages 2-11)	Single-case design: nonconcurrent multiple-baseline-across-parents design to evaluate effects of the training procedures and videoconferencing on treatment integrity	Letter Sounds, Letter ID, Letter Blends, Sight Words, Synonymns, Antonymns, Color ID, Number ID, Shape ID, Object ID, Emotion ID, Prepositions, and Community Helpers	Parent in vivo training (an initial visit and a training day). Confederates followed a script appropriate and inappropriate responding and provided feedback.	(a)Global parental treatment integrity during DTI using checklist based on the Discrete-Trials Teaching Evaluation Form. (b) Child Mastery of targeted skills	Parents learned to implement DTI with high integrity following in vivo behavioral skills training. The DTI skills that parents learned with a confederate were generalized to working

						with their children. Parents continued to implement DTI with high treatment integrity with remote supervision delivered via videoconferencing several months after training.
Vismara et al. (2009)	Ten interventionists with minimum of Bachelor's degree and no training in ESDM, 29 children with diagnosis of ASD (ages 24-51 months)	An effectiveness trial to compare distance learning vs. live instruction for training community-based therapists to implement the Early Start Denver Model	Spontaneous functional verbal utterances and imitative behaviors.	(a) direct intervention of the ESDM; and (b) parent coaching of the ESDM.	(a)Therapist/parent fidelity(treatment fidelity scores examined using a repeated measures mixed model analysis wherein training condition was treated as a 4-level within-subjects variable and delivery method was treated as a	(a) distance learning and live instruction were equally effective for teaching therapists to both implement the model and to train parents; (b) didactic workshops and team supervision were required to improve therapists' skill use; (c) significant

					2-level between subjects variable). (b) Change in children's behaviors (functional verbal utterances, imitation, attention, and social initiations)	child gains occurred over time and across teaching modalities; and (d) parents implemented the model more skillfully after coaching
Vismara et al. (2013)	Eight children (20-45 months) with ASD and at least one parent who expressed interest in learning the intervention and was available to participate in all of the telehealth sessions	Single-case design: single-subject, multiple-baseline design was conducted across the eight parent–child dyads	(a) Functional verbal utterances for the purposes of requesting/commenting and (b) Nonverbal joint attention initiations	Self-guided website. Parent coaching sessions occurred once-per-week for 1.5 h across 12 weeks with discussion, role-playing, and feedback	(1) their satisfaction with the program, (2) their intervention skills and engagement style with the child, (3) their direct usage and impact of the website on intervention and engagement skills, and (4) their effect on improving children's social communicative behaviors.	Their overall mean fidelity during intervention was 3.68/5.0 with six of the eight parents achieving scores of 4.00 or higher; whereas the other two parents made improvements but did not meet the threshold. At follow-up, all parents except one had at least one fidelity

						score of 4.00 or higher with a group mean of 4.15.
Vismara et al. (2019)	Twenty-four parents and their children (diagnosed with ASD, age 18-48 months)	RCT: P-ESDM vs treatment-as-usual services accessed from within their communities	Social Communication behaviors(a) Spontaneous, unprompted functional verbal utterances (b) imitative functional, related play actions and (c) unprompted, nonverbal joint attention behaviors	Telehealth parent training in the Early Start Denver Model (P-ESDM) vs. a community treatment-as-usual, early intervention program	Primary outcome measures included group differences in parents' P-ESDM fidelity use followed by secondary changes in children's social communication skills as a result of parent-implementation. Social Communication behaviors in children	P-ESDM Fidelity: no one met fidelity during baseline and therefore only post and follow-up time points were included in the model to enhance convergence. At post-treatment, five out of 14 P-ESDM parents met fidelity compared with only two out of the eight comparison parents. Social Communication Behaviors: Overall, children in the P-ESDM group produced

						higher rates of imitation and both groups increased their imitation across time. no significant main effects in joint attention.
Wainer et al. (2015)	Five young children with ASD and their parents (age 29-59 months)	Single-case design: single-subject, multiple-baseline design was conducted across the five parent–child dyads	Imitation	(1) Self-directed portion of the telehealth program and two subsequent data collection probes followed by (2) three, 30-min coaching sessions and three data collection probes (coaching probes). The follow-up phase involved two data collection probes approxim	Trained observers scored the parent–child interactions for parent fidelity of the RIT intervention techniques using the RIT fidelity form. Trained observers scored the parent–child interactions for child spontaneous imitation. Rate per minute of spontaneous imitation	Parents: Self-directed condition, parents demonstrated immediate increases in fidelity levels with ratings in the high to moderate to high range.Four of the five parents achieved overall fidelity of implementation at some point during either the self-directed and/or the coaching conditions.

				ately 1- and 3-months after the final coaching probe		Once parents achieved fidelity of implementation, most maintained high levels of overall fidelity at the 1- and/or 3-month follow up time points. Children: Most of the children demonstrated moderate levels of spontaneous imitation at the 1- and 3-month follow up probes, with four out of the five children maintaining higher than baseline rates of spontaneous imitation

Figure 1. PRISMA diagram of search strategy

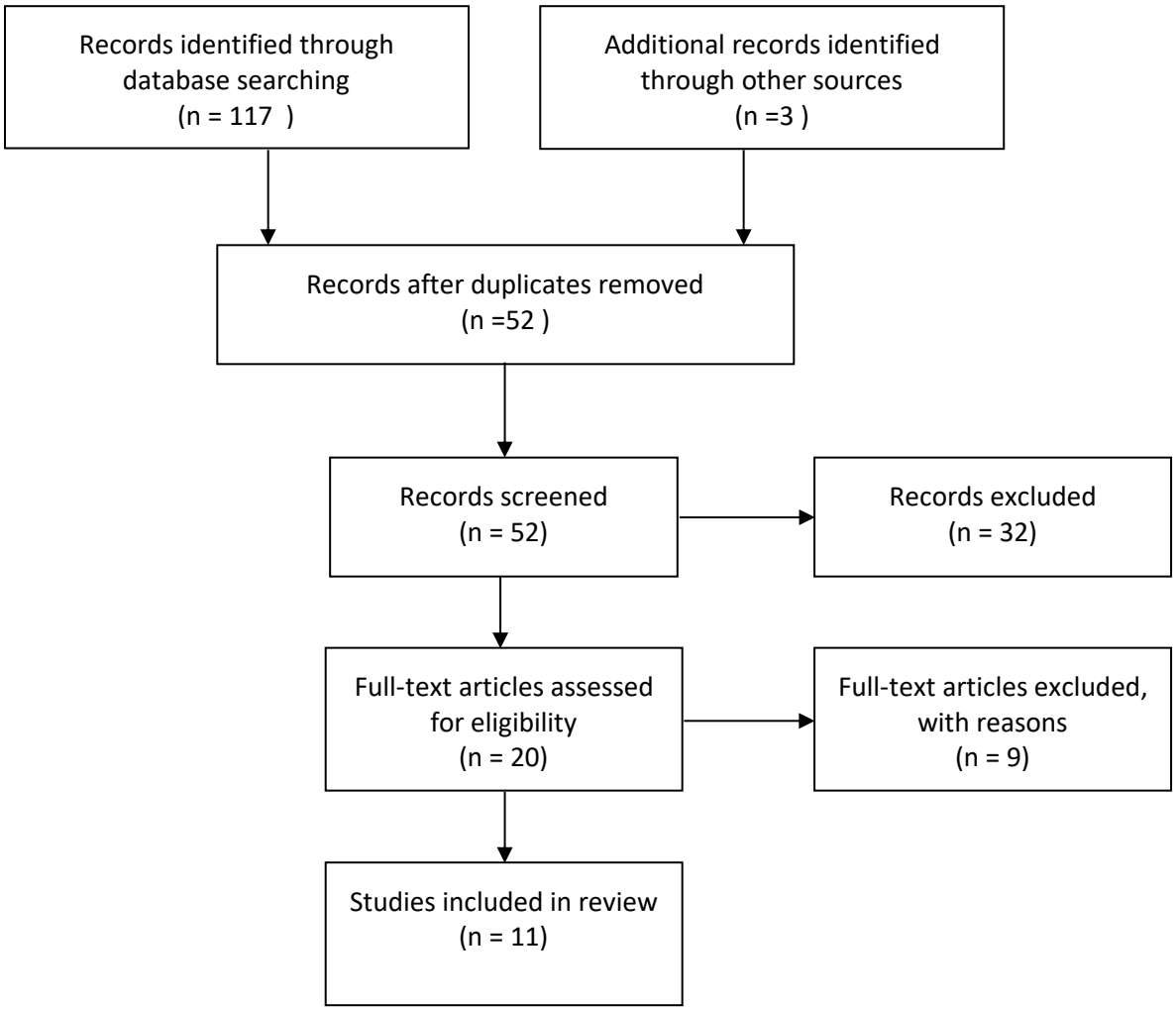
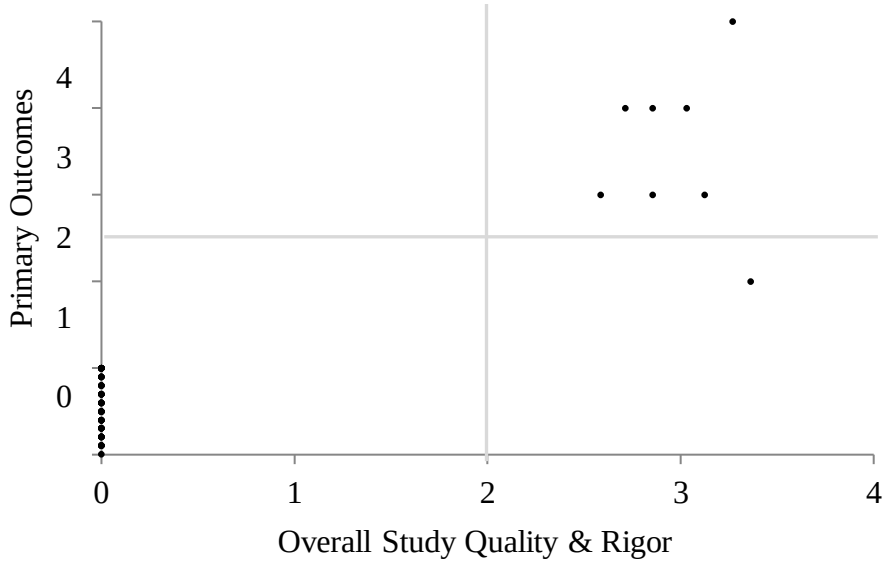
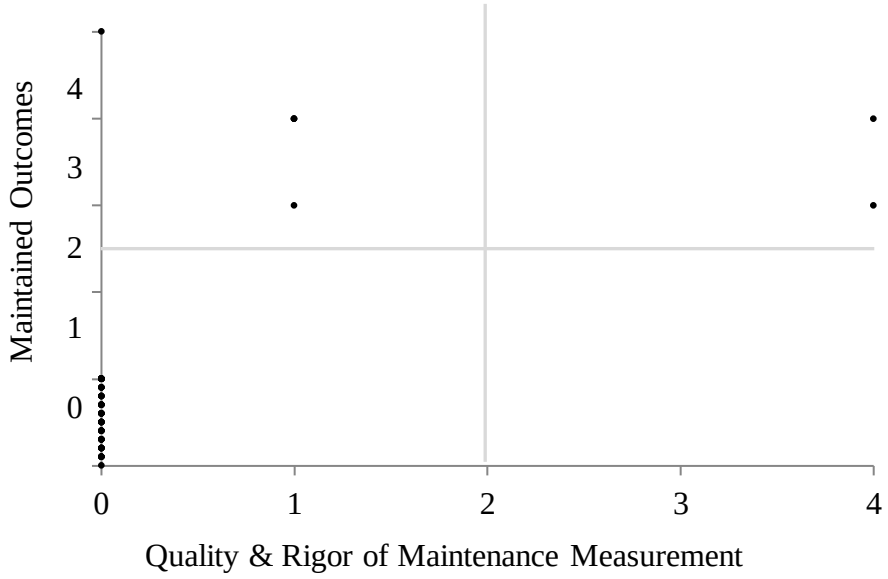
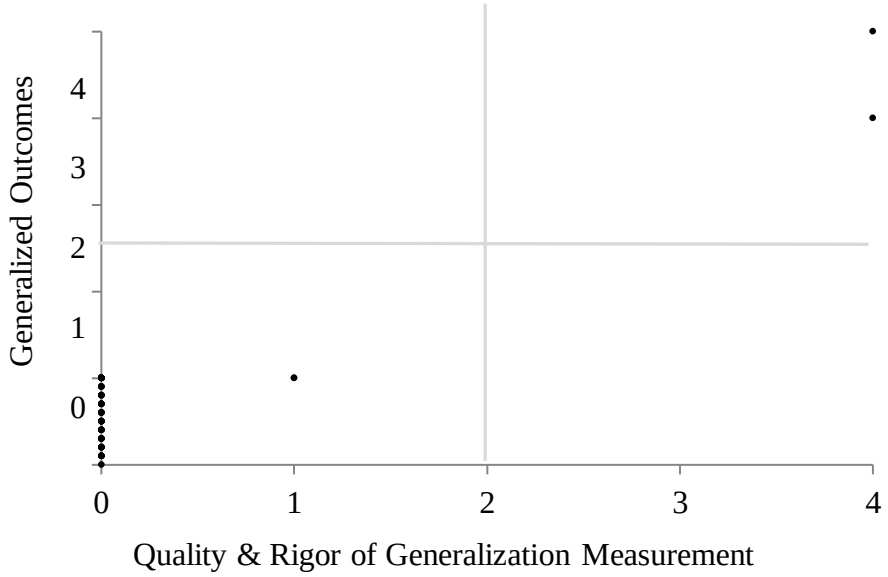


Figure 2. SCARF graphs of study rigor and quality




Maintained Outcomes
0
1
2
3
4
0
1
2
3
4
Quality & Rigor of Maintenance Measurement


Generalized Outcomes
0
1
2
3
4
0
1
2
3
4
Quality & Rigor of Generalization Measurement