

ABA Training via Telehealth for Caregivers of Children with Autism: A Review of the Literature

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Abstract

The current COVID-19 circumstances have forced many of us to turn away from in-person consultations and receive virtual services instead, but are autistic children receiving the effective services they need during the COVID-19 pandemic? Applied Behavior Analysis (ABA) procedures have been used as an effective form of treatment for autistic children for many years and have been provided via telehealth even before the pandemic came along. The purpose of this review of literature was to investigate if ABA caregiver training via telehealth was an effective form of providing services to families of children with autism. We strived to focus on the functional analysis (FA) and functional communication training (FCT) portions of the caregiver training in ABA therapy. The population of interest for this review included children ages 2-12 diagnosed with autism spectrum disorder (ASD) and their caregivers. The findings of this study demonstrate that ABA therapy via telehealth was effective because it reduced problem behaviors and increased mands, it could be feasibly implemented with fidelity by caregivers, it was accessible, and it was highly rated by caregivers of children with autism.

Keywords: functional communication training, telehealth, functional analysis, applied behavior analysis, parent training

Introduction

According to the Centers for Disease Control and Prevention (2020) data from 2016, 1 out of every 54 children in the U.S. is diagnosed with autism spectrum disorder (ASD). Some of the main difficulties that children with ASD struggle with include problematic behaviors such as aggression, self-injurious behaviors (SIB), property destruction, and noncompliance. However, there are treatments that have demonstrated to be effective in treating and helping reduce these problematic behaviors, some of which include applied behavior analysis (ABA). ABA therapy has been used by caregivers of children with autism for decades. These therapies include procedures such as functional analysis (FA) used to detect the function of behaviors, and functional communication training (FCT) which is an intervention used to help reduce the targeted problem behavior through the detection of the function of behavior in FA.

Although ABA therapy has shown to be an effective treatment for the challenging symptoms of children with autism, it may not be possible for all families to access these services. Therefore, recent research has studied telehealth as an alternative option for those families who perhaps live in a rural area or are too far away from clinics/hospitals in which ABA services can be provided. Furthermore, these studies have strived to examine the effectiveness of caregiver training via telehealth, specifically the fidelity of FA and FCT procedures implemented by the caregivers, and the caregivers' acceptability of treatment. As a result, caregiver training via telehealth provided by behavior consultants may be a promising option available to those with limited access to ABA services.

According to McLeod's (2018) article on B.F. Skinner's operant conditioning theory, an individual makes an association between a behavior and a consequence. The operant conditioning theory argues that behaviors that are reinforced are more likely to occur, and behaviors that are

not reinforced are less likely to occur (Skinner, 1938). In his famous "Skinner Box" experiment, Skinner demonstrated that rats learned and repeated behaviors that had been reinforced by a rewarding consequence (food), this is known as positive reinforcement. The rats in Skinner's studies also learned and repeated behaviors that had previously resulted in the removal of an unwanted stimulus (electric shock), also known as negative reinforcement (Skinner, 1938; McLeod, 2018). Similarly, applied behavior analysis uses reinforcement and rewards to strengthen desired behaviors and removes them to make undesired behaviors less likely.

During ABA therapies' caregivers are taught to reward their children's positive behavior by providing some type of reinforcement, and not rewarding the unwanted behaviors. Similar to the ABA therapies used to train the caregivers of children with autism, B.F. Skinner's (1938) operant conditioning experiment gives us a better understanding of the connection someone makes between a behavior and a consequence as well as the power of reinforcement on behavior. However, it is important to note that much of the learned behaviors in Skinner's experiment could have been due to the rats' enclosure in the box and their inability to escape. In addition, Shrestha (2017) reports that the operant conditioning learning theory fails to acknowledge the "mental thoughts and cognitive factors that influence learning, memory and behavior." Some suggest that the rats' behaviors cannot be representative of the way humans would behave due to the differences in physiology and anatomy between the two.

Other theories, such as Bandura's (1977) Social Learning Theory acknowledges the importance a social context has on a person's behavior. His theory focused on the process of observational learning. Unlike Skinner, Bandura's theory highlighted the cognitive factors that took place during the learning process. Bandura believed that humans actively process information and consider the consequences of their behaviors (Bandura, 1977). In 1986, Bandura renamed his

theory, Social Cognitive Theory. Bandura proposed four mediational processes: attention, retention, reproduction, and motivation, which explained the mental events that take place before any imitation of behavior occurs (Bandura, 1986). Although Bandura's theory acknowledges the existence of the mental processes that take place when deciding whether to imitate a behavior or not, McLeod (2016) states that it fails to identify behavior through the interaction of both nature (biology) and nurture (environment). In addition, it cannot fully explain humans' thoughts and feelings processes. Therefore, it fails to provide a complete interpretation of behavior. Keeping these general theoretical approaches in mind, we would like to dive into the more recent and specific research studies analyzed for this review regarding ABA training via telehealth.

Literature Review

Wacker et al. (2012) examined the effectiveness of ABA caregiver training via telehealth. Their study included 17 caregivers of children with ASD who conducted functional assessments and functional communication training via telehealth in order to reduce problem behaviors. The problem behaviors identified by the caregivers in this study include aggression, self-injury, property destruction, screaming, elopement, repetitive behavior, dangerous behavior, and task refusal. Amongst the 17 children, a total of 19 FCT treatments were implemented (Wacker et al., 2012). The researchers' findings indicate that 93.5% of targeted problem behaviors decreased. In the caregiver acceptability survey completed by the caregivers, they rated the telehealth services as highly acceptable (Wacker et al., 2012). In addition, Wacker et al. (2012) compared the costs of in vivo and telehealth services to conduct FAs and FCTs and determined that telehealth services were relatively cheaper than in vivo sessions.

Recent research, such as Tsami et al. (2019) have demonstrated the effectiveness of providing behavior analysis services and caregiver training via telehealth in other countries (outside of the U.S.). The researchers' findings indicate that both functional assessment (FA) and functional communication training (FCT) provided to caregivers of children with autism via telehealth was successful. Through the help of interpreters to assist the caregivers' and the therapists' communication while implementing FA and FCT, they were able to decrease problematic behaviors such as screaming, aggression, self-injury, flopping, and property destruction, by at least 80% in all of the 12 children who remained in their study (Tsami et al., 2019). In addition, the 12 caregivers in the study rated the telehealth services by completing an acceptability survey, which was also completed by 13 caregivers in the U.S. who received telehealth services during this time by the same therapist. The results of their study indicate that caregivers were overall satisfied with the procedures and their ratings were similar to the caregivers who received telehealth services in the U.S. Therefore, the findings from Tsami et al. (2019) indicate that FA and FCT via telehealth can be successfully applied even if there are cultural differences or communication barriers present.

Furthermore, a study conducted by researchers Benson et

al. (2018) coached the caregivers of two boys with developmental disabilities via telehealth by using FA and FCT in order to reduce self-injurious behaviors (SIB). One of the boys was an 8-year-old with cerebral palsy, and the other was a 5-year-old with ASD. The coach was a graduate student in Educational Psychology with 3 years of experience in implementing FA and FCT procedures. Using an ABAB design, the baseline (FA) and intervention (FCT) were conducted by each of the boys' caregivers while following the instructions of the coach via telehealth (Benson et al., 2018). Their results showed a caregiver fidelity of 99% across FCT conditions for one of the boys, and 88% for the other. Although the correct implementation of FA procedures ranged from 33% to 100% (Benson et al., 2018) a great majority of the FA conditions demonstrated above 80% fidelity. In addition, the results from Benson et al. (2018) demonstrated that the rate of SIB of the two boys decreased to zero or nearly zero in the final conditions.

One of the most recent studies, Lindgren et al. (2020) included 38 children with ASD (ages 21-84 months) in which FA and FCT was implemented via telehealth. Caregivers conducted all FA and FCT procedures in their homes with the help of coaching from behavioral consultants via telehealth (Lindgren et al., 2020). The problematic behaviors in this study were self-injurious behavior, aggressive behaviors, verbal outburst, and noncompliance. Through a randomized control trial, Lindgren et al. (2020) randomly assigned participants into either a control group which received delayed intervention (FCT), or the immediate group which received immediate FCT intervention. Their results demonstrated that caregiver implemented FCT via telehealth provided better results in problem behavior reduction than the intervention "as usual" group (Lindgren et al., 2020). However, once FCT treatments were introduced to the "delayed" intervention group, the control group's problem behaviors also significantly declined. Lastly, the caregivers' acceptability was also taken into account by using a 7-point Likert scale post hoc in which the caregivers indicated their high acceptability for the FCT procedures they had learned and implemented via telehealth (Lindgren et al., 2020).

Likewise, Suess et al. (2014) found that functional communication training via telehealth reduced problem behaviors across all three of their participants. Their findings show that telehealth can be an effective and beneficial resource for caregivers of children with autism in rural areas. Furthermore, Suess et al. (2014) studied the treatment fidelity of the caregiver's implementation of the FA and FCT procedures in which caregivers recorded themselves during independent sessions. During these independent sessions, caregivers were given specific steps to follow in order to correctly apply FCT procedures. After each video was submitted, a coaching session was provided by the behavior consultant. In addition, the behavior consultant gave feedback to the caregivers based on the errors or correctly implemented steps seen in the recordings (Suess et al., 2014). Similarly, caregiver acceptability of treatment via telehealth was highly rated (Suess et al., 2014).

Preliminary evidence found by Suess et al. (2016), suggests that all participants showed a reduction in problem

behaviors of 50% or more, 65.1% on average, with FA and FCT procedures implemented while using telehealth services. In their study behavior consultants trained the caregivers of 5 children with ASD on FA and FCT procedures during a 1-hr FA visit and three 15-min FCT visits. The purpose of their study was to demonstrate the effectiveness of FA and FCT procedures via telehealth while decreasing the amount of time needed in training caregivers (Suess et al., 2016). The researchers strived to demonstrate that ABA services through telehealth are effective and available to families sooner than the typical wait time of six months, for access to these services (Suess et al., 2016).

However, a single-case analysis conducted by Schieltz et al. (2018) found that caregiver training in FA and FCT procedures via telehealth is not always successful in reducing problem behaviors. Schieltz et al. (2018) focused on two participants, Liam and Sara, from a previous study (Lindgren & Wacker, 2011) in which FCT procedures via telehealth were unsuccessful at decreasing problem behaviors. The purpose of their study was to determine why FA and FCT failed in these two cases and to examine the fidelity with which the procedures were implemented. Through the use of establishing operations and reinforcement analysis, the researchers reanalyzed the cases and found that Liam's problem behavior was maintained first by social reinforcers but then switched to automatic reinforcement (Schieltz et al., 2018). Whereas Sara's problem behavior was also maintained by social reinforcers but showed high variability in manding and task completion during FCT (Schieltz et al., 2018). In addition, the fidelity of the behavior consultants in their study was 100%, 96% for Liam's mother, and only 45% fidelity was recorded for Sara's mother. Thus, suggesting that low fidelity could have been what impacted Sara's results during FCT (Schieltz et al., 2018).

Further inspection by Wacker et al. (2013) suggests that FAs can be conducted effectively with little training time and it is a cost-effective alternative to in-person consultations. Two behavior consultants in their study trained the caregiver assistants and caregivers of 20 children with ASD (ages 29-80 months) on FA procedures via telehealth. The total training time via telehealth of caregivers, caregiver assistants, and consultants' time, took approximately 4 hours per participant. The weekly costs of telehealth services were \$57.95, rather than \$335.09 if the services were provided in person (Wacker et al., 2013). Furthermore, their findings demonstrated a successful and cost-effective means for reducing problem behavior in all participants, after FCT interventions were matched to the FA results (Wacker et al., 2013).

Moreover, a study by Machalicek et al. (2016) trained the caregivers of three school-aged children with ASD through teleconferencing. The caregivers of the children in Machalicek et al. (2016) were trained to effectively implement functional analyses, functional communication training, antecedent manipulation strategies, and consequence-based strategies. Caregivers in their study were allowed to try and select the intervention that best fit their family needs. Additionally, a social validity questionnaire was given to the caregivers to determine the acceptability, effectiveness, and disadvantages of the

interventions (Machalicek et al., 2016). Their findings indicate that caregiver training in intervention strategies via telehealth was an effective way to reduce challenging behaviors of all of their participants with ASD (Machalicek et al., 2016).

Unlike most studies, which tend to focus on FA and FCT procedures via telehealth for decreasing challenging behaviors, Simacek et al. (2017) chose to focus on communication interventions for children with neurodevelopmental disabilities. Their study included three young females (ages 3.5-4 years old), two with ASD and one with Rett syndrome, and their caregivers. A functional assessment interview (FAI), a structured descriptive assessment (SDA), and a multi element probe design (MPD) was used in this study (Simacek et al., 2017). The researchers trained caregivers to conduct FA and FCT procedures via telehealth with the goal of decreasing idiosyncratic responses (difficult to interpret responses such as reaching or tantrums) and increasing augmentative and alternative communication (AAC) in order to provide the participants with a more broadly understood form of communication. Simacek et al. (2017) findings indicated that communication interventions via telehealth were effective and highly acceptable by the caregivers through the use of a modified version of the Treatment Acceptability Rating Form-Revised (TARF-R; Reimers and Wacker 1988; Reimers et al. 1981).

The purpose of the current review of literature is to analyze the existing research on the use of telehealth services to deliver ABA caregiver training and therapy to children with autism. Additionally, we want to examine the fidelity and feasibility with which caregivers are able to implement the FA and FCT procedures. But will ABA caregiver training via telehealth be truly effective in reducing problem behaviors in children with autism? Will the FA and FCT procedures be implemented with fidelity by the caregivers? Based on my research questions, I hypothesize that caregivers who receive ABA caregiver training via telehealth in FA and FCT procedures will effectively reduce problem behaviors of their children with ASD. In addition, I hypothesize that the FA and FCT procedures will be implemented with fidelity and rated as acceptable by the caregivers.

Methods

Participants

For this literature review, there was a particular interest in studies focused on children with autism and their caregivers. A total of 105 children with ASD and their families participated in the selected studies for this review. The target age range of interest for this literature review was children with autism ages 2-12 years old and their caregivers (see Table 1). The level of education of the caregivers was expected to vary greatly. In addition, these studies focused on ABA therapists who were using telehealth services to provide therapy and training. Likewise, the levels of education and experience of each ABA therapist was expected to differ (see Table 2).

Materials

The articles that were selected for this review of literature

were collected through a series of steps to ensure a high-quality evaluation of the effectiveness of ABA telehealth services used for caregiver training of children with autism. In addition to the use of the University Library OneSearch engine, some of the key databases that were searched for this review of literature include EBSCOhost, Academic Search Premier, PsycINFO, ScienceDirect, and Google Scholar. These searches aimed to find peer-reviewed journals relevant to the topic of ABA therapy, telehealth education, and ABA training for caregivers of children with autism. Important educational journals in which these articles were published were analyzed independently and included in this review. Academic journals such as the *Journal of Applied Behavior Analysis*, *Behavior Analysis in Practice*, *Journal of Autism and Developmental Disorders*, *Journal of Educational and Psychological Consultation*, *Research in Autism Spectrum Disorders*, *Behavioral Interventions*, *Behavior Analysis: Research and Practice*, *Journal of Developmental and Physical Disabilities*, were all considered significant and possible contributors for this review.

Procedure

First, a wide search was made in each of the previously mentioned databases using the following keywords: *autism spectrum disorder*, *applied behavior analysis*, *ABA therapy*, *telehealth*, *telecommunication*, *telemedicine*, *parent training*, *caregiver training*, *virtual-training*, *functional analysis*, *functional communication training*, and *ABA interventions*. Next, a filter was applied to each of the database searches in order to ensure only peer-reviewed articles published from 2010 to 2020 were located for future examination. Lastly, the reference section of each article was considered in order to obtain more articles relevant to the topic of interest. Through the use of this search method, a minimum of 10 studies were selected and analyzed in which different areas of focus were evaluated including the effectiveness of telehealth consultations, the use of ABA therapy, behavior analytic interventions, autism caregiver training, and functional communication training via telehealth.

All of the studies were individually inspected based on the following components: child participant age range and diagnosis, caregiver implementing procedures, caregiver level of education, consultant's level of education/experience, additional caregiver assistance provided, child and caregiver location, type of ABA procedure implemented, target behaviors, caregiver

treatment acceptability rating, and the impact of telehealth services on behaviors of the participants. The system of methods utilized by these studies during their collection of data, such as the use of surveys, learning outcomes, or descriptive data, was noted.

Design

For this review of the literature, past research on the topic of caregiver training via ABA telehealth services was reviewed in order to obtain a better understanding and ultimately be able to apply the results of significant studies to ABA practice. Therefore, a thorough review process was implemented.

A meta-analysis was not conducted because elements such as the methods for data collection, areas of focus, and type of telehealth service providers used, differed significantly amongst the studies. In addition, the reliability and validity of the studies was not always reported. Therefore, the accuracy and exactness necessary for a meta-analysis was not present.

Results

Based on the results of previous studies (Benson et al. 2018; Lindgren et al. 2020; Machalicek et al. 2016; Schieltz et al. 2018; Simacek et al. 2017; Suess et al. 2014; Suess et al. 2016; Tsami et al. 2014; Wacker et al. 2012; Wacker et al. 2013), we expected to find a high percentage of caregivers' acceptability of FA and FCT procedures via telehealth. Although not all studies reported caregiver acceptability ratings, the studies that did showed that caregivers considered the treatment via telehealth as highly acceptable (see Table 3). We also expected to find a decrease in problematic behaviors across all participants (children with autism) in this review. As expected, the current review of literature demonstrated a decrease in problematic behaviors across most of the examined studies (see Table 3). In addition, the fidelity of caregiver applied FA and FCT procedures were expected to be at elevated levels. Likewise, the feasibility of caregiver training, provided by behavior consultants, on FA and FCT procedures were expected to be relevant and applicable. Although not all of the variables were addressed in all of the studies chosen for this review, the majority of studies demonstrated high fidelity, feasibility, and acceptability of caregiver training in FA and FCT procedures via telehealth (see Table 3). In addition, the location of the behavior consultants and the families of the children receiving treatment were also noted (see Table 2).

Table 1
Participant Demographic Information

Study	Participants	Ages	Diagnosis	Caregiver Implementing Procedures	Caregiver Level of Education
Wacker et al. (2012)	17 children	29-83 months	ASD	16 mothers, 2 fathers	Some level of post-secondary education

Table 1
Continued

Study	Participants	Ages	Diagnosis	Caregiver Implementing Procedures	Caregiver Level of Education
Wacker et al. (2013)	20 children	29-80 months	ASD	19 mothers, 1 father	Most had a degree beyond high school
Suess et al. (2014)	3 children	2.7-3.3 years	ASD	3 caregivers	Ranged from high school to doctoral degree
Machalicek et al. (2016)	3 children	8-16 years	ASD	2 mothers, 1 father,	Ranged from high school to bachelor's degree
Suess et al. (2016)	5 children	2.5-7.1 years	ASD	Caregivers	Not found
Simacek et al. (2017)	3 children	3.5-4 years	ASD (1) Rett Syndrome (2)	3 mothers, 2 fathers	Not found
Benson et al. (2018)	2 children	5-8 years	ASD or Cerebral Palsy	Caregivers	Not found
Schieltz et al. (2018)	2 children	2.10-6.11 years	ASD	2 mothers	Ranged from some college experience to master's degree
Tsami et al. (2019)	12 children	3-13 years	ASD	10 mothers, 1 father, 1 brother	10 out of 12 had college degrees
Lindgren et al. (2020)	38 children	21-84 months	ASD	Caregivers	Not found

Note. ASD = autism spectrum disorder.

Table 2
Telehealth Consultations Information

Study	Consultants Location	Consultants Providing Coaching	Consultant's Level of Education/ Experience	Additional Caregiver Assistance Provided	Child and Caregiver Location
Wacker et al. (2012)	University of Iowa Children's Hospital (about 222 miles from regional clinics)	2 behavior consultants, 1 senior behavior analyst	Behavior consultants unknown, BCBA 20 years	Caregiver assistants available	Child Health Specialty Clinics (within 15 miles from family's homes)
Wacker et al. (2013)	University of Iowa Children's Hospital (about 222 miles from regional clinics)	2 behavior consultants	4-9 years of experience One w/bachelor's degree, and one doctoral candidate.	Caregiver assistants available	Child Health Specialty Clinics (within 15 miles from family's homes)
Suess et al. (2014)	Telehealth Center at University of Iowa Children's Hospital	1 behavior consultant	Doctoral student with 6 years' experience	None	Family's Home

Study	Consultants Location	Consultants Providing Coaching	Consultant's Level of Education/ Experience	Additional Caregiver Assistance Provided	Child and Caregiver Location
Machalicek et al. (2016)	Private university office	1 behavior consultant	BCBA-D with PhD in Special Education	None	Family's Home
Suess et al. (2016)	Telehealth Center at University of Iowa Children's Hospital	3 behavior consultants	Doctoral students with 5-8 years' experience	Caregiver assistants available	Therapy room at a regional autism center (177 miles from UICH)

Table 2
Continued

Study	Consultants Location	Consultants Providing Coaching	Consultant's Level of Education/ Experience	Additional Caregiver Assistance Provided	Child and Caregiver Location
Simacek et al. (2017)	Telepresence Behavior Lab (TBL)	Behavior consultants	Unknown	None	Family's Home
Benson et al. (2018)	Tele Behaviour Lab at the University of Minnesota	Behavior consultants	Graduate student in Educational Psychology with 3 years' experience provided direct caregiver-coaching	None	Family's Home
Schieltz et al. (2018)	Telehealth Center at University of Iowa Children's Hospital	Behavior consultant	Unknown	None	Family's Home (64-296 miles from telehealth center)
Tsami et al. (2019)	Office at a Houston, TX university	2 behavior consultants	Unknown	Interpreters	Family's Home (Internationally)
Lindgren et al. (2020)	Telehealth Center at University of Iowa Children's Hospital	Behavior consultants	Behavior analyst or advanced graduate trainees with at least 2 years' experience	None	Family's Home

Note. BCBA = board certified behavior analyst.

Table 3
Caregiver Training in ABA Procedures via Telehealth

Study	Type of ABA procedure	Target Behaviors	Results	Treatment Acceptability
Wacker et al. (2012)	FA + FCT	Problem behaviors: aggression, self-injury, destruction, and disruption	93.5% reduction in problem behavior	Not reported
Wacker et al. (2013)	FA	Problem behaviors: aggression, property destruction, self-injury, disruption, dangerous behavior, and repetitive movements	90% identified social function during initial FA	Not reported
Suess et al. (2014)	FCT	Problem behaviors: SIB, aggression, and property destruction	All participants demonstrated significant reductions in problem behaviors	Rated as highly acceptable by caregivers (TARF-R)
Machalicek et al. (2016)	FA + Function-based treatment	Challenging behaviors: aggression, inappropriate vocalizations, SIB, material destruction, and spitting	Decreased challenging behaviors for each participant	Mean rating of 5.22 on a 6-point Likert scale
Suess et al. (2016)	FA+FCT	Problem behaviors: aggression, destruction, SIB, and crying	Identified social functions for most participants, on average problem behaviors reduced by 65.1%, task completion increased by 34.3% and by 87.5% for manding	Not reported
Simacek et al. (2017)	FA+FCT	Communication skills: identifying idiosyncratic responses (difficult to interpret responses such as reaching or crying/tantrums) and reinforcing augmentative and alternative communication	Idiosyncratic responses decreased and AAC responses were obtained by participants. FA and FCT procedures were implemented successfully by caregivers.	Rated as highly acceptable by caregivers with an average score 6.91 on a 7-point Likert scale

Table 3
Continued

Study	Type of ABA procedure	Target Behaviors	Results	Treatment Acceptability
Benson et al. (2018)	FA + FCT	Problem behavior: Self-injurious behaviors	Decrease in self-injurious behaviors and increase in mands. Treatment implemented with 95% fidelity by caregivers.	Not reported
Schieltz et al. (2018)	FA + FCT	Problem behaviors: SIB, aggression, and property destruction	Results were unsuccessful in the host-study, after reanalysis the current study behavior function switch was detected for one participant, and poor caregiver fidelity was detected for the other.	Not reported
Tsami et al. (2019)	FA + FCT	Problem behaviors: self-injury, screaming, aggression, property destruction, and flopping	Reduced problem behaviors by at least 80% and increased manding to 90%	Rated acceptable and effective by caregivers internationally
Lindgren et al. (2020)	FA + FCT	Problem behaviors: SIB, aggression, property destruction, verbal outburst, and severe noncompliance	Problem behaviors reduced by an average of 97% after completing FCT treatment	Caregivers' acceptance rate using the TARF-R 7-point Likert scale averaged 6.30

Note. FA = functional assessment; FCT = functional communication training; SIB = self-injurious behavior; TARF-R = Treatment Acceptability Rating Form-Revised; AAC = augmentative and alternative communication.

Discussion

Clearly, this topic is important to study because many children with ASD and their families can continue to have access to ABA services via telehealth throughout the current COVID-19 circumstances. Additionally, families who do not already have access to ABA services, due to living in rural areas in which ABA services are scarce, can benefit from telehealth. Our findings can contribute to the suggestions of the effectiveness of caregiver training in FA and FCT procedures to help reduce problem behaviors in children with autism. In addition, we can bring awareness to the lack of access to ABA services in disadvantaged areas, in which poverty is present, and the possible limitations of access to appropriate internet services needed for telehealth services. Most importantly, children in need of ABA intervention and their caregivers will have the opportunity to learn how to reduce problem behaviors that may interfere with their daily living tasks in order to increase the benefits received from both educational and social settings. Due to the majority of the aforementioned studies focusing on decreasing problem behaviors in children with autism, further research is needed in caregiver training via telehealth on skill acquisition. Furthermore, there is a high need in research focusing on children learning through virtual formats, in general, as a result of the recent changes that COVID-19 has brought about. There is also a need to identify which type of learners will benefit most from virtual formats such as telehealth.

Furthermore, limitations of the studies selected for this review include that caregivers in the studies reported a higher level of education ranging from high school diploma to PhD. Therefore, future research should look at the effect of caregiver level of education on the effectiveness of implementation of FA and FCT procedures via telehealth. Although this review of literature on telehealth services seems to be an effective way of providing training for the caregivers of children with ASD, there are also technological issues that may arise during telehealth sessions. Lee et al. (2014) addressed technical problems and troubleshooting methods in an attempt to try and make ABA sessions via telehealth more productive. Lee et al. (2014) provided step-by-step support for providers such as IT support and troubleshooting for a delay in audio (or missing audio), video-transmission, and webcam issues. Their study contributes to the ABA telehealth support needed during the drastic increase in virtual communication that the recent COVID-19 pandemic has brought about. Lee et al. (2014) is one of the few studies that have examined the technological issues that may arise during telehealth consultations, therefore more research is needed on this topic to determine the effects of technical problems on the results of ABA training via telehealth.

In the end, this study brings light to the many difficulties that caregivers of children with autism may face when trying to obtain ABA services such as, living in rural areas away from clinics/providers, the international shortage of BCBA's, the language barriers that can possibly impede in service quality or understanding, and the challenges that children with problem behaviors may face on a daily basis. However, the children, caregivers, and behavior consultants in these

studies found a way to conquer these challenges and complete the treatments successfully via telehealth. By reducing challenging behaviors while also finding a possible solution to delivering previously inaccessible services, caregivers of children with autism can help increase their child's quality of life.

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