

# ***Exploring Telehealth ABA Therapy During the COVID-19 Pandemic for Children with Autism***

Jierui Li<sup>1,a,\*</sup>

<sup>1</sup>*Graduate School of Education, University of Pennsylvania, 3700 Walnut St, Philadelphia, PA, U.S.  
a. lijierui@alumni.upenn.edu  
\*corresponding author*

**Abstract:** Given the COVID-19 pandemic that has caused the regular in-person Applied Behavior Analysis (ABA) therapy to be disrupted, there is a growing interest among researchers in investigating the application of telehealth ABA therapy to children with autism spectrum disorder (ASD). This review will summarize the previous studies during the COVID-19 period on telehealth ABA therapy especially for children with ASD. Nine studies were identified and three telehealth ABA models arose in these studies: the direct delivery model, the caregiver-support model, and the caregiver-training model. All of these nine studies indicated that telehealth ABA therapy was effective and efficient during the COVID-19 period, as all child participants with ASD in these studies showed statistically significant improvements in target developmental domains. This article also included two international models of ABA therapy during the COVID-19 period, with one in Italy and the other one in India. These two international studies demonstrated that telehealth ABA models can be culturally adaptative, and further proved the effectiveness of telehealth ABA therapy. Considering the limitations of current telehealth ABA therapy models, more future research is needed to solidify the research basis of telehealth ABA therapy and to determine the full potential of applying telehealth ABA therapy to children with ASD in the post-pandemic era.

**Keywords:** Applied Behavior Analysis, autism, telehealth

## **1. Introduction**

Autism spectrum disorder (ASD) affects a large number of youngsters worldwide. The academic community in autism therapy has come to the conclusion that Applied Behavior Analysis (ABA) therapy is successful in treating ASD in kids. In order to get around potential obstacles in the traditional ABA treatments, there has been an urgent interest in research on telehealth applications for ABA therapy along with the rapid growth of technology. Even while telemedicine ABA therapy has been recognized as a legitimate and efficient method of delivering ABA therapies, it wasn't until the COVID-19 pandemic that it was extensively used and researched. The current review would summarize the research during the COVID-19 period on the application of telehealth ABA therapy to children with ASD. Three telehealth ABA therapy models were identified in these studies during this period: the direct delivery model, the caregiver-support model, and the caregiver-training model. Main components and effects of the three models would be discussed in detail.

## 2. Overview of Telehealth ABA Therapy

ASD is a neurological and developmental disability with life-long impairments in communication and presences of repetitive and restricted behaviors. About 1 out of 36 children has been diagnosed with ASD in the United States. The high persistence and prevalence of this disorder highlight the need to provide effective treatments and sufficient support services for all children with ASD. Research in this field has established that ABA therapy is an effective intervention for children with ASD and is widely practiced across the United States [1]. This therapy can help improve children's communication skills, increase their social cognitive skills, and reduce their problem behaviors [1]. ABA approaches include comprehensive behavioral models designed to address all developmental areas of need (e.g., discrete trial training, naturalistic interventions), as well as behavioral models that focus on a set of skills (e.g., functional communication training, positive behavior support, picture exchange communication system); both of which result in widespread and durable treatment outcomes [1].

However, it is challenging to gain access to ABA therapy for children who live in rural areas with restricted transportation, who live in areas lack of professionals and mental health services, and who are in lower socioeconomic status and level of parental education. These health disparities were worsened during the COVID-19 pandemic. Even children who regularly receiving ABA interventions experienced disruption to their ABA services due to the shutdowns and the shortage in staff at the service providers. Furthermore, due to the economic downturn during COVID-19 pandemic, many families have lost insurance benefits and the out-of-pocket costs for ABA therapy were untenable.

In order to address these worries, during the COVID-19 period, an effective line of study looked into using telehealth to deliver ABA therapy. Telehealth is the general term for the provision of healthcare services through the use of technology, and it typically takes the form of online video conferences [2]. Telehealth aims to increase access to care by removing obstacles like transportation, geographic accessibility inequities, or treatment delays. More importantly, the delivery of mental health interventions through telehealth has demonstrated to be cost- and time-effective due to the ease of Internet connection and the growing availability of hardware devices like smartphones [2]. ABA therapy delivered via telehealth is one such. Research prior to the COVID-19 period demonstrated that telehealth could serve as an acceptable platform for ABA therapy, with a favorable outcome that all of the identified studies reported improvements in at least one variable related to target skills and treatment goals [2]. Therefore, telehealth was considered as a gateway to resume the disrupted in-person ABA therapy during the COVID-19 period.

## 3. Telehealth ABA Therapy Models

The field of ABA therapy has rapidly adapted to telehealth during the COVID-19 period. Numerous organizations, such as Behavior Analyst Certification Board (BACB), have published protocols accordingly on how to provide telehealth ABA therapy during this period, which facilitated the adaptations from in-clinic services to telehealth sessions [3]. The telehealth ABA therapy models can be separated into three different models during the COVID-19 pandemic: the direct delivery model, the caregiver-support model, and the caregiver-training model.

### 3.1. The Direct Model

The direct telehealth model of ABA therapy refers to when a child participates in the virtual ABA sessions independently and receive the instructions directly from an ABA service provider. Three recent studies explored this direct telehealth model during the COVID-19 period [4] [5] [6]. Ferguson et al. examined applying telehealth to Discrete Trial Teaching (DTT) (i.e., an ABA procedure that teach skills in small components with reinforcers) on teaching tacts to children with ASD [4]. In this

experiment 6 children received the virtual sessions in a dyad setting, and each child would receive eight teaching trials on the target tacts [4]. All children in this experiment acquired the target tacts and maintained the tacts for up to 9 days post-training [4]. The results of their experiment also suggested the efficiency of implementing telehealth DTT, given that all children acquired the target skills within 24 minutes [4]. Similar findings were shown in Knopp et al.'s study, in which 3 children diagnosed with ASD were taught six expressive labels via direct telehealth DTT procedures [5]. They found that all children mastered the six expressive labels and maintained the targets with 95% accuracy for up to two months after the teaching sessions [5]. Nohelty et al. expanded the scope of studies on the direct telehealth model by examining the implementation of Natural Environment Teaching (NET) (i.e., an ABA procedure that contrive a context-relevant environment to teach new skills), in addition to DTT procedures [6]. According to the children's personal treatment goals, 4 ASD children got training on specific abilities that belonged to the social, linguistic, or adaptive skill domains [6]. The DTT format was used for all of the children's instructions, and two of them additionally received NET instructions [6]. The outcomes once more showed that telemedicine ABA techniques enabled the kids to acquire and maintain their desired skills [6]. What's more, the application of NET techniques in this study assisted the kids in generalizing their learned abilities to their family members in the home settings [6]. The findings of all three trials when combined showed the efficacy and efficiency of providing ABA therapy to children with ASD via a direct telehealth strategy.

### **3.2. The Caregiver-Support Model**

In a caregiver-support telehealth model of ABA therapy, children with ASD will still receive the ABA training procedures directly from an ABA service provider via videoconference. However, a caregiver will provide support for the procedures as needed in this model. Typically, the level of caregiver support differs across children. For instance, if a child has a lower severity level of ASD and has been trained to be able to attend the virtual sessions independently, he/she might only need caregivers to provide physical care or technical support; On the other hand, if a child with ASD has difficulty attending to the ABA service provider or has elopement issue during the session, a caregiver might need to provide assistance in prompting, reinforcement or redirection [6].

Given the children with ASD will directly receive the treatment as the direct telehealth model, even though there might be caregivers' assistances present, research rarely separates the first two models and studies the caregiver-support telehealth model of ABA therapy specifically. Nohelty et al. incorporated two children with ASD who needed caregivers' assistance to study the caregiver-support telehealth model [6]. Caregivers of these two children received training before the telehealth sessions started and were involved on a minimal basis during the telehealth sessions, such as providing technical support, giving prompts to help with transitions, and redirecting children if they tried to escape [6]. Same as children who received direct ABA therapy, those who required minimal caregiver support during the telehealth sessions also met the mastery criteria of the target skills and were able to maintain and generalize the skills in daily settings [6].

### **3.3. The Caregiver-Training Model**

The caregiver-training telehealth model involves an ABA service provider providing training to caregiver and guiding the caregiver to implement the intervention via videoconferencing. It was the most common format of telehealth ABA therapy implemented during the COVID-19 period. Caregivers' involvement might be necessary for children who have high severity of levels of ASD and who lack prerequisite skills required for attending telehealth direct therapy independently [6]. In the caregiver-training telehealth model, the caregiver training procedures varied on the design and

method based on the children's treatment targets. During the COVID-19 pandemic, four studies explored the telehealth caregiver-training model based on the typical ABA therapy structure [3] [7] [8] [9].

In Lindgren et al.'s study, caregivers of 38 children with ASD were trained to implement the telehealth Functional Communication Training (FCT) [7]. FCT is an ABA therapy procedure on dealing with children's problem behaviors. The caregivers in this study were trained 12 weeks virtually by a behavioral consultant to, first, use functional analysis method to identify the reason why the children maintain the problem behavior, and then use FCT to teach the children alternative communication strategies to address the problem behavior [7]. The results represented a significant decrease in children's problem behavior to 98% and significant increases in children's social communication and task completion, which successfully demonstrated the effectiveness of caregiver-training on FCT using telehealth [7]. Gerow et al. explored an overarching telehealth caregiver training program, which consisted of teaching the caregivers strategies to help their children achieve multiple target skills and behavior goals [8]. The program lasted about 2 months and the therapists met with the families via videoconferencing twice per week for 1.5 hours [8]. During the sessions, the caregivers of 30 children with ASD received training on NET for communication and social skills, DTT for daily living skills, and FCT for problem behaviors [8]. Their results showed that the caregivers could implement the ABA procedures up to 95% accuracy, and children in this study represented medium to large effect size improvements on 85% of the target skills and behavior goals [8].

Early Intensive Behavioral Intervention (EIBI) is a subset of ABA therapy that aims to lessen problem behavior and increase prosocial, adaptive behavior in very young children with ASD. Fisher et al. tested a telehealth program to train caregivers remotely in EIBI skills [9]. In this program, caregivers would complete online learning modules and practice the target skills with a partner while being instructed by the therapist via videoconferencing [9]. In this study, the caregivers who received the telehealth ABA training demonstrated substantial, statistically significant improvements in the application of all target EIBI skills [9]. However, they did not evaluate the caregivers' performance with their own children, so the effectiveness of this program on the outcomes of the children was unclear. A different telemedicine ABA caregiver-training program was examined by Yi and Dixon, which consisted of an onboarding overview meeting, five online skill development lessons, and five one-to-one consultations during a 60-day period [3]. Their results again demonstrated that the caregivers effectively mastered on the target skills through the training program [3]; however, same as Fisher et al.'s study, they did not provide insights into the potential outcomes of the program on children's performance.

### **3.4. Cultural Adaptation of the Models**

Since telehealth has been increasingly accepted as a service delivery modality, telehealth ABA therapy began to expand the services globally to children with ASD. Despite some minor cultural adaptations, the global telehealth ABA therapy is still following a uniform protocol published by BACB. During the COVID-19 period, some countries borrowed the models from the United States in ABA telehealth therapy in response to the disrupted ABA services due to lockdown. These studies brought insights and experiences in expanding ABA telehealth services globally.

In their article, Espinosa et al. described how they adapted the telehealth ABA therapy models in Italy during the COVID-19 period [10]. They classified children in their study into three categories based on the children's need for support and perceived amenability: preschool-age, minimally verbal, and verbally interactive [10]. The verbally interactive children received therapy through the direct telehealth model because they were able to attend the sessions with the ABA tutor independently, and each day the children would attend two 50 minutes sessions [10]. The minimally verbal children and

preschool-age children received ABA services through the caregiver-training telehealth model. After the first 3-hour training session, the caregivers of the children would receive tutoring on daily basis [10]. The target skills in Espinosa et al.'s program included structuring the day, learning contextually appropriate at-home activities, and reducing challenging behaviors [10]. Even though in this study the researchers were unable to statistically test the effectiveness of telehealth ABA therapy in Italy during the COVID-19 pandemic, they found through daily virtual meetings that the program successfully brought order to these children's home activities [10].

Similar to this, children with ASD got varied ABA services through several telehealth models in Awasthi et al.'s program in India during the COVID-19 period depending on the children's capacity to attend the sessions independently [11]. Based on the in-person sessions held before to the pandemic, if the kids were verbally engaging and could focus for longer than 20 minutes, they would receive therapy using the direct telemedicine paradigm [11]. The caregiver-support telehealth model would be used to deliver the therapy for the children if they need their caregivers to step back and provide prompts and reinforcers as needed by the therapists during the sessions [11]. For caregivers who chose to receive training from the therapist, the researchers also incorporated the caregiver-training telemedicine model [11]. Over the 6-month telehealth ABA therapy, all children across the models acquired the target skills, and more than half of the children acquired more skills compared to the in-clinic sessions [11]. This demonstrated that telehealth ABA therapy could be culturally adaptive, and further proved the effectiveness of telehealth ABA therapy models.

#### 4. Discussion

While the COVID-19 pandemic created previously unheard-of difficulties for providing ABA services, telemedicine has been demonstrated in numerous trials to be a useful tool for offering ABA therapy to children with ASD. Collectively, the nine studies conducted throughout the COVID-19 period on the three telehealth ABA therapy models showed that the implementation of ABA therapy methods via telehealth was successful and efficient. The growing involvement of caregivers in telemedicine ABA therapy models also suggested that caregiver involvement in ABA treatments has numerous advantages. The telehealth models provided caregivers with enhanced transparency of the daily therapy for children receiving direct telemedicine ABA therapy by allowing them to observe sessions; For children who needed more support in the caregiver-support and the caregiver-training telehealth models, the caregivers received trainings in multiple skill acquisition and behavior management strategies, which might help the children maintain the effect of therapy sessions in daily settings.

The research on telehealth ABA treatments during the COVID-19 period also provided precious experiences in incorporating telehealth ABA therapy into clinic-, school- or home-based services in the post-pandemic era. This alternative mode would be extremely helpful for children with ASD who live in areas with insufficient staff available or with limited transportation to ABA service providers. Although these studies demonstrated the effectiveness of telehealth ABA treatments, the full potential of implementing telehealth ABA therapy has not been established yet. There are some limitations that future research might be addressed. First, the sample size and skills targeted in these studies were limited. Second, the efficiency measurement was limited to specific teaching strategies (i.e., DTT, NET, FCT), given that in in-person sessions the therapist would collaborate multiple strategies. Third, the telehealth sessions were designed with limited duration, comparative to intensive treatment children receive in in-person sessions.

## 5. Conclusion

The study on telemedicine ABA therapy for kids with ASD conducted during the COVID-19 period was examined in the current review. The direct delivery approach, the caregiver-support model, and the caregiver-training model are the three telemedicine therapy models that were discovered in these research. The selection of the models was mostly based on the children's ASD severity levels and their capacity for autonomously participating in the virtual session. The telehealth ABA therapies were helpful in enhancing the target developmental domains for the ASD children, according to the findings of all investigations across the three models. Additionally, the international research showed that telemedicine ABA therapy during the COVID-19 period could potentially be culturally adaptative. The success of telehealth ABA therapy during the COVID-19 period also provided insights into how to utilize telehealth ABA models to overcome potential barriers in the post-pandemic era such as difficulty in transportation and shortage of staff. Given the paucity of research on telehealth ABA therapy, the full potential of implementing telehealth ABA therapy has not been established yet. Future studies should address the current limitations and further solidify the research basis of telehealth ABA therapy for children with ASD.

## Acknowledgement

I would like to express my very great appreciation to Dr. Lin for her valuable and constructive suggestions during the planning and development of this review article.

## References

- [1] Vismara, L. A., & Rogers, S. J. (2010). *Behavioral treatments in autism spectrum disorder: What do we know?* *Annual Review of Clinical Psychology*, 6(1), 447–468.
- [2] Ferguson, J., Craig, E. A., & Dounavi, K. (2018). *Telehealth as a model for providing behaviour analytic interventions to individuals with autism spectrum disorder: A systematic review.* *Journal of Autism and Developmental Disorders*, 49(2), 582–616.
- [3] Yi, Z., & Dixon, M. R. (2020). *Developing and enhancing adherence to a telehealth ABA parent training curriculum for caregivers of children with autism.* *Behavior Analysis in Practice*, 14(1), 58–74.
- [4] 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*, 53(4), 1876–1888.
- [5] Knopp, K., Ferguson, J. L., Piazza, J., Weiss, M. J., Lee, M., Cihon, J. H., & Leaf, J. B. (2022). *A comparison between direct telehealth and in-person methods of teaching expressive labels to children diagnosed with autism spectrum disorder.* *Behavior Modification*, 47(2), 432–453.
- [6] Nohelty, K., Bradford, C. B., Hirschfeld, L., Miyake, C., & Novack, M. N. (2021a). *Effectiveness of telehealth direct therapy for individuals with autism spectrum disorder.* *Behavior Analysis in Practice*, 15(3), 643–658.
- [7] Lindgren, S., Wacker, D., Schieltz, K., Suess, A., Pelzel, K., Kopelman, T., ... O'Brien, M. (2020). *A randomized controlled trial of functional communication training via telehealth for young children with autism spectrum disorder.* *Journal of Autism and Developmental Disorders*, 50(12), 4449–4462.
- [8] Gerow, S., Kirkpatrick, M., McGinnis, K., Sulak, T. N., Davis, T. N., & Fritz, S. (2022). *Evaluation of a telehealth ABA program for caregivers of children with ASD.* *Behavior Modification*, 47(2), 349–379.
- [9] Fisher, W. W., Luczynski, K. C., Blowers, A. P., Vosters, M. E., Pisman, M. D., Craig, A. R., ... 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*, 53(4), 1856–1875.
- [10] degli Espinosa, F., Metko, A., Raimondi, M., Impenna, M., & Scognamiglio, E. (2020). *A model of support for families of children with autism living in the COVID-19 lockdown: Lessons from Italy.* *Behavior Analysis in Practice*, 13(3), 550–558.
- [11] Awasthi, S., Aravamudhan, S., Jagdish, A., Joshi, B., Mukherjee, P., Kalkivaya, R., ... Edasserykkudy, S. (2021). *Transitioning ABA services from in clinic to Telehealth: Case Study of an Indian organization's response to covid-19 lockdown.* *Behavior Analysis in Practice*, 14(4), 893–912.