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Training Parents via Telehealth to Teach Manding to Children with ASD to Replace Problem Behavior

Sukarah Almulhim
University of South Florida

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by

Sukarah Almulhim

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Co-Major Professor: Ann Cranston-Gingras, Ph.D.
Co-Major Professor: Rosé Iovannone, Ph.D.
John Ferron, Ph.D.
Brenda Walker, Ph. D.

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ABSTRACT

This study assessed the effectiveness of using Behavioral Skills Training (BST) for parent training to implement functional behavior training and video modeling via a telehealth platform designed to increase manding abilities and to decrease problem behaviors with children with Autism Spectrum Disorders (ASD). With eight participants, this study used a multiple-baseline design across subjects (four parents and four children with ASD). The research was divided into three phases: parent training, baseline, and intervention. BST was administered remotely from the United States through synchronous video conferencing with families in different countries in the Middle East. All parents were able to learn to identify the function of their child's problem behavior, to create video models, and to implement the functional communication intervention. Problem behaviors were eliminated or nearly eliminated for all participants, and all participants were able to use manding independently to request desired items. Manding generalized to other settings for two of the four participants. The intervention was well received by all participants and the study's social validity questionnaire revealed that all parents were satisfied with the training. The results of this study have significant implications for clinical application and contribute a meaningful and unique approach to add to the academic literature in ABA.

CHAPTER ONE: INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in communication skills, difficulties in social interaction with peers, repetitive behaviors and limited interests (American Psychiatric Association, 2013). Children with ASD have difficulties understanding social interactions or mental/emotional states in others and may not be able to understand the perspective of another person (i.e., theory of mind) (Baron- Cohen, 2005). Children with ASD also often have challenges with executive functioning, a cognitive process that includes planning, time management, goal setting, etc., (Ozonoff and Jensen, 1999). The deficits of ASD can lead to a variety of academic and social issues, such as being unable to follow a daily routine, problem behaviors, and weakened academic performance.

Communication deficits are a primary feature of an ASD diagnosis, and many children struggle with manding, which is requesting something (e.g., an item, activity, or a break) or requesting information (Meadows, 2016). Children who have difficulties manding may resort to behavioral problems such as screaming, tantrums, aggression, and property destruction, in an attempt to get what they want or need when they do not have the communication skills to request appropriately (Shillingburg, Powell, and Bowen, 2013). In other words, the function of the problem behavior is the same as if the child were using appropriate communication to get his wants or needs met. Functional Communication Training (FCT) is often used to teach children with ASD to mand appropriately and has been shown to improve communication and reduce problem behaviors (Tiger, Hanley, and Bruzek, 2008).

Parents struggle to care for their children with ASD and often face difficulties with providers, such as insufficient insurance coverage or obtaining various services, making life more challenging (e.g., time, people coming in and out of the home, paying for services, etc.) and placing more psychological pressure on parents (Young et al., 2009). Research on parent stress indicates that teaching early adaptive skills for children with disabilities is a primary stressor for parents (Krakovich, McGrew, Yu, and Ruble, 2016; Norton, Dyches, Harper, Roper, and Caldarella, 2016). To reduce the stress on parents, interventions must focus on socially significant outcomes and use naturalistic teaching to minimize the demands on the parents. Parent training; utilizing the parent as a natural change agent; is an evidence-based methodology for implementing effective and generalizable interventions (Wong et al., 2015; Gerow, Rispoli, Ninci, Gregori, & Hagan-Burke, 2018; Hansen, DeMarco, & Etchison, 2021). To ensure effective parent training, it is essential to use evidence-based behavior analysis procedures.

Theoretical Framework for Behavior Analysis

Behaviorism

John B. Watson founded the psychology movement known as Behaviorism in 1913 and is considered to be the “father of Behaviorism” (Miltenberger, 2016). According to Demirezen (1988), "The major principle of the behaviorist theory rests on the analysis of human behavior in observable stimulus-response interaction and the association between them." (p.153). The behaviorism framework focuses on spoken language that affects human actions and feelings. Behaviorism views assessment as a tool for the instructor to monitor or observe student behaviors and to interpret the intention of the behaviors by identifying the function of the behaviors. In addition, it is essential to identify the antecedents and consequences to understand

what is maintaining a behavior and to make changes to the behaviors in the future (Krause et al., 2010).

Radical Behaviorism

B.F Skinner expanded Behaviorism described by Watson by developing the Radical Behaviorism framework (Miltenberger, 2016) that involves ABA principles, the experimental analysis of behavior, and operant conditioning. B.F. Skinner, the originator of Radical Behaviorism, believed that understanding the complicated human experience is vital for studying behavior (Lundy, Moore2 and Bishop, 2017). The central claim of Radical Behaviorism is that underlying causes of behavior can be discovered and manipulated using the same methodologies and rigor used with other scientific fields such as biology or chemistry. Within the scope of this theory, implementing experimental designs that offer valid and trustworthy data is necessary to make accurate predictions about human behavior (Lundy, Moore2 and Bishop, 2017).

B.F. Skinner believed that human behavior should be considered subject matter apart from any inner causations, whether mental or physiological (Skinner 1989). Skinner's perspective, as opposed to other mentalist and cognitivist traditions, assumed that the behavior should be perceived as an indicator of the direct consequence of these inner dispositions (Lundy, Moore, and Bishop, 2017). Private events represent the behavior caused by environmental variables. Acquired responses are maintained by direct results derived from life situations that a person encounters, daily, like any observable behaviors. Radical Behaviorism emphasizes the concept that when humans are exposed to environmental influences, these influences affect human behavior by controlling and maintaining the behaviors under various circumstances (Lundy, Moore, and Bishop, 2017). A wide range of beneficial applications have stemmed from

Radical Behaviorism including pharmacology, traffic safety, organizational management, and teaching and this was the foundation for what is now known as Applied Behavior Analysis (ABA) (Cooper et al., 2020).

Applied Behavior Analysis

Applied Behavior Analysis (ABA) has a wealth of evidence supporting its effectiveness for treating children with ASD (Cooper, 2020). Families require these services, particularly for early intervention, to help minimize behavioral challenges and to improve communication, pro-social behaviors, and social skills so that the child can be more successful in school, at home, and in the community. Unfortunately, these services can be expensive, and services can be difficult to obtain. In-person ABA services can include several cost barriers such as the expense of transporting behavior therapists to the client's home, the location of the client's home, family financial circumstances, time restrictions, the availability of behavior analysis services in the area, or lack of insurance (Wacker et al. 2013). Clinic services can also be cost-prohibitive and transportation to and from the clinic can be challenging for families. Additionally, a child's problem behaviors may exclude them from participating in clinic services and there are often staff shortages or frequent turnover in clinics. In more rural areas, there may not be any service providers nearby. In more urban areas, there are often many service providers but none specialized in ABA. There is a great need for conducting telehealth training for parents who cannot access services for their child due to finances, lack of services, or living remotely (O'Brien et al., 2020; Suess et al., 2014). Valentine et al. (2020) indicated promising outcomes, such as increased treatment availability and reduced diagnosis, monitoring, and assessment

waiting times, by utilizing telehealth services, despite a lack of evidence across a study that recorded these factors.

COVID-19, Telehealth, and ABA Services

The COVID-19 pandemic has limited all services including healthcare services and behavioral interventions for children with ASD, and it has migrated the services from in-person to online. Telehealth aims to provide healthcare services via telecommunication and communication technologies to promote health education, public health, and health care (Center for Connected Health Policy, 2020). Telehealth contains video, audio, pictures, and multimedia information broadcast from afar. Telehealth offers accessible options to obtain more vital services and support, and there is a growing body of research supporting its use (Center for Connected Health Policy, 2020). This is not only valuable during times like the COVID-19 pandemic, but it is also a more viable option for individuals living more remotely where services are more difficult to obtain in person (Esposito et al., 2020). Some evidence-based interventions are conducive to telehealth and accommodating the needs of the pandemic such as remote delivery, social distancing, accessibility, and easier implementation (e.g., video modeling).

Video Modeling

Video modeling is an evidence-based ABA procedure that potentially can be administered without physical contact and can be delivered in a remote platform, perhaps not only addressing remote delivery during COVID, but also for serving individuals who live remotely or who not have regular access to services. Video modeling (VM) is a procedure that allows the individual to watch a brief video clip of a person modeling a target skill or behavior

that also provides an opportunity to imitate the target skill or behavior (Bellini and Akullian 2007). Typically, the video is repeated many times until the individual masters the desired skill on a consistent basis. VM is an effective teaching tool that facilitates the desired behavior by repeatedly watching and imitating the video clip (Bellini and Akullian, 2007). Children with ASD have been taught multiple skills using VM such as social communication, playing with peers, and vocational skills (Rayner, Denholm, and Sigafoos, 2009). When teaching manding, VM involves a video model of a person making a mand (i.e., request) and then getting what they asked for (i.e. reinforcement). After watching the video, the subject has the opportunity to mand for the desired object or activity and is reinforced for using the correct mand (Nikopoulos and Keenan, 2004; Wert and Neisworth, 2003).

Video modeling utilizes the concept of observational learning, initially described by Bandura's Social Learning Theory in 1977, which demonstrated that human learning often occurs through observation and modeling by others (Bandura, 1977). Modeled behavior can be shown in vivo, on video, TV, movies, video games, or through pictures. Video modeling has been shown to be effective in numerous research studies for teaching social skills to individuals with ASD and other intellectual or developmental disabilities (e.g. Ashori and Jalil-Abkenar, 2019); teaching play skills (e.g. Duenas, Plavnick, and Bak, 2018); employability skills (e.g. Park, Bouck, and Duenas, 2020); adaptive life skills (e.g. Piccin, Crippa, Nobile, Hardan, and Brambilla, 2018); communication training (e.g. Delano, 2007); professional development (e.g. Cardinal, et. al., 2017); and parent training (Acar, Tekin-Iftar, and Yikmis, 2016). Children with ASD may be ideal candidates for video modeling as it narrows the field of vision so that the child can focus better on relevant information. Video modeling can be adapted to meet cognitive and language delays and can be used in a variety of settings. It is able to target a variety of skills

and behaviors; can use self, peers or adults as models (or even animated characters); and is more likely to lead to generalization and maintenance (Delano, 2007).

Manding and Functional Behavioral Training

Manding is a behavioral term for teaching children to make requests and is identified as an evidence-based ABA approach for students with ASD (Sundberg and Michael, 2001). The individual with ASD needs manding to develop language skills (Sundberg and Michael, 2001). Through manding, individuals can ask for any items or actions based on motivation level, enabling them to control the environmental variables surrounding the behavior by asking about the delivery of reinforcers. Teaching how to initiate a conversation is the primary role of manding rather than just responding to language or other demands (Wiech, 2014). Functional Communication Training (FCT) requires identifying the function of a behavior and teaching a communicative replacement behavior through extinction and reinforcement. FCT is often used to build manding skills for children with ASD. In FCT, manding can decrease the number of occurrences of a problem behavior if the reinforcement is delivered after the manding behavior, putting the problem behavior in extinction. (Harding et al.,2009).

Statement of the Problem

Applied Behavior Analysis (ABA) is one of the best evidence-based practices for treating children with ASD, but it can be expensive. There is a great need for conducting telehealth training for parents who cannot access services for their child due to finances, lack of services, or living remotely (O'Brien et al., 2020; Suess et al., 2014). The time and intensity level of telehealth training should also be taken into consideration while delivering the intervention. This

type of training must be conducted with careful attention that focuses on time and intensive ABA therapy issues such as reoccurrence of problem behavior, using appropriate techniques that facilitate intervention generalization across different settings, effects on parents' stress, and interaction of ABA services with other services (Lindgren, 2020). According to Lindgren et al (2020), studies should focus on a treatment package that includes functional analysis and FCT. The use of telehealth to teach parents to use FCT can provide a choice for parents to obtain alternative services that can help the intervention be successful.

Suess et al. (2014) suggested continuing to examine behavior services via telehealth because of effective treatment outcomes that appeared recently. To get maximum advantage of telehealth treatment, researchers should determine all variables that ameliorate behavior for both parent and child. This ensures that parents can learn to resist issues such as not having an ABA trainer in person or modifying or changing the treatment. Furthermore, there is a need to conduct a study of telehealth services that ensures a high quality of procedural integrity data from the family, and they need to record each baseline and intervention step during the sessions without help from behavior analysts. Enabling parents to be independent provides the highest level of positive outcomes that families need from telehealth services (Wacker et al.,2014). Simacek et al. (2021) recommended that future research should look at telehealth as a significant tool that can combine with intervention strategies to solve obstacles and move forward in improving the lives of the family and the children. Further investigation necessitates evaluating the long and short-term effects of telehealth services concerning social communication intervention for children with ASD.

Purpose of the Study

This study aimed to evaluate the efficacy of training parents on Functional Communication Training (FCT) via video modeling by using telehealth training to assist parents in teaching manding to children with ASD. Specifically, parents were taught to:

- Define and measure problem behavior.
- Identify the function of the problem behavior.
- Identify a socially relevant replacement behavior via communication (verbal, picture, or gesture)
- Create a video that models FCT with an age-equivalent peer showing reinforcement of communication
- Implement video modeling (including data collection) with their child to reach target goals
- Identify and implement maintenance and generalization procedures

Research Questions

The following research question guided the study:

1. What are the effects of using telehealth training on functional communication training via video modeling and the parents' ability to teach manding to children with ASD?
2. What is the fidelity of implementation regarding the parents' ability to teach manding to children with ASD?
3. Is there a functional relationship between the use of functional communication training with video modeling and the increased use of manding by children with ASD?

CHAPTER TWO: LITERATURE REVIEW

Functional Communication Training (FCT)

FCT is an antecedent intervention, based on differential reinforcement of alternative behavior (DRA), that teaches a child to learn a replacement behavior (i.e., communication) to replace a problem behavior with the same function (Cooper, Heron, & Heward, 2020). FCT focuses on communicative responses such as verbal, written, pictures, or sign language that have the same function as the problem behavior (e.g., attention, escape, sensory, or access to tangibles) and that are considered socially significant to the child (O'Brien et al., 2021). The replacement behavior delivers the same reinforcement that maintained the problem behavior, and the problem behavior is placed on extinction resulting in socially significant communication replacing the problem behavior (Suess et al., 2014).

FCT is an intervention that involves differentially reinforcing an alternative communication response maintained by a problem behavior. Implementing a functional analysis assists the researcher or clinician in understanding the function of the behavior and in specifying the type of reinforcement that maintained the problem behavior. FCT, functional analysis, and differential reinforcement procedures have been used as a successful intervention package that results in decreasing disruptive and harmful behaviors for children with developmental disabilities (Pelios et al.1999; Tiger et al. 2008). To illustrate, when the problem behavior (e.g., aggression) continues due to positive reinforcement (e.g., escaping demands of homework), the individual could be taught an alternative communicative behavior, such as, "I need a break,"

which would result in the child receiving a brief break from homework to reinforce the appropriate communicative behavior (Kunnavatana et al., 2018).

Functional Communication Training and Manding

Manding is often taught through FCT as it provides natural consequences for making a request while extinguishing problem behaviors by replacing them with functional communication. Children with ASD often have a restricted repertoire of responses within a given response class which increases the possibility of having invariable responses. Differentiation, or differential reinforcement of the desired behavior, communication, can help to decrease the problem behavior and minimize other related problem behaviors (Rodriguez and Thompson, To illustrate, Betz et al. (2011) designed a study of differential reinforcement of emitting new responses before and after learning each mand frame. Three of the four participants were able to successfully demonstrate the highest number of new mand frames. These variables can be highlighted, within experimental analyses and descriptive assessments, to examine the potential impact on developing responses for people with ASD that are lower level in variety than for people without ASD (Rodriguez and Thompson, 2015).

Two experiments addressed the evaluation of schedules of reinforcement with FCT on problem behaviors for persons with ASD (Adami et al.,2017 and Falcomata et al., 2018). Adami et al. (2017), addressed the effects of two lags of schedules of reinforcement, by comparing lag1 and lag0 during FCT, on reducing the problem behavior by using a variety of mands for two individuals with ASD. A lag schedule refers to providing reinforcers based on a target response different from a predetermined number of responses. More specifically, the child should emit a different response from the last two responses in the Lag 2 schedule (Adami et al.,2017). They

found that each participant elevated the usage of various mands during lag1 with the FCT phase more than lag0 with FCT. In addition, both phases demonstrated a low level of problem behaviors relative to the baseline. A similar study evaluated the effectiveness of different topographies of lag schedules of reinforcement from lag0 up to lag5 with the same group of participants compared to the baseline, and mutable mand persisted at a high level during the schedule thinning. At the same time, the problem behaviors achieved a zero rate as the value of lag schedules of reinforcement grew, and the participants exhibited an equitable response allocation among diverse forms of mands (Falcomata et al. 2018). Another study conducted the lag1 schedule of reinforcement embedded with a time progression delay to see how this impacted two children with autism using a variety of vocal mands. As a result of the experiment, the mixture of the topography of the vocal mand grew with participants (Silbaugh et al. 2018). Silbaugh and Falcomata (2018) replicated the same study with a male with ASD who displayed limited verbal skills by implementing the comparable intervention with slight changes, using sign mand topographies. Silbaugh et al. (2020) replicated previous studies by combining lag schedule of reinforcement with prompt-fading procedures during FCT on problem behaviors and mand variability for children with ASD. This study presented the first evidence of experimental control on independent variant vocal manding in three of four children with ASD with two children demonstrating a high level of manding by lag schedules alone during FCT, and with one child showing an increase in rate when prompting was removed from the lag schedule of reinforcement (Silbaugh et al. 2020). Notably, Silbaugh et al. 2020, extended the literature of FCT with lag schedules of reinforcement, conducted with participants of early childhood age, with response prompt fading procedure, and mainly focused on the vocal communication skills and topography mand, whereas other studies examined adolescence and adult participants and

presented a large selection of mands for the participants to select from in each session and no prompts were used (Adami et al., 2017 and Falcomata et al., 2018).

There is a large body of literature that supports the efficacy of FCT (Tiger et al., 2008), however, there are insufficient research studies that have examined the selection-based mand incorporated in FCT treatment phases (Adami et al., 2017 and Falcomata et al., 2018). Thus, this may provide a route to arbitrary selection of mand topographies which, in turn, can result in an alternative communication response which potentially may not continue firmly, or a that may result in a resurgence of the problem behavior. Several studies analyzed different variables that impacted effectiveness of FCT, which linked with mand topographies such as preference (Harding et al. 2009), novelty (Winborn, Wacker, Richman, Asmus, and Geier, 2002), proficiency (Ringdahl et al., 2009), and effort (Bailey, McComas, Benavides, and Lovascz, 2002). Deciding which modalities (sign language vs. picture exchange) can affect each individual consumed effort (Richman, Wacker, and Winborn, 2001), especially when each individual is more likely to have a different mode of communication (Kunnavatana et al., 2018). Teaching novel mand topographies may not be appropriate for individuals who still do not have basic communication skills. Accordingly, a piece of valuable idiosyncratic information may come from proficiency and preference that may be used as guidance to decide on selecting a list of mand topographies to serve as the aim of the intervention (Kunnavatana et al., 2018). *Proficiency* is defined by Ringdahl et al. (2009) as a variable that is specific to mands that affect treatment outcomes during FCT. The researchers evaluated the effectiveness of the mand topography assessment (MAT) to look at the proficiency level incorporated to FCT for three participants and how that related to the problem behavior. A mand topography assessment was conducted to measure the prompting level used with each participant, whether they needed a

high level of prompting, which encompasses a high low level of proficiency in FCT, or if they needed a lower level of prompting, which indicated a high level of proficiency in FCT. Results were superior when FCT included a high level of proficiency, and which resulted in acquiring more independence and exhibiting fewer problem behaviors for all participants, compared to the FCT with a lower level of proficiency. This study indicates that the processes underpinning proficiency of manding are needed as a vital consideration in potential studies (Ringdahl et al., 2008).

Preference is another method that can used to assess mand topography, in that preference fosters engagement during the intervention and builds self-determination that drives the effort emitted by the individual (Sigafoos, O'Reilly, Ganz, Lancioni, and Schlosser, 2005). One study analyzed the preference of two novel manding topographies (picture card and microswitch activation) for two participants with developmental disabilities, during FCT, while controlling for the confounding variables (response effort, amount, and quality level of reinforcement) Winborn-Kemmerer et al.,2009). Manding was focused on motor responses to either exchanged picture cards or by pressing the microswitch, and reinforcement was given using a fixed-ratio 1 schedule and was removed when the problem behavior occurred during the intervention of FCT. The next phase was a choice analysis to present the mand in a concurrent schedule of reinforcement (as opposed to a fixed ratio 1 schedule). All participants showed a higher response rate using micro switch manding compared to picture card manding, while the problem behavior decreased in all sessions. In conclusion, Winborn-Kemmerer's study indicated that the preference wasn't necessarily linked to the number of responses frequently paired with the reinforcer during FCT treatment.

Kunnavatana, et al.,(2018), assessed whether or not preference of mand topography might improve treatment effectiveness and increase self-determination in FCT. Two participants made clear preferences for mand topography and results supported that preference improved independent communication and reduced problem behaviors.

Video Modeling

Although VM is considered one of the most effective procedures in ABA, there are some limitations. Sometimes, VM requires interventionists to present a vivo model after designing the evocative event (Sundberg & Michael, 2001). Another issue is when antitypical temporal sequence is observed by a participant, which can lead to limited stimulus control and thus delaying generalization of the mand to other settings (Bourret et al., 2004; Jennett et al., 2008). These studies, as well as others, emphasize the value and importance of the generalization phase during teaching mands that increases repertoires for children with ASD (Bourret et al., 2004; Jennett et al., 2008). Plavnick and Ferreri (2011) demonstrated how to improve generalization by teaching meaningful and recognizable mands in the child's natural environment. In addition, they showed the importance of having the function of the behavior clearly represented in the video modeling. Children who watched non-function-based video models did not show generalization of the mand response whereas students exposed to the function-based condition did.

Children with ASD can obtain quickly developed recognized mand repertoires despite the lack of established imitative repertoires before training. Rayner et al. (2009) suggests that individuals need prerequisites related to imitation skills to be qualified to learn through video modeling. The ability to learn how to imitate a video model may be needed before attempting to place the verbal or motor imitation skills under instructional control (Plavnick and Ferreri, 2011).

For instance, in teaching children to communicate using the Picture Exchange Communication System (PECS), some students are able to acquire the PECS mands quickly through video modeling while others may acquire the skills (Plavnick and Ferreri, 2011) in the generalization stage, similar to the Frost & Bondy (2002) studies on PECS administered in vivo.

VM has been shown to be an effective tool for teaching social skills to children with ASD. For example, Plavnick et al. (2015) evaluated two conditions of social initiation: sharing condition (sharing a toy by inviting a peer to play in preferred activity), and joining condition (asking peers if they could join a preferred activity), when using video modeling for children with ASD. Researchers measured the variability of video modeling and the way that linked to motivation level and natural reinforcement. The intervention successfully focused on using video modeling to increase sharing and joining with peers. Tetreault and Lerman's (2010) study used a *point-of-view* video modeling approach to examine social interactions with children with ASD. The point-of-view video portrayed a scenario of desired behavior from the participants' visual perspective. Results were inconsistent in that one participant did not learn the target behavior from the video, but the other participants did. Using preferred activities in videos may also improve the effectiveness of video modeling whereas using non-preferred activities may have no positive outcomes (Plavnick and Ferreri, 2011; Tetreault and Lerman, 2010).

One study measured the verbal compliments for two children with ASD after video modeling. (Apple et al. 2005). One research consisted of two experimental studies; the first study presented video modeling followed by instruction to teach compliments behavior to assist children with ASD in beginning social interactions. The researchers found that children responded to the video modeling combined with reinforcement to increase their compliment behavior to begin social interactions. In the following study, a similar result showed that children

who repeated watching the video exhibited compliance in responding to peers as well as initiating with compliments. One of the limitations of the Apple et al. (2005) study was that they looked at compliments and responses separately, but had not investigated the combining of the two behaviors

Available literature suggests that video modeling can be effective in addressing verbal and nonverbal behavior concurrently (Charlop et al. 2010; Gena et al. 2005). Kevin, Charlop, and Miltenberge (2014) conducted a study for children with ASD to assess the effectiveness of a portable video modeling treatment provided in the naturalistic environment during an athletic game on two types of compliments: verbal and gestures. The data showed increases in verbal compliments to peers by children with ASD when using video modeling on the iPad during the kickball game. The participants frequently displayed more than one compliment in each opportunity after watching the video, as four out of five participants showed considerable response diversity. The generalization phase that followed the intervention revealed an increase in demonstrated verbal compliments across kickball activities, even though there is no consistency within and across children. In contrast, compliment gestures were rarely made by participants.

A study by Petursdottir and Gudmundsdottir (2021) assessed the effects of video modeling on the three variables with four children with ASD: latency to social initiation, duration of reciprocal play with peers, and frequency of spoken words used during the play. According to the study, participants began social interaction with peers which reduced latency; spent more prolonged periods during reciprocal play and increased the number of words used during playing than before; and exhibited generalized social skills with novel peers and a bigger group and, finally, with the entire classroom, in many situations. These findings suggest that

using a portable device to model the video can end with valuable results in enhancing social skills during play interaction. This result is in line with Kabashi and Kaczmarek's (2017) study that demonstrated that video with models was more successful in encouraging social involvement than video-self-modeling. VM can be an effective and efficient procedure for increasing pro-social behaviors such as communication, and for reducing and replacing problem behaviors. When done properly, VM can have significant maintenance and generalization effects and can be socially meaningful.

Advantages of Video Modeling

VM is derived from the behavioral theory of imitation and modeling (Cooper et al., 2020). More clearly, students watch the peer perform the behavior correctly followed by copying it by imitation, which should reinforce the appearance of positive results. Modeling and prompting are provided from VM that enhances understanding of the natural setting of the target behaviors. The VM establishes the proper sequence of skills students are required to follow in order to imitate (Stahmer et al., 2003). According to Lindsay et al. (2013), the likelihood of generalization for a desired behavior may frequently occur because the VM illustrates when and what to imitate, and this, in turn, strengthens the student's comprehension of the expectation of VM. Also, VM can be used in the natural environment and context. To illustrate, if the video includes authentic materials that facilitate the process of generalization, but uses non-natural settings, materials, or stimuli, it may be complicated for students to generalize the target behavior to other settings (Lindsay et al., 2013). VM is flexible and straightforward, provides various methods that can be used to maximize each student’s individual learning needs, and is motivating and engaging for students.

Traditional Video Modeling

Zarate and Maggin (2021) summarized the steps for implementing traditional VM that can be used as guidance. These steps are as follows:

1. Preparing for Recording: The first step is to define the behavior operationally, identify the function using data analysis, then use a task analysis to break the target behavior into small steps. Following that, the script should be created to include the steps of ABC (antecedents, behaviors, and consequences).
2. Video creating: The models in the videos should be students who agreed to and are willing to participate in making the videos. Before making the video, the consent form should be reviewed by the teacher with each participating student. The students who will engage in the video should inform the target behavior and the environment in which it occurs.
3. Watching the video: The video should be seen before, during, and after the lesson in which the problem behaviors are presented. Each student has a different ability, and some will need to view one time while others will need to view it multiple times to understand and master the skill. Using strategies, such as prompting, can help students to stay focused when watching the video clip.
4. Rehearse the desired behavior and track progress. This step requires students to practice the target behavior in the same environment used in recording the video clip, while the teacher collects data on the behavior and compares baseline and intervention. Students have the opportunity to imitate the skill or behavior from the video and then teachers can decide if there is a need to modify or change the video clip (Fuchs et al., 2017). When the

target skill or behavior is complicated, the student may take many opportunities to practice and reach mastery.

5. Making a decision: In the previous step, the FBA/ABC data should be taken to determine what is next. The teacher will continue to let the student watch the video several times until he/she achieves the goal if the data indicates that the student responds correctly to the video.

When students do not respond to the traditional VM, other approaches of VM can be applied to address their needs effectively (Losinski et al., 2016).

Versions of Video Modeling

Video modeling with other models (VOM) is the most popular form of VM in which another person or peer acts as a model to demonstrate a target skill or behavior. This VM is considered to be the traditional form (Zarate and Maggin, 2021). Another type of VM is video-self modeling (VSM) in which the student performs as his or her own model in the video (Mason et al., 2013). Filming the target skill through VM simplifies the intervention process to meet the individual student's needs. Making a VSM needs extra preparation of small video clips that require editing to ensure a high-quality and clear video of the student as his own model. Because the students are the main characters in the film, the teacher needs to use prompting to guide the students to perform the target behavior during the film production. Some students may take advantage of this intensive level of VSM if they normally like viewing films or seeing photos of themselves. Nevertheless, on video playback, the behavior must be smooth and devoid of signs of any prompting from the teacher during the editing process (Zarate and Maggin, 2021).

An additional type of VM is video-self modeling based on the student's perspective when creating the film (Blood et al., 2011). This type is different from others because it is not required to get the additional model and abridge the time for the teacher if the camera can be attached to any part of clothing to capture the scene smoothly. This type of intensification broadens the scope of the VM treatment by raising the level of students' understanding of seeing proper behaviors or skills that they should be doing from their point of view (Fuchs et al., 2017). Effectively, this intensification can be suitable for the students who struggle with imitation because this sort of VM does not involve observation of another person. Instead, they can visualize themselves correctly completing the target behaviors (Zarate and Maggin, 2021).

Video feedback (VF) is another version of VM that involves recording the student's behavior, letting students view their performance, and evaluating themselves by a self-monitoring checklist (Mason et al., 2013). VF entails following two steps: first step necessary to use traditional VM is to capture the student's performance of target behavior in a natural environment. When the video clip of students' behavior is recorded, they can watch their performance to review and analyze by using a rubric of task analysis. Students should have the ability of self-awareness and self-assessment when using the VF approach because it builds a sense of responsibility for their behaviors (Baker et al., 2009). The feedback permits employed individualization, the ability to transfer the learned skills from FV to a natural setting, and increased comprehension level (Fuchs et al., 2017).

Students with problem behaviors who need intensive services may benefit from the types of VM with extra modification to suit their needs, consistently. Fuchs and colleagues (2017), describe various methods that practitioners might use to raise the intensity of interventions including, increased strength, dose, comprehensiveness, and alignment to student needs.

Telehealth and Parent Training

The behavioral intervention plan addresses behavioral issues for children with ASD and is based on ABA principles that ensure the decisive intervention that offers remediation of problem behaviors (National Autism Center, 2015). The intervention services are provided individually, in most cases intensively, in-home setting, school setting, clinical setting with therapy for children with ASD (Eikeseth, Smith, Jahr, and Eldevik, 2007; Howling, Magiati, & Charman, 2009) and parent training for ABA principles training (Matson, Mahan, & Matson, 2009). Two obstacles that families encounter include the high cost of ABA services and scarcity of providers (Behavior Analyst Certification Board, 2015). Specifically, families are unable to receive service because their area does not have ABA services (O'Brien et al., 2020; Suess et al.,2014). Parents benefit from Telehealth training that saves money and time for them and simultaneously for therapists (Lindgren et al., 2016; Wacker et al., 2013).

According to Chacko et al. (2016), a substantial dropout rate has been shown in parent training, with 40–60 percent of parents failing to complete the training program. There might be several explanations for this, including ABA principles and techniques that are difficult to implement for parents in the natural environment due to the parents' family responsibilities. (McConnell, Parakkal, Savage, and Rempel, 2015). Family stress can be exacerbated due to traditional therapist-directed behavioral services (Hastings and Beck, 2004). The Division for Early Childhood (2014) proposed guidelines for an early intervention program that implemented in-home settings for children with disabilities and fortified the parent's competence in everyday living. Exchanging information, organizing the intervention, and permitting parents to access the materials when needed are advantages provided by parents' training delivered via an online platform (Pennefather et al., 2018).

A recent study was implemented using FCT to train parents through a telehealth model in three alternative contexts: manding with play context, manding with word picture and safe-spot in play context, and manding with word picture and safe-spot in neutral task context. The study found that adding FCT alternative contexts that are not related to problem behavior in the intervention procedures can avoid an episode of resurgence of problem behavior (Suess et al, 2020). A noteworthy point of this training was that schedule thinning was not needed during the alternative context. To clarify, when tests of resurgence were implemented with all participants, the persistence of appropriate behavior (task completion and manding) showed great levels of increasing. This contributed to a decreased number of FCT sessions and reinforcement required during FCT treatment context (Suess et al, 2020). Three children in the early childhood stage were evaluated in the study to assess whether the preference of various manding topographies during implementing FCT procedure will appear over time; problem behavior related to the augmentative communication (novel) or verbal manding (exciting) (Harding et al.,2009). During the baseline, all children emitting a history of limited vocal manding using a single word. During the treatment phase, the parents implement the study to teach children how to access the reinforcement via many mandings (pressing on microswitch communication card/ picture, manual signing, or vocalizing. The parents used least to most instructive prompting with children during FA and FCT while teaching children to use multiple topographies of manding. Eventually, the researchers reported that manding works as a substitute for problem behavior and a way of earning reinforcement. The vocal manding was a preference in all participants but emerged with other manding topographies simultaneously (Harding et al., 2009).

The Impact of COVID-19 on ABA Services and Telehealth Models

The coronavirus (COVID-19) pandemic that began in 2019 has had an extraordinary effect on people all over the globe and has altered the way our local community and global societies work. The pandemic has had a particularly devasting impact on individuals with autism and their families, as well as on the clinical services and research process (White et al., 2021). A recent study was conducted by White et al. (2021) explored the effects of COVID-19 on providing services to individuals with ASD and how service disruptions affected families. Based on the result of White's study, the Covid-19 pandemic caused a widespread interruption to all related services provided to treat ASD. Also, the study showed that intensive services in ABA, special education, speech-language pathologist, physical therapy, and occupational therapy were more frequently disrupted. Some services were less used than before, such as medical clinics closing entirely or opened only for a small capacity of people, or avoiding face-to-face by moving to the telehealth service model. The related services for all ages of people with ASD were disrupted due to the risk of COVID-19 pandemic. These populations are vulnerable and need to be considered in providing adapted services and intensive support during any emergency circumstances.

Online models can be utilized in offering many ABA services that can mitigate the negative effects of the pandemic to some extent while also providing a greater convenience for parents or caregivers (Wallisch et al., 2019). Training parents through online models can be effective even for therapists who may also be providing services in the home setting. Hao et al., (2020), conducted a pilot study on parent-mediated treatments which revealed that there was no difference in results between training parents face-to-face vs. training parents online through a telehealth platform. In addition, online training can decrease the occurrence of problem

behaviors for individuals with ASD (Lindgren et al., 2020). However, providing ABA interventions and special education online to the children with ASD has limited evidence in the literature (White et al., 2021).

Telehealth and Parent Training

Behavioral intervention plans address the behavioral issues for children with ASD and are based on ABA principles to ensure the decisive intervention offers remediation of problem behaviors (National Autism Center, 2015). Behavioral intervention services are often provided individually (or in small groups), in most cases intensively, in the home setting, school setting, or clinical setting providing services for children with ASD (Eikeseth, Smith, Jahr, and Eldevik, 2007; Howling, Magiati, and Charman, 2009). Parent training for implementation of behavior plans and skill building (e.g., communication) are also often included in behavioral service plans (Matson, Mahan, & Matson, 2009). Obstacles that families encounter include the high cost of ABA services, difficulty with time commitments, challenges related to people coming into their homes, and scarcity of providers (Behavior Analyst Certification Board, 2015). Families living remotely or in lower income areas often have limited ABA services which can cause an even greater scarcity of providers (O'Brien et al., 2020; Suess et al.,2014), or low-income (Wacker et al., 2013). Many parents can benefit from telehealth training that saves money and time, and improves accessibility to services (Lindgren et al., 2016; Suess, Wacker, Schwartz, Lustig, & Detrick, 2016; Wacker et al., 2013).

According to Chacko et al. (2016), a substantial dropout rate has been shown in parent training, with 40–60 percent of parents failing to complete the training program. There are several potential explanations for this, including the fact that ABA principles and techniques can

be difficult to implement for parents in the home environment due to their other responsibilities (e.g., work, other children, etc.) (McConnell, Parakkal, Savage, and Rempel, 2015). Families that have children with ASD or other developmental disabilities are at an increased risk of having high levels of stress and mental health issues, but traditional therapist-directed behavioral services for children along with support groups for parents can have a significant effect on reducing this stress (Hastings and Beck, 2004). The Division for Early Childhood (2014) proposed guidelines for early intervention programs that implemented in-home settings for children with disabilities and fortified the parent's competence in everyday living. These recommendations included building respectful and trusting relationships with families; communicating frequently about progress and goals; being responsive to family needs and concerns; working together with the family on treatment goals; building on family strengths and values; providing continuous education; helping families identify support systems and resources; helping families understand and advocate for their rights; and informing them about skill-building opportunities and parent training. When using an online platform like telehealth, therapists should exchange the information, organize the intervention, and permit parents to access the materials when needed (Pennefather et al ., 2018).

Pennefather et al. (2018) implemented a study of a parent training online program using ABA and Acceptance and Commitment Therapy (ACT) and observed decreases in parent stress, increases in knowledge of ABA and ACT, increases in pro-social behaviors and decreases in problem behaviors for the children, and high satisfaction with the intervention in social validity surveys. Considering the bidirectional link described in the research between the child’s problem behaviors and parental stress this online intervention model can be successful (Neece et al. (2012).

Telehealth is an alternative modality for delivering services and training that provides health-related information through the internet in the form of concurrent video conversations, readings, or modules prepared by experienced experts (Blackman, Jimenez-Gomez, and Shvarts,2019). One of the studies that utilized telehealth, implemented video communication to teach parents how to use FCT with children with ASD to overcome their problem behaviors (Wacker et al., 2013). The effectiveness of training parents via a telehealth modality often produces an equivalent result to in-vivo training for applying a functional analysis, FCT, and reducing problem behavior (Wacker et al., 2013).

In a study conducted by Lindgren et al. (2016), researchers investigated whether synchronous telehealth was a valuable approach for delivering basic ABA training to parents. They examined three groups of children (providing information by clinic-based telehealth, home-based telehealth, and in-home therapy). These groups exhibited a 90 percent drop in problem behaviors after teaching parents how to apply ABA techniques. Furthermore, all three groups produced the same result, which means there were no significant differences between groups. It is noteworthy that the cost of parent training delivered in both clinic-based telehealth and home-based telehealth reduced the cost of training parents by 75% and 64%, respectively, relative to providing in-home therapy.

Blackman, Jimenez-Gomez, and Shvarts (2019) aimed to determine if online, self-paced parent training may be a suitable option instead of in-person parent training. They compared online training to in-vivo training by evaluating parent stress, understanding the ABA content, improving the interaction between child and parent, and conducting parental competence measures before and after completing the training modules. The online and in-person groups indicated that parent-child dyads greatly enhanced their scores on the interaction between child

and parent and ABA content evaluation tests. As a final result of the study, both training online and in-vivo training demonstrated equal improvements regarding awareness of the ABA approaches in boosting parent-child relationships, leading to generalization and maintenance of behavioral therapy skills.

Griffiths (2020) conducted a study that looked at how telehealth training can assist Albanian parents applying manding with children with ASD with fidelity and improving communication between child and parents. Aspects of the study included measuring parents' implementation fidelity in both the role play and the generalization video, as well as recording their children's mand in generalization video. Results indicated that the children with ASD improved their expressive language and made more requests for their favored things or activities (i.e., manding) outside of the study context. Additionally, the study investigated parents' perception of telehealth training and its outcomes as part of the research project and parents rated the intervention as highly satisfactory.

Another study looked at utilizing telehealth for behavioral consultations to the families of children with ASD (Machalicek, et al., 2016). The results indicated that using a telehealth behavioral consultation model effectively measures the problem behavior and trains parents to apply the ABA strategies remotely. This study corroborates Wacker et al.'s (2013a) finding that telehealth assists parents to implement functional behavior assessment which leads to determining the environmental factors that maintain problem behaviors and telehealth teaches parents to use evidence-based -practices to reduce problem behaviors. Vismara et al.'s 2012 study looked at how parent intervention boosts children's learning during daily play in the home setting. Parents enhanced children's communication skills utilizing teachable opportunities that resulted in improvements in spontaneous language and imitation. Also, the study of Vismara et

al. 2012, indicated that telehealth contributes to helping the parent understand and adopt the early intervention frequently when they interact with children daily. Vismara and colleagues in 2013, conducted another study to examine parent involvement in the telehealth program and how that influences children with ASD in learning verbal utterances and joint attention skills. Verbal utterances progress in children with ASD improved in the study due to the parents' intervention and high-quality parenting skills (Vismara et al., 2013).

Functional Communication Training (FCT) with coaching and independent trials utilizing telehealth was studied by Suess et al. (2014) to examine treatment fidelity. The findings of this research revealed that there is no consistent difference between coached and independent trials. During the final treatment trials and coached trials, the behavior issues in children decreased significantly. Suess' study recommends employing telehealth training in teaching FCT, which leads to a sufficient level of fidelity and reduction of problem behavior in children. Another study by Suess et al. (2016), utilized telehealth to train parents in an outpatient clinic to evaluate and deliver an intervention to reduce problem behavior. Findings confirmed that telehealth may be used in an outpatient clinic and could accelerate the success of the intervention. Another study used self-paced instruction via a telehealth modality to teach parents ABA techniques and related skills, combined with follow-up coaching and remote check-ins to ensure they learned the skills effectively (Yi and Dixon, 2020). Boutain et al. (2020), recently conducted a study of behavioral skills training utilizing a telehealth model to deliver information to three parents of children with autism to learn how to use graduated guidance to teach children numerous critical self-care skills. The finding indicated that parents reached an extremely high level of fidelity in applying graduated guidance, and children exhibited improvement in self-care skills and performed these skills independently and with accuracy.

Research strongly supports the fact that telehealth has produced prolific and unequivocal advances in terms of delivering parent-implemented interventions for children with ASD including reducing behavioral challenges, FCT, and improving social skills, play, communication, and self-help skills (McDuffie et al., 2013; Vismara et al., 2013; Machalicek et al., 2016; Simacek et al., 2017; Gumundsdóttir et al., 2017). The telehealth model has become an accepted and trusted method of delivery for parent training and for serving individuals with ASD. Since the COVID-19 pandemic, telehealth has grown substantially and is considered to be a cost-effective, accessible, efficient, and successful model that does not significantly differ from in-person models (de Nocker and Toolan, 2021).

CHAPTER THREE: METHODOLOGY

The present study assessed the effectiveness of training parents on Functional Communication Training (FCT) via video modeling, by using telehealth training to help parents learn and implement the procedures to teach manding to their child with ASD to replace problem behaviors.

Study Participants

Participants included four children with ASD and four parents (total of eight participants). Medical reports in the initial interview were used to determine diagnosis. Children with ASD were within the age range of three-nine years old. The participants were of different nationalities. The parent interview (See Appendix A: Parent Intake and Functional Assessment) determined that the child displayed problem behaviors including, but not limited to, physical aggression, tantrum, screaming, lower level of self-injurious behavior, non-compliance, property destruction, and elopement, and had limited verbal communication or language abilities that included difficulties in manding. All levels of functioning were considered as long as the child demonstrated difficulties requesting and if the problem behavior interfered with their communication. Target behaviors were determined by parent interview and a video observation by the researcher with the parent contributed video evidence demonstrating the problem behavior with the antecedents and consequences.

Exclusion criteria included children with disabilities other than ASD such as blindness, deafness, or other impairments that might impede the child's ability to participate using video

modeling and visual supports. Children with an intellectual disability, ADHD, OCD, anxiety, or other disorders could participate if they met other inclusion criteria. Parents who lived in an area with extensive ABA services and the child was receiving them; and children who showed an extreme level of self-injurious or aggressive behaviors; were excluded.

The study was conducted after obtaining the Institutional Research Board (IRB) approval. The participants were recruited through family associations and Autism centers such as Autism Speaks who asked to share the recruitment flyer (See Appendix I: Recruitment Flyer) with their list of parents, via email and/or social media. The flyer addressed inclusion and exclusion criteria for the study and outlined the requirements to participate, as well as contact information if interested in participating. Once a parent contacted the researcher via email or phone, they received an email that included the informed consent to be signed before participating in this study. Parents were selected on a first-come, first-served basis. Some parents declined to participate after the initial interview but no parents were rejected based on not meeting inclusion criteria. In order to clarify the study procedure, duration of the study, study requirements, and expected outcomes, the researcher arranged an initial meeting at a suitable time with parents to answer any questions, review informed consent, and confirm the parent was qualified and willing to fulfill the requirements of the study.

Child Participants

This study collected a full description of each child including demographic information such as age, gender, disability level, race/ethnicity; how long the child had been enrolled in a special education program; was receiving IEP services; or how long child had the ASD diagnosis and received services.

Adam was a 9-year-old (white) male identified as having ASD diagnosed at four years old. He attended a self-contained special education classroom and received speech therapy. He took Risperdal medication to manage hyperactivity, reactions and sleep regulation. He was nonverbal and communicated by pulling the hand of an adult to what he wanted. He engaged in mildly aggressive behaviors. Adam lived in a rural area in Saudi Arabia with his mom, dad and sibling. His mother participated in the research. The mother identified grabbing as Adam's target behavior, which was defined as pulling his mother's hand forcefully and taking objects without permission.

Abdelaziz was a 4-year-old (white) boy identified as having ASD which was diagnosed at three years old. He attended school at a special education preschool classroom. He lived in a rural area in Saudi Arabia. His problem behavior of grabbing was operationally defined as taking meals without parental consent and grabbing edibles from someone else's plate or attempting to grab food from counters, kitchen tables, and the pantry, without adult consent. This often included climbing on furniture to obtain food.

Eyad was a 9-year-old (brown) boy who was identified as having ASD at three years old and 9 months. He lived in Somalia, one of the Arab Gulf Countries. He was presently not enrolled in school due to not having access to special education as a result of their low income and the absence of free options for immigrant children with disabilities. Eyad's mother was attempting to look for alternatives such as grants for his schooling. She was currently home-schooling him to the best of her ability. Eyad had not received any ABA services. He had limited verbal communication (2–3-word sentences) and preferred solitary play activities such as playing with construction cubes. Eyad's problem behavior of stealing was operationally defined as

stealing or taking food from the refrigerator, pantries, or from strangers in parks without asking for permission. This behavior happened multiple times per day before and after meals.

Fadia was a six years old (white) girl who had been identified at five years old as having ASD. She lived in a rural area in Saudi Arabia. She had limited verbal communication and communicated primarily using gestures. She liked to play with Play-Doh, make bracelets, and play with construction blocks. Fadia's problem behavior of grabbing food was operationally defined as grabbing the food/ item from pantry or tables without asking permission.

Parent Participants

All participating parents had no knowledge or training on the intervention procedures (manding, video modeling, and FCT), and had not received training on FCT, previously. This knowledge was determined in the parent interview where parents were asked to explain their experience with ABA and the included components of this study. Parents had access to the internet, a laptop, tablet, or smart phone with a camera, and available time to participate in scheduled appointments for training and implementing the intervention with their child. The parents' demographic information included age, gender, employment, previous experience in parent training, and level of education. Parents' demographic information was collected in the parent interview. All who participated were female parents.

Adam's mother was a thirty-three years old (white) female who was a full-time teacher. She was an Arabic speaker; who had a college education and was married with four children.

Abdelaziz's mother was twenty-six years old (white) and unemployed. She was an Arabic speaker. She had a high school education and did not attend college. She was married with two children.

Eyad's mother was twenty-three years old (brown), and she was unemployed. She had a high school education. She was an Arabic speaker. She was married with three children.

Fadia's mother was thirty-three years old (white) and was a full-time teacher. She was an Arabic speaker, married with two children.

Settings and Materials

All families participated virtually in their home settings using the Zoom videoconferencing platform. A video camera from each mother's phone or tablet was used to record sessions and to create and show videos to the child. Two electronic devices were required during treatment delivery: one for recording the session for researcher review data collection, and one for showing video models to the child.

Dependent Variables

Problem Behavior

The frequency of problem behavior was indicated by the parent using ABC data sheets during baseline and intervention sessions to record the changes in problem behavior (See Appendix C: ABC Data Sheets). The parent totaled the number of times the problem behavior occurred using the ABA data sheet and the frequency of occurrences was totaled for each 20-minute session. Parents collected baseline data for 3- 6 or 9 baseline sessions, depending on their schedule, using the multiple-baseline design. They also collected problem behavior data during intervention sessions totaling six or eight sessions depending on the child's ability to reach mastery criteria. Antecedents and consequences of problem behavior were also measured by the parent during baseline and intervention (when the problem behavior occurred) to establish the

function of that behavior (See Appendix C: ABA Data Sheet). To ensure reliability of parent data collection, the researcher also coded the frequency of problem behavior for problem behaviors via the recorded sessions (See Interobserver Reliability in Results for more information).

Manding

The functional communicative replacement behavior (i.e., manding) that would be taught to the child was selected to be suitable for parents and the home environment, fit the function of the problem behavior, and was incompatible with the problem behavior meaning that the problem behavior would not occur at the same time as the replacement behavior. Replacement behaviors could be verbal responses, picture communication, augmentative communication devices, gestures, or sign language. In this study, participants used verbal responses and pointing for manding**.** Manding frequency and type were also measured by parent as Independent (I), Prompted (P), or No Response (NR) during baseline and the intervention to evaluate the improvements in manding behavior (See Appendix D: functional communication Data Sheets). The researcher verified the accuracy of the parent data collection on manding using recorded sessions (See Interobserver Reliability in Procedures for more information).

Research Design

A nonconcurrent multiple baseline across subjects was implemented, having three tiers of baselines with three, six, and nine session minimum baselines, with two participants in each tier of the baseline. Response-guided analysis was used to ensure that baselines were stable prior to starting intervention for each participant. Participants were randomly assigned to one of the three tiers of the baseline using a random number generator on the computer. This design introduced the independent variable to multiple people who display similar behaviors and who have similar

characteristics and environments (Ledford and Gast, 2010). After achieving a steady baseline of behavior, the independent variable was delivered to one of the participants while the others remained in the baseline condition. When the first individual reached a steady state of baseline via visual analysis of the data, the independent variable was applied to the second participant and so on (Cooper, 2020). This design does not require withholding the intervention and every subject acts as its own control (Cooper, 2020). The multiple baseline design is advantageous in that there is no control group, and every participant has access to the intervention. The design is well suited to many practitioners who are interested in examining gradual changes in behaviors (Cooper, 2020).

General Procedures

Behavioral skills training (BST) was used to train parents to use FBA and FCT/VM via telehealth. All BST procedures were delivered virtually and followed the sequence below:

Instructions

Instructions were emailed to each parent following their signing the informed consent and agreeing to participate in the study. Instructions included a two-five minute description of the importance of the skills parents were learning in PPT presentation. A written description of the procedure and the necessary data sheets were sent to the parent, via email, to be printed for each session. Parents were asked to print the data sheets, collect data, take a photo of the data sheet following each session, and email the photo of the completed data sheet to the researcher. The PPT presentation also included an explanation of the skill steps for baseline and intervention, how to collect data, and how to problem solve throughout each phase. Time was also allotted for parents to ask questions about the procedures. The language of the written copy and verbal

instructions was easy for the parents to understand with all communication being at a language level no higher than 8th grade. Both written and verbal communication were delivered in Arabic.

Modeling

The researcher next modeled the skill being taught to the parents. This was performed via telehealth with a researcher presenting pre-made scenarios /videotapes showing the skill being taught. A researcher produced the instructional video, which included a parent-child dyad of similar age to the research participants. The video was less than one minute long.

Rehearsal

Parents were given the opportunity to practice the target skills that were modeled. Rehearsal consisted with verbal scripting, or role-playing (e.g., researcher played the role of the child while parent practiced intervention techniques). The rehearsal involved short sessions, of two to five minutes in length.

Feedback

The trainer gave feedback verbally on data collection (ABC data and behavior data sheets), practicing of skills, identification of the replacement behavior, materials, the parent-created video models, and the intervention. To ensure the trainees accepted the corrective feedback, the trainer initiated and ended with positive feedback highlighting what the expectation was while avoiding discouraging comments, focusing instead on the strengths of the parent. When error correction was needed (e.g., over-use of prompting), the researcher provided feedback and briefly walked the parent through the BST steps to implement the procedure correctly.

Parent Intake and Functional Assessment Interview

Following initial screening and informed consent, the researcher met with each parent and interviewed them to identify and define the target problem behaviors, the antecedent events predicting the target behaviors, and the consequences following target behaviors. Hypotheses statements were developed that summarized the data and identified the most likely function of the target behaviors (See Parent Interview - Appendix A). Following the interview, the parent was asked to submit a video of their child demonstrating the problem behavior and the associated antecedents and consequences within a week of the interview. All parents complied and submitted their initial video on time. This video was used to finalize the target behaviors for the study with the researcher and the parent and to identify potential antecedents and consequences of the problem behaviors.

Phase1: Parent Training

Behavioral Skills Training FBA

The researcher used BST procedures (described earlier) to train parents to conduct the FBA (see the Training and Implementation Protocol – Appendix E). Training of the FBA included a five-minute explanation of FBA, how it is conducted, why it is used, and how it can be done at home. Specific examples were used to make it easy for the parent to understand. Following each example, the researcher demonstrated how to collect ABC data based on written scenarios (See appendix X- Parent Training Protocol). Three video vignettes showing examples of child behavior resulting in different functions of behavior (attention, escape, and tangible) were shown (described in the next section). Parents were then asked to practice collecting ABC data with practice videos shown to them by the researcher (i.e., not with their child present). The

researcher observed the parent via live video or recording to implement the steps included in collecting ABC data. This portion of the study took two-three weeks to complete. The steps included:

- Setting up the camera in a way that captured both the parent and child during the designed play or work activity (determined when the problem behavior tends to occurred)
- Set up a routine where the behavior typically occurs (e.g., play time, homework, bedtime, etc.).
- Have ABC data sheet and pen/pencil ready (a clipboard comes in handy).
- Start the camera and engage the child in the routine that has typically caused the behavioral challenge and respond as you normally would if they exhibited the behavior. Record for as long as the behavior continues and stop when the child has stopped or moved on.
- If the child does not show the behavior problem, you may need to try again the next day or later the same day. It is important to have a video clip that shows what happened before the behavior started (e.g., you putting the iPad away), the behavior itself (e.g., child screams, cries, and grabs onto you), and what happened right after (e.g., you give them the iPad or you walk away, etc.).
- Once you have a good video, submit it to the researcher using *Google Docs* and a meeting will be arranged regarding next steps for baseline sessions.

Scenarios. Three scenarios were created to show examples of functions of behavior. Each scenario covered a different function. The first scenario showed a child engaging in escape/avoidance behavior to get out of a non-preferred activity and the adult negatively reinforcing the child by letting them escape or avoid the activity. The second scenario showed a

child engaging in problem behavior to get access to something that they wanted with the adult providing positive reinforcement by letting the child have what he wanted. The third scenario showed a child engaging in problem behavior to get attention from the adult with the adult providing positive reinforcement by giving the child attention. The discussion of scenarios was a significant part of training that led to improved understanding of behavioral procedures.

Video Vignettes. Parents watched a video of the child with problem behavior to practice implementing ABC recording and to identify the problem behavior and potential function of that behavior for their child. The video clips varied in duration of less than one minute. The video was obtained from YouTube.

Behavior and ABC Recording Sheet. This data sheet given to the parents to fill out while they observed their child during baseline and to practice during FBA training (see the Behavior and ABC data sheet -Appendix C), included three ABC sections (the behavior, antecedents, and consequences) as well as frequency and summary of the behavior. During the FBA training, the parents collected ABC data while watching the video described above and discussed this with the researcher.

Functional Communication Data Sheet. This data sheet was used during training, baseline, and intervention to track Independent, Prompted, and No Response opportunities for Functional Communication (see the functional communication data sheets - Appendix D). The researcher demonstrated how to collect data by showing a video of a child engaging in replacement behavior, which served the same function as problem behavior. After that, a researcher requested that the parents employ role-playing during rehearsal after which the researcher offered corrective feedback.

Phase 2: Baseline

The researcher instructed parents on how to perform a series of trials during a twenty minute, one-on-one play session. During baseline, the parents set up the environment to provide natural opportunities for the child to mand such as placing a preferred toy out of reach or asking the child to complete a task during which they may want to escape or take a break. When the problem behavior occurred, the parent was instructed to respond as she normally would in these circumstances. The baseline period continued for the time assigned to that participant (three, six, and nine 20 minutes sessions) and until the participant displayed a stable level of behavior during at least three sessions. After conducting the FBA and finding the function of the problem behavior, the parent created the video related to the treatment (modeling the replacement behavior with a peer). Parents collected data on the problem behavior and manding (if it occurs naturally) during baseline using the behavior data and ABC data sheet. Parents submitted their videos to the researcher through an online document sharing service. Reliability check of all videos was done by the researcher during all phases to ensure that the parent was collecting data correctly and implementing the procedures correctly. Feedback was provided to the parent regarding data collection at each online meeting after the parent had submitted the video to the researcher. Feedback sessions were completed within two days of the researcher receiving the video from the parent.

Creating Video

After completing the FBA and the hypothesis, the researcher met with each parent and discussed their performance on collecting data regarding their child to learn the function of the behavior, provided feedback and suggestions about the specific FCT that the child needed, and

how best to develop a video to meet that need. Subsequently, the parents created a video to teach the child the verbal or picture exchange mand. The video modeling included a replacement behavior that was functionally equivalent to that of the problem behavior. The video recorded the moment when the peer model emitted the target mand along with any materials related to the mand in the home setting (Plavnick & Ferreri ,2011). The peer model modeled the desired communication behavior (e.g. pointing, handing a picture, verbal, etc.) to replace the problem /inappropriate behavior and the adult in the video immediately reinforced the manding behavior to establish the functional relationship between manding and receiving the desired object. The videos lasted between fifteen-forty-five seconds and two-three videos were made for each child based on communication needs and generalization.

Parents were trained to create their own one-three minute videos that would be used as video models to teach the child the communicative replacement behavior. Parents were instructed to follow the same format as the videos they watched during training, to include the peer using a mand to request the desired object and the adult in the video providing immediate reinforcement with praise and giving the child the desired object. Videos included the parent and a neuro-typical peer who modeled the mand/request. Peer models were siblings available to the parent. They were of similar age (i.e. the same age or one-three years older). Adam's video included his sister, who was 2 years older. She modeled sign language and used the sign,"Pointing to the mouth," for requesting an item. Abdelaziz's video showed his brother, who was two years older. He modeled a point to request an item. Eyad's video included his brother who was one year older. He modeled how to request food by using the phrase "I want ____." Fadia's twin sister modeled pointing to an item to request it.

The parents' phone or tablet was used to record the video clips that showed the peer manding or requesting the preferred item or activity, and the parent providing reinforcement to the peer model. Once the video was made, the researcher watched the video and provided feedback to the parent, if necessary, to make corrections. Some videos were needed to be redone because they were not clear or had two behaviors at the same time (asking and grabbing at the same time).

Phase 3: Intervention

Following identification of the function of the problem behavior, identifying a replacement behavior (manding procedure), and creating the video models, the parent was instructed to set up the environment similar to the baseline to practice using the communication replacement behavior (e.g., set desired object nearby, engage child in non-preferred activity, etc.), gather the necessary materials, and data sheets. The parents were instructed to let the child sit at a table or sofa to watch the video model that they made. They asked the child to watch the video and the parent was reminded to redirect the child if he/she was distracted by pausing the video and saying, "it's time to watch a video." The duration of the sessions was twenty minutes each day, four times per week. The parent showed the child the video model and then provided an opportunity for the child to use a mand to request the desired object (e.g., food). If the child used a mand independently, the parent immediately provided reinforcement. If the child did not use a mand, the parent was taught to prompt the child using least-most prompting (e.g., pointing to the desired item, verbal prompt, placing the child's hand on picture for picture communication).

The parent practiced the communication steps with the child two times in the first ten minutes then took a two minute break. Children were allowed to play with a desired toy during the break but were not given access to food as that was the item used for the manding procedure. Following the break, the communication steps were repeated two more times in ten minutes for a total of four trials. Each session was recorded, and the researcher reviewed each session with the parent to provide feedback for effective implementation. Once the child had mastered the manding response and problem behavior had been diminished, the parent presented the manding opportunity for two consecutive sessions without using the video model to ensure mastery of the response.

Data was collected by the parent for each session, using the functional communication data sheet. Data collected included independent/correct manding responses, prompted manding, and no responses. problem behaviors were recorded each time they occurred using the behavior ABC data sheet.

Generalization and Maintenance

Two generalization probes were collected following the intervention phase that assessed whether the child was able to implement the learned appropriate communication with other adults or with peers. Once the child reached mastery for appropriate manding, there was a two week break although the parent was encouraged to provide two sessions of manding opportunities in the natural environment to measure maintenance.

Planned Analysis

In this study, a visual analysis was utilized to graph and analyze the results of the study on a continuous basis until the study was completed. All of the results of each session were plotted in graphic display using a standard multiple baseline design format (Kennedy, 2005). Visual analysis detects significant behavior change and is considered a conservative and evidence-based technique (Cooper, Heron, Heward, 2020). There are three components to assess patterns: level, trend, and variability. The *level* measures the behavior change by the means of the data within the condition and provides an easy way to look at the average for each child's performance. Assessing the level is done before and after the treatment condition in order to establish whether there are substantial improvements in the desired behaviors (Cooper et al., 2020; Kratochwill et al., 2013). The second component is *trend* which represents the best-fit straight line on the data and is described in increasing, decreasing and zero trend. The last component is *variability* and indicates individual data points that strayed from the general trend (Kennedy, 2005). The functional relationship between the dependent and independent variables can be identified by visual analysis (Kratochwill et al., 2013).

A *masked* analysis was conducted by a university professor and graduate students. This is a structure supplement tool in addition to the typical visual analysis that aims to control for type-1 error. The masked analysis is a procedure that allows for a thorough full visual analysis with definite statistical intention of controlling the probability of having false intervention effects (Ferron & Jones, 2006). The study required both researcher and analyst. The researcher conducted the intervention in addition to training parents and collecting data, while the analyst, an expert in single case design, conducted the analysis along with a summary of the visual

analysis. The researcher, who is responsible for intervention, sent daily data results to the analyst to conduct an on-going analysis (Ferron et al., 2017).

Significantly, when the data was submitted to the analyst by the researcher, the data was masked so that the analyst was only aware of the values of the dependent variables for each participant and was not informed of the values of the independent variable, observations of which are baseline and intervention (Ferron et al., 2017). In the multiple baseline design, the analyst analyzes the masked data in each session for all participants until all data points have been analyzed (Ferron et al., 2017).

Fidelity of Implementation

Adapted from Biagi (2021), a task analysis was developed for baseline and intervention procedures that included all the steps that the parent should be implementing. The researcher asked the parents to fill out the form during the intervention. A 5-point Likert scale was used to get the average rating where the lowest rating was indicated by 1 and the highest rating by 5: 1) not at all; 2) inconsistent and ineffective implementation; 3) some effective implementation but inconsistent; 4) mostly effective implementation; and 5) used consistently and effectively. The parent tracked the steps for fidelity using the parent visual for baseline and intervention (see Appendix G).

Interobserver Agreement

Interobserver agreement was used in this study to evaluate whether or not the measurements made by two or more independent observers provided the same observed results (Cooper, Heron, & Heward, 2020). Interobserver agreement is a percentage of agreement

between researcher and parent during the entire observation of parent training. The agreement percentage between observers' outcomes should be 80%. The researcher measured total agreement type by calculating the total of the number of responses of researcher and parent, dividing the smaller count and larger count then multiplying by 100%. The researcher calculated 33% of the parents collecting data frequency of problem behavior and FCT/ video modeling during the baseline and intervention.

Social Validity

A subjective evaluation was used by giving the parents a questionnaire related to the training (See Social Validity Survey – Appendix H)**.** A revised version of the Treatment Acceptability Rating Form (TARF-R), adapted from Reimers and Wacker (1988), was used to collect data on social validity. The questionnaire included nine questions on a five-point Likert-type scale ranging from 1 (disliked) to 5 (liked) (liked very much). These questions assessed the parent's point of view of telehealth training. The form consisted of the following items: measuring the understanding level; acceptable level of telehealth training; effectiveness level of telehealth training; confidence level for implementing the learned skills from the training; beneficial level that will support the parent to help the child learn manding in the future; negative experiences of the training; difficulty level of the training; improving the ability to teach the child manding; and recommendation level to other parents (Treszl, 2021).

CHAPTER FOUR: RESULTS

Functional Behavior Assessment

All mothers completed the ABC data sheet prior to intervention and recorded the video to capture the behaviors for research.

Adam's mother completed the ABC data sheet and recorded a video to capture the mild aggression during afternoons. The antecedent included the mother putting Adam's favorite food in the pantry. His behavior consisted of him pulling her hand several times toward the pantry, and the consequence consisted of the mother reprimanding his behavior by saying, "no" or telling him to pronounce the name of item to obtain it. The researcher and Adam's mother identified a mild aggression as a problem behavior. The function of his behavior was gaining access to tangible items.

Abdelaziz's mother completed the ABC data sheet and sent the recorded video to the researcher. The problem behavior of grabbing was identified as having an antecedent of food being on the top of the refrigerator. His behavior included pulling a small table to help him climb to get the food and after he reached the food and ate it, the consequence was that his mother reprimanded him and told him that, "it's not a choice". The function of his behavior was gaining access to tangible items.

Eyad's mother submitted the ABC data form and sent the researcher the recorded video. Eyad engaged in food stealing behavior. The antecedent was observed as occurring when a parent, sibling, friend, or another stranger was present and there was a juice or other food item in the refrigerator that he wanted. His behavior consisted of him stealing an item from the

refrigerator and consuming it. The consequence was that his mother reprimanded him and told him not to take it. The function of his behavior was gaining access to tangible items.

Fadia's mother completed the form of ABC and sent it to the researcher with video recording. The problem behavior was grabbing items without asking. The antecedent was observed as having food in the cabinet that Fadia desired. The behavior was grabbing cereal from the cabinet and consuming it. The consequence was a reprimand from her mother not to take food without asking. The function of her behavior was gaining access to tangible items.

Frequency of Problem Behaviors

All four children showed stable baselines of problem behaviors and all four children responded to the intervention. A decrease in problem behavior was observed after a few intervention sessions (see Figure 1 below**).** This figure showcases the multiple baselines across participants. These results are from data collected on the frequency of problem behavior during phases.

The top panel of Figure 1 below shows data for Adam with three stable baseline sessions with a frequency of grabbing six-eight times per session. The intervention consisted of eight sessions. On his third session, his problem behavior had decreased to zero and this was maintained across remaining intervention sessions.

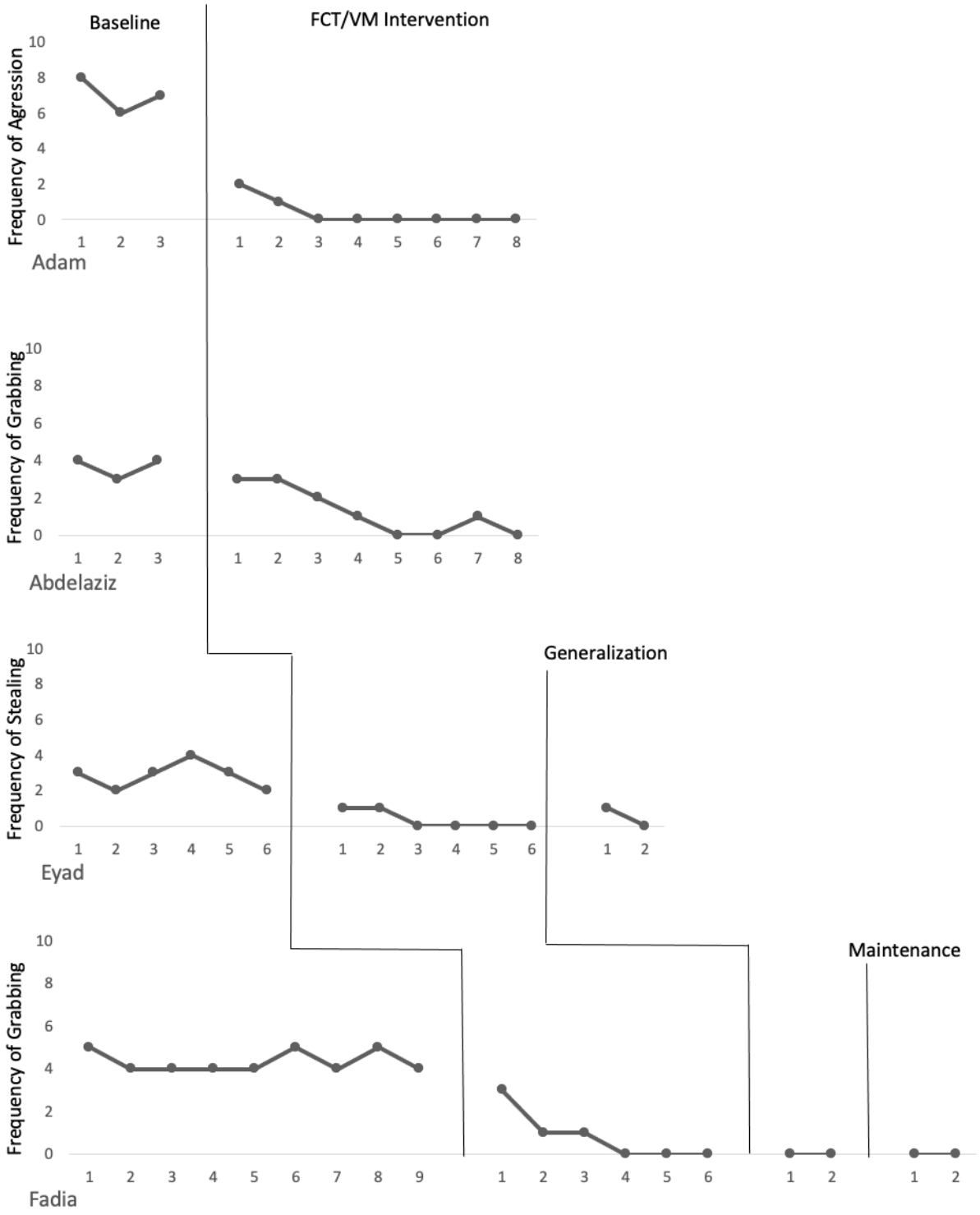

Figure 1 Participants Multiple Baseline on Frequency of Problem Behavior.

The data for Abdelaziz is illustrated in the second panel of Graph 1above. Abdelaziz's mother conducted three baseline sessions, which were stable for all three sessions. The frequency of grabbing behavior during baseline sessions was three to four times per session. The data shows a reduction in problem behavior from the third session to the sixth session during the intervention with an occurrence of 2-0. Although there is one occurrence of grabbing during session seven, it decreased to 0 in the last session.

The data depicted in the third panel of Figure 1 illustrates the frequency of stealing food per session during the baseline phase of the study for Eyad. The baseline phase consisted of six sessions, during which the data remained stable with a frequency range of two to four occurrences per session. The intervention phase demonstrated a reduction in the frequency of the stealing food behavior from one to 0 occurrences across all six sessions. The generalization phase, however, still exhibited instances of this problem behavior, albeit at a lower frequency than the baseline phase, with a frequency of one occurrence during the first session of generalization.

The final panel of Figure 1 presents the data pertaining to Fadia. The frequency of grabbing items remained stable at four to five occurrences across all nine baseline sessions. During the intervention phase, there were attempts to grab items in the first three sessions, but this behavior decreased to zero occurrences in the remaining intervention sessions. This trend of zero occurrences persisted throughout the generalization and maintenance phases, indicating a reduction in the problem behavior across all phases of the study.

Functional Communication Responses (Manding)

Baseline was stable for all four participants with 100% no responses and 0% prompted responses and 0% independent responses for manding. All participants responded to the intervention and showed an increase in manding responses (See Figure 2 below). This figure showcases the multiple baselines across participants on functional communication training and video modeling.

During the intervention, Adam had zero non-responsive behaviors recorded, and prompted responses were initially noted at a high level of 75-100% but decreased to 0%. This was due to the mother's overuse of excessive verbal prompts in quick succession. To assist Adam in responding independently, she was taught to fade prompts. During the fourth session of the intervention, the percentage of prompted responses dropped to 40%, and then gradually decreased to 0% during the sixth session. At the start of the intervention, the rate of independent responses was 0%, but it steadily grew from 60% to 100% during the length of the intervention. This growth was made possible by using video modeling in the first six sessions during the intervention. With video modeling, he achieved 80% in session five and 100% in session six, after which his mother withdrew the VM in sessions six through eight, and he achieved 100% in the final two sessions without reliance on VM or prompting from his mother. Mastery criteria was achieved.

Abdelaziz participated in the intervention for a total of eight sessions. The outcome of the initial three sessions demonstrated a 100% prompted response. This outcome necessitated the implementation of additional training on prompted delays for the mother, which was conducted during a meeting after the third session. The supplementary training led to a decrease in the proportion of prompted responses to 20% during the following sessions. Conversely, the

percentage of independent responses increased to 100% during the fifth intervention session, however, it regressed to 75% in the last session. It is important to note that all intervention sessions utilized video modeling. The mastery criteria were not achieved.

Eyad engaged in six sessions during the intervention phase. The first two sessions of the intervention exhibited a high rate of prompted responses, ranging from 100% to 80%. In an effort to reduce the utilization of prompts by mother, the researcher provided supplementary training on the implementation of time-delay prompting. This resulted in a decrease of the rate of prompted responses to 30% in the third session, and a further gradual decrease to 0% in the fourth, fifth and sixth sessions. Independent responses increased to reach mastery criteria with VM in session three by 80% and 100% in session four. This outcome enabled the researcher to progress to the subsequent step of the study, which entailed instructing the mother to implement the intervention without the utilization of video modeling. Eyad demonstrated the ability to communicate independently at a rate of 100% during the last two sessions without the use of VM and reached mastery criteria.

Fadia participated in six intervention sessions, two generalization sessions, and two maintenance sessions. During the intervention, the initial session exhibited 80% prompted responses and 20% non-responsive behavior. Subsequently, the researcher provided feedback to the mother on the implementation of time-delay prompting. The mother effectively implemented this feedback, as evidenced by Fadia's data showing a decrease in prompted responses from 20% in the second session to 0% in the remaining sessions. Similarly, non-responsive behavior decreased from 20% to 0% in the following sessions. Fadia's data also showed an increase in independent responses from 50% in the second session to 100% in the third and fourth sessions with video modeling, as she had mastered the ability to communicate independently.

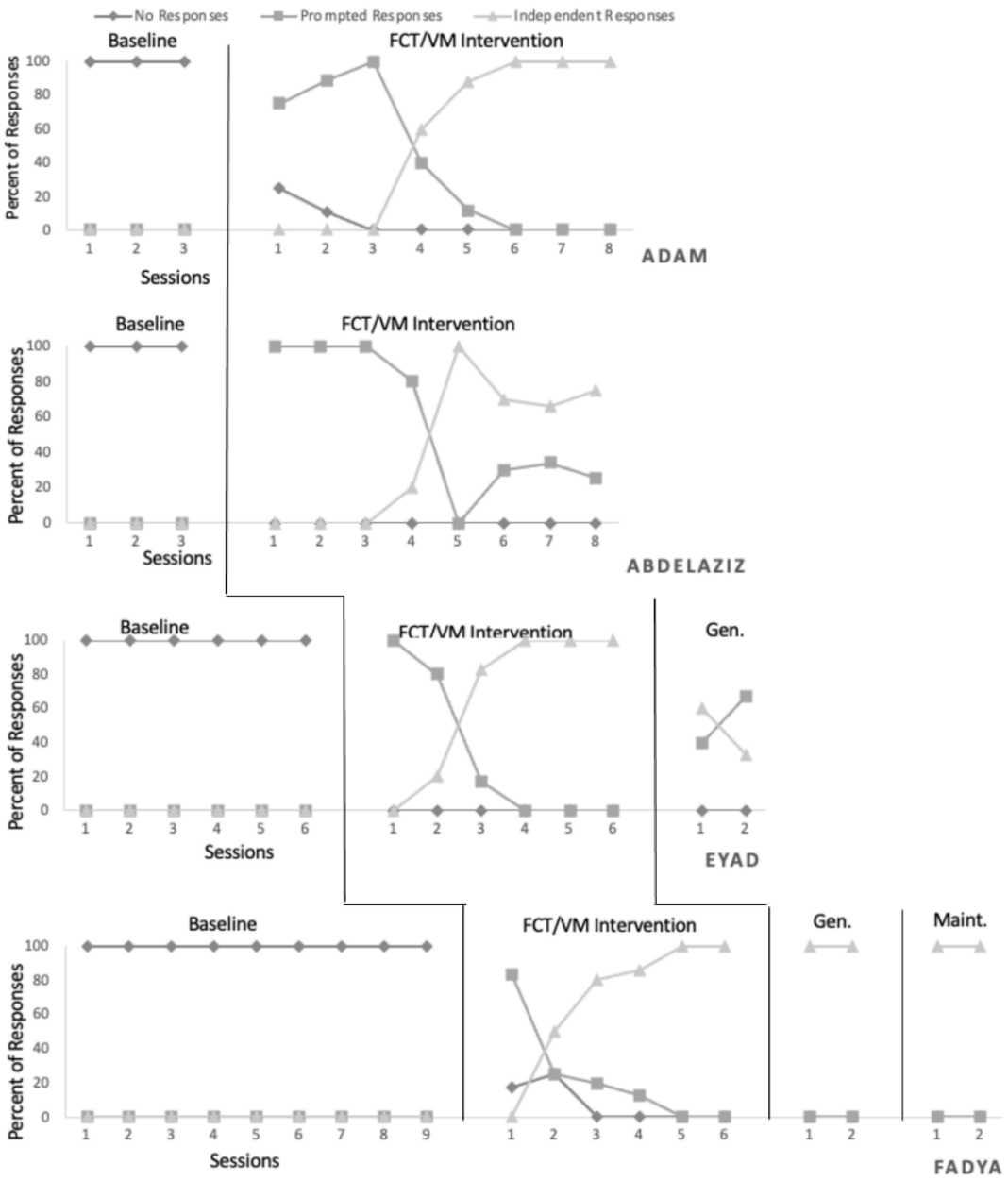

Figure 2 Participants Multiple Baseline on Functional Communication.

As a result, the mother was guided to proceed to the next step, which involved implementing the intervention without video modeling. Fadia exhibited 100% independent responses in the fifth and sixth sessions without VM and reached mastery criteria.

Generalization and Maintenance

There was no generalization observed for Adam and Abdelaziz due to the restricted time of study. Abdulazizi was the only one who did not master the criterion, but he was very close to that with his last session recorded at 75% independent responding. Adam reached the mastery criterion with additional two sessions during the intervention without video modeling. The outcome of Eyad's intervention sessions enabled him to proceed to the generalization phase, which yielded a range of independent responses from 100% to 70%. The two generalization sessions were conducted in a park setting. Fadia's mother implemented the generalization phase in a supermarket setting, and the two generalization sessions were successful, yielding 100% independent responses. Fadia was the only participant to progress to the advanced phase (Maintenance), and she was able to demonstrate a very high percentage of independent responses at 100%.

Masked Analysis

Masked Analysis for Problem Behavior

The masked visual analyst was informed that potential baseline lengths were 3, 6, and 9, and that one of those baseline lengths was randomly selected to be assigned to two participants, such that the baseline lengths could have been 3, 3, 6, and 9, or 3, 6, 6, and 9, or 3, 6, 9, and 9. Then the four participants were randomly assigned to the four baseline lengths. Therefore, there were 36 possible assignments (3 * 12). The analysts correctly identified the assignment on their second try (the first time they had incorrectly specified Abdelaziz to have a baseline of 6). Because it took two tries, the *p*-value was 2/36 = .0556.

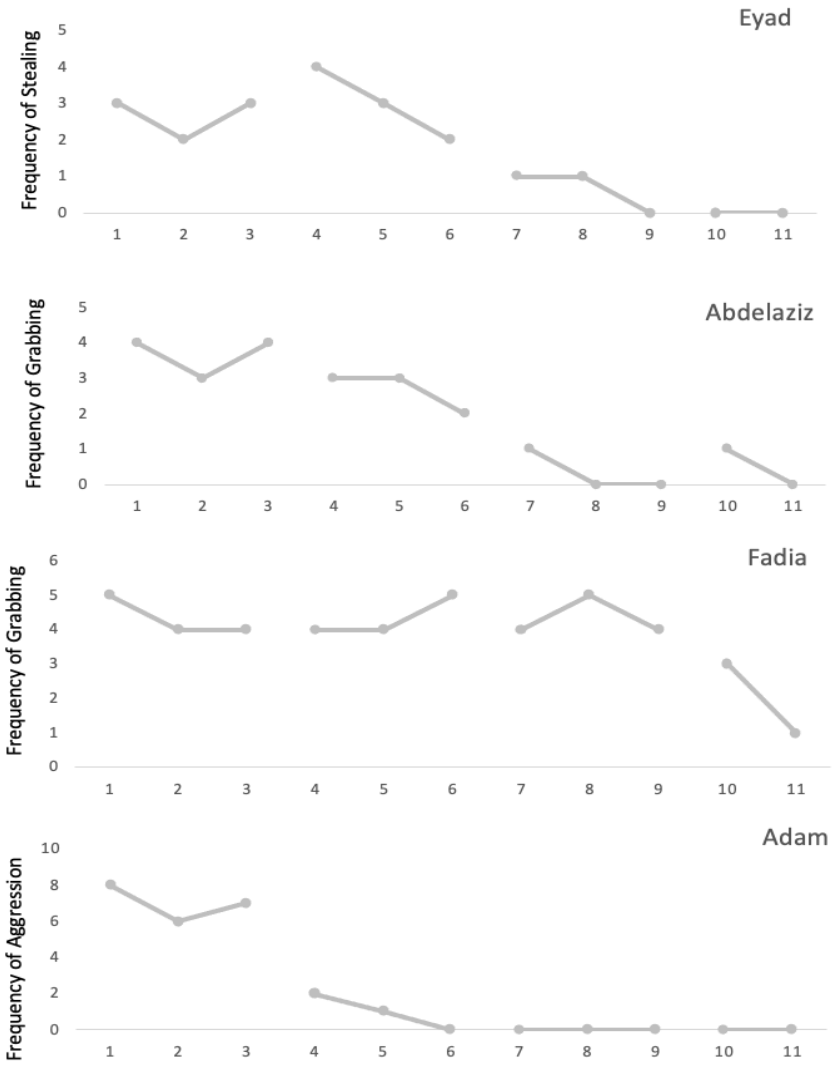

Figure 3 Masked Analysis of Problem Behavior.

Masked Analysis for Functional Communication Training

This masked analysis is for functional communication training and video modeling (independent responses). Because the masked analysis for independent responses was done after it was known that there were two baselines of 3, the number of assignments being considered was only 12 (i.e., the 12 ways of assigning 4 participants to baselines of 3, 3, 6, and 9). The

masked visual analyst was shown the graph in Figure 4. The fact that the masked visual analyst successfully recognized the actual assignment on the first attempt adds more evidence that the treatment had an impact. The likelihood of the masked visual analyst successfully recognizing the assignment on the first try is 1/ 12 (p =.0833) if the treatment has no impact.

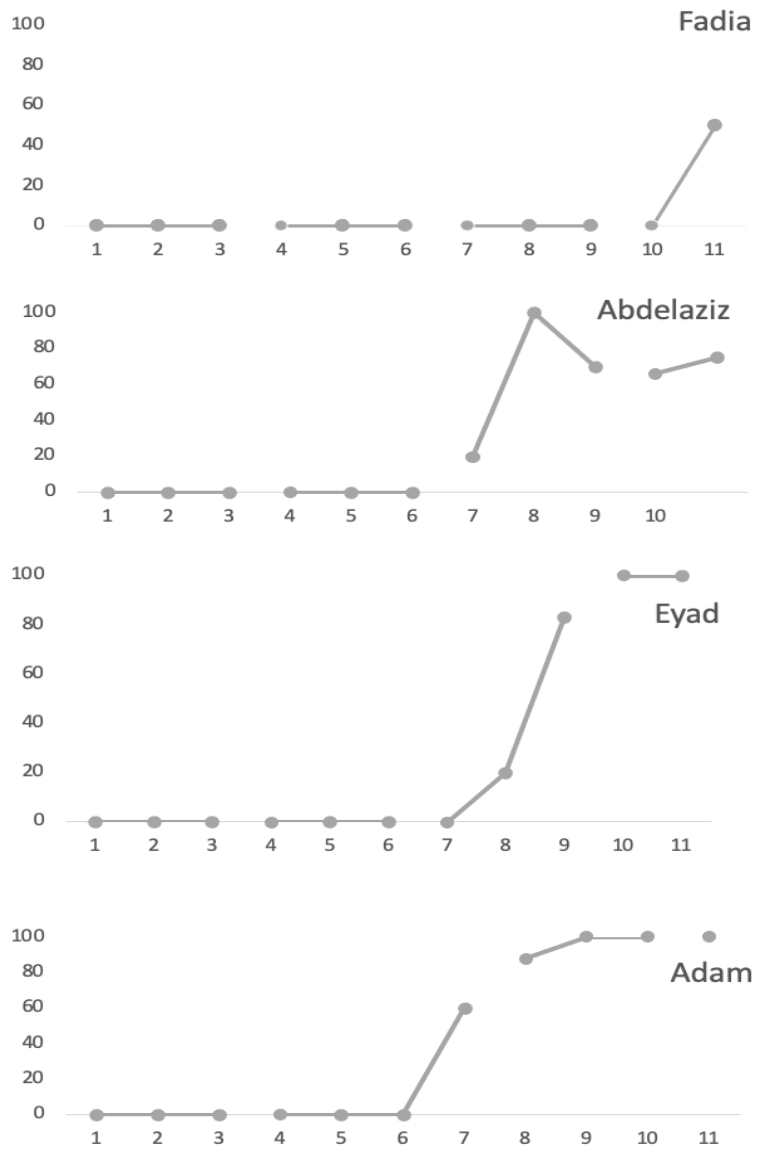

Figure 4 Masked Analysis for Functional Communication Training and Video modeling (independent responses).

Social Validity

All parents completed the social validity questionnaire which utilized a Likert rating scale with 1 being the lowest and 5 being the highest rating (See Figure 5 below). For the first item in the questionnaire, all parents indicated that the FCT/VM training was very clear (M=5). They also stated that the given training was very acceptable (M=5), their level of efficiency was very effective (M=5), and their confidence in conducting the training was very confident (M=5).

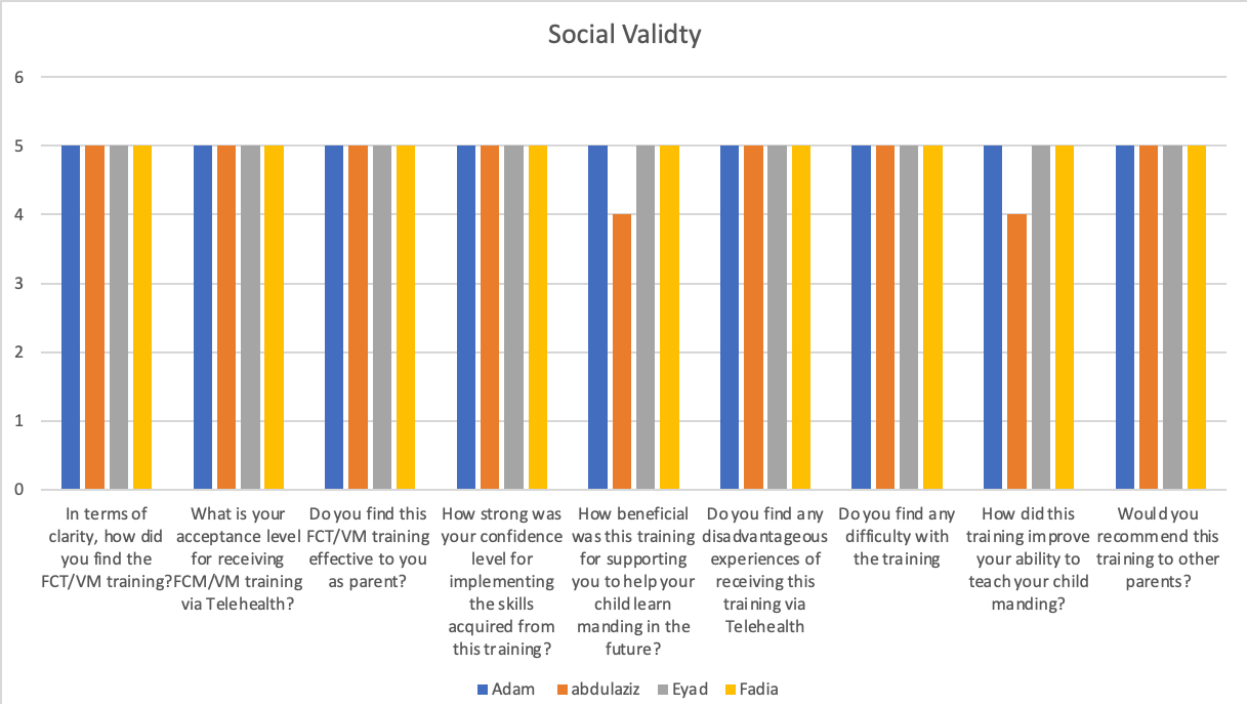

Figure 5 Social Validity Outcomes

The probability of benefitting from this training in helping their child communicate was very effective, but Abdelaziz's mother mentioned that it was effective, so the mean score was 4.47. Following the receipt of telehealth training, the parents reported that they did not find any disadvantageous experience with a mean of 5. In addition, there were no difficulties applying the

training, with a mean of 5. Furthermore, the parents found the training improved their ability to teach their child manding, with a mean of 5. The last item suggesting other parents engage in this training in the future was an average of 5. Ultimately, it can be inferred that parents perceived this training to be socially significant, effective, obtainable, and advantageous.

Fidelity of Implementation

To evaluate the fidelity of implementation of the mothers utilizing the intervention, a form by Biagi (2021), was completed by each parent during the intervention. A 5-point Likert scale was used with 1 being the lowest rating and 5 being the highest rating: 1) not at all; 2) inconsistent and ineffective implementation; 3) some effective implementation but inconsistent; 4) mostly effective implementation; and 5) used consistently and effectively. Fidelity ratings indicated an average of 4.9 for Adam's mother, an average of 5 for Abdelaziz's mother, an average of 4.9 for Eyad's mother, and an average of 5 for Fadia's mother. Overall, high levels of fidelity were achieved for all parents. Training sessions were modified to boost fidelity of implementation for prompting, reinforcement, and other procedures as needed. These ratings indicate that parent training was effective and that the mothers felt confident and comfortable implementing the procedures with their children.

Interobserver Agreement

Interobserver agreement was used in this study to evaluate whether or not the measurements made by two or more independent observers provided the same observed results (Cooper, Heron and Heward, 2020). Interobserver agreement is a percentage of agreement between observers of the entire observation of behaviors. The agreement percentage between

researcher's and parents' outcomes should be 80% or more (Cooper, Heron & Heward, 2020). The researcher measured total agreement type by calculating the total of the number of responses of the researcher and the parent, dividing the smaller count and larger count and multiplying by 100%. The researcher calculated 33% of the parents collecting data frequency of problem behavior and FCT/ video modeling during the baseline and intervention. The average of IOA with all parents ranged from 85% to 100%. For Adam's mother, the average IOA was 98%. For Abdelaziz's mother, the average IOA was 85%. For Eyad's mother, the average IOA was 95%. Fadia's mother averaged 100%.

Summary

The data in this study revealed that parents conducted the FCT/VM procedure with their children and all of the children responded to the intervention but with slightly different outcomes. The parents implemented all three phases (FBA, Baseline, and FCT/VM intervention) after receiving parent training on all phases. The data determined that all problem behavior for all four children was decreased to 0% in the intervention phase, and that all children showed increases in manding responses.

The data indicated that Adam, Eyad, and Fadia met the study criterion of two sessions with VM and two sessions without VM. Abdelaziz demonstrated response to the intervention but did not reach mastery. Eyad participated in all phases of the study except for the maintenance phase, as he did not achieve mastery during the generalization phase. Fadia was the only participant who participated in all phases of the study, including baseline, intervention, generalization, and maintenance with a high level of success, specifically with 100% independent responses.

CHAPTER FIVE: DISCUSSION

The intent of this study was to evaluate the effectiveness of training parents on Functional Communication Training (FCT) via video modeling by using telehealth training to aid parents in teaching manding to children with ASD. The outcomes of all participants were graphed and presented to address the study questions:

1. What are the effects of using telehealth training on FCT via video modeling and the parents' ability to teach manding to children with ASD? Does this decrease problem behaviors?
2. Is there a functional relationship between the use of FCT with video modeling and an increase in the use of manding by children with ASD?
3. What is the fidelity of implementation regarding the parents' ability to teach manding to children with ASD?

This study aimed to evaluate the impact of utilizing a telehealth parent-training package on teaching functional communication through video modeling to reduce problem behaviors. Behavioral Skills Training (BST) was used to teach the parents how to identify the function of a problem behavior using ABC (Antecedent, Behavior, Consequence) data collection, and how to use FCT with video modeling to teach manding to replace problem behaviors. Results determined that telehealth instruction was effective, in varying degrees, for parent training and parents were able to effectively learn the skills for data collection and intervention, which is consistent with previous research (Hoffmann et al., 2019 and. Togashi et al., 2020). This study

led to similar results to the Hoffmann (2014) study that utilized parent implementation of functional analysis (i.e., ABC data) and FCT, and was effective in the identification of the underlying function of behavior and in teaching the child to use functional communication independently.

The intervention was effective in mostly eliminating problem behaviors for all participants and all children learned to use manding to communicate functionally and appropriately. All participants showed a dramatic decrease in their problem behavior as their functional communication increased. Utilizing both FCT and VM at the same time was a practical and useful method for parents to teach manding to their children with ASD. All but one of the participants reached mastery criteria for manding (one participant reached 75% instead of 100%). This study confirms the results of Drew et al, (2022), that also found a functional relationship between increases in functional communication and decreases in problem behavior.

While the literature is robust with findings related to parent training for functional communication and decreasing problem behavior, there are fewer studies that utilize technology to improve accessibility, feasibility, and usability. The use of telehealth for parent training in this study increased accessibility to families in need and provided support to parents residing in regions lacking ABA services, areas expensive for ABA services, and families who were not eligible for local special education classes (e.g., immigration issues). This study also improved accessibility to treatment by addressing the distance barriers and transportation issues for parents to receive training and access to intervention for their children. Previous research also employed telehealth to train parents who resided in rural areas or who lived a long distance from behavioral services to get FCT treatments (e.g., Drew, et al., 2022).

While there are a growing number of studies related to using telehealth to increase and improve ABA services in the United States, there are very few studies that address the problem of improving access to families in countries with limited access to ABA (Sivaraman & Fahmie, 2020). Ferguson, Dounavi, and Craig (2022) indicated that the dearth of studies that have been conducted on telehealth platforms outside the United States only examined training parents' naturalistic treatment modalities and tend not to include interventions focused on FBA and FCT. Craig et al. 2021, posited the feasibility of this type of research being replicated internationally. This study was conducted on participants from different countries and cultural backgrounds to make an important scholarly contribution to address a gap in the literature. Ferguson, Dounavi, and Craig (2022) indicated that there are several unique benefits of broadening the scope of training by having an expert who is from or is located in the same or nearby countries as the trainees.

In this study, the researcher (a native Middle Eastern resident) was able to connect with families from the Middle East, who have limited or no access to ABA services, via telehealth, to provide much-needed parent training. Synchronous training allowed the trainer and trainee to meet virtually at times that were convenient for the families. The cultural connectedness of the researcher with the participants allowed for a deeper understanding of the home environment and culture to optimize parent training sessions in the home. While there are some initiatives for promoting ABA and outreach for improving education and knowledge about ABA in the Middle East, services are still minimal or are not obtainable for many families. Generating a cost-efficient solution that is oriented to a specific region such as using a telehealth platform can support increasing the accessibility to ABA services in an area where services are not currently available or common (Ferguson, Dounavi, & Craig, 2022).

This study supports the effectiveness of telehealth for training parents by teaching evidence-based behavioral interventions which led to successful results and improved their child's (and their own) quality of life, and results were consistent with prior studies (Boutain, Sheldon, & Sherman, 2020; McDuffie et al., 2013; Vismara et al., 2012; Wacker et al., 2013). The findings of this study align with those of previous research that indicates the effectiveness of telehealth technologies in enabling the delivery of effective interventions but with a different population (older children and adolescent) (Drew et al., 2021).

Similar to other studies, function-based manding was acquired quickly using video modeling for all participants (within 2-5 sessions) (Plavnick & Ferreri, 2011). Studies that taught manding without video modeling report more inconsistent results with some studies reporting that participants do not quickly learn manding (e.g., Jennet, et al., 2008). Similarly, studies that have done parent training via telehealth to improve functional communication and reduce problem behaviors in children with ASD have shown similar results to this study with problem behaviors decreasing congruently with the increase in manding within 2-5 sessions (Suess, et al., 2014). Utilizing BST via telehealth at an international level to teach parents to identify the function of problem behaviors, and to utilize video modeling procedures and FCT to improve their child's communication skills not only contributes to the ABA literature, but also adds social impact potential on improving methods of ABA services throughout the world.

Due to the lack of prior education related to the ABA treatments in this study, all parents received additional ABA training, but to varying extents, to increase their level of fidelity. The supplementary training included additional meetings and feedback. Video recordings of the interactions between parent and child during baseline and intervention made it convenient for the researcher to analyze that data, and to observe parent-child interactions for training and

feedback. Video recording had the additional benefit of reducing potential researcher mitigated reactivity effects (i.e., the child was more likely to act naturally without a researcher in the home observing) (Togashi el al., 2022).

Parents rated themselves in their fidelity of implementation and all parents indicated a high level of fidelity with an average range of 4.9-5 on a 5-point Likert scale. These ratings indicate that the training was effective in building confidence and knowledge of the intervention procedures. Some parents experienced minor issues in implementation that were addressed through additional BST training sessions.

A parent's level of fidelity of implementation was influenced by several factors including the parent receiving training to help implement the protocol as planned due to time constraints, or the parent having a difficult time understanding the concept of manding by being unable to distinguish between manding (requesting) and echoic responses (repeating a word after another person). To address this obstacle, the researcher used role-playing to help the parent learn to provide correct examples of manding. Another issue with fidelity of implementation was that some parents placed the preferred item that the child should mand for near the child, which triggered the problem behavior (grabbing or stealing). To correct this, the researcher instructed the parent to increase the distance between the preferred item and the child. Another factor, common in at home interventions, was that Abdelaziz' mother included the brother during the session which distracted the target child and may have affected his behavior. To address this, the researcher met with Abdukaziz' mother asking her to remove his brother from the sessions and explained why this was important for his success with the intervention. In addition, the researcher utilized online sessions live by letting the mother conduct the session and giving her immediate feedback. This was effective in improving the mother's comprehension of the

feedback and improving fidelity of implementation. An additional issue with fidelity of implementation was a reliance on prompting early in the intervention for all parents. All parents relied heavily on prompting initially with a time delay of zero. Feedback was provided to all parents but was not helpful for all of them. Some parents required more training (online-live training) than others to model and role-play time delay prompting. The type of prompting was another important variable during implementation of the intervention. Some parents used verbal and physical prompting at the same time and some used prompting, extensively. The researcher met with the parents who had prompting issues and taught them to use least-most prompting procedures using BST. When the researcher observed that a child was displaying a very low level of manding during a session, it was discovered that after questioning the mother, the child had eaten before the session (satiation) which decreased the values of the stimulus (food), thereby affecting manding behavior. The mother was taught to understand motivating operations (i.e., environmental factor that can encourage or discourage specific behaviors e.g., satiation or deprivation of food)) before implementing the sessions. A deprivation protocol was then implemented to temporarily enhance the perceived value of the desired items (food). As a result, this increased the child's motivation to use manding to request food items. Some of the parents varied their verbal prompts in the initial intervention sessions, such as, "I want chips," "give me chips," or "can I have chips?" which instigated confusion for the child and hampered their ability to learn the manding interaction. To address this, the researcher required parents to use one phrase consistently in all sessions and all parents complied effectively with that rule, and their children were able to learn the manding response. The researcher observed that some parents were not providing immediate reinforcement for the target behavior (manding). Subsequently, parents received instruction, modeling, role-playing, and feedback to help them learn that

immediate reinforcement should be instituted. The researcher utilized instruction, modeling, and role-playing, and delivered consistent and constructive feedback to all the parents, as required by the BST model. While helpful, some parents, such as Abdulaziz's mother, may require further training in these techniques. Building a relationship with parents is a pivotal component in optimizing the intervention phase. One must be compassionate and sympathetic to the worries and difficulties faced by parents and understand that they may be experiencing a tough time and may want help and direction. Spend time listening to their worries, inquiries, and stories about their children and recognize all the struggles and assure them there will be no judgment. Being honest and clear about the goals of the research will help them decide the best course of action to take to improve the child's quality of life. Be flexible in terms of the time of the meeting, which will make the parents feel more at ease. Understanding and showing the respect for the parent's culture and beliefs leads to becoming a partner with the researcher in choosing the most appropriate replacement behavior for the child. All of this helps parents feel comfortable with participating in the research.

While this study proved to be advantageous and valuable, there were some limitations. These limitations included the inability to complete all phases of the intervention (generalization and maintenance) for two participants due to time limitations. In addition, the study would have been improved by teaching multiple manding responses for different functions of behavior. The use of technology was an issue for one parent who experienced difficulties sending recorded videos via email so, in order to overcome this issue, the researcher asked the parent to use a program with her phone to send the video. Arranging meetings between researcher and parents to schedule training and feedback sessions was problematic due to the conflicting obligations and responsibilities that parents had. This impeded the ability to allot mutually convenient times to

handle parent's questions or concerns, or issues with fidelity of implementation. In addition, these barriers consumed more time to conduct the study. Some parents reported that some videos did not transfer because other family members unexpectedly appeared in the video, which necessitated restarting the session. Additionally, some bias may have been introduced into this study since the parent deleted the less successful part of the videos and kept the ones that showed more independent responses and communication for their child. Finally, the short period of time for parent training limited the study to only learning what was needed to implement the intervention. More intensive and informative parent training sessions in ABA would provide parents with a stronger understanding of behavior and how to work with their child at home. Although multiple baseline designs are the most commonly employed in ABA, the research design of this study was another limitation in that a multiple baseline design across four similar participants is limited in terms of generalization to the diverse population of children with ASD. That being said, the design did demonstrate a functional relationship between the intervention and outcomes for the participants in this study (Slocum, Pinkelman, Joslyn, & Nicholes, 2022). The study only included the parent fidelity of implementation not the fidelity of implementing the training by the researcher

Finally, the size of the gains (i.e., the number of mands and problem behaviors targeted) was limited to only one manding behavior and one problem behavior while other studies included gestures as well as verbal manding (e.g., Plavnick & Ferreri, 2011), or targeted multiple behaviors such as on-task behaviors (e.g., Lindgren, et al., 2016).

Future studies should focus on how to make telehealth more available for parents who live in rural areas or do not have ABA services, particularly families in countries that may have a severe shortage of ABA services. Future research should also assess the accessibility and

usability of technology and provide parent training on the technology prior to training ABA procedures. It should further assess the fidelity of implementing the training by the researcher. BST should extend ABA training for better results. For example, parent training should include teaching the philosophy of ABA to ensure parent buy-in; various prompting techniques such as using least-most prompting, motivation operations, maintenance, and generalization before jumping into teaching functional analysis; FCT; and video modeling. This additional training should include more modeling (video could be pre-made to demonstrate each concept) and more role-playing for more effective understanding and implementation. Moreover, it is imperative that attention be given to the critical phase of generalization and the benefits it holds during parent training. Lastly, it is recommended that researchers and practitioners adopt a phased approach in parent training by initiating training with live sessions via telehealth to guide parents in vivo with proper implementation of the intervention then gradually transitioning to recorded videos for subsequent sessions.

Most previous studies focused on just FCT using telehealth (Lindgren et al., 2016; Suess, Wacker, Schwartz, Lustig, & Detrick, 2016; Wacker et al., 2013; Suess, 2020). There is a clear need to conduct more research on FCT and VM through telehealth to increase manding ability and to decrease problem behaviors. This study incorporated two different interventions to increase manding for children with ASD through telehealth training by parents. There has been limited research combining these interventions and using telehealth. There are even fewer studies that have attempted to provide this kind of intervention at an international level. This study introduced a new approach to amalgamate FCT and VM treatments for training parents via telehealth on the techniques of imparting manding skills to their children. Parents acquired the skills to implement the FCT/VM interventions and subsequently applied it effectively with

children with ASD through structured and organized telehealth training. Utilizing these strategies within a home setting is a practical and cost-effective solution for parents that improves accessibility, usability, and effectiveness for ABA intervention. This study revealed effective outcomes and high social validity ratings from participating parents. Anecdotal outcomes were also favorable including Fadia's mother reporting that implementing this training protocol not only helped in decreasing grabbing food without permission but also led to a reduction in crying incidents occurring in the grocery store. Furthermore, Fadia's mother observed that her child began to exhibit a smile on her face while making requests. These important and socially valid outcomes further illustrate the importance of this kind of training for parents.

Conclusion

This study examined the effectiveness of telehealth training for parents regarding FCT/VM treatments to teach manding skills to their children with ASD. The researcher used BST to facilitate the training protocol. All the parents exhibited positive perceptions on the social validity questionnaire which confirmed the practicality and potential for this type of intervention. In addition, all children responded to the intervention with 100 % independent responding except for one child (Abdelaziz) who was near the mastery criterion 75%. The conclusions of this study are in synchronization with previous research (Drew et al., 2022, Boutain Sheldon and Sherman, 2020; McDuffie et al., 2013; Vismara et al., 2012; Wacker et al., 2013; Hoffmann, 2014) that established the efficacy of utilizing parent training via telehealth.

Overall, this study demonstrated that the training procedures were effective for these families and are promising for decreasing problem behavior while simultaneously improving communication skills. While this study is not conclusive and future research is needed, the

results and social validity outcomes provide promise that these types of interventions may ultimately lead to improved quality of life for children with ASD and their parents.

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APPENDIX A: PARENT INTAKE AND FUNCTIONAL ASSESSMENT INTERVIEW

Child: _____ Date: _____
Grade: _____ DOB: _____ Age: ____years ____months
Gender: _____ Email: _____

Parent Name: _____ Relationship to child: _____
Age: _____ Racial/Ethnic Identity: _____
Current Employer: _____ Position: _____
Education Level:
Did not graduate high school:____ High School Graduate: _____
Some college: _____ 2-Year Degree: ____ 4-year Degree: _____
Graduate degree: _____

Problem Behavior(s): _____
Describe the behavior:
_____
_____

1. Do you have access to the following at home?
    a. Internet? _____
    b. Computer? _____
    c. Tablet? _____
    d. Mobile phone with camera/video? _____
    e. Other? _____

2. Does your child have a diagnosis of Autism Spectrum Disorder (ASD)?

3. Is your child enrolled in a special education program?

4. What ABA services has your child received?

5. What ABA training have you received?

6. Describe your child. What is he/she like at home?

7. How often does the problem behavior occur at home?
    _____

8. Do you believe the behavior could be attributed to any of the following?
    a. Medications? _____
    b. Sleep problems? _____
    c. Medical conditions? _____
    d. Physical impairments? _____
    e. Appetite/diet? _____

9. Describe times or activities when the problem behavior is most likely to occur (e.g. bedtime, homework, outings, transitions, etc.).
    _____
    _____

10. Who is typically present when the behavior occurs?

11. Does the problem behavior happen more when
    a. a certain type of task/request is given? _____
    b. an easy task is given? _____
    c. a difficult task is given? _____
    d. certain activities are presented? _____
    e. new activities are presented? _____
    f. a request is made during an activity? _____
    g. child is asked to start a task? _____
    h. child is asked to stop a task? _____
    i. child's request has been denied? _____
    j. normal routine is disrupted? please specify the routine:
        _____
    k. Other _____

12. Is there any kind of trigger that tends to make the problem behavior more likely?
    _____

13. When the problem behavior occurs or worsens, does your child obtain
    a. Attention? _____
    b. If attention, from whom? _____
    c. Praise? _____
    d. Time out? _____
    e. Reprimands/lectures? _____
    f. Other negative consequences? _____
    g. Games? _____
    h. Toys? _____
    i. Food? _____
    j. Videos? _____
    k. A certain task/activity? _____

14. When the problem behavior occurs, does your child lose privileges such as

a. Playdate? _____
b. Electronics? _____
c. Points/tokens? _____
d. Snacks/treats? _____
e. Toys? _____
f. Other? _____

15. When the problem behavior occurs, does your child avoid
    a. Parent/adult demands? _____
    b. Parent/adult feedback? _____
    c. Specific activity/task? _____
    d. Other? _____

16. What positive or preventative strategies have you tried and how effective were they?

_____
_____

17. What consequences have you used and how effective were they?

_____
_____

18. How does your child best communicate?
    a. Verbal? _____
    b. Gestures? _____
    c. Sign? _____
    d. Pictures? _____
    e. Augmentative communication system? _____
    f. Other? _____

19. What are your child's most preferred interests, activities, or items?

APPENDIX B: PROBLEM BEHAVIOR AND ABC DATA SHEET

Child: Date: Parent:
Problem Behavior (PB):
Routine/Activity:
Phase (circle one): Baseline Intervention

Session time	**Frequency (hash marks)**	**Intensity 1: Mild 2: Moderate 3: Severe**	**Antecedent (what happened before the behavior)**	**Behavior (briefly describe)**	**Consequence (what happened after the behavior)**	**Comments**
1-5 minutes						
5- 10 minutes						
10- 15 minutes						
15-20 minutes						
TOTALS						

Hypothesis for ABC Data:

_____

_____

APPENDIX C: FUNCTIONAL COMMUNICATION INTERVENTION DATA SHEET

Child: Date: Parent:
Session Time: 20 minutes (please indicate if different): _____
Behaviors:
Communication Method (circle one): Verbal Picture Sign
Gesture Other
Routine/Activity:

Communication Opportunity (provide at least 4 opportunities per session)	**Independent/Correct (I/C) or Prompted (P) or No Response (NR)**	**Comments: Video (V) or No Video (NV) just for Mastery**
(Opportunity #1)		
(Opportunity #2)		
(Opportunity #3)		
(Opportunity #4)		
(Opportunity #5)		
TOTAL (I)		
TOTAL (P)		
TOTAL (NR)		

Notes:
_____
_____

APPENDIX D: TRAINING AND IMPLEMENTATION PROTOCOL

Steps	Date Introduced	Date Completed
Pre-Training		
Interview with parent via online (identify the problem behavior and determine the routine in which the behavior occurred) – *Parent Intake and Functional Assessment Form*		
Phase 1: Parent Training – 2.5 hours (Day 1: 1.5 hours; Day 2: 30 minutes; Day 3: 30 minutes)		
Instruction: The researcher provides 10-minute presentation on FBA (Training Day 1): ▪ Defining FBA ▪ Components of FBA 1. Identify the problem behavior (lists of problem behaviors with definition and examples) 2. Collect data on behavior and determine the function of the behavior (ABC+ hypotheses).		
Model: Provide scenarios, and show examples of ABC data and writing the hypotheses (Training Day 1)		
Rehearsal: Provide opportunity for the parent to use ABC data sheet and write the hypotheses using video scenarios (Training Day 1)		
Feedback: Researcher provides feedback to the parent on ABC data and hypothesis (Training Day 1)		
Instruction: Train parents how to record the behaviors on duration, frequency, and		

intensity. *Behavior Data Sheet* (Training Day 2)		
Model: Show parents' examples of how to take data and give scenarios for different types of data collection. (Training Day 2)		
Rehearsal: Parent practices using both data sheets with child for 2 sessions in 10-minute sessions and records and sends to researcher. If the child does not display problem behavior, parent should record a 3rd session.		
Feedback: Researcher views parent videos prior to meeting with parent. Meeting with researcher to check the data sheets and the child's behavior (Training Day 3).		
Phase 2: Baseline		
Baseline Training (1 hour): Researcher meets with parent via online to explain the baseline steps (*Baseline Instructions Visual*): 1- 20-minute sessions 2- Setting up the environment (work area and play area) to create opportunity to engage in problem behavior (provide break at designated time in data sheet) 3- Collect behavior data (full session) and ABC data (only if problem behavior occurs)		
Baseline Data Collection: Parent collects baseline for designated baseline days and sends videos and data sheets to researcher to review. Feedback is provided at start of FCT training.		
Functional Communication Training (1.5 hours): Once parent has completed 1-2 baseline days, researcher meets with parent to determine the replacement behavior (mand) that serves the same function as problem behavior. Instructions are provided for creating materials (e.g., picture communication) and teaching the mand.		
Video Model: During the FCT training session, video modeling is reviewed, and examples are provided. Parent is given specific instructions for creating video model with a peer that will be		

used for intervention. *How to Make a Video Model Visual*		
Feedback: Parent sends video model to researcher to review. Video is finalized prior to starting intervention phase.		
Phase 3: **Intervention**		
(Intervention Instructions Visual) • Parent will collect session materials (data sheets, pencil, computer/tablet, toys or snacks or other materials for the child interaction). • Parent will sit with their child at a table or on the floor to begin the session. • Parent will show the video model to the child multiple times during each session. • Parent will provide opportunities for their child to mand (i.e., make a request) and will wait 5- 10 seconds for the child to respond. • Parent will reinforce their child's manding by giving the child what they requested (i.e., a break, an activity, an object, or attention). Parent will prompt the child if they do not mand or if they mand incorrectly. • Parent will repeat video modeling and manding opportunities with reinforcement or prompting for the remainder of the 20-minute session with one 5-minute break. • Parent will collect data on the child's manding responses and problem behaviors. • Parent will submit a video of the session and data sheets to the researcher at the end of the session. • When the child can mand independently for 2 consecutive sessions twice a day, the parent will: Provide manding opportunities for 2 consecutive sessions without video modeling.		

Feedback: The researcher will review the parent data sheets and videos daily and provide feedback by email or a video call. An online meeting will be scheduled if needed to fix problems in implementation or data collection.		
Generalization		
Once child has mastered mand, parent is instructed to provide an opportunity for child to use mand (with no video modeling) for something different (e.g. if child is manding for iPad, child is given opportunity to mand for video game or something else). Parent asked to provide 2 generalization opportunities in a 20-minute session.		
Maintenance		
2 weeks following completion of the study, parents will be asked to submit a 20-minute video interacting with their child and having mand opportunities with no video modeling.		

APPENDIX E: FIDELITY OF IMPLEMENTATION – PARENT TRAINING

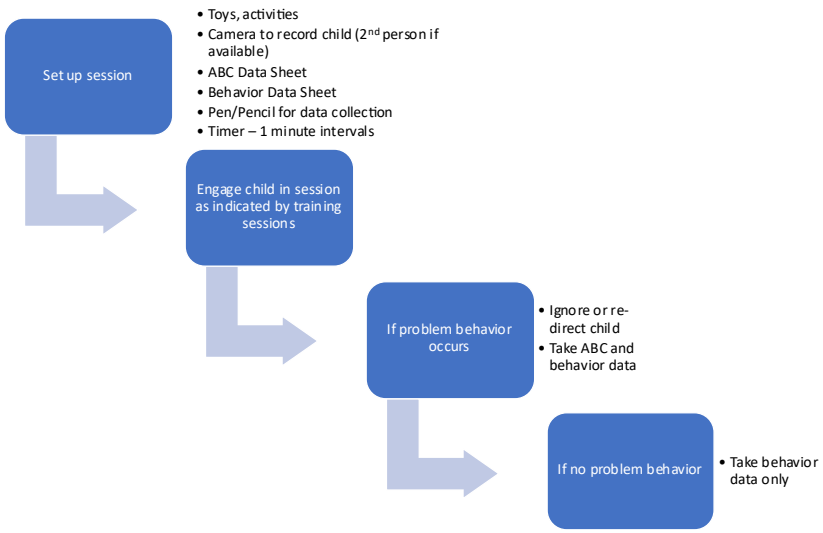
Adapted from Biagi (2021)

Self-Monitored: ____ Observer: _____
Skill to teach: _____
Ratings:
1 – Not at all
2 – Inconsistent and ineffective implementation
3 – Some effective implementation but inconsistent
4 – Mostly effective implementation
5 – Used consistently and effectively

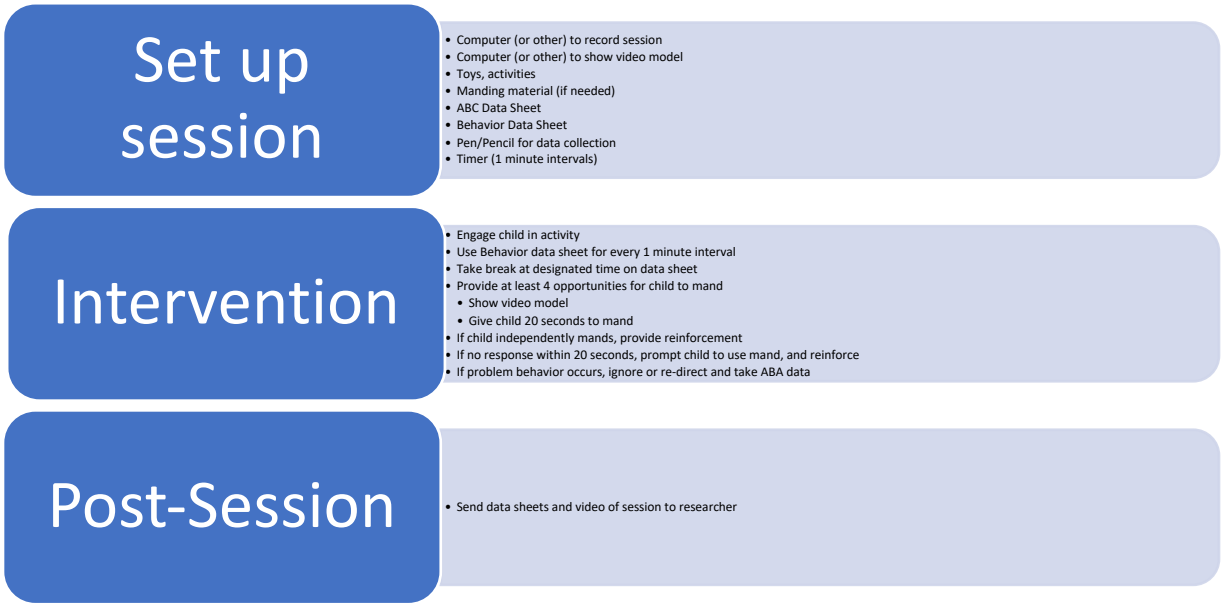
Instruction	Rating	Comments
Trainer describes the skill to be performed.		
Description of the skill uses only language appropriate for the trainee's previous competency with the topic.		
Description of the skill uses only language appropriate for the trainee's previous competency with the topic.		
When possible, written documentation or diagrams of the skill are provided to supplement instruction.		
Trainer stops and checks for understanding and answers any trainee questions fully.		
Scenarios and Modeling	**Rating**	**Comments**
Trainer provides clear and relevant scenarios or models.		
Trainer is able to demonstrate each step of the task to 100% accuracy.		
Steps of the task are completed slowly enough for a trainee to identify each action during the first demonstration.		
Trainer pauses and checks with the trainee for whether they require a step to be repeated.		
Trainer pauses on a VR3 schedule and checks with the trainee for whether they require a step to be repeated.		

Trainer pauses and checks with the trainee for whether they require additional observation before moving into the rehearsal stage.		
Rehearsal and Implementation	**Rating**	**Comments**
Trainer prompts the trainee to engage in the skill taught.		
Trainer collects data on trainee performance of the skill.		
Trainer continues rehearsal/feedback loop until a pre-specified performance criteria is met (mastery).		
Trainer checks reliability of parent data collection.		
Feedback	**Rating**	**Comments**
Trainer watches parent-child videos prior to feedback session and takes notes with times to show video clips during feedback as needed.		
Feedback provided is behavioral, objective, and specific.		
Trainer offers to re-explain or re-model missed steps for the trainee.		
Positive feedback is included to help shape the terminal behavior.		
Trainer checks for understanding and answers any trainee questions fully before prompting another rehearsal trial or continuing to next phase of implementation.		
Average Rating Score:		

APPENDIX F: BASELINE AND INTERVENTION INSTRUCTIONS VISUAL FOR PARENTS



Intervention Visual for Parents



APPENDIX G: SOCIAL VALIDITY SURVEY

Treatment Acceptability Rating Form Revised (TARF-R)

Please answer the following questions on the list below by placing a check mark on the line that best describes how your experience was with training on FCT/ VM.

1- In terms of clarity, how did you find the FCT/VM training?
Not at all clear A little unclear Neutral clear Very Clear

2- How was your acceptable level of receiving FCT/VM training via Telehealth?
Not at all acceptable A little acceptable Neutral acceptable Very acceptable

3- Do you find this FCT/VM training effective to you as parent?
Not at all effective A little ineffective Neutral effective Very effective

4- What was your confidence level of implementing the learned skills from this training?
Not at all Confident A little unconfident Neutral Confident Very Confident

5- How beneficial was the level that will support you to help your child learn manding in the future?
Not at all beneficial A little not beneficial Neutral Benefit Very Benefit

6- Do you find any disadvantageous experiences of receiving this training via Telehealth?
Very disadvantageous A little disadvantageous Neutral advantageous
Very advantageous

7- Do you find any difficulty with the training?
Very difficult difficult Neutral A little difficult Not at all difficult

8-How did this training improve your ability of teaching your child manding?
Not at all improve A little not improve Neutral improved Very improve

9- Would you recommend this training to other parents?
Not at all likely A little likely Neutral likely Very likely

APPENDIX H: RECRUITEMENT FLYER

UNIVERSITY OF SOUTH FLORIDA
A PREEMINENT RESEARCH UNIVERSITY

STUDY004259: RESEACH OPPORTUNITY TO TEACH COMMUNICATION SKILLS TO CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD)

The purpose of this study is to evaluate the effectiveness of training parents to teach their child how to make communication requests that can replace their problem behaviors.

- Does your child need help with requesting?
- Does your child have problem behaviors that you want to decrease?
- Do you have internet access?
- Are you willing to work with your child at home?

If you answered YES to these questions, this study may be a good opportunity for you and your child to decrease problem behaviors and improve communication skills.

To participate, your child must:

- Be between the ages of 3-9 years old.
- Have an ASD educational classification for receiving IEP supports or have an ASD diagnosis
- Demonstrate difficulties in communication, particularly in requesting what they want or need.
- Exhibit problem behaviors (e.g. mild aggression, screaming, throwing, running off, etc.).

You must be willing to learn the intervention via telehealth training, create a video model to use with your child, and implement the intervention with your child. Each session will be about 20-30 minutes, 4 days per week across 2-3 months. You will be compensated $25 gift card for your participation after you complete 4 sessions.

Possible benefits of this research include your child learning to communicate more effectively and decreasing problem behaviors. Parents will learn valuable skills for managing their child's behavior and building their communication skills. Children will learn to communicate more effectively and to engage in activities more appropriately with their parent.

You must also have access to 2 electronic devices that can show and record video that you can send to the researcher.

To learn more about the study contact: Sukarah Almulhim
Email: sukarah@usf.edu

APPENDIX I: IRB APPROVAL LETTER

UNIVERSITY of SOUTH FLORIDA

APPROVAL

Dear Sukarah Almulhim:

On 9/19/2022, the IRB reviewed and approved the following protocol:

Application Type:	Initial Study
IRB ID:	STUDY004259
Review Type:	Expedited 6, 7a
Title:	Training Parents via Telehealth to Teach Manding to Children with ASD to replace problem behavior
Funding:	None
IND, IDE, or HDE:	None
Approved Protocol and Consent(s)/Assent(s):	• Social Behavioral Protocol Sukarah (SA) 19-9-22 .docx; • Social Behavioral Verbal Consent Script - Sukarah (SA)_ 9_13_22.pdf Approved study documents can be found under the 'Documents' tab in the main study workspace. Use the stamped consent found under the 'Last Finalized' column under the 'Documents' tab.

Within 30 days of the anniversary date of study approval, confirm your research is ongoing by clicking Confirm Ongoing Research in BullsIRB, or if your research is complete, submit a study closure request in BullsIRB by clicking Create Modification/CR.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Your study qualifies for a waiver of the requirements for the documentation of informed consent for online interviews as outlined in the federal regulations at 45 CFR 46.117(c).

UNIVERSITY of SOUTH FLORIDA

Research Involving Children as Subjects: 45 CFR 46.404
This research involving children as participants was approved under 45 CFR 46.404: Research not involving greater than minimal risk to children is presented.

Requirements for Assent and/or Permission by Parents or Guardians: 45 CFR 46.408
Permission of one parent is sufficient.
Assent is waived because it is not appropriate due to the age, maturity, and/or psychological state of the child.

Sincerely,

Myah Luna
IRB Research Compliance Administrator