Implementation of Behavior Skills Training via Telehealth to Teach Pre-Session Pairing to Caregivers of Children with Autism Spectrum Disorder

Le-E Chin

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Implementation of Behavior Skills Training via Telehealth to Teach Pre-Session Pairing to Caregivers of Children with Autism Spectrum Disorder

by

Le-E Chin

A thesis submitted to the College of Psychology and Liberal Arts of Florida Institute of Technology in partial fulfillment of the requirements for the degree of

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We the undersigned committee hereby approve the attached thesis, “Implementation of Behavior Skills Training via Telehealth to Teach Pre-Session Pairing to Caregivers of Children with Autism Spectrum Disorder.”

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This study aimed to extend the literature on training procedures used in telehealth and extend the literature on caregiver training. This study utilized a multiple-baseline design to implement behavior skills training to teach pre-session pairing skills to 2 parents/caregivers in Malaysia via telehealth. This study also examined the cultural social validity of pre-session pairing as a preventative procedure in therapeutic settings outside of the United States. Results demonstrated that behavior skills training with an additional component of specific performance feedback was effective to train participants up to mastery criteria. Social validity results indicated an increase in positive interactions between parent/caregiver and child relationships. Parents/caregivers also reported positive results regarding the usefulness, feasibility, and the likelihood of sustaining future implementations.
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Dedication

_I would like to dedicate my thesis to Eileen and Peter, for all the unconditional love and support throughout this journey we call life._

_Nothing is impossible as long as you put your heart in it._
Implementation of Behavior Skills Training via Telehealth to Teach Pre-Session Pairing to Caregivers of Children with Autism Spectrum Disorder

Autism Spectrum Disorder (ASD)

Autism spectrum disorder (ASD) is categorized as a neurodevelopmental disorder with two main characterized symptoms varying in severity across individuals: 1) impaired communication and social interactions, and 2) restricted activities and interests (American Psychological Association [APA], 2013). ASD affects all domains of functioning, and as a result, individuals diagnosed with ASD may struggle with successfully functioning in school or finding and maintaining employment, among other challenges. Applied behavior analysis (ABA) is the application of the science of behavior to socially significant problems in real life settings. ABA is not a manualized program, but instead is a branch of behavior analysis that focuses on identifying skills to improve, problem behaviors to decrease, and employing methods to arrange the environment to support and maintain the changes (Baer et al., 1968). ABA uses empirically validated techniques to improve behaviors like communication, direction following, eye contact, daily living skills, motor skills, academic skills, as well as decrease problem behaviors such as noncompliance, tantrums, running away, self-injury, self-stimulation, and aggression (Cooper et al., 2020).

ASD is prevalent across every age range, ethnic group, and socioeconomic class. Based on statistics (Maener et al., 2020), the region with the highest prevalence in Asia – Hong Kong leading with 327 per 10,000 children, and South Korea with the second-highest prevalence of 263 per 10,000 children. The United States has the third-highest prevalence, with every 222 of 10,000 children diagnosed with ASD. Research has consistently documented disparities in the diagnosis of neurodevelopmental disabilities based on family income level, ethnic
background, and parental education level (Eikeseth et al., 2007). According to the global map of autism prevalence by Spectrum (n.d.), ASD diagnoses in developing countries are not as high likely due to limited expertise and access to healthcare. Additional factors associated with the discrepancy in diagnosis include reduced parental reporting of concern, physical barriers to care, limited referral practices and access to specialty services, family's knowledge/comfort with developmental milestones, and family's ability to navigate health care (Reichow et al., 2014). Professional barriers exist, with an increased burden on physicians stemming from limited time and resources to screen and evaluate ASD.

**Telehealth**

It has been shown that early intervention positively impacts high-risk, low-income children, and those effects carry into adulthood (Reichow et al., 2014). Early intervention has also been shown to increase positive functional outcomes for children with diagnosed neurodevelopmental disabilities; however, disparities in access to care continue to plague this population. Behavioral services are expensive in terms of dollars and labor. As a result, parents/caregivers, particularly those in remote areas with limited access to behavioral therapy, have compelling reasons to learn how to implement behavioral interventions with their children. Although several web-based training programs exist for learning ABA (e.g., Hamad et al., 2010), most of them are designed for practitioners who are working toward becoming a certified behavioral service provider (e.g., Registered Behavior Technician, Board Certified Behavior Analyst), and they provide limited depth and few opportunities for practice or coaching on skill acquisition.

With the evolution of technology and the rapid advancement of resources available via communication technologies, telehealth services are becoming a practical application for practice provision (Hall et al., 2013). The American
Speech-Language-Hearing Association (2016) has suggested that telehealth should be considered when attempting to overcome barriers to service delivery and access. Affordable end-user devices and internet applications have allowed for synchronous (real-time) video interactions to be accessible on consumer-grade software (Taylor et al., 2015). Telehealth can be defined as the delivery of learning over distance through the application of information and communication technologies (Eldevik et al., 2009). It can extend clinical outreach to rural and remote facilities and benefit metropolitan regions when time constraints may limit accessibility. Given the unique barriers to access care that individuals may face, telepractice has the potential to improve the access of patients to valuable clinical services.

Taylor et al. (2015) found that both parents and service providers described limited local service options in rural and remote locations with many services having insufficient capacity to meet the needs. Where services existed, the specialized therapy required was often beyond the expertise of the generalist services available in rural towns. In many cases, the only options available to families were to travel to larger cities for appointments or have specialist providers travel to them on a fly-in, fly-out basis. Families also reported a lack of choice of services to spend their funding packages or spending it on areas that were not their highest priorities. In addition to the financial costs, accessing services in the city entailed personal costs for families, including the need to access time-off work and childcare for their other children, distance from emotional supports, and stress when their children did not cope well with unfamiliar environments. Service providers reported that fly-in services were often not financially viable.
Behavior Skills Training (BST)

Parents and other caregivers are generally accountable for implementing in-home interventions outside of clinical settings and services. Several studies (Neef, 1995; Lafasakis & Sturmey, 2007; Seiverling et al., 2012) have examined the benefits of parents/caregivers' involvement in ASD interventions, which include, but are not limited to, support generalization and maintenance of learned skills, decrease in parental/caregiver stress related to tending for a child with ASD, increase parent confidence and reported recreation time. Interventions typically designed by behavior analysts for parent implementation include but are not limited to methods to promote social skills, communication skills, functional skills, and problem behavior reduction (Hodges et al., 2020). Behavioral skills training (BST) is an empirically supported method to teach caregivers skills to implement in-home. BST is a widely used, comprehensive teaching method to train parents, caregivers, paraprofessionals, and other individuals to implement applied behavior analytic interventions independently.

Brock et al. (2017) conducted a meta-analysis of 118 studies that used single-subject designs (e.g., multiple-baseline design and multiple-probe design) in which practitioners implemented different procedure pieces of training for individuals who work with individuals with disabilities. Amongst the studies analyzed, the authors found that practitioners that used BST for training had "the most consistent improvement of implementation fidelity" (Brock et al., 2017, p. 21). Specifically, BST consists of the instructor first presenting written instructions of target skills operationally defined to participants to read through briefly. The instructor will proceed to model (can consist of video or in-person) target skills to the participant. Rehearsal (also termed role-playing) involves the participant practicing in exhibiting target skills to the instructor. In this case, the roles are
reversed between instructor and participants. Participants will act as the instructor and attempt to teach the acting participants (original instructor). The instructor will then provide immediate verbal corrective feedback regarding any target skills that participants need to improve upon. This process occurs multiple times until participants reach a specific mastery criterion.

BST has been used in parent training across many types of behavioral assessments and behavior change procedures. For example, toilet-training procedures, functional assessments, programs for increasing social and communications behaviors, and feeding programs. Dogan et al. (2017) evaluated the effects of BST on implementing social skills programs with four parents of children with ASD. Results presented consistent progress in social skills in participating children and in parents who were instructors. In another study, Seiverling et al. (2012) used BST to train three parents of children with ASD and food selectivity. The treatment package contained taste exposure, escape extinction and fading. Parents' post-training performance showed that there was an improvement during tasting sessions and probe meals. Thus, it reflected an increase in children's acceptance of bites, decreased mealtime problem behavior, and maintained even at three weekly follow-up meetings. Boutain et al. (2020) conducted a study on implementing BST on parent training via telehealth. Three parents were trained in implementing graduate guidance when teaching self-care skills to their children with ASD. The study examined the effectiveness of only using detailed written instructions against using BST as a training procedure. Results indicated that BST effectively increases treatment fidelity, and all the participating children met goal criteria for self-care skills with higher levels of accuracy and independence. Subsequently, parents have also reported high levels of satisfaction with telehealth BST training and their children's ability to execute self-care skills.
Presession Pairing Skills (PSP)

Parenting a child with autism can be stressful, as the social impairment has been associated with unusual activation patterns in reward system of the brain which may create a negative feedback loop and lead to lower social motivation during social interactions, which in turn, can result in fewer opportunities to learn from social stimuli (Dawson, 2008). According to Shillingsburg et al. (2014), these social impairments can hinder young learners with ASD as they often require intensive behavioral services to strengthen social and language skills. Therefore, children with ASD often spend a significant amount of time interacting with instructors (e.g., behavior therapists, teachers, parents/caregivers) in a one-to-one instructional format. A prevalent instructional method used in applied behavior analysis is discrete trial training (DTT). A single discrete trial consists of instruction, prompt response, and consequence. Multiple discrete trials are presented within a short interval averaging between one to five minutes (Smith, 2001). Several studies have validated the effectiveness of using DTT to teach academic, social, and communication skills (e.g., Roxburgh & Carbone, 2012; Smith, 1999, 2001; Tarbox & Najdowski, 2008). Despite the well-established positive effects demonstrated in literature, it is not without limitations. Consider that the onset of demands has the probability of evoking negative behaviors, teaching environments such as DTT – which requires the learner to comply in a constructed environment – may lead to an unprecedented association between the teaching environment with demands, the child and instructor (e.g., caregivers/parents, teachers). Thus, the child is exhibiting behaviors motivated by escape and uncooperative negative behaviors (Carbone et al., 2010).

Aside from implementing interventions in the comfort of their own home, parents and caregivers often play with their children. Sundberg and Partington (1998) framed the term establishing rapport as constituting the instructor in a
conditioned reinforcement with the child, also known as pre-session pairing in modern literature. Both authors outlined the procedure as an antecedent-based approach; by having the instructor approach the child, present a reinforcer, and play with the child while they are consuming the reinforcer. It is suggested that the rapport is established between the instructor and the client when consistently paired with the delivery of positive reinforcers; this is a good starting point to being a presentation of instruction (Barbera, 2007; Sundberg & Partington, 1998). Engagement while playing can include zealously narrating the activities or edibles, involving toys, while making eye contact. The pre-session pairing has been referenced in literature frequently, but only recently has it been operationally defined and experimentally evaluated.

Shillingsburg et al. (2014) examined the effects of pairing procedures to enhance social receptiveness and approach during DTT with two children diagnosed with ASD while decreasing social avoidance. One of the participants was aged 2-years and nine months, and the other was 3-years and 7-months at the time the study was conducted. The pairing condition consisted of removing demands and presenting a high density of social interaction with access to preferred tangibles (toys and activities). The pairing procedure was alternated with a demand condition, in which another therapist would only present instructions. Results found that the combination of therapists and highly preferred activities in a teaching environment with an addition of demand removal advocated for a higher social approach and reduced social avoidance. Subsequently, avoidance during task presentation (i.e., DTT) decreased when pairing was conducted before task demands. An unexpected outcome was seen in the study as both participants displayed an initial increase in appropriate on-task, in-seat behavior in the Demand Intervention phase with the demand therapist.
Kelly et al. (2015) conducted a study to analyze the effects of presession pairing on academic responding and challenging behavior with three children with autism. A functional analysis was conducted at the beginning of the study to determine the function of the participants' challenging behavior, and results showed that these behaviors were maintained by escape and attention. The authors then used a preference assessment to determine highly preferred activities and toys for each individual, followed by obtaining baseline data. The study was separated into two conditions, demands placed with or without presession pairing. Participants' highly preferred activities were available throughout the entire presession, pairing as noncontingent, ranging from two to four minutes to allow a natural end to the pairing activities. Results reported a consistent overall reduction in challenging behavior when participants were engaged in brief interactions with the instructor before instruction presentation despite different variables maintaining challenge behavior. All three participants emitted 0% of challenging behavior, and academic responses remained at higher levels during intervals than baseline. The study conducted a social validity in the form of a semi-structured interview among teachers, behavior technicians, speech pathologists, and paraprofessionals. Feedback received determined that the presession pairing procedure is satisfactory and practical.

Lugo et al. (2018) analyzed the effects of systematic application of presession pairing skills protocols demonstrated in Lugo et al. (2017) with a 4-year-old child diagnosed with ASD. The participant exhibited disruptive behavior (i.e., negative vocalizations and noncompliance) during discrete trial instructions and academic instructions. This study investigated the effects of manipulating antecedents on therapeutic settings' preferences and the effects of presession pairing on disruptive behavior occurrences during discrete trial instruction (DTI). This study utilized a revised concurrent-chains arrangement with a baseline phase.
Each concurrent-chains session was separated into two phases: concurrent-chains training and a preference evaluation. Therapist reversals were used to demonstrate further that behavior change was due to antecedent manipulations instead of the therapists themselves. Multiple stimuli without replacement (MSWO) were used in the preassessment phase to differentiate between highly preferred tangible items and moderately preferred tangible items used during DTI. Participant's mastered tasks were identified via the previous Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008). Baseline data of disruptive behavior and noncompliance were recorded in the DTI-only condition. The invention phase was then separated into three conditions: DTI-only, 2 minutes and 30 seconds of presession pairing prior to conducting DTI, and a free-play condition that lasted 2 minutes and 30 seconds before conducting DTI. The participant had unlimited access to all their preferred items during the free-play condition. Results demonstrated that the participant preferred the presession pairing condition despite having the option of free play concurrently. Both those conditions were identical except for the interactions provided by therapists in the presession pairing condition. Thus, it further suggested that therapist interactions delivered during presession pairing were preferred rather than the delayed onset of DTI or tangibles' access to tangibles.

Lugo et al. (2017) recently evaluated the effects of behavioral skills training and performance feedback on the implementation of pre-session pairing across six therapists. The study aimed to operationalize rapport while providing necessary component skills in presession pairing. In addition, the second objective was to equip behavior analytic practitioners with the adequate implementation of presession pairing skills. Behavior analytic services were conducted in the clinic's play area, and a nonconcurrent multiple baseline design was used to measure practitioners' performance and acquisition of presession pairing skills. Presession
pairing skills were measured in three different measurement systems: frequency, percentage of opportunities, or whole-interval recording. Practitioners were directed to review a checklist containing seven fundamental skill definitions, examples, measurement schemes of presession pairing for two minutes and were instructed to proceed with the session based on the list's behaviors. One session of behavioral skills training (BST) was then implemented. The experimenter verbally explained, modeled, role-played each skill with each practitioner—followed by positive or corrective feedback depending on if the staffs' demonstrations met mastery criteria or not. As mentioned above, performance feedback was also used in this study. Investigators reviewed practitioners' performance (demonstration of presession pairing skills) via graphed data and verbal feedback regarding meeting mastery criteria or not. The study indicated that no one met the criteria during baseline, whereas improvements were seen after BST implementation. None of the practitioners exhibited mastery immediately upon the implementation of BST. However, practitioners varied in the number of sessions of performance feedback ranging from three to eight sessions. Lugo et al. (2017), offered a preliminary training framework for pre-session pairing with which to extend to other populations.

The purpose of the current study was to extend the current literature in three ways. First, the current study aimed to systematically replicate the procedures from Lugo et al (2017) to teach caregivers to implement presession pairing. A second purpose of this study was to extend the literature in training procedures used in telehealth and extend the literature in parent training. Finally, this study aimed to examine the cultural social validity of presession pairing as a preventative procedure in therapeutic settings outside of the United States.
Methods

Participants

The study included 2 parents/caregivers from 2 different families of children with ASD from Malaysia with children aging between 6 to 8 years old. Inclusion criteria were: (a) caregivers of children between the ages of 4 to 9 years old, (b) caregivers of children with a diagnosis of autism spectrum disorder by an independent licensed professional, (c) internet access in the families' home throughout the study, (d) no previous participation in a formal parent training study – regardless of synchronous or asynchronous methods, (e) the same parent available for all baseline, data collection, and training sessions.

The principal investigator identified participants interested in participating in the study and who struggle with intervention implementation in their homes via a Facebook group created for caregivers of children with ASD in Malaysia. Participants liaised with the investigator via a messaging platform called WhatsApp. An informed consent form describing the potential risks and benefits of the study and participants' right to withdraw or decline at any time was attached and sent via email. Families' backgrounds were diverse and spoke more than English in the household.

Settings and Materials

All parents/caregivers completed the telehealth program using their own or family members' home computers, web cameras, and internet connections. All data collection and training sessions occurred in the parents' home. All sessions were conducted and recorded via Zoom. Prior to the first baseline session, parents/caregivers and the trainer met to strategize about positioning the web
camera for optimal viewing of the parent/caregiver-child interactions in the homes. Families' toys and materials were used during data collection periods.

**Experimental Design and Dependent Measures**

This study used a single-subject, multiple-baseline design (Horner and Baer, 1978) across 2 parents with a final maintenance session to examine the relations between the implementation of BST via telehealth and the acquisition of presession pairing skills in parents/caregivers. Collected baseline data indicated parents'/caregivers' level of performance before training implementation. BST was introduced after baseline, and data collected determined if criterion-level performance demonstrated behavior change in caregivers. Each meeting lasted approximately 40 minutes in total meeting time and allocated into 5-minute sessions for each sitting of observation. Parents/caregivers were also presented with a social validity questionnaire at the end of the study.

Parents/caregivers' presession pairing skills were divided into two dependent measures: (a) percentage of presession pairing skills demonstrated at least once in one session and (b) percentage of presession pairing skills demonstrated to criteria in one session. Each presession pairing skill presented in Table 1 was measured using frequency and whole-interval recordings. 30-second interval recordings measured proximity throughout all 5-minute sessions. Describe and initiate were measured in frequency per skill, per 5-minute session. Target mastery criteria per session were 10 intervals of caregivers demonstrating proximity, 5 describing, and 5 initiate occurrences. Mastery criteria across the study will be targeted at 100% correct implementation of steps across 3 consecutive sessions.
Procedure

Baseline

Parents/caregivers were provided a list of operationally defined terms and skills that were observed during sessions. Participants had 24 hours to review these terms before the first session of baseline. Parents/caregivers were instructed to implement pre-session pairing skills to the best of their ability without reference to the operational terms. Parents/caregivers were allowed to ask questions before starting sessions on the condition that the questions asked do not include further training. Data was collected based on the frequency of parent/caregiver engagement in pre-session pairing skills during 5-minute timed sessions.

Behavior Skills Training (BST)

After baseline, parents/caregivers received coaching with reference to each pre-session pairing skill in the form of behavior skills training (BST). Parents/caregivers received a list of pre-session pairing skills that were observed accompanied by the investigator's verbal explanations start of every session during intervention. The investigator demonstrated the pre-session pairing skills twice during BST while parents/caregivers personate as the child participants. Thereafter, parents/caregivers were informed that child participants will participate in the following training segment. Parents/caregivers were instructed to prepare some of the child's highly preferred toys or activities and to then execute the pre-session pairing skills with the child participant.

Performance Feedback

Mastery criteria for training was 100% accurate implementation of all the pre-session pairing skills for 3 consecutive sessions. The investigator provided any
corrective feedback if an incorrect execution of skills has been observed at the end of every 5-minute session. In addition, the investigator also provided exact number of occurrences for skills such as describe and initiate, informing participants if they have met mastery criteria for that session. This step was repeated until mastery criteria have been met for all pre-session pairing skills.

**Interobserver Agreement and Treatment Integrity**

A secondary observer collected data using the exact measurement procedures as the investigator and collected 30% of all sessions for all participants. The investigator had to follow scripted instructions when available across the study. Treatment integrity data was separated into 3 categories: 24 hours prior first baseline meeting, baseline, and BST (see Appendix A). Treatment integrity results for both participants 1 and 2 reports 100%. Total count interobserver agreement was first collected and converted into percentage. These percentages were then summed up and then averaged across the number of sessions in which interobserver agreement was collected. Results reported 90% interobserver agreement for participant 1 and 71.91% interobserver agreement for participant 2. Interobserver agreement was lower for participant 2 due to discrepancies of operational definition for proximity between primary and secondary observer. The secondary observer was then retrained and interobserver agreement was able to increase from 44.59% to 70%.

**Social Validity**

Parents/caregivers were provided a social validity questionnaire to answer at the end of the study (see Appendix B) via Qualtrics for easy access and feasibility. The questionnaire consisted of 7 questions and participants were asked to rate their satisfaction on a Likert scale between 1 being “very unclear, not
valuable, very ineffective, very unlikely, very unimportant” to 5 being “very clear, very valuable, very ineffective, very likely, very important”. Questions examined the parents/caregivers’ overall experience in terms of efficacy, feasibility, and recommending it to their peers. Additionally, parents/caregivers were asked to comment on their rationale for ratings and a space was provided should they have other comments that they would like to convey to the investigator as part of the study.
Results

Results are represented in Figure 1 with percentage of steps on the vertical axis, percentage of pre-session pairing skills implemented correctly represented by bar charts and percentage of pre-session pairing skills implemented to criteria represented by the line path. Both these variables are measured across several sessions as indicated on the horizontal axis. During baseline, none of the participants implemented pre-session pairing skills to criteria for each session. Upon the implementation of BST, all participants exhibited behavior improvement.

Participant 1

Participant 1 had an average of 66.67% of pre-session pairing skills exhibited and an average of 66.67% pre-session pairing skills implemented to criteria during all 3 baseline sessions with zero trend and variability. Intervention was implemented at session 4 and demonstrated a downward trend with lightly high variability. Participant 1 exhibited 100% of pre-session pairing skills with an average of 58.33% of pre-session pairing skills implemented to criteria by session 6. Participant 1 continued to demonstrate 100% of pre-session pairing skills from session 7 to 11 with an average of 91.67% pre-session pairing skills implemented to criteria with upward trend and little variability when an additional component of specific performance feedback was added to the intervention. Intervention was implemented across 8 sessions. Maintenance results at session 12 demonstrates 100% of pre-session pairing skills implemented correctly and 100% of pre-session pairing skills implemented to criteria within session.
**Participant 2**

Participant 2 had an average of 76.67% of presession pairing skills exhibited and an average of 9.99% presession pairing skills implemented to criteria during all 10 baseline sessions with zero trend and low variability. Intervention was implemented at session 11 and demonstrated a downward trend with high variability. Participant 2 exhibited 100% of presession pairing skills with an average of 57.14% of presession pairing skills implemented to criteria by session 16. Participant 2 continued to demonstrate 100% of presession pairing skills from session 17 to 24 with an average of 76.19% presession pairing skills implemented to criteria with upward trend and little variability when an additional component of specific performance feedback was added to the intervention. Intervention was implemented across 15 sessions. Maintenance results at session 25 demonstrates 100% of pre-session pairing skills implemented correctly and 100% of pre-session pairing skills implemented to criteria within session.

**Social Validity**

Social validity results in Table 2 yielded moderate to positive satisfactory levels in terms of usefulness of presession pairing skills, effectiveness in increasing positive interactions with child learner, and implementation feasibility to parents/caregivers in addition to the likelihood of implementing presession pairing skills in the future as well as recommending it to others.
Discussion

A multiple-baseline was chosen for this study to have an initial gauge of participants’ skills and once stable responding occurred in baseline; BST was then introduced followed by additional specific performance feedback. Treatment decisions were made based on participants’ performance and stability of data. Figure 1 depicts participant performance and overall acquisition of said pre-session pairing skills. Participant 1 demonstrated two out of three skills that were observed in the study to mastery criteria at all three baseline levels, specifically describe and proximity. Participant 2 demonstrated describe, initiate, proximity to mastery criteria in three out of ten sessions but had seven out of ten sessions of only exhibiting mainly describe and proximity at baseline levels. In addition, Participant 2 demonstrated proximity to mastery criteria in three out of ten baseline sessions. Data presented at sessions followed by behavior skills training (BST) showed that both participants were able to correctly exhibit all three skills at least once in each session but were insufficient to meet mastery criteria for all skills. This is evident by the gray bars in Figure 1 meeting mastery criteria at one hundred percent, but a downward trend was observed for both participants’ line graph depicting percentage of skills exhibited to criteria. Maintenance sessions were conducted at least one week after training for both participants and results show that both participants still maintained all pre-session pairing skills at mastery levels.

Participant 1 had three total sessions of BST while Participant 2 had six total sessions of BST without a meaningful change in level or trend. Both participants were not meeting mastery criteria for both describe and sometimes for initiate as well. Thereafter, an additional component of specific performance feedback was combined with BST to bolster the frequency of the pairing skills. Upon the incorporation of this component, Participant 1 demonstrated all three
skills to mastery criteria within five sessions while Participant 2 demonstrated all three skills to mastery criteria within eight sessions. Parents/caregivers received training at least once a week and up to three sessions a week. Nevertheless, as presented in the graphs above, BST alone was insufficient to train parents/caregivers on pre-session pairing skills to meet the mastery criteria of the study. The additional component consisted of providing specific number of occurrences for each skill after each session and parents/caregivers were able to track their progress with reference to each session’s mastery criteria. Specific examples of describe and initiate alongside additional practice opportunities were presented during feedback if parents/caregivers did not meet mastery criteria during the observed session. BST with the addition of specific performance feedback had the most meaningful effect on increasing parents/caregivers’ fluency in pre-session pairing skills as demonstrated in Lugo et al. (2017) with behavior therapists in a clinical setting. Parents/caregivers of this study had not received any type of caregiver training prior to participating in the study, thus specific performance feedback may have contributed to further understanding the specific typographies of the pre-session pairing skills observed.

The nature of administering the intervention via telehealth required additional setup procedures to ensure the intervention could be successfully executed and captured on camera. Parents/caregivers would attempt to adjust devices in angles that were feasible for observation as locations differ in the house across sessions. In addition, both participants in the study had two children each. Siblings would often join in at the beginning or in the midst of session observations. This study primarily targeted parents/caregivers’ behaviors therefore, child participants’ siblings’ participation did not disrupt data collection, instead, it provided parents/caregivers more opportunities to exhibit all three pre-session pairing skills within each session. The incorporation of siblings may have
contributed to a higher probability of generalizing and developing variability for each of these pre-session pairing skills but this study was unable to demonstrate a functional relationship between those two variables. Future research should analyze the generality and variable typography of pre-session pairing skills across caregivers with more than one child in the homes.

While the data from this study depict favorable outcomes, this study has its limitations. Due the nature of telehealth, proximity in this study was an inconsistent measure between primary and secondary observer during data collection and that played a role in the results of interobserver agreement for participant 2. Future studies should include a more detailed typographical operational definition of proximity between parents/caregiver and child when attempting to teach pre-session pairing skills. In addition, due to the pandemic, health restrictions in Malaysia played a significant role in the execution of this study in a timely manner as parents/caregivers had their lifestyles and schedules disrupted leading to several sessions being cancelled. The cancellations further extended the execution time and resulted inconsistent gaps of time between training sessions. Moreover, stable internet connection and other children in the homes played a role in viable observation as well. Not all homes had portable equipment that could move around the house as sessions are ongoing or stable internet connection across sessions. Several sessions were interrupted due to unstable internet connection or technological issues while some sessions had equipment interference due to other children in the whilst sessions were in progress. These factors extended data collection periods as sessions were paused and data collection would resume when internet connection resumed. Since all sessions were recorded, data were rescored through multiple rewatches of sessions to ensure data collection accuracy and no data was discarded of. Participants in this study were also fluent in English thus, no
translations were required, and this further ensured that neither data collection discrepancies occurred nor were discarded.

Correspondingly, sessions were conducted approximately between 8:00 pm to 10:00 pm in Malaysia’s time zone and in the homes of parents/caregivers. Often child participants are getting ready for bed before or after sessions leading to some distractions occurring during data collection period. Likewise, child participants were occasionally distracted by the equipment during sessions; and Participant 2’s child had one occurrence of problem behavior but did not put equipment or themselves at risk. Moreover, if the client had proceeded to demonstrate severe problem behavior that the parent was not trained to manage, behavior analysts were not on site to manage the problem behavior. Future research should conduct a maintenance follow-up to observe if all three pre-session pairing skills maintained for more than a week as well as if these pre-session pairing skills are generalized to other settings such as school and other communities, across various play concepts, or other children within the household. Additionally, collateral behavior such as problem behaviors or avoidance behaviors such as whining, crying, and elopement coupled with social approach behaviors such as in-seat behavior (Shillingsburg et al., 2014) of the child participant can also be recorded. This will provide information on how pre-session pairing affects a child’s behaviors and further strengthen the efficacy of pre-session pairing in therapeutic settings.

Social validity results from this study displayed pre-session pairing as an important and useful in contributing to positive interactions between parents/caregivers and child relationships. Parents/caregivers reported there were observable increases in positive interactions between them and child participants. One participant particularly reported that their child seemed to exhibit higher tolerance to changes within daily life routines such as different playstyles of highly
preferred activities and being able to tolerate putting on other garments such as socks and neckties for longer periods. All three skills included in this study reported feasible execution and both parents/caregivers reported high probabilities of recommending these skills to their peers, although, one participant reported that the skills observed in this study were rather rigid. Future research can include additional components of pre-session pairing such as praise, reflecting child participants’ vocalizations, imitating play skills exhibited by child participants, and creating new activities by changing the function of a toy. In addition, future research should further disseminate pre-session pairing across different cultures and participants to cross-examine the social validity and effects of pre-session pairing in different therapeutic settings. Future studies should also collect data on different child behaviors to extend on positive interactions between parents/caregivers and child relationships.

Conducting parent/caregiver training, particularly on teaching them pre-session pairing skills, via telehealth can be an alternative modality to face-to-face parent training as an additional resource for parents/caregivers with children with autism spectrum disorder. Teaching pre-session pairing skills via telehealth and other caregiver training on how to implement treatment plans can also be easily executed if both parties – parents/caregivers and behavior analysts – have the right equipment to do so. This can provide further access to services to families who cite issues of convenience and accessibility as a result of families living far away from a treatment center and/or do not have frequent feasible access to in-home therapy. In addition, behavior analysts can also save on travel time and costs if the home is distant. The time previously allocated to travel can be allocated to conduct telehealth treatment with parents and/or work on programming for the clients.
This study successfully taught parents/caregivers pre-session pairing skills to better facilitate positive interactions between them and their children. This study also demonstrated the social validity of this intervention package via telehealth across cultures. Pre-session pairing is a socially valid and important component to behavior analytic treatment and development of quality relationships between children and their parents/caregivers.
References


### Appendix A

#### Caregiver Training – Pre-session Pairing Skills Study
 "Therapist – Treatment Integrity"

<table>
<thead>
<tr>
<th>Caregiver Name or #: ______________</th>
<th>Child Name or #: ____________</th>
<th>Session: ______________</th>
<th>Data Collector: ____________</th>
<th>Date: ____________</th>
</tr>
</thead>
</table>

#### Pre-Session Pairing Skills

<table>
<thead>
<tr>
<th>Phase</th>
<th>Steps</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 hours prior to the first baseline session</td>
<td>Provide caregiver with a list of the names and operational definitions of each pre-session pairing skill. “The purpose of this meeting is to provide you with the names and definitions of each of the skills that I would like you to implement during our first session tomorrow. Please read through this document during the next 24-hours until we meet again.”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Baseline | Therapist says: Before we start training, we want to identify how useful are the instructions we provided in the absence of training. This will inform us how we can help other parents in the future. To do this, we are going to run some sessions of baseline. Do you have any questions?  
- Have the parent put instructions away “Please put the instructions away while YOU play with your child”  
- Remind caregiver to get all necessary toys/items to run a session.  
- “Please let me know when you are ready to start”  
- When parent says “I’m ready”  
- Therapist says “ok, go play with your child” | | | |
| | Start session - Start timer for session (5min) | | | |
| BST | “The purpose of this session is to train you on the pre-session pairing skills. I will do this by using a procedure called behavioral skills training. First, I will verbally name, define and explain each of the pre-session pairing skills. Then, I will pretend to be the caregiver and model each of the skills while you serve as a child. After this, we will bring in the child and you demonstrate pre-session skills to him/her. Lastly, I will provide you feedback whenever an error occurs while implementing these skills” (Note: sessions might be shorter than 5 min during rehearsal & feedback) |
| Instructions: Verbally and/or written explanation of skill |
| “The first pre-session pairing skill is proximity; this means you have to be within arm’s reach of your child at all times. The second skill is described, here you must describe appropriate play skills exhibited by child, for example, if your child is playing with a piano toy, you can say: “You are playing with a piano or you are making music”. The last skill is initiate, for this skill you should offer items to the child, without presenting a demand.” For example, rolling playdough it your hands and then giving it to the child or pushing a car back and forward and then giving it to the child. |
| Model: Model the skill with caregiver as child |
| “Using a second therapist/ doll/ stuffed toy as my child, I will now show you what the skill, proximity, looks like. After that you will serve as the child and I will model the skills described and initiate to you. Please make sure to have different toys available.” |
| Rehearsal: Bring in the child |
| “We will now bring in the child and you will demonstrate all of the skills, with the child. Please have some toys available.” |
| • “Please let me know when you are ready to start – we are going to practice the skills.” |
| • When caregiver says “I’m ready” |
- Therapist says “ok, “go play with your child”

Feedback: Researcher provides feedback after each 5 minute session “5 minutes is up. Remember that…xxx”

Total percentage: ________________

<table>
<thead>
<tr>
<th>Skill Name: Proximity</th>
<th>Describe</th>
<th>Initiate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Definition:</td>
<td>Caregiver stays within arm's distance of child. When caregiver extends her arm she must be able to touch the child</td>
<td>Caregiver describes appropriate play skills exhibited by child. No more that 2 instances of same description will be counted</td>
</tr>
<tr>
<td>Whole interval - 30 sec</td>
<td>Frequency (tally) - 5min</td>
<td>Frequency (tally) - 5min</td>
</tr>
<tr>
<td>Y = ✔ N = ✘</td>
<td>E.g. IIIII</td>
<td>E.g. III</td>
</tr>
</tbody>
</table>

Session: ____________________________

Total: ____________________________
Appendix B

Social Validity Questionnaire

Participant: ___________________  Date: __________

Parent/Caregiver Questionnaire

Please rate the extent to which you agree or disagree with the following statements that most closely reflect your opinion.

1. How clear was your understanding of what presession pairing skills are before the study?

<table>
<thead>
<tr>
<th>Extremely unclear</th>
<th>Somewhat unclear</th>
<th>Neither unclear nor clear</th>
<th>Somewhat clear</th>
<th>Extremely clear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

2. How clear is your understanding of what presession pairing skills are after the study?

<table>
<thead>
<tr>
<th>Extremely unclear</th>
<th>Somewhat unclear</th>
<th>Neither unclear nor clear</th>
<th>Somewhat clear</th>
<th>Extremely clear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

3. How useful were the presession pairing skills training to you?

<table>
<thead>
<tr>
<th>Not at all useful</th>
<th>Slightly useful</th>
<th>Moderately useful</th>
<th>Very useful</th>
<th>Extremely useful</th>
</tr>
</thead>
</table>
4. How effective were the presession pairing skills training in increasing the positive interactions you have with my child overall?

<table>
<thead>
<tr>
<th>Not effective at all</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

5. How likely are you to recommend presession pairing skills to others?

<table>
<thead>
<tr>
<th>Extremely unlikely</th>
<th>Somewhat unlikely</th>
<th>Neither unlikely nor likely</th>
<th>Somewhat likely</th>
<th>Extremely likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

6. How likely will you use strategies with your child in future sessions?

<table>
<thead>
<tr>
<th>Extremely unlikely</th>
<th>Somewhat unlikely</th>
<th>Neither unlikely nor likely</th>
<th>Somewhat likely</th>
<th>Extremely likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

7. In your opinion, how important do you think it is to pair with your child?
<table>
<thead>
<tr>
<th>Not at all important</th>
<th>Slightly important</th>
<th>Moderately important</th>
<th>Very important</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1 = extremely unclear, not at all useful, not effective at all, extremely unlikely, not at all important

2 = somewhat unclear, slightly useful, slightly effective, somewhat unlikely, slightly important

3 = neither unclear nor clear, moderately useful, moderately effective, neither unlikely nor likely, moderately important

4 = somewhat clear, very useful, very effective, somewhat likely, very important.

5 = extremely clear, extremely useful, extremely effective, extremely likely, extremely important.
Figure 1
Participants’ Results

Note. Performance data for Participant 1 and Participant 2. The percentage of skills correctly implemented per session are represented by gray bars. The black data path represents the percentage of skills implemented to criteria per session.
Table 1
Operational definitions and measurement procedures used for each presession pairing skill

<table>
<thead>
<tr>
<th>Skill</th>
<th>Definition</th>
<th>Measurement Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe</td>
<td>Parent/caregiver describes play activities displayed by the learner</td>
<td>Frequency</td>
</tr>
<tr>
<td>Initiate</td>
<td>Parent/caregiver offers tangible items to the learner</td>
<td>Frequency</td>
</tr>
<tr>
<td>Proximity</td>
<td>Parent/caregiver stays within arm’s length of client</td>
<td>30-s whole interval recording</td>
</tr>
</tbody>
</table>
Table 2
Social Validity Questionnaire Results

<table>
<thead>
<tr>
<th>Questions</th>
<th>Rating</th>
<th>Participant 1</th>
<th>Participant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How clear was your understanding of what presession pairing skills are <em>before</em> the study?</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2. How clear was your understanding of what presession pairing skills are <em>after</em> the study?</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. How useful was the presession pairing skills training to you?</td>
<td></td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4. How effective were the presession pairing skills training in increasing the positive interactions you have with my child overall?</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. How likely are you to recommend presession pairing skills to others?</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. How likely will you use strategies with your child in future sessions?</td>
<td></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. In your opinion, how important do you think it is to pair with your child?</td>
<td></td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note.* 1 = extremely unclear, not at all useful, not effective at all, extremely unlikely, not at all important. 2 = somewhat unclear, slightly useful, slightly effective, somewhat unlikely, slightly important. 3 = neither unclear nor clear, moderately useful, moderately effective, neither unlikely nor likely, moderately important. 4 = somewhat clear, very useful, very effective, somewhat likely, very important. 5 = extremely clear, extremely useful, extremely effective, extremely likely, extremely important.