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Further Comparison of Preference for Intervention With and Without Restricted Topics

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FURTHER COMPARISON OF PREFERENCE FOR INTERVENTION WITH AND
WITHOUT RESTRICTED TOPICS

By

Meg R. Patel

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WITHOUT RESTRICTED TOPICS

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By

Meg R. Patel

DEDICATION

This thesis is dedicated to my mother, Vibha, and my late father, Rohit, for their unwavering love, support, and patience. Thank you for all the sacrifices that you have made so that I could receive a higher education and pursue my passions. I am so very grateful to be your daughter.

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FURTHER COMPARISON OF PREFERENCE FOR INTERVENTION WITH AND WITHOUT RESTRICTED TOPICS

Abstract

By Meg R. Patel

University of the Pacific
2020

Previous research has shown that individuals diagnosed with autism spectrum disorder (ASD) may dwell on restricted topics of interest during conversations (Mercier et al., 2000; Smerbeck, 2019). Stocco et al. (in press) found that individuals may prefer a conversational-skill intervention that includes access to restricted topics over an intervention that only provides high-quality attention for speech about experimenter-led topics. We replicated and extended Stocco et al. in two ways. First, we evaluated if speech about restricted topics (a) occurred at high levels and (b) was sensitive to interested responses from a listener. Second, we experimentally evaluated the additive effects of using restricted topics as reinforcement on participant preference for intervention. Finally, we sought to evaluate the reliability and generality of previous findings by conducting this study using telehealth. All participants spoke about restricted topics at high levels, and their speech was sensitive to different qualities of attention. Additionally, two out of three participants preferred an intervention with access to restricted topics, compared to an intervention that only included differential attention. These outcomes may have implications for practitioners who are asked to conduct virtual assessments or interventions for clients who engage in speech about restricted topics.

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LIST OF ABBREVIATIONS

HQ NR / LQ R	High-quality Nonrestricted / Low-quality Restricted
Exp Topic HQ Attn	Experimenter Topic High-quality Attention
FT, LQ ATTN	Fixed-time, Low-quality Attention
Exp Topic HQ Attn + R Topics SR ⁺	Experimenter Topic High-quality Attention + Restricted Topics Reinforcement

CHAPTER 1: INTRODUCTION

Individuals diagnosed with autism spectrum disorder (ASD) can struggle with developing and maintaining social relationships (DSM-V, 2013), and they often report feeling lonely (Bauminger & Kasari, 2000; Locke et al., 2010). Kinnear et al. (2016) found that of 502 parents of children diagnosed with ASD, 82.9% reported that their child had trouble making friends and 74.5% indicated that their child was regularly excluded from activities by peers. Moreover, challenges with developing social relationships can persist through adolescence (Church et al., 2000) and adulthood (Barnhill, 2007). Locke et al. (2010) surveyed high school students and found that only 7.6% of neurotypical adolescents were either isolated or not significantly connected with another neurotypical classmate, compared to 71.4% of adolescents diagnosed with ASD. When individuals diagnosed with ASD do form friendships, they are often reported to be of a lower quality compared to their typically developing peers (Bauminger & Kasari, 2000; Locke et al., 2010). Individuals diagnosed with ASD can also struggle with forming high-quality relationships with their family members. For example, mothers of adolescents and adults diagnosed with ASD reported that the level of affection and respect that they felt towards their child was not completely reciprocated (Orsmond et al., 2006).

Although relationships can be impacted by many factors (e.g., frequency of telling lies; Engels et al., 2006), individuals diagnosed with ASD who exhibit restricted, idiosyncratic interests may deter social interactions if they dwell on their interests during conversations. Parents have reported that children diagnosed with ASD often engage in excessive speech about restricted topics of interest during conversations (Smerbeck, 2019). Mercier et al. (2000)

interviewed siblings or parents of individuals diagnosed with ASD and found that these family members identified restricted interests as a barrier to social interactions. For example, one sibling reported that her brother's restricted interests "swallow up everything, all the time" to the point where they "can't talk about anything else" (Mercier et al., 2000, p. 414). In contrast, neurotypical children often respond with on-topic statements when peers initiate a conversation (Turkstra et al., 2003), and individuals who appear interested in peer topics have been rated as more likeable compared to individuals who appear uninterested (Black & Hazen, 1990). Therefore, one avenue toward improving the social interactions of individuals diagnosed with ASD involves evaluating client preference for components of effective intervention.

To date, all published functional analyses have demonstrated attention as a maintaining variable for speech about restricted topics and researchers have shown decreases in this type of speech using noncontingent reinforcement (NCR; Carr & Britton, 1999; Noel & Rubow, 2018), differential reinforcement of other behavior (DRO; Fisher et al., 2013), and differential reinforcement of alternative behavior (DRA; Fisher et al., 2013; Frea & Hughes, 1997; Kuntz et al., 2019; Rehfeldt & Chambers, 2003; Roantree & Kennedy, 2012). A majority of studies on function-based interventions have focused on reducing speech about restricted topics by withholding high-quality attention for this type of speech and providing attention for appropriate or on-topic speech (Frea & Hughes, 1997; Kuntz et al., 2019; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003; Roantree & Kennedy, 2012).

In contrast, Fisher et al. (2013) used access to conversations about restricted topics as a reinforcer for engaging in on-topic speech. In addition to providing high-quality attention for on-topic speech and withholding high-quality attention for speech about restricted topics, the therapist provided 60 s of access to restricted topics if the participant spoke about the

experimenter's preselected topic for 30 cumulative seconds. The experimenters correlated colors on a card with a two-component chain schedule. One color was correlated with the experimenter providing high-quality attention for speech about the preselected topic, and the other color was correlated with the experimenter providing high-quality attention for any topic, including the restricted topics that were reported as problematic. Using a chain schedule, Fisher et al. demonstrated stimulus control of speech about restricted topics. When the card signaled that high-quality attention would only be provided for preselected topics, the participant engaged in low levels of speech about restricted topics and high levels of speech about the experimenter's preselected topic. The opposite effect was observed when the card signaled that high-quality attention would be provided for speaking about restricted topics. However, little is known about the potential benefits of using restricted topics as reinforcement for speech about nonrestricted topics during intervention.

More recently, Stocco et al. (in press) evaluated the additive effects and social validity of using access to restricted topics as reinforcement for speaking about topics selected by caregivers. Participants were eight individuals diagnosed with ASD or attention-deficit/hyperactivity disorder (ADHD). Caregivers reported that participants engaged in excessive speech about restricted topics of interest during conversations that interfered with forming normative relationships. Sessions consisted of 5-min conversations between the experimenter and the participant. The authors first investigated the influence of different qualities of attention on speech by manipulating the listener responses exhibited by the experimenter and measuring the on-topic and problematic speech of the participant. Researchers defined problematic speech as talking about any topic other than the assigned topic for a given session, which included speech about restricted topics. The experimenter delivered different

qualities of attention to the participant, depending on the topic of conversation and the condition. The experimenter behaved as interested by providing high-quality attention in the form of nonvocal responses (e.g., eye contact, orienting their body towards the participant, smiling, and nodding) and vocal responses (e.g., saying “mm-hmm,” asking questions, or making statements about the conversation topic). Uninterested responses consisted of the experimenter orienting their body away from the participant, withholding eye contact, making a neutral facial expression, and redirecting the conversation back to the assigned topic. After the initial analysis demonstrated that speech was sensitive to different qualities of attention, the experimenter provided signaled access to restricted topics in addition to contingent high-quality attention. The main finding was that providing access to restricted topics did not produce significant changes in levels of on-topic or problematic speech. However, when the authors evaluated participant preference, the results showed that participants preferred an intervention that included contingent access to restricted topics over an intervention that only provided high-quality attention for talking about less-preferred topics nominated by caregivers.

Building on previous research, the results of Stocco et al. (in press) further demonstrated that speech about restricted interests may be sensitive to different qualities of attention and suggested that using restricted topics as reinforcement during intervention may be more preferred by clients experiencing social skills intervention. However, few studies have demonstrated the problematic nature of speech about restricted topics. Previous research has demonstrated the sensitivity of speech about perseverative topics to different qualities of attention (Frea & Hughes, 1997; Kuntz et al., 2019; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003), but these analyses did not demonstrate that participants engaged in high levels of speech about restricted topics compared to other topics during conversation. Researchers have either not measured speech

about other topics (Frea & Hughes, 1997; Kuntz et al., 2019; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003) or combined measures of speech about restricted topics with others (Stocco et al., in press). One exception was the analysis in Fisher et al. (2013), during which the participant engaged in high levels of speech about restricted topics and low levels of speech about other topics when high-quality attention was available for speaking about any topic. More research is needed on the generality of these outcomes across individuals who are reported to engage in excessive speech about restricted topics.

An additional limitation of the findings on client preference in Stocco et al. (in press) is that researchers did not include an experimental design to evaluate the influence of contingent access to restricted topics. Without manipulating differential reinforcement with or without restricted topics as a component of intervention within an experimental design, there are several plausible alternative explanations for the preference outcomes reported in Stocco et al. First, selecting the intervention that included reinforcement with restricted topics could be attributed to the participant receiving another social skills program outside of the study that teaches individuals how to initiate conversations with people who exhibit similar interests (i.e., history; Petursdottir & Carr, 2018). Second, all participants experienced a component analysis before the preference assessment. The final phase of the component analysis involved the intervention that included reinforcement using restricted topics. Because preference can be impacted by an individual's recent learning history (Drifke et al., 2019), the sequence of repeated interactions with the experimenter could account for the preference assessment outcomes (i.e., testing; Petursdottir & Carr, 2018). A systematic replication of the free-operant preference assessment conducted by Stocco et al. using a reversal design could clarify the influence of using restricted topics as reinforcement on client preference for social skills intervention.

Additionally, a general limitation of restricted interests research is that no studies have included assessments or interventions with participants using telehealth services. Telehealth has been used in other areas of research, such as conducting functional analyses of problem behavior and implementing functional communication training (Suess et al., 2016; Wacker et al., 2013a,b), conducting preference assessments for leisure items (Higgins et al., 2017), and teaching self-care skills to individuals diagnosed with ASD (Boutain et al., 2020). However, no studies have evaluated the influence of variables on speech about restricted interests or client preference for intervention components using telehealth services. Due to considerable differences between in-person and virtual conversations, and the growing need for telehealth services (LeBlanc et al., 2020), questions remain about the external validity of previously reported outcomes to digital environments. An additional limitation is that most of the research that has used a telehealth format has focused on training participants' caregivers to implement procedures of behavior change programs, instead of directly delivering services to clients (LeBlanc et al., 2020; Schieltz & Wacker, 2020; Tomlinson et al., 2018). More research is needed on methods of directly delivering telehealth services to the recipients of behavior change programs.

We sought to systematically replicate and extend Stocco et al. (in press) in three ways. First, we started by conducting a functional analysis to evaluate if speech about restricted topics (a) occurred at high levels when high-quality attention was available for any topic and (b) was sensitive to interested responses from a listener. Second, we used a free-operant preference assessment within a reversal design to evaluate the potential additive effects of using restricted topics as reinforcement on participant preference for intervention targeting the increase of speech about experimenter-led topics. We focused on experimenter-led topics in an effort to emulate

what may occur in a child's typical environment. For example, caregivers may have certain topics that they would like to talk more about with their child but could have difficulty talking about these topics because their child often dominates the conversation by dwelling on their restricted topics. Third, we evaluated the reliability and generality of previous findings and extended the telehealth literature by conducting assessments using telecommunication technology.

CHAPTER 2: METHOD

Participants and Setting

Three individuals with a diagnosis of ASD participated in this study. We recruited all participants through flyers distributed to local regional centers that provided therapeutic services for individuals diagnosed with ASD. Caregivers of all three participants reported that their child engaged in speech about restricted topics during conversations that interfered with social interactions. The experimenter also interviewed caregivers to ensure that the participants could speak in full sentences and did not engage in echolalia or repetitive nonconversational vocalizations.

Jamie was a 12-year-old male and attended a 7th grade classroom at a public middle school. He attended a general education classroom with aide support for the majority of subjects, but received instruction in an alternative classroom that included fewer students and more teacher support for two subjects. He received 1:1 in-home behavioral services for approximately four years, but he no longer received these services once he started 2nd grade. His parents expressed that their primary concern was that Jamie's speech about restricted topics would inhibit his ability to develop and maintain friendships with typically developing peers.

Evan was a 14-year-old male and attended 9th grade at a public high school. He attended a general education classroom for the majority of subjects, but received instruction in an alternative classroom with fewer students and more teacher support for two subjects. He had received in-home behavioral services through a regional center in the past, and currently received these services through the school district. Evan was able to speak in full sentences, but his mom

reported that he often responded in one or two words when a conversation partner asked him a question about a nonrestricted topic. Evan's mom also reported that she could typically only have back and forth conversations with Evan about his restricted topic of interest.

Tyler was an 11-year-old male who took 6th grade classes through an online schooling program. He maintained grades of A's in all of his classes and had a 4.0 GPA. His dad reported that he received 1:1 ABA services in the home for about 6 years, but he stopped receiving services when he turned 8 years old. Additionally, his dad stated that he and Tyler's mom could have back and forth conversations with Tyler about nonrestricted topics for a little while, but that he would typically bring the conversation back to one of his restricted topics.

The majority of meetings with the participants were conducted via Zoom, a video conferencing platform, due to the COVID-19 circumstances. During each Zoom meeting, the experimenter conducted two or three sessions with the participant. We conducted five sessions of the functional analysis in person with Tyler at a university research room, but the experimenter then switched to conducting sessions via video conference. All sessions for Evan and Jamie were conducted via video conference. The experimenter asked caregivers to set up the video conference and all of the session materials in a quiet room at the participant's home. Caregivers were present in the room during all sessions, but the experimenter asked caregivers to refrain from interacting with the participants as much as possible.

Preassessments

The preassessments were identical to those conducted by Stocco et al. (in press). The experimenter administered the preassessment questionnaires to Tyler's parents in person and via Zoom to Jamie and Evan's parents. The first two preassessment questionnaires were adapted from the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher et al.,

1996; Appendix A) to identify the participants' restricted topics, as well as topics that caregivers would like to talk more or less about with their child. The top 4 or 5 conversation topics that parents would like to talk more about with their child were used as the experimenter topics during sessions. The restricted and experimenter topics for each participant are listed in Table 1.

Additionally, parents completed a leisure item questionnaire (Appendix B) that asked them to identify a moderately preferred leisure item that participants could engage with during each intervention option. The purpose of providing a leisure item was to more closely approximate participants' typical environment, where there are other activities available besides interacting with another individual. We asked parents to identify items available at their home that their child typically played with on their own, but were not items that they played with exclusively. The experimenter initially planned on excluding leisure items that parents identified as highly preferred for all participants to reduce the likelihood that participants would exclusively engage with the leisure items during sessions. However, we used a highly preferred leisure item (LEGO car) for the majority of Tyler's sessions because his dad reported that this was an activity that Tyler typically engaged in on his own. His dad reported that some of Tyler's moderately preferred leisure items included playing with action figures and Hot Wheels, but that he and his brother typically played with these items together. Therefore, we did not use these leisure items because these were not items that Tyler typically engaged with on his own. We used moderately preferred leisure items for Evan and Jamie, as identified by their parents on the questionnaire. Each participant's leisure items are displayed in Table 1.

Dependent Measures and Interobserver Agreement (IOA)

All data were collected from video recordings of sessions using a data collection program (Instant Data PC). The experimenter recorded the sessions using the Record function on the Zoom video conferencing application. During the functional analysis, we measured the duration that the participant engaged in speech about restricted topics and nonrestricted topics. We divided the duration that the participant engaged in the corresponding type of speech by the total duration of the session and converted to a percentage. Speech about *restricted topics* was defined as talking to the experimenter about any of the topics identified by the caregivers on the preassessment questionnaire. Similar to Fisher et al. (2013), speech about *nonrestricted topics* was defined as talking to the experimenter about any topic besides a restricted topic. Statements that were not about a specific topic, such as “I don’t know,” “What else can I say?” or “Can you repeat that?” were excluded. If the participant spoke to another person besides the experimenter during sessions (e.g., parent, siblings), this was excluded as well.

During each phase of the free-operant preference assessment, participants had the choice of wearing one of three different colored leis, with each lei representing a different intervention option that participants could experience. The primary measure during the free-operant preference assessment was *duration of selection*, or the time that the participant wore the colored lei corresponding to an intervention option. The onset of this measure occurred once the participant put on the lei associated with an intervention option and the lei was completely around their neck. The experimenter first instructed the participant to select one of the intervention options. After the participant wore one of the colored leis, the experimenter put on the lei that corresponded with the one that the participant selected and said “3, 2, 1 start” to mark the start of the session. The onset was measured after the experimenter started the session to

account for the time it took for the experimenter to wear the lei. The offset of this measure occurred when the participant took off the lei and the lei was completely off their neck.

We also included four supplementary measures during the free-operant preference assessment to provide some context on the participant's behavior in each of the four options. All four of these measures were calculated by dividing the total duration that the participant engaged in each measure by the total duration that the participant selected a given option and converting to a percentage. We measured speech about restricted topics (defined above), experimenter topics, or other topics. Speech about *experimenter topics* was defined as talking to the experimenter about the target topic initiated by the experimenter. The experimenter initiated a conversation about two topics identified for increase from the preassessment per session. Topics were rotated so that each topic was paired with all of the other topics at least once before repeating a pair. Speech about *other topics* was defined as talking to the experimenter about any topic except for restricted topics or experimenter topics. Similar to the functional analysis, if the participant spoke to another individual besides the experimenter during a session (e.g., their parent), this was excluded. During the no interaction option, Tyler engaged in some speech while he played with his leisure items that was not directed towards the experimenter, which we also excluded. Similar to Rubin and Dyck (1980), this type of speech included tacting or making a comment about the play materials, describing actions during play, or engaging in fantasy statements (e.g., "We need to move fast to get away from the jungle monsters"). Finally, we measured *engagement with leisure items*, which was defined as touching, holding, or manipulating the leisure items. It should be noted that all of the participants sometimes moved their hands out of view from the camera while they were engaging with their leisure item, making it impossible to code leisure item engagement. For example, Tyler and Jamie would

build with their LEGOs in the view of the camera, then hold a single piece of the LEGOs and move their hand so that it was no longer visible in the frame of the camera. We excluded the duration that this occurred during a session by subtracting it from the total duration that the participant selected the corresponding intervention option.

Two secondary observers independently collected data on a minimum of 33% of sessions for all participants. We used the Instant IOA software program to score IOA for all measures. We divided each session into 1-s intervals on Instant IOA to score an agreement or a disagreement for each interval. If the primary and the secondary observer both recorded the occurrence or the nonoccurrence of a measure for a given interval, that was scored as an agreement. Instant IOA automatically calculated agreement by dividing the number of intervals with agreements by the total number of intervals and converting the quotient to a percentage. For the functional analysis, all agreement coefficients were at or above 82%. The agreement results for duration of selection during the free-operant preference assessment are depicted in Table 2. All agreement coefficients for the supplementary measures of the free-operant preference assessment were at or above 86%.

Observer Training

The primary data collector provided written instructions and operational definitions to a secondary data collector that included examples of each measure. Before collecting IOA data, the secondary data collector was trained on data collection using practice videos created by the primary data collector. The practice videos consisted of role-play sessions of the functional analysis and the free-operant preference assessment and was coded by the primary data collector. The secondary data collector was required to obtain an IOA score of 80% or higher for each

dependent measure for three consecutive videos. All data collectors met the criteria on the first attempt.

Functional Analysis

We conducted a functional analysis to evaluate if the participant's speech was sensitive to different qualities of attention. The experimental design was an ABA reversal design for Jamie and Evan and an ABAB design for Tyler. Each session was 5 minutes. At the start of each session, the experimenter told participants "Let's talk." The experimenter then oriented their body towards the participant and waited for them to initiate a conversation.

Control

Similar to Fisher et al. (2013), the experimenter delivered high-quality attention to the participant, no matter what they talked about. If the participant initiated any topic of conversation, including the restricted topics that parents identified, the experimenter delivered high-quality attention by behaving as an interested listener. Similar to Peters and Thompson (2015), interested responses consisted of the experimenter providing high-quality attention in the form of nonvocal responses (e.g., orienting their body towards the participant, smiling and nodding, engaging in appropriate facial expressions, and providing eye contact) and vocal responses (e.g., saying "yeah" or "uh-huh" and asking questions or making statements about the conversation topic approximately every 10–15 s). Any time there was a pause in the participant's speech, the experimenter continued facing the participant but did not provide any prompts or ask questions about a specific topic. If the participant resumed speaking about any topic, the experimenter provided high-quality attention and behaved as an interested listener. The purpose of behaving as an interested listener contingent on any speech was to evaluate if the

participant engaged in high levels of speech about restricted topics, even when high-quality attention was available for speaking about any topic.

High-quality Nonrestricted / Low-quality Restricted (HQ NR / LQ R)

The purpose of this condition was to evaluate if the participant engaged in higher levels of speech about nonrestricted topics compared to restricted topics when high-quality attention was only available for speaking about nonrestricted topics. The experimenter behaved as an interested listener only when the participant engaged in speech that was unrelated to their restricted topic(s). If the participant initiated the conversation by speaking about their restricted topic(s), the experimenter behaved as an uninterested listener. Similar to Peters and Thompson (2015), uninterested responses consisted of the experimenter orienting their body away from the participant, withholding eye contact, engaging in a neutral facial expression, and redirecting the conversation (e.g., “I don’t want to talk about dogs, but you can talk to me about other topics”). If the participant responded by speaking about any topic besides their restricted topic(s), the experimenter provided high-quality attention and behaved as an interested listener. However, if the participant continued to talk about a restricted topic, the experimenter behaved uninterested and made statements of disinterest every 10–15 seconds. The experimenter did not ask questions about a specific topic any time there was a pause in the participant’s speech. Following this condition, the experimenter conducted a replication of the control condition. For Tyler, the experimenter also conducted a replication of the HQ NR / LQ R condition.

Free-Operant Preference Assessment

Participants chose between (a) an intervention that delivers reinforcement for speaking about experimenter-selected topics, (b) free access to restricted topics and fixed-time, low-quality attention for speech (fixed-time, low-quality attention [FT, LQ attn]), and (c) escape from

conversation and free access to leisure items (no interaction). We used a reversal design to evaluate the additive effects of using restricted topics as reinforcement for speech about experimenter topics. During the A phase, intervention consisted of providing high-quality attention for speech about the experimenter topic and withholding attention for speech about restricted topics (experimenter topic high-quality attention [exp topic HQ attn]). In the B phase, we added restricted topics as reinforcement for engaging in speech about the experimenter topic (experimenter topic high-quality attention + restricted topics reinforcement [exp topic HQ attn + R topics SR⁺]).

All sessions were conducted with assistance from one caregiver for each participant. Before the start of sessions, the experimenter emailed the caregiver a picture illustrating the placement of all of materials used in sessions. Materials included a laptop, four different colored leis, a paper session log, watch, timer, and a leisure item.

Prior to each session, the caregiver asked the participant to sit in front of the computer, joined the video conference on the laptop, and placed three colored leis and one leisure activity on the table (Evan, Tyler) or floor (Jamie) next to the participant. Tyler and Evan used leis that were already available at their home, and Jamie used leis provided by the experimenter. The leis that represented the exp topic HQ attn intervention option were green (Tyler) or blue (Evan, Jamie). The leis that represented the FT, LQ attn option were orange (Tyler), multicolored (Evan), or purple (Jamie). The no interaction option corresponded with a multicolored (Tyler) or green lei (Evan, Jamie). Finally, a pink lei represented the exp topic HQ attn + R topics SR⁺ intervention option for all participants. All three participants used a leisure item that was already available at their home. To reduce the likelihood that participants might start playing with

another leisure item, the experimenter asked caregivers to conduct sessions in a room that does not typically include access to other leisure items.

Before the first session within each phase, the experimenter described the conditions associated with each lei. For example, during phases in which intervention included contingent access to restricted topics, the experimenter described the rules:

There are three colored leis next to you on the table. You can choose to wear whichever lei you want and you can also play with the toy on the table. You can wear each lei as long as you like. If you want to wear a different lei at any time, you can take off the lei that you are wearing and wear a different one instead. Please make sure to only wear one lei at a time and take off one lei before you put on another one. If you choose to wear the (insert color) lei, you will be able to play with your (insert leisure item), but I will not talk to you. If you choose to wear the (insert color) lei, you can still play with your toys, but you get to talk to me about whatever topic you would like. However, I will not be a good listener. I will look away and say things like “uh-huh” and “okay.” If you wear the (insert color) lei, I will be a good listener only when you talk about my topic, but then it will be your turn to talk about whatever you want and I will still be a good listener. I will look at you, smile, and ask you questions. Please stay seated in the chair until I tell you that it is time to take a break.”

After describing the consequences for each intervention, the experimenter asked the participant to describe the consequences associated with wearing each lei. If the participant could not do so, the experimenter provided additional instructions until the participant could accurately describe the consequences. Following this, the experimenter conducted exposure trials in which they prompted the participant to wear each lei and role-played the corresponding option. During all subsequent sessions within each phase, the experimenter asked the participant

to describe the consequences for wearing each lei. If the participant did not accurately describe the consequences, the experimenter restated the contingencies and asked the participant to describe them until they did so accurately.

Each session was 10 min and there was at least a 2-min break between sessions. The experimenter occasioned the first selection by instructing the participant to “Pick the one you like.” Once the participant selected a lei, the experimenter put on the same colored lei and delivered the consequences associated with selecting that lei. The participant was able to change leis as many times as they liked during the session. There were two experimenter topics assigned per session and the experimenter topic changed at approximately the 5-min mark.

Experimenter Topic High-quality Attention (Exp Topic HQ Attn)

The participant received differential, high-quality attention for speaking about topics initiated by the experimenter (e.g., Rehfeldt & Chambers, 2003). The experimenter oriented their body away from the participant, withheld eye contact, and waited 10–15 s for the participant to initiate a conversation. If the participant did not initiate a conversation, the experimenter asked a question about the experimenter topic (e.g., “Do you have any brothers or sisters?”). If the participant responded by speaking about the topic that the experimenter initiated, the experimenter behaved as an interested listener by orienting their body towards the participant, smiling, and delivering eye contact. The experimenter also asked questions or made statements of interest approximately every 10–15 s (e.g., “What do you and your brother like to do together?”). Any time there was a 10-s pause in the participant’s speech, the experimenter asked the participant a question about the experimenter topic. If the participant engaged in speech about a restricted topic, or speech about any other topic, the experimenter behaved as uninterested and tried to redirect the conversation back to the experimenter topic (e.g., “I don’t

really want to hear about dogs. I would love to hear more about your brother”). At approximately the 5-min mark of each session, the experimenter introduced the second experimenter topic by asking the participant an open-ended question about the topic (e.g., “What is your favorite food?”). If the participant responded by speaking about the experimenter topic, the experimenter behaved as an interested listener.

Fixed-time, Low-quality Attention (FT, LQ Attn)

The participant was able to talk about any topic, however, the experimenter only delivered low-quality attention on a time-based schedule. Low-quality attention included many of the components as behaving uninterested, such as the experimenter sitting with their body oriented away from the participant, withholding eye contact, and engaging in a neutral facial expression. However, the experimenter also made neutral statements such as “uh-huh” or “okay” on a fixed-time schedule of every 10–15 seconds. If the participant did not initiate a conversation, or if there was a pause in the participant’s speech, the experimenter did not prompt the participant to begin talking. The experimenter delivered neutral statements when they were scheduled to be delivered, whether or not the participant was speaking during that interval. The duration that participants selected this option would indicate if receiving low-quality attention for speaking about restricted topics was more reinforcing than receiving high-quality attention for speaking about topics initiated by the experimenter.

No Interaction

The purpose of including this option was to evaluate if avoiding conversation and receiving free access to leisure items was more reinforcing for the participant than receiving high-quality attention from the experimenter. The experimenter faced away from the participant,

withheld eye contact, engaged in a neutral facial expression, and did not make any vocal statements.

Experimenter Topic High-quality Attention + Restricted Topics Reinforcement (Exp Topic HQ Attn + R Topics SR⁺)

This option was identical to the exp topic HQ attn option with the addition of providing contingent access to periods in which restricted topics were permitted. The experimenter provided a fixed, 60 s of access to restricted topics after the participant talked about the experimenter topic for 60 cumulative seconds. The experimenter tracked on-topic speech using a stopwatch and paused the timer when 2 s or more passed without speech or if the participant took off the lei corresponding with this intervention option before meeting the response requirement. If the participant wore the lei corresponding with this intervention option again during the session and continued talking about the experimenter topic, the experimenter resumed the stopwatch. Once the participant met the 60 s response requirement, the experimenter paused the timer and commented on what the participant spoke about (e.g., “Thank you for telling me about your brother. Now what do you want to talk about?”). After making this comment, the experimenter allowed the participant to talk about the topic of their choice for approximately 60 s. The purpose of pausing the timer during the reinforcement interval was to equate opportunities for speech about the experimenter topic during this intervention option and the exp topic HQ attn option.

Procedural Modification (Tyler)

During the first two phases that we conducted with Tyler, his leisure item was a LEGO car toy (parent-identified as highly preferred). During these sessions, Tyler selected the intervention option at a higher duration compared to the no interaction option, but still selected

the no interaction option for part of the session during the majority of sessions. We thought that this could potentially be attributed to using a highly preferred leisure item instead of a moderately preferred leisure item. Therefore, during the third phase, we decided to switch Tyler's leisure item to a moderately preferred leisure item to evaluate if that would affect the duration that he selected each option. We asked Tyler's parents to identify a moderately preferred leisure item that Tyler typically played with on his own. His parents identified coloring with crayons, which is the leisure item that we used during the third phase. The experimenter asked Tyler's parents to select coloring pages of some of Tyler's moderately preferred characters or themes. His parents provided coloring pages of superheroes and Transformers, but the specific coloring pages that were available varied across sessions. During the fourth phase, we switched back to using the LEGO car as the leisure item.

The experimenter made conclusions about preference by visually inspecting the data from this phase. Once the participant exhibited a stable pattern of responding in duration of selections, the experimenter conducted a replication of both the A and B phases for Jamie and Evan. We did not conduct a replication of the A and B phases for Tyler because adding in access to restricted topics did not impact the duration that he selected the intervention option.

Measures of Extraneous Events

Because the primary purpose of the study was to evaluate the additive effects of contingent access to restricted topics on participants selecting intervention, trained observers also measured two extraneous events that could influence outcomes. First, because the experimenter's delivery of high-quality attention was dependent on the extent to which the participant engaged in on-topic speech, the overall rate of attention could not be held constant across experimental conditions. Moreover, yoking the rates of high-quality attention would not

be ideal because it could result in withholding or removing attention at times that it was programmed for the intervention. For example, if the participant began to engage in speech about the experimenter topic, yoking could result in withholding or delaying high-quality attention. Therefore, observers collected data on the percentage of the session that the experimenter delivered high-quality attention to the participant during both intervention options of the free-operant preference assessment. Including this measure allowed experimenters to assess if there were systematic differences in the duration that the experimenter delivered high-quality attention to the participant. This was calculated by dividing the total duration that the experimenter delivered high-quality attention by the total duration that the participant selected the intervention option during a session and converting to a percentage. During the exp topic HQ attn + R topics SR⁺ option, the periods in which the participants received access to their restricted topics were excluded from this calculation by subtracting the total duration of the reinforcement intervals from the total duration that the participant selected the intervention option.

Second, we measured the topics that participants talked about during the reinforcement intervals of the exp topic HQ attn + R topics SR⁺ intervention option. The purpose of this was to assess if participants talked about their restricted topics when they had the opportunity to talk about whatever topic they would like, or if they talked about an experimenter or other topic. We measured the duration that the participants talked about specific topics across sessions, divided them by the total duration of the reinforcement interval, and converted to a percentage. We added up all of these percentages to obtain a measure of total speech during the reinforcement intervals (i.e., the percentage of the reinforcement intervals that the participants spent talking).

CHAPTER 3: RESULTS

Functional Analysis

Figure 1 illustrates the results of the functional analysis for Jamie (top), Evan (middle), and Tyler (bottom). When high-quality attention was only provided for speaking about nonrestricted topics, all participants engaged in lower levels of speech about restricted topics (Jamie: $M = 1\%$, Evan: $M = 1\%$, Tyler: $M = 2\%$) compared to when high-quality attention was available for speech about any topic (control; Jamie: $M = 69\%$, Evan: $M = 52\%$, Tyler: $M = 67\%$). In contrast, all participants talked about nonrestricted topics for longer when high-quality attention was contingent on doing so (Jamie: $M = 77\%$, Evan: $M = 68\%$, Tyler: $M = 80\%$) than when high-quality attention was arranged for any topic (Jamie: $M = 17\%$, Evan: $M = 14\%$, Tyler: $M = 20\%$). These effects were replicated in an ABA (Jamie, Evan) or ABAB (Tyler) reversal design.

Free-Operant Preference Assessment

The first and second panels of Figure 2 depict the results for Jamie. The duration of selecting intervention occurred at higher levels in the two phases when restricted topics were added as reinforcement ($M = 96\%$) as compared to intervention that only included high-quality attention for talking about the experimenter's topics ($M = 14\%$). Jamie selected intervention exclusively for 5 out of 6 (83%) sessions when it included restricted topics as reinforcement. In contrast, Jamie exclusively selected intervention during 1 out of 11 (9%) sessions when reinforcement for speech about the experimenter's topic only included high-quality attention. Without the addition of contingent access to restricted topics, Jamie tended to choose no

interaction ($M = 77\%$) over FT, LQ attn ($M = 9\%$) or intervention ($M = 14\%$), and exclusively chose no interaction for 8 out of 11 (72%) sessions.

The third and fourth panels of Figure 2 depict the results for Evan. Evan selected the intervention at higher levels during the two phases where we included access to restricted topics ($M = 32\%$), compared to the three phases where intervention only included high-quality attention for speech about experimenter-led topics ($M = 7\%$). Evan exclusively selected the intervention option for 4 out of 15 sessions when intervention included access to restricted topics (27%), compared to 1 out of 14 sessions when intervention only included high-quality attention (7%). Despite selecting intervention at higher levels when reinforcement included access to restricted topics, Evan selected the no interaction option for the majority of sessions across all phases. However, he selected the no interaction option at lower levels when intervention included periods in which restricted topics were permitted ($M = 68\%$), compared to when intervention did not include contingent access to restricted topics ($M = 93\%$).

Figure 3 illustrates the results of the free-operant preference assessment for Tyler. Across the first two phases, Tyler selected intervention for longer durations than no interaction or FT, LQ attn, but there was no difference between selections of intervention with ($M = 69\%$) or without ($M = 72\%$) restricted topics as reinforcement. No interaction was the second most selected context across the first ($M = 27\%$) and second phases ($M = 31\%$), and FT, LQ attn was selected the least across both phases (first phase: $M = 0.5\%$, second phase: $M = 0\%$). Following the change from a high-preference (LEGO car) to a moderate-preference leisure item (coloring) in the third phase, there were similar patterns of selections during the first two sessions. However, Tyler selected intervention for shorter durations ($M = 8\%$, range, 1% to 20%) and no interaction for longer durations across the last three sessions of the third phase ($M = 92\%$, range,

80% to 99%). When the experimenter returned to including a high preference leisure item (LEGO car) in the final phase, there was an initial increase in the duration of selecting intervention ($M = 43\%$, range, 27% to 53%) and decrease in selecting no interaction ($M = 57\%$, range, 47% to 74%) in the first three sessions. However, high levels of selecting no interaction returned across the last three sessions of this phase ($M = 85\%$, range, 77% to 97%).

Table 3 shows the supplementary measures of participants' speech and engagement with leisure items during the free-operant preference assessment. All participants engaged in higher levels of speech about experimenter topics compared to restricted or other topics when they experienced intervention with or without restricted topics as reinforcement. Overall, leisure item engagement was high for all participants. In contrast to Jamie and Tyler, Evan engaged in overall low levels of speech while he selected both interventions options, but still spoke about experimenter topics at higher levels compared to restricted or other topics.

Measures of Extraneous Events

Figure 4 depicts the percentage of a session during which the experimenter delivered high-quality attention for Jamie (top), Evan (middle), and Tyler (bottom) across intervention options. For two of three participants, the experimenter delivered similar levels of high-quality attention across both intervention options. The experimenter delivered high-quality attention for Jamie and Evan at an average of 87% (exp topic HQ attn) and 86% (exp topic HQ attn + R topics SR^+) and 64% (exp topic HQ attn) and 69% (exp topic HQ attn + R topics SR^+) of the total assessment time, respectively. Tyler experienced higher levels of high-quality attention during exp topic HQ attn phases than exp topic HQ attn + R topics SR^+ phases ($M = 92\%$ vs. $M = 75\%$, respectively). However, it should be noted that overall rates of high-quality attention during exp topic HQ attn + R topics SR^+ were lower because Tyler selected intervention for brief durations

at the very end of session 13 (8 s) and 14 (16 s) and did not engage in any speech about the experimenter-led topic (depicted as 0% on the graph). Excluding Sessions 13 and 14, the experimenter delivered high-quality attention to Tyler an average of 85% of the total assessment time during the exp topic HQ attn + R topics SR⁺ option.

The topics that each participant talked about during periods of access to restricted topics in exp topic HQ attn + R topics SR⁺ phases are depicted in Figure 5. Overall, participants talked during 70% (Jamie), 37% (Evan), and 75% (Tyler) of the intervals when they had access to restricted topics. Jamie talked about a total of 16 different topics, most of which were not identified by his parents on the preassessment questionnaire, which are referred to as other topics in Figure 5 (e.g., food, oceans and sharks, creepy situations). He spent the majority of the time talking about food (16%), travel (8%), and the September 11th terrorist attacks (8%). Jamie talked about his restricted topics, action movies (3%) and Jeeps (2%), at low levels across all reinforcement intervals. Evan spent the majority of the time talking about his restricted topic (makeup; 33%) but also talked about one other topic at low levels (COVID-19; 4%). Tyler talked about 11 different topics across all reinforcement intervals, most of which were other topics (e.g., music, cats, TV shows). However, he spent the most time talking about his family (16%) and music (12%). He talked about two of his restricted topics, including cars (11%) and LEGOs (9%) across all reinforcement intervals, but did not talk about any of the other topics that his parents identified as restricted.

CHAPTER 4: DISCUSSION

This study extended Stocco et al. (in press) in two ways. First, we conducted a functional analysis to evaluate if speech about restricted topics was sensitive to different qualities of attention, and if it occurred at high levels when high-quality attention was available for speech about any topic. Consistent with previous findings (e.g., Fisher et al., 2013; Kuntz et al., 2019; Rehfeldt & Chambers, 2003; Stocco et al., in press), all three participants' speech about restricted topics was sensitive to different qualities of attention. Further, when high-quality attention was available for speaking about any topic, all participants talked about restricted topics for longer durations than nonrestricted topics, sometimes talking about restricted topics exclusively. Second, we experimentally evaluated the influence of using restricted topics as reinforcement on client preference for intervention. Jamie and Evan preferred the intervention that included contingent access to restricted topics over the intervention that only consisted of high-quality attention for speech about experimenter-led topics, and there was no difference in selections of intervention with or without restricted topics for Tyler. We also extended the telehealth literature by working with participants as the direct interventionist instead of training caregivers to conduct the procedures, which could have implications for practitioners that provide services for individuals who engage in speech about restricted topics.

These findings add to the reliability and generality of previous research on variables that influence topics of speech during conversation and client preference for components of a conversational-skill intervention. This is the first study that used telehealth to (a) evaluate variables that influence topics of speech and (b) evaluate client preference for intervention

targeting the increase of speech about experimenter-led topics. Despite using telehealth, our results were consistent with previous functional analyses showing that topics of speech during conversations were sensitive to interested responses from a listener (e.g., Fisher et al., 2013; Kuntz et al., 2019; Rehfeldt & Chambers, 2003; Stocco et al., in press). This could potentially have been attributed to including discriminative stimuli that facilitated discrimination between interested and uninterested listener responses (e.g., body orientation, eye contact, statements of interest or redirection), even though sessions were not conducted face-to-face. The results of the free-operant preference assessment were also consistent with Stocco et al. (in press), as most of the participants preferred the intervention that included access to restricted topics. We extended Stocco et al. (in press) by measuring the level of high-quality attention that the experimenter delivered during the two intervention options. Jamie and Evan received similar levels of high-quality attention while they experienced both interventions, suggesting that their preference for intervention with access to restricted topics over the intervention that only included differential attention was not due to systematic differences in the level of high-quality attention from the experimenter. Similar to recommendations made by Stocco et al. (in press), these results indicate that when practitioners work with certain clients via telehealth, they should consider designing conversational-skill interventions that include access to restricted topics. Doing so could increase the likelihood of clients voluntarily participating during virtually-implemented intervention sessions or produce an increase in the number of conversations between the caregiver and child at home.

However, there was low reliability between the restricted topics identified by parents and the topics that Jamie and Tyler talked about during the reinforcement intervals. Both participants rarely spoke about topics identified by caregivers on the preassessment questionnaire, which

could be perceived as a limitation of the indirect method we used to identify restricted topics. However, it should be noted that participants were still given the opportunity to talk about whatever topic they wanted, including the topics that parents identified as restricted. Previous research has either relied on caregiver or teacher report to identify participants' restricted topics (Kuntz et al., 2019; Roantree & Kennedy, 2012), or did not clearly specify the procedures that were used (Fisher et al., 2013; Frea & Hughes, 1997; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003). Because there can be discrepancies between caregiver report and the participant's behavior during direct assessments (Cote et al., 2007; Green et al., 1988; Reid et al., 1999), and because patterns of behavior can fluctuate across time (Hanley et al., 2006), researchers could consider using alternative methods besides caregiver report to identify restricted topics. In addition to interviewing caregivers, Stocco et al. (in press) asked participants prior to each session what they would like to talk about, and any topic that was not identified by caregivers on the preassessment questionnaire was added to the participant's list of restricted topics.

Caregiver report of restricted topics could also be unreliable when topics overlap with caregiver preferences. For example, Tyler's dad did not initially identify one of Tyler's restricted topics (history) on the preassessment questionnaire. After Tyler spoke about history at high levels during sessions 3 and 4 of the functional analysis, the experimenter spoke with Tyler's dad and asked him if history was a topic that Tyler talked about excessively at home. His dad reported that Tyler excessively talks about history, but he did not report that as a restricted topic because he also enjoyed talking about history. However, Tyler's dad mentioned that other family members (e.g., mom, siblings) often lost interest when Tyler excessively talked about history. Conversely, it is possible that a caregiver might identify a topic as restricted when

the topic is aversive or not preferred by the caregiver. Because there is limited research on procedures to identify restricted topics, and most of the research that currently exists relies on caregiver report, future research could evaluate more objective methods of identifying restricted topics. However, as our outcomes suggested, another method could be to give participants the opportunity to initiate conversations about the topic of their choice.

It should also be noted that Jamie and Tyler's patterns of responding during periods in which restricted topics were permitted differed across assessments. During the control condition of the functional analysis, both participants engaged in higher levels of speech about parent-identified restricted topics compared to other topics. In contrast, they talked about restricted topics at low levels and talked about a wider range of topics during the reinforcement intervals of the free-operant preference assessment. This difference may seem surprising because the contingencies were identical, as the experimenter delivered high-quality attention regardless of the content of speech. However, an important difference is that during the functional analysis, we did not initiate conversations about specific topics, whereas we did initiate conversations about experimenter-led topics during the intervention options of the free-operant preference assessment. This may have occasioned speech about certain topics for participants, thus promoting more varied responding during the reinforcement intervals. Although our intervention procedures likely induced variability in the topics that some participants talked about during the reinforcement intervals, it is unclear if talking about certain topics (e.g., Roscoe et al., 2010), or giving participants the opportunity to choose the topic (e.g., Tiger et al., 2006) functioned as reinforcement. A future study could conduct a yoked procedure to clarify the reinforcing value of speaking about certain topics, versus being able to choose the conversation topic. The experimenter could conduct a preassessment at the start of the study that is identical to the

procedures of the exp topic HQ attn + R topics SR⁺ intervention option and evaluate the topics of speech that participants initiate. Then, the experimenter could evaluate participant preference for two different options: One option where the experimenter introduces the participant-initiated conversation topics presented during the preassessment in a yoked procedure, and another option where the participant has the choice to initiate a conversation about any topic. The duration that participants select each of these two options could indicate if speaking about certain conversation topics, or receiving the opportunity to choose the conversation topic is more reinforcing.

Despite selecting intervention at higher levels when intervention included contingent access to restricted topics, Evan still selected no interaction for the majority of the free-operant preference assessment. One potential reason for these outcomes is that Evan may have social skills deficits that result in a lower rate or quality of reinforcement during conversations compared to peers (e.g., Jamie). During the free-operant preference assessment, Evan engaged in overall low levels of speech. When the experimenter asked him questions about the experimenter topic (e.g., school), Evan typically replied in 1 or 2 words and rarely elaborated on the topic or asked the conversation partner questions about the topic. To the extent that a conversation partner making vocal sounds of interest (e.g., “mm-hmm” or “uh-huh”; Duncan, 1972), agreeing with statements (Conger & Killeen, 1974), or answering questions (Turkstra et al., 2003) function as reinforcement, such limited vocalizations may result in little reinforcement during conversation. Future research should evaluate the influence of teaching certain social skills on client preference for conversations. Although previous research has demonstrated procedures for teaching individuals to ask questions, make statements about topics initiated by a conversation partner, or change topics during conversations (Hood et al., 2017; Nuernberger et

al., 2013; Peters & Thompson, 2015), little is known about the extent to which skill development increases client preference for conversing with peers or family members.

Another reason that Evan may have selected no interaction most often could be attributed to the competing reinforcement produced by uninterrupted engagement with a leisure activity (drawing). Future research should evaluate other methods to increase the relative reinforcing value of interventions for conversation skills. One option is to allow clients to talk about restricted topics while teaching them conversation skills, aligning with recommendations to incorporate restricted interests into therapeutic services for individuals diagnosed with ASD (e.g., Baker, 2000; Gunn & Delafield-Butt, 2016; Koegel et al., 2012; Mancil & Pearl, 2008). For example, Nuernberger et al. (2013) taught individuals diagnosed with ASD to make statements related to the conversation topic or to ask questions during conversations with a peer about the participant's preferred topics. As intervention progresses, clinicians could implement a form of demand fading by systematically thinning the amount of time that participants talk about restricted topics and incorporating less-preferred topics (see also Luiselli, 2000; Piazza et al., 1996).

In contrast to Jamie and Evan, the presence or absence of restricted topics as reinforcement did not influence Tyler's preference for intervention. We became interested in the reliability of these outcomes across different leisure items. However, when we replaced the LEGO car (high preference) with coloring pages and crayons (moderate preference), there was an overall decrease in intervention selections and a corresponding increase in no interaction selections. Although returning to the LEGO car produced an immediate increase in selecting intervention, patterns of responding continued to favor no interaction over time. As a result, the variables influencing Tyler's selections remain unclear. It is possible that features of our

experimental arrangement produced these patterns of selection showing escape from conversation over time. These patterns of selection could be due to Tyler talking with the experimenter about the same topics (e.g., school, Martial Arts) or from receiving similar forms of high-quality attention (e.g., eye contact, nodding, statements of interest) across sessions, which may have functioned as abolishing operations for talking to the experimenter. However, given that there was an immediate initial increase in selecting intervention when we returned to the LEGO car during the fourth phase, this explanation seems unlikely. Additionally, there was only a three-day gap between these two phases, which aligned with the typical gap in time between Zoom meetings with Tyler (about three or four days). Another extraneous variable that may have impacted selections during the third phase is differences in coloring pages across sessions. Tyler had a stack of coloring pages that were available to him during each session block, but his parents switched out the specific coloring pages between each session block, so the pages were not the same across all sessions. It is possible that differences in coloring pages influenced the overall increase in selecting no interaction during this phase. On the other hand, extraexperimental events may have interfered with our evaluation of Tyler's preference for intervention. For example, Tyler could have participated in another therapy program targeting play skills during the course of the study (i.e., history threat to internal validity; Petursdottir & Carr, 2018). It is possible that learning new play skills may have increased the reinforcing value of playing with leisure items over having a conversation with the experimenter.

The current study had at least three limitations. First, we relied on caregiver report to evaluate preference for leisure items instead of conducting a direct assessment of preference (e.g., paired-stimulus; Fisher et al., 1992, multiple-stimulus without replacement; DeLeon & Iwata, 1996). Similar to potential limitations of relying on caregiver report to identify restricted

topics, a limitation of using indirect measures to identify preference for leisure items is that caregiver report of participant's behavior may not align with the participant's behavior during objective assessments (Cote et al., 2007; Green et al., 1988; Reid et al., 1999). For example, Cote et al. (2007) demonstrated that there was poor reliability between teacher report of participant's preferred leisure items, and items that participants selected during a paired-stimulus preference assessment. Future research could address this limitation by including leisure items based on the results of assessments that directly measure client preference. Because preference for leisure items can change across time for some individuals (Hanley et al., 2006), researchers could also consider conducting multiple preference assessments throughout the intervention to account for shifts in preference.

Second, we did not collect data on the integrity that the experimenter correctly implemented the procedures that corresponded with each condition. This may be problematic if the experimenter delivered high-quality attention when it was not supposed to be delivered (e.g., if the participant spoke about a restricted or other topic during the intervention option), or withheld high-quality attention at times when the participant should have received it (e.g., when they spoke about the experimenter topic). Additionally, although we did measure the level of high-quality attention delivered by the experimenter during the intervention options, we did not measure the experimenter's integrity of attention delivery during the reinforcement intervals where participants had access to restricted topics. Future research should evaluate the integrity that the experimenter correctly implements the procedures of the intervention, and the integrity that the experimenter delivers attention to the participant across reinforcement intervals.

Third, conducting this study through telehealth produced challenges in controlling some aspects of the participant's environment. For example, even though we instructed caregivers to

refrain from interacting with their child as much as possible, they and other family members (e.g., siblings) sometimes talked to the participant during sessions. Additionally, we experienced some technological issues (e.g., internet connection loss, Zoom failing to save recorded videos of sessions) that did not allow us to collect data for a total of three sessions. However, despite the limitations of using telehealth, we would recommend it as a viable alternative when it is not possible for researchers to conduct sessions in person. It should also be noted that even though we added to the reliability and generality of previous research on restricted interests by conducting this study through telehealth, this study was not a systematic evaluation of telehealth compared to in-person sessions. Therefore, any potential differences between conducting social skills assessments or interventions in person versus telehealth are still unknown. Tyler was the only participant for whom we were able to conduct some in-person sessions of the functional analysis before switching to telehealth sessions. He engaged in similar patterns of responding after switching from in-person to telehealth services, suggesting that conducting sessions through telehealth may have a similar effect to in-person sessions for some individuals. However, future studies could systematically compare the effects of conducting sessions with participants through telehealth to conducting sessions in-person.

This was the first study to use telehealth to evaluate variables that influence topics of speech and to assess client preference for intervention targeting the increase of speech about experimenter-led topics. We found that participants engaged in high levels of speech about restricted topics, and that their speech was sensitive to interested responses from a listener. Additionally, most participants preferred an intervention that included access to restricted topics over an intervention that only included high-quality attention for speaking about experimenter-led topics. These outcomes add to the reliability and generality of previous research on speech

about restricted topics, and may have implications for practitioners who are asked to conduct virtual assessments or interventions for clients diagnosed with ASD who engage in speech about restricted topics. However, future research is necessary to evaluate other methods of increasing the relative reinforcing value of conversational-skill interventions, in addition to using restricted topics as reinforcement. Additionally, future research should compare the outcomes of conducting sessions via telehealth with in-person sessions to clarify the effects of using a telehealth model on variables that influence topics of speech and participant preference for conversational-skill interventions.

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Table 1
Participant Characteristics, Restricted and Experimenter Topics, and Leisure Items

Participant	Age (years)	Restricted topics	Experimenter topics	Leisure item(s)
Jamie	12	Jeeps, Fortnite, certain movie genres (horror, war, action, and adventure)	Travel, outdoor activities, sports, music, school	LEGOs
Evan	14	Makeup	Art, video and computer games, food, school	Drawing with pen
Tyler	11	History, politics, sports, cars, LEGOs, Star Wars, Warrior Cats book series	School, family, religion, martial arts	LEGO car, coloring with crayons

Table 2
Interobserver Agreement for Duration of Selection M (session range)

Participant	Exp topic HQ attn + R topics SR ⁺	Exp topic HQ attn	FT, LQ attn	No interaction
Jamie	97.4% (95.8%–98%)	99.9% (99.7%–100%)	100%	99.9% (99.7%–100%)
Evan	99.4% (98%–100%)	100%	100%	99.9% (99.8%–100%)
Tyler	99% (97.5%–100%)	100%	100%	99.9% (99.7%–100%)

Table 3
Supplementary Measures % of Engagement M (session range)

Intervention option	Experimenter topic	Restricted topic	Other topic	Leisure items
Jamie				
Exp topic HQ attn + R topics SR ⁺	63% (55%–73%)	0.2% (0%–1%)	5% (3%–10%)	97% (90%–100%)
Exp topic HQ attn	68% (63%–73%)	0.3% (0%–0.7%)	6% (3%–10%)	50% (1%–99%)
FT, LQ attn	2%	8%	50%	98.5%
No interaction	0%	0%	.08% (0%–0.8%)	99% (97%–100%)
Evan				
Exp topic HQ attn + R topics SR ⁺	18% (0%–24%)	0.1% (0%–0.7%)	0.2% (0%–1%)	79% (52%–100%)
Exp topic HQ attn	16%	0%	0%	100%
No interaction	0%	0%	.03% (0%–0.5%)	97% (57%–100%)
Tyler				
Exp topic HQ attn + R topics SR ⁺	62% (0%–81%)	0.3% (0%–3%)	3.4% (0%–4.9%)	41% (0%–100%)
Exp topic HQ attn	81% (69%–89%)	0.3% (0%–1%)	0.9% (0%–9%)	43% (7%–80%)
FT, LQ attn	0%	0%	0%	0%
No interaction	0%	0%	.02% (0%–3.3%)	99% (97%–100%)

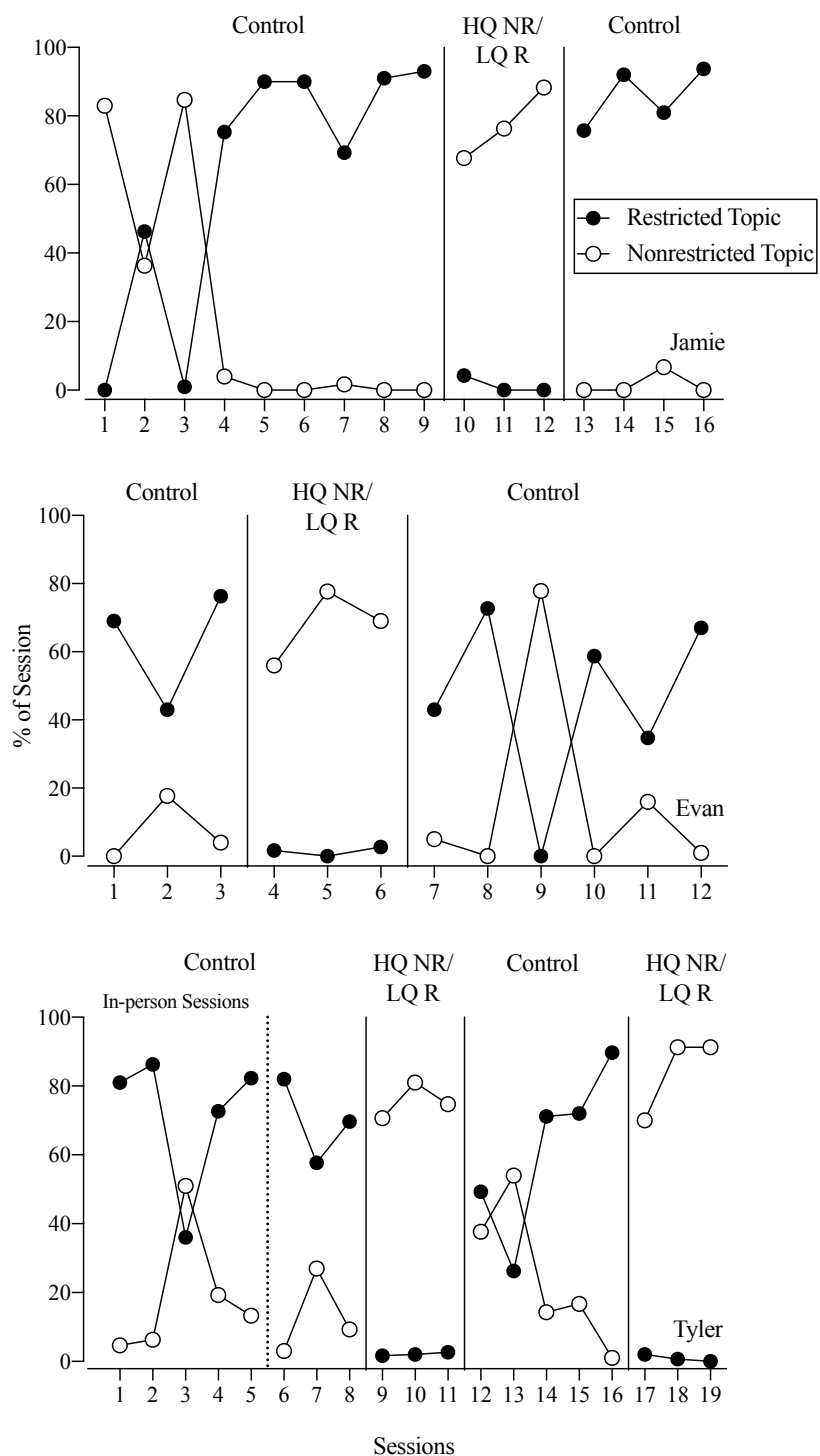


Figure 1. Percentage of the session with engagement in restricted and nonrestricted speech during the functional analysis for Jamie (top panel), Evan (middle panel), and Tyler (bottom panel).

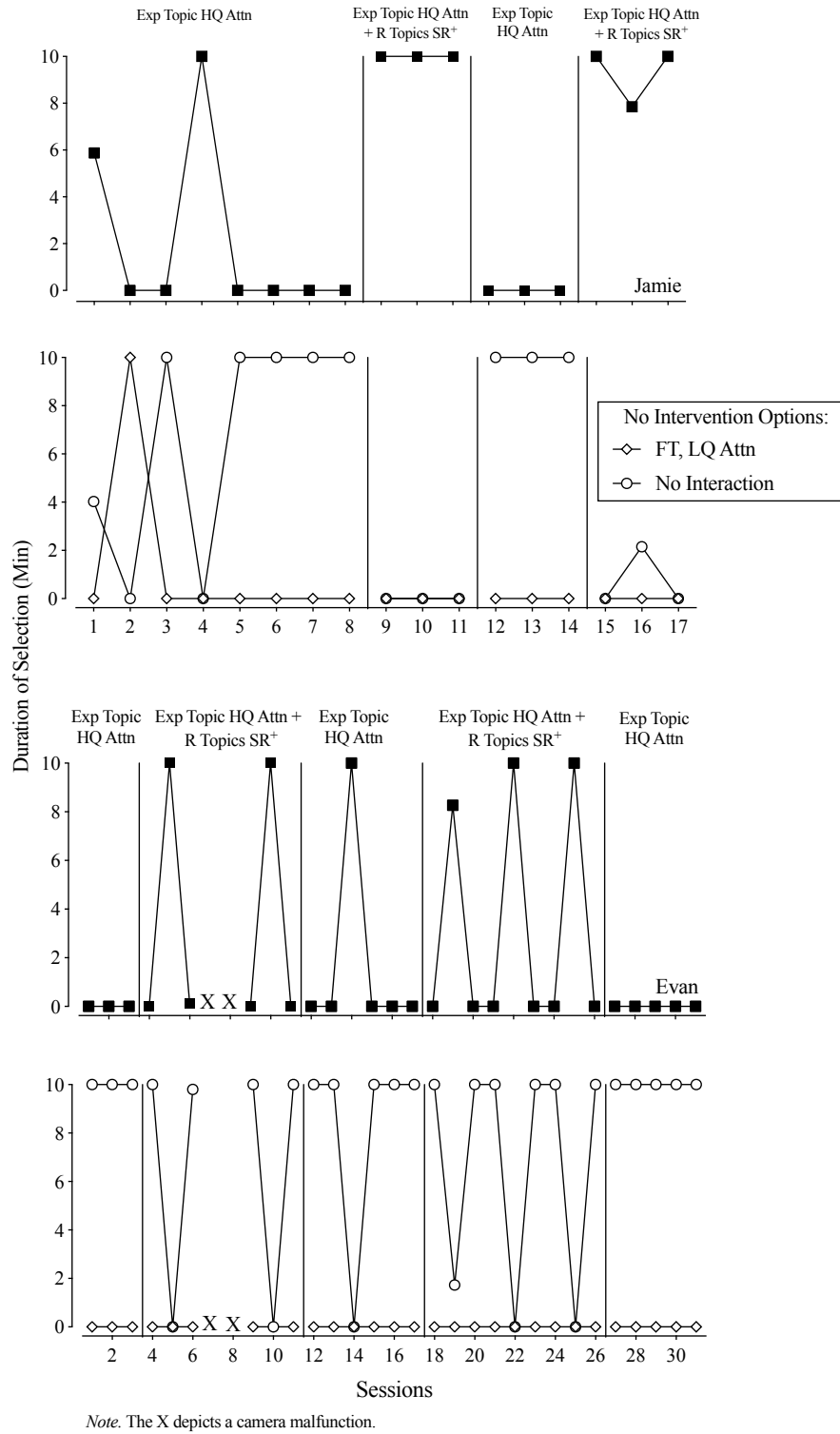


Figure 2. Duration of selection data during the free-operant preference assessment for Jamie (top panel, upper middle panel) and Evan (lower middle panel, bottom panel).

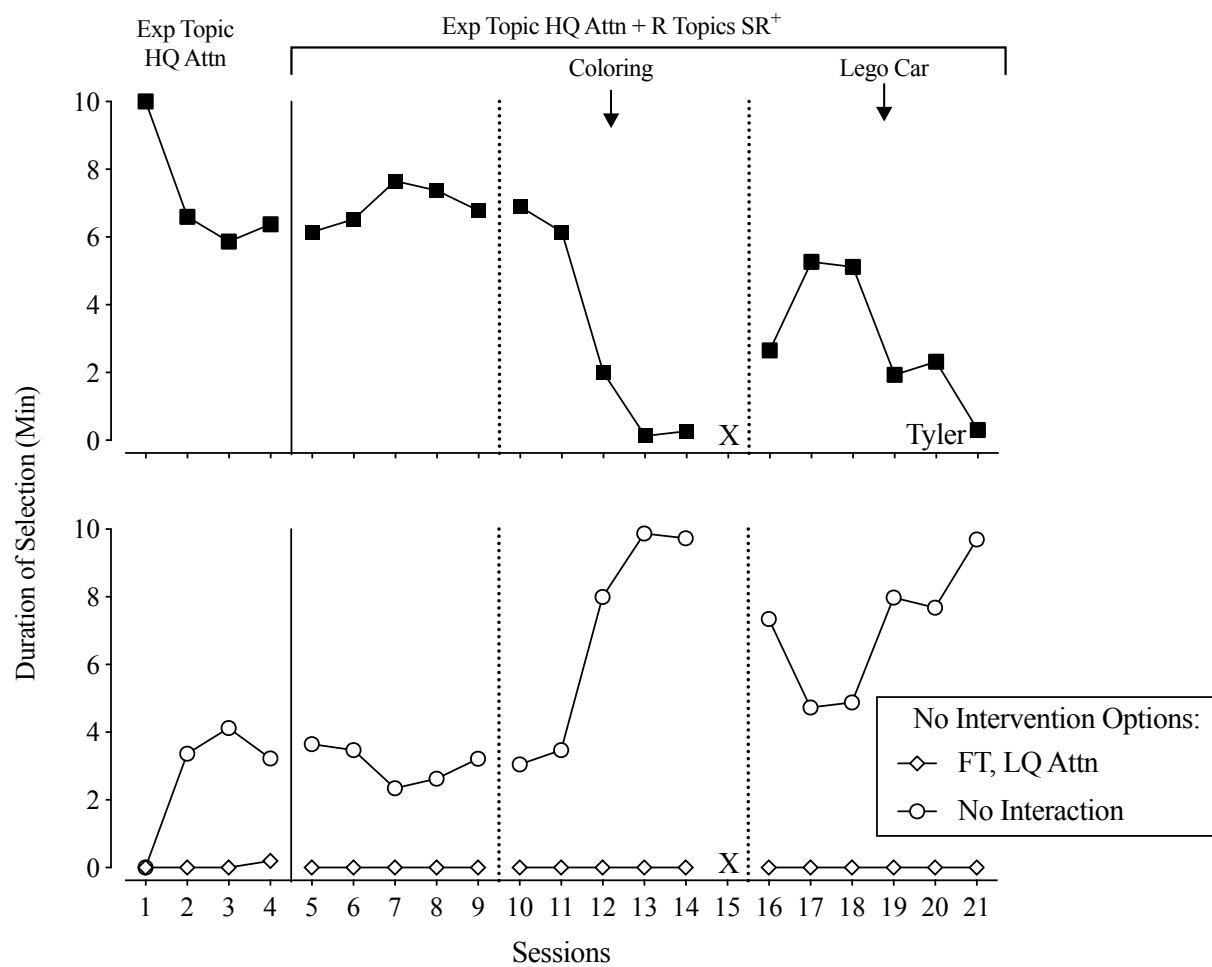


Figure 3. Duration of selection data during the free-operant preference assessment for Tyler.

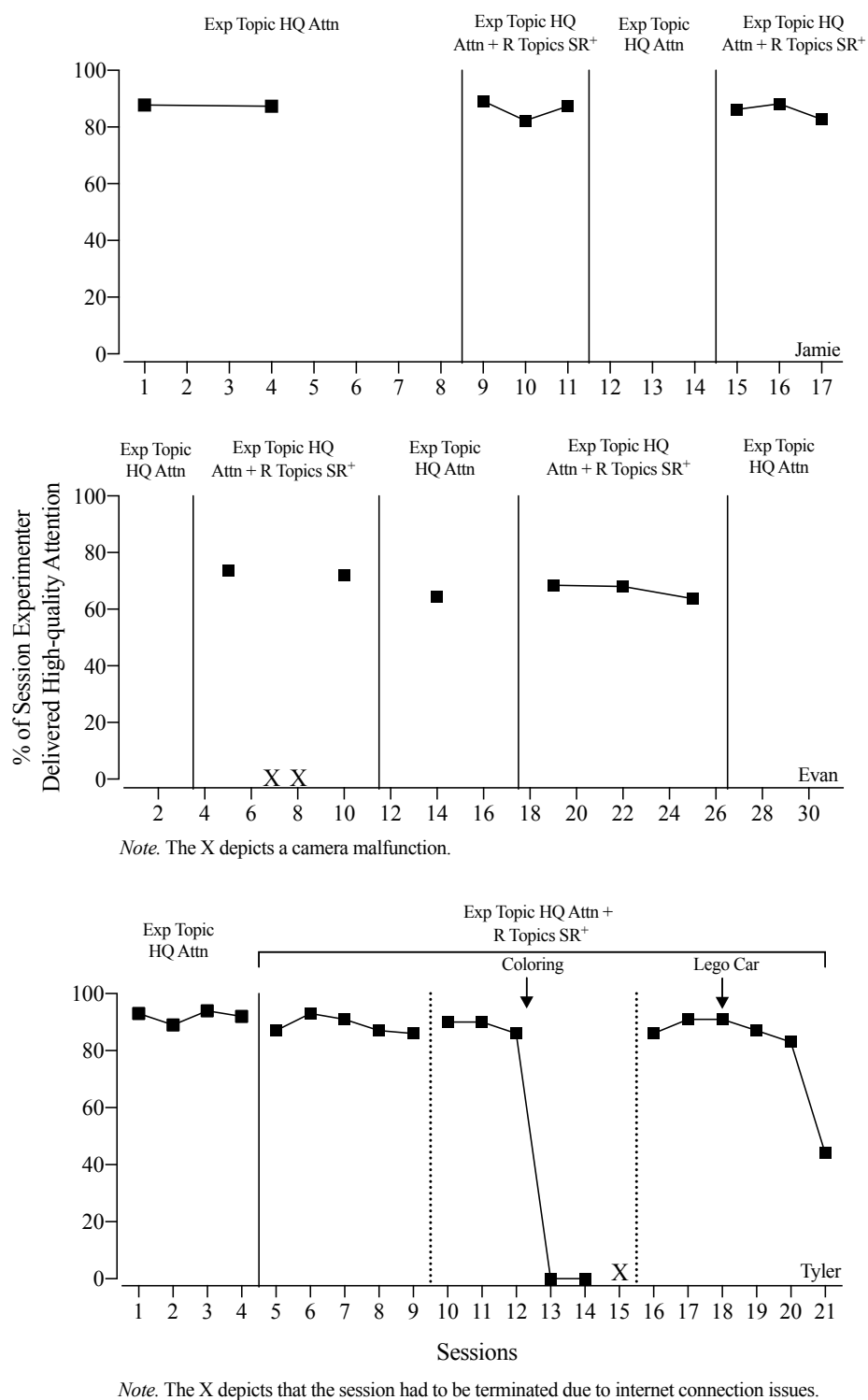
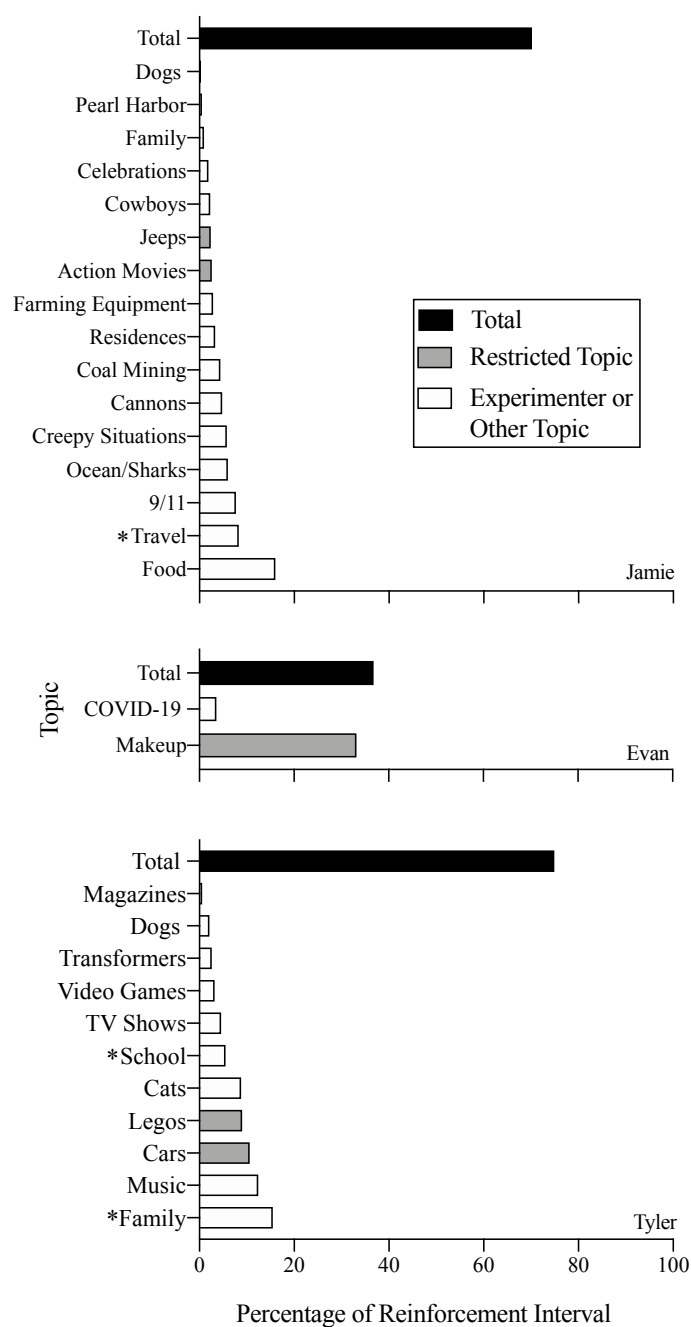


Figure 4. Percentage of the session that the experimenter delivered high-quality attention across both intervention options for Jamie (top panel), Evan (middle panel), and Tyler (bottom panel).



Note. The * depicts that the topic was an experimenter topic.

Figure 5. Total speech and the topics participants talked about during the reinforcement intervals of the exp topic HQ attn + R topics SR⁺ intervention for Jamie (top panel), Evan (middle panel), and Tyler (bottom panel).

APPENDIX A: PREASSESSMENT QUESTIONNAIRE ADMINISTERED TO PARENTS TO IDENTIFY CONVERSATION TOPICS

A modified version of the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Bowman, & Amari, 1996) that we used to identify target topics.

Participant's name: _____

Name of reporter: _____

The purpose of this survey is to identify age-appropriate conversation topics that people interacting with _____ would like to talk more about.

1. What is _____ favorite conversation topic(s)? Please list every conversation topic that _____ likes to talk about on a frequent basis.

Response to question:

2. What is a topic that you would like to talk less about with _____?

Response to question:

3. Some individuals really enjoy talking about food or drink such as favorite foods, favorite drinks, cooking, places to eat, etc. What are some food or drink topics you would like to talk more about with _____?

Response to question:

4. Some individuals really enjoy talking about arts & crafts such as knitting, scrapbooking, painting, etc. What are some arts & crafts topics you would like to talk more about with _____?

Response to question:

5. Some individuals really enjoy talking about travelling such as places they would like to go, favorite place to which they've traveled, favorite mode of travel (e.g., airplane or car), etc. What are some travel topics you would like to talk more about with _____?

Response to question:

6. Some individuals really enjoy talking about entertainment such as television shows, movies, video games, books, etc. What are some entertainment topics you would like to talk more about with _____?

Response to question:

7. Some individuals really enjoy talking about academics such as favorite subject to study, things they did at school that day, etc. What are some academic topics you would like to talk more about with _____?

Response to question:

8. Some individuals really enjoy talking about outdoor activities such as hiking, camping, boating, etc. What are some outdoor activity topics you would like to talk more about with _____?

Response to question:

9. Some individuals really enjoy talking about family such as number of siblings, family descent, children, etc. What are some family topics you would like to talk more about with _____?

Response to question:

10. Some individuals really enjoy talking about sports such as baseball, basketball, football, soccer, hockey, etc. What are some sports topics you would like to talk more about with _____?

Response to question:

11. Some individuals really enjoy talking about music such as listening to music, playing music, writing music, etc. What are some music topics you would like to talk more about with - _____?

Response to question:

12. What are some other topics that you would like to talk more about with _____?

Response to question:

Rank Conversation Topics

Please rank the conversation topics you would like to talk more about with _____: 1 = conversation topic you would *most* like to talk more about; 10 = conversation topic you would *least* like to talk more about.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

APPENDIX B: PREASSESSMENT QUESTIONNAIRE ADMINISTERED TO PARENTS TO IDENTIFY LEISURE ITEMS

The open-ended questionnaire we used to identify leisure items included in the free-operant assessment.

Individual's name: _____ Date: _____

Name of reporter: _____

1. What leisure items, toys, or activities does your student/child/ward play with typically?
2. What types of leisure items, toys, or activities are typically within reach and available to your student/child/ward?
3. Are there certain leisure items, toys, or activities that are difficult to remove from your student/child/ward?
4. Are there certain leisure items, toys, or activities that your student/child/ward engages with for the majority of the day?
5. What are leisure items, toys, or activities that your student/child/ward, doesn't spend too much time engaging?
6. What leisure items, toys, or activities would be easy to remove from your student/child/ward?

	Highly enjoys/frequently uses/plays	Enjoys/ only uses/plays sometimes
Toys/activities (e.g., LEGOs, board games)		
Electronics (e.g., tablet, laptop, video games, radio)		

7. Are there any items (that you mentioned in the table above) that you may not want to use?
8. Are there any items (that you mentioned in the table above) that you would not want to limit _____'s access? Please explain.