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Free Operant Comparison of Interventions for Problematic Speech Using Reinforcement With and Without Preferred Topics

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FREE OPERANT COMPARISON OF INTERVENTIONS FOR PROBLEMATIC SPEECH
USING REINFORCEMENT WITH AND WITHOUT PREFERRED TOPICS

by

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Ingrid M. Saavedra

DEDICATION

This thesis is dedicated to my parents, Omar and Blanca Saavedra. Because of their endless love, hard work, and sacrifices, I have had the privilege of obtaining an education. Thank you for helping me reach my dreams. I hope one day I can give it all back to you both.

Esta tesis está dedicada a mis padres, Omar y Blanca Saavedra. Debido a su amor incondicional, arduo trabajo, y sacrificios, he tenido el privilegio de obtener una educación. Gracias por ayudarme a alcanzar mis sueños. Espero que algún día pueda devolverles todo.

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Free Operant Comparison of Interventions for Problematic Speech Using Reinforcement with and Without Preferred Topics

Abstract

by Ingrid Saavedra

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2019

Deficits in conversation skills can be one barrier to developing and maintaining relationships for individuals with autism spectrum disorder (ASD). Individuals with ASD may deter conversation partners if they do not stay on topic or if they dwell on topics. Several interventions have been identified in targeting the reduction of problematic (off-topic or perseverative) speech, and withheld attention for its occurrence. In addition to leveraging attention as a reinforcer, one study provided signaled access to preferred topics contingent on talking about non-perseverative or therapist-selected topics. Despite showing clear improvements in on-topic speech and stimulus control of preferred topics, little is known about the additive effects of including contingent access to preferred topics. A free operant assessment was used to evaluate participant preference for including access to preferred topics. The results indicated that participants preferred the proposed intervention with access to a leisure item.

Keywords: conversation, preference assessment, problematic speech, restricted interests

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Chapter 1: Introduction and Literature Review

People diagnosed with autism spectrum disorder (ASD) often exhibit deficits in social communication (DSM-V, 2013). These deficits can impede the development of normative relationships. Orsmond, Krauss, and Selzer (2004) surveyed 50 mothers of adolescents and adults with ASD and found that 46.4% of respondents reported their child had no friends of the same age and 8.1% had at least one friend. Moreover, children with high-functioning autism have reported feeling lonely and wanting to engage in social relationships (Bauminger, Nirit, Kasari, & Connie, 1999). Barnhill (2007) reported that these concerns tend to continue into adulthood as adults with ASD have difficulty maintaining social relationships.

Deficits in conversation skills may be one barrier to developing and maintaining relationships (Barnhill, 2007; Berney, 2004). Individuals with ASD may deter conversation partners if they do not stay on-topic or if they dwell on certain topics. Parents of individuals with ASD have reported concerns regarding their children's restricted topics and limited social interactions (Mercier, Motron, & Belleville, 2000). Mercier et al. (2000) interviewed family members about the restricted interests of individuals diagnosed with an ASD. Parents expressed concerns about their children being ostracized due to their restricted interests. One family member reported that her daughter often spoke about her restricted interests to the point of "getting on people's nerves" (p. 414). A further concern was that these individuals spoke about their restricted interest regardless of whether their conversation partner was interested. In contrast, typically developing adolescents commonly respond to topics raised by their conversation partners (Turkstra, Ciccia, & Seaton, 2003). Black and Hazen (1990) also found that children were rated as less likeable if they did not respond or said something irrelevant when a peer initiated conversation. Therefore, off-topic or perseverative speech may be problematic

during a conversation, and responding to topics initiated by a conversation partner might aid in developing and maintaining social relationships.

Behavior analytic research on interventions for problematic speech during conversations could be broadly categorized into two types. The first type has focused on teaching individuals with disabilities how to respond when others initiate topics of conversation or appear uninterested (e.g., Hood, Luczynski, & Mitteer, 2017; Peters & Thompson, 2015; Stewart et al., 2007). For example, Hood et al., (2017) taught individuals to change the topic of conversation when a listener engaged in non-vocal signs of disinterest (e.g., looking at a watch or phone). They also taught participants to make statements or ask questions in response to the topics raised by a conversation partner. Differential reinforcement was delivered in the form of breaks and tokens for correct responses. A second type of research involves evaluating the contingencies of reinforcement that maintain topics of speech (i.e., functional analysis) and developing corresponding function-based interventions (Fisher, Rodriguez, & Owens, 2013; Frea & Hughes, 1997; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003). By identifying contingencies that influence topics of speech, behavior analysts can leverage relevant antecedents and consequences to reduce speech about certain topics or to teach other social skills.

To date, all published functional analyses have demonstrated attention as a maintaining consequence for problematic speech (i.e., perseverative or off-topic speech). As a result, effective function-based interventions have provided attention using differential reinforcement of alternative behavior (DRA; Frea & Hughes, 1997; Rehfeldt & Chambers, 2003; Wilder, Masuda, O'Connor, & Baham, 2001), differential reinforcement of other behavior (DRO; Butz & Hasazi, 1973; Fisher et al., 2013), or noncontingent reinforcement (NCR; Noel & Rubow, 2018). For example, Frea and Hughes (1997) conducted a functional analysis that was composed of

escaping social attention, escaping tasks, attention, and play conditions. Higher levels of perseverative speech were observed in the social attention condition in which the teacher directed conversation to the participant's peer and delivered a 30 s of conversational attention to the participant contingent on engaging in perseverative speech. Similarly, Rehfeldt and Chambers (2003) implemented an intervention that involved delivering attention and eye contact contingent on engaging in appropriate speech and withholding attention and eye contact for inappropriate speech (i.e., DRA). The functional analysis used to identify the maintaining variable for perseverative speech included attention, escape, tangible, and alone conditions. Using a reversal design, the results showed higher levels of appropriate speech only when the intervention was in place. After conducting a latency-based functional analysis consisting of an attention, escape, and play condition, Noel and Rubow (2018) showed decreases in preservative speech produced by an intervention consisting of noncontingent attention.

Despite using different reinforcement procedures for attention-maintained off-topic or perseverative speech, most researchers have focused on the reduction of this speech, and withheld attention for its occurrence (Butz & Hasazi, 1973; Fisher et al., 2013; Frea & Hughes, 1997; Liberman, Teigen, Patterson, & Baker, 1973; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003, Wilder, et al., 2000). One implication is that tangential or perseverative topics of speech should not occur. However, it is important to note that the topics of speech targeted for reduction might be considered appropriate under certain conditions. For example, Rehfeldt and Chambers (2003) reported that a participant excessively talked about sirens or alarms, which may be appropriate for a short time with any conversation partner. Moreover, it could be appropriate to talk about sirens or alarms with an electrical engineer or firefighter.

Rather than targeting perseverative topics for reduction and always withholding attention for its occurrence, Fisher et al. (2013) established stimulus control of the attention-maintained perseverative speech of a 14-year-old boy diagnosed with Asperger syndrome. In addition to leveraging attention as a reinforcer, the therapist provided signaled access to preferred topics (e.g., comic-book characters) contingent on the boy talking about nonperseverative topics or a therapist-selected topic. This was done by using a chain schedule in which a red card was presented to signal it was time to speak about the experimenter's pre-selected topic for 30 s. The experimenter delivered attention contingent on the participant engaging in on-topic speech, while attention was minimized when the participant engaged in speech regarding perseverative topics. Once the participant met the 30 s response requirement for on-topic speech, a green card was used to signal access to 60 s of his preferred topic and attention. During this intervention, on-topic speech levels were high and perseverative speech levels were low when the red card was presented. When the green card was presented, the opposite effect was observed; thus, the on-topic and perseverative speech came under the control of the schedule-correlated stimuli. Despite demonstrating improvement in on-topic speech and stimulus control over preferred topics of conversation, multiple interventions exist for attention-maintained problematic speech. Moreover, it is unknown whether participants would prefer interventions using differential reinforcement of on-topic speech with or without preferred topics.

One aspect of developing socially valid interventions is incorporating the values and preferences of clients (Behavior Analyst Certification Board, 2014). Wolf (1978) argued that if interventions are socially *invalid*, clients may "avoid it, or run away, or complain loudly" and "society will be less likely to use our technology, no matter how potentially effective and efficient it might be" (p. 206). It is important to note that dwelling on perseverative topics may

be better described as speaking about preferred topics for some individuals diagnosed with disabilities. Because access to preferred topics can function as reinforcement (Roscoe, Kindle, & Pence, 2010), it is reasonable to suspect that individuals are less likely to talk to someone who always ignores their preferred topics, which could result in fewer social interactions. Alternatively, individuals might prefer conversation partners or interventions that incorporate their preferred topics. Therefore, it is important to compare client preference for interventions that either (a) target preferred topics for elimination (e.g., Rehfeldt & Chambers, 2003) or (b) use preferred topics as a reinforcer (e.g., Fisher et al., 2013).

To assess the social validity of interventions, researchers have used indirect or direct measures of participant preference. Indirect measures are those that do not include direct observation of a behavior, but are information obtained from reports such as questionnaires, surveys, and rankings (Cooper et al., 2007, p. 275). These questionnaires, surveys, and rankings are given to recipients of the interventions or caregivers of those receiving interventions. For example, Kazdin (1980) delivered a 16-item Likert scale called the Treatment Evaluation Inventory (TEI; Kazdin, 1980) to students to evaluate the acceptability of treatments (reinforcement, electric shock, and drugs). McMahon and Forehand (1983) noted that the majority of social validity measures on treatments for children involved indirect measures and, had little to no data to show the measures were valid due to the fact that the social validity surveys are typically used once and not replicated in other studies. The use of direct measures is preferable over indirect measures because they involve direct observation of behavior, rather than reports of behavior. Additionally, poor correspondence may exist between what the individual reports and what the individual actually prefers (Bernstein & Michael, 1990; Cote, Thompson, Hanley, & McKerchar, 2007; Northup, 2000; Pace et al., 1985).

Schwartz and Baer (1991) recommended using direct measures of participant preference. Providing choices to consumers of the intervention helps ensure that the consumers receive the most dignifying and individualized treatment possible (Hanley, 2010). Some common preference assessments include single-stimulus presentations (Pace et al., 1985), paired-stimulus presentations (Fisher et al., 1992), multiple-stimulus presentations (DeLeon & Iwata, 1996; Windsor, Piche, & Locke, 1994), and free-operant assessments (Roane et al. 1998). Free-operant preference-assessments involve unrestricted access to a variety of items or activities during an observation period and measurement of the intervals an individual engages with the items or activities (Cooper et al., 2007, p. 277; e.g., Roane et al., 1998). There are some advantages to using a free-operant arrangement to evaluate the social validity of interventions. One advantage is that the arrangement allows the participant to have simultaneous access to items or activities which is typical of most home environments. A second advantage is that the procedures may evoke less problem behavior because the experimenter does not remove items or activities (Ortiz & Carr, 2000). Third, a free-operant arrangement emulates the natural environment in which multiple items or activities are simultaneously available, and the participant can freely move between them.

Taken together, the literature on function-based interventions for attention-maintained problematic speech during conversations includes two broad options that carry divergent implications. One implies that intervention should focus on the reduction of problematic speech (e.g., Rehfeldt & Chambers, 2003); another suggests that speech should be brought under appropriate stimulus control (e.g., Fisher et al., 2013). The purpose of this study was to evaluate the social validity of interventions for attention-maintained problematic speech using reinforcement with and without contingent access to preferred topics. We did this because in a

previous study, we identified three individuals with attention-maintained problematic speech for whom two interventions (with and without contingent access to preferred topics) both produced decreased levels of off-topics speech. Because both interventions produced similar results, we had the opportunity to assess for participant preference. A free-operant assessment was used in the current study to evaluate preference for three conditions (two of which were interventions experienced in the previous study). The first option focused on reducing or eliminating problematic speech and withheld attention for its occurrence (e.g., Rehfeldt & Chambers, 2003). For the second option, we replicated the procedures from Fisher et al. (2013) and provided access to participant's preferred topics contingent on talking about less preferred topics. The third was a no-intervention-control option, during which the participant could play with leisure items without having a conversation. Analogous to a home environment, the participants could move freely between the three options throughout a session. If participants preferred one option over the other, we would expect to see longer durations of selection or quicker latencies to selection. We also recorded the effects of the interventions on problematic or on-topic speech during a selection.

Chapter 2: General Method

Participants, Settings, and Materials

Three individuals with autism participated. The participants were identified by caregivers who reported their children engaged in problematic speech in the form of perseverative and off-topic speech during conversations. Following caregiver referral, caregivers were also asked questions via phone or e-mail to ensure the speech was not scripting (e.g., Silla-Zaleski, & Vesloski, 2010) or echolalia (e.g., Ahearn, Clark, MacDonald, & 2007). To identify the participants' and parents' preferred topics, we used a questionnaire based on the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Bowman, & Amari, 1996; see Appendix C). Additionally, a preference questionnaire based on the RAISD was delivered to parents to identify leisure items that could be presented during session.

It is important to note that participants in this study participated in a previous study that involved a component analysis of the procedures used in Fisher et al. (2013). That study evaluated the additive effects of contingent access to preferred topics as a component of intervention for decreasing attention-maintained off-topic speech. The main finding was that differential reinforcement with or without access to preferred topics were equally effective in reducing off-topic speech. All participants in the current study were able to speak in complete sentences and able to ask questions or make comments during conversation. The participants did not engage in problematic speech such as scripting, vocal stereotypy, or echolalia.

Walt was a 13-year-old male who took 8th grade, advanced placement classes at a public middle school. He maintained grades of As and Bs in his classes. His parents reported that he had received 1:1 ABA services since the age of 3, but he was no longer receiving these services once he got to middle school. His parents reported that he perseverated on topics such as video

games, Disney™, and role-playing fictional characters with his friends. They expressed that the speech was problematic and may contribute to Walt not being able to sustain friendships. His mom reported that she found the speech problematic because he would talk for prolonged periods of time about topics that were not interesting to her, but she always allowed him to speak about what he wanted without interruption because she felt that was her duty as a parent to listen.

Rick was a 12-year-old male, attended 6th grade special education classes in a non-public school targeting challenging behavior, and received 1:1 ABA services in the home from age nine to the time of the study. His mom also received two years of in-home behavioral consultation and training prior to Rick receiving 1:1 ABA services. His mom reported that he perseverated on topics such as video editing, computer games, and feet. Rick was able to speak in full-sentences, but often responded in one or two words. When asked questions, Rick would respond, but not continue the conversation. His mom reported that she could only have back and forth conversations when he was speaking about his preferred topics.

Lydia was a 14-year-old female, attended special education classes at a public school, and had previously received 1:1 ABA services through a regional center referral. Lydia was reported to perseverate on topics such as celebrity birthdays, Hollywood, and television shows. She would also repeat phrases in different wordings (e.g., "On our trip we went to McDonalds" and "McDonalds is where we went"). Her mom reported that she would often mention irrelevant topics during conversation. For example, she would respond to questions about school with details about a preferred TV show.

Sessions for the current study were conducted in a quiet room at a participant's home or in a university conference room. We included items typically found in these spaces (e.g., cabinets, books, pens). Materials for the current study included a paper session log, a rectangular

table with 6 identical chairs, a timer, a watch, a video camera, and 6 tablecloths (2 red, 2 orange, 2 blue).

Measures

The primary measure, *duration of selection*, refers to the time the participant was sitting in a chair corresponding to a condition. The onset of this measure occurred when the participant's buttocks were on the chair corresponding to a condition. The offset of a selection was scored when a participant stood up and his or her buttocks were no longer on the seat. For the first selection, the onset was scored after the participant sat in a chair and the experimenter sat across from the participant and counted down to the start of the session ("3, 2, 1, start").

Supplementary measures included (1) on-topic speech, (2) problematic speech, and (3) engagement with leisure items during each selection. *On-topic speech* was defined as participants talking about the topic assigned for a given session while sitting at one of the three chairs. The assigned topics were selected from caregiver responses to a questionnaire based on the RAISD which was used to identify topics that parents would like their child to talk about more. Two topics were assigned per session, and the topics were rotated so that each topic was paired with the others at least once before repeating a pair. *Problematic speech* was defined as the participant speaking about topics unrelated to the assigned topic while sitting at one of the three chairs. *Engagement with leisure items* was defined as touching, holding, or manipulating the leisure items at the table while sitting in one of the three chairs. All three measures were scored under each of the three conditions using 5-s partial-interval recording to provide an approximate measure of what the participant was doing while experiencing the various options for intervention. We reported the percentage of intervals with on-topic speech, problematic speech, or engagement with leisure items per selection within the free-operant assessment (see

below). This was calculated by taking the sum of intervals with engagement in either on-topic speech, problematic speech, or leisure items and dividing by the total number of intervals that the participant was sitting in a given condition. Finally, we also recorded *latency to the first selection*. The onset was scored once the instruction "Pick the one you like" was delivered, and the offset of the measure was marked by the participant sitting on a chair.

Observer Training

The primary investigator provided written instructions and operational definitions to a secondary data collector that included examples of each dependent measure. Before collecting data for the study, observers were trained on data collection using practice videos created by the experimenters. The practice videos were composed of role-play sessions of the free-operant sessions in which all measures were represented across the videos. The primary investigator coded the practice videos as a master record. Secondary observers were required to achieve reliable data collection at 80% or higher for three consecutive practice videos per dependent measure. All data collectors met the criteria on the first attempt.

Interobserver Agreement (IOA)

Two observers independently coded the measures using videos of sessions and paper data sheets for duration of selection and the secondary measures (latency and percent of intervals with engagement). The data sheet for duration of selection included time stamps of onset and offset. IOA was calculated for at least 33% of sessions for all measures. IOA was collected for duration of selection and latency of selection with the following formula ($\pm$ 3 s short duration $\div$ long duration x 100). If the onset or offset of one observer was within 3 s of the first, the IOA was scored as 100% agreement. IOA for engagement with the leisure items and engagement in on-topic and problematic speech within all three conditions was measured using block-by-block

IOA. That is, each interval with agreement was given a score of one and disagreements given a score of zero. Agreements were added and then divided by the total number of possible intervals to produce the percentage of agreement (e.g., Agreement 1 + Agreement 2 + Agreement 3 ÷ Total Intervals = N x 100).

Procedure

We evaluated participant preference for differential reinforcement of on-topic speech using (a) attention only (b) attention plus preferred topics, or (c) a no-intervention control. During the assessment, a rectangular table was divided into three equal sections. We placed two chairs facing each other on opposite sides of the table with three different colored tablecloths draped over the backs of the chairs in each section. Within each section, we placed a menu holder that identified which intervention option was correlated with a section. The menu holders held pictures representing rules during the intervention options. The picture representing no intervention had a picture of an individual with their index finger to their mouth indicating "shhhh," and cards representing both interventions had an image of two individuals having a conversation to indicate that the participant could talk when selecting one of two interventions. The menu cards were placed on the table in front of the chairs corresponding to the conditions to add more salient stimuli to correspond with each condition (Hanley et al., 1997). We rotated the tablecloths and menu holders clockwise across trials.

We placed identical leisure-items in each section that were available for the client to play. These leisure items were identified by caregiver report in a questionnaire (Appendix D) as items typically available in the participant's environment, but were not items that the participant played with exclusively. Items identified as highly preferred were excluded to minimize the possibility of exclusive engagement with that item. Leisure items included Play-doh (Lydia), coloring with

colored pencils (Walt), and Jenga blocks (Rick). It should be noted that although Rick's leisure

item included a game that would typically require the attention of another player, he only stacked

the blocks and engaged in solitary play.

When participants entered the session room, they were asked what they wanted to talk

about and the experimenter recorded their response. Any topic that the participant identified was

added to the participant's list of preferred topics. We were interested in these preferred topics

because these topics were considered problematic speech, which was one of our supplementary

measures in this study. Additionally, we asked what the participants wanted to talk about to

identify the topic delivered as reinforcement during the attention-plus-access-to-preferred-topics

condition (see below). Because the participants experienced two of the intervention conditions

during the previous study, the experimenter only described the contingencies correlated with

sitting in each chair before conducting the preference assessment. The instructions were

delivered as follows:

> There is a table with three chairs on each side. Each chair is covered with a
> colored tablecloth: red, blue, and orange. You can choose to sit at whichever
> chair you want on this side of the table (left) and play with the toys on the tables.
> You can sit there as long as you like or you can move if you like. If you choose
> to sit in the chair with the red tablecloth, you will be able to play with your (insert
> leisure item). If you choose to sit at the chair with the blue or orange tablecloths,
> you can still play with your toys but you get to talk to me too. If you choose to sit
> at the chair with the blue tablecloth, I will be a good listener only when you talk
> with me about my topic for a little bit, then it will be your turn to talk about
> whatever you want. If you choose to sit at the chair with the orange tablecloth, I
> will only be a good listener when you talk about my topic. Remember, I will only
> talk to you if you're sitting at a chair with the orange or blue tablecloth.

After stating the instructions, the experimenter asked the participant to describe the

consequences for sitting at each of the tables before moving on to the preference assessment. If

the participant could not describe the consequences (e.g., the blue is when you take turns talking,

red is playing with toys and not talking), then additional instruction was given until the participant described the consequences accurately.

Once the participant described the consequences, a session block began. A session block typically consisted of two to three 10-min sessions. Following each 10-min session, there was at least one 2-min break before moving on to the next 10-min session. During the break, the colored tablecloths and menu cards were moved to the neighboring chair and table area in a clockwise manner to control for possible side biases. Before each session block, the experimenter stood behind the camera and said "Pick the one you like." The experimenter remained in this position until the participant sat on a chair corresponding to a condition. When the participant sat on a chair, the experimenter sat on a chair with the same tablecloth color on the opposite side from them, and delivered the corresponding consequences. The participant could sit in any of the chairs as many times as they liked during the 10-min session. There were no programmed consequences if the participant was near the table, but not sitting. If the participant were to say that he or she did not want to participate, needed to use the restroom, or engaged in challenging behavior that would result in injury to the participant or others, sessions would have been terminated. Criteria for ending the assessment were based on visually inspecting the data for stability in selections and in the engagement of on-topic and problematic speech.

Attention on-topic. This condition was presented to evaluate whether the participants would prefer an intervention that used differential attention alone (e.g., Rehfeldt & Chambers, 2003). The attention-on-topic condition corresponded with a chair draped with an orange tablecloth. When the participant sat in the chair associated with this condition, the experimenter sat across from them, oriented their body away from the participant, withheld eye contact, and

waited 15 s for the participant to initiate conversation. If the participant did not initiate

conversation within 15 s, the experimenter asked a question about the assigned conversation

topic (e.g., "What did you do at school today?"). The experimenter delivered attention in the

form of eye-contact and statements of interest following on-topic speech. If the participant

engaged in problematic speech, the experimenter turned their body away from the participant,

and delivered statements of disinterest and redirection for problematic speech (e.g., "I don't

know about that. I want to hear more about your teacher.").

     Attention plus preferred topics. This condition was presented to evaluate whether the

participants would prefer an intervention that used contingent access to preferred topics as

reinforcers (e.g., Fisher et al., 2013), as opposed to differential attention alone (Rehfeldt &

Chambers, 2003). This condition was a systematic replication of the intervention in Fisher et al.,

(2013) and was associated with a chair draped with a blue tablecloth. In addition to arranging

attention like we did during the attention-on-topic sessions, we also provided signaled,

contingent access to preferred topics. At the start of the session, the experimenter described the

contingencies in place and informed the participant about the assigned topic. During the session,

the experimenter provided a fixed, 60 s of access to preferred topics after the participant talked

about the target topic for 60 cumulative seconds. To equate opportunities for on-topic speech

during these and the attention-on-topic sessions, the experimenter paused the session timer while

providing access to a preferred topic. As the experimenter paused the session timer, he or she

commented on what the participant talked about (e.g., "Thanks for telling me about all of those

things you did at school today, now you can talk about whatever you'd like"). This was the only

stimulus that signaled access to preferred topics for Walt. For Rick and Lydia, we used a card to

signal topic of conversation. One side of the card was red, which signaled that talking about the

target topic produced attention; the other side was green, signaling access to preferred topics.

The experimenter tracked on-topic speech using a stopwatch on a wristwatch or smartphone and

paused the on-topic-speech timer when 2 s or more passed without speech or when the

participant left the chair with the blue tablecloth before she or he met the response requirement.

The cumulative response requirement did not reset if the participant left the chair, and the

stopwatch timer was resumed if the participant returned to the chair with the blue tablecloth and

engaged in on-topic speech.

No intervention. This condition was presented because it allowed us to distinguish

between indifferent and indiscriminate patterns of responding (Hanley, 2010). Moreover,

because we were interested in the direct consumer's acceptability of interventions, the no-

intervention option allowed us to isolate the omission of an intervention within the same

environment as the two other interventions to detect the likelihood of participation in an

intervention condition (Schwartz & Baer, 1991; Wolf, 1978). If the participant preferred the no-

intervention condition, it is possible that the intervention might not be acceptable to the direct

consumer, and they might be less likely participate. If a participant prefers an intervention

condition, they might be more likely to participate.

The no-intervention condition corresponded with a chair draped with a red tablecloth.

We included this option for two reasons. If the participant sat at the chair associated with the no-

intervention condition, the experimenter sat down at the table, turned away, averted eyes, and

refrained from speaking to the participant. If the participant made bids for attention or

conversation, the experimenter pointed to the menu cards associated with the intervention

options and reminded the participant that they would only talk with her or him when the

participant was sitting at the chairs with the orange or blue tablecloth. This instruction was only

provided once per session block if bids for attention were made.

       Procedural modification (Lydia). Across the first six sessions for Lydia, we saw

cyclical patterns of selections. We noticed that Lydia was sitting in the same chair during each

session, and the cyclical pattern was the result of rotating the colored tablecloths associated with

a chair clockwise across sessions. We hypothesized that this bias may have developed because

Lydia sat in that chair when she participated in the component analysis that preceded this study.

Therefore, at the start of the seventh session, we conducted sessions in a different room without a

table and arranged three chairs in a circle, each of which was associated with the three

intervention options. During sessions, the experimenter sat in a chair positioned in the center of

the three chairs, swiveled toward the chair in which the participant was sitting, and provided the

consequences associated with that selection. All other aspects of these sessions were identical to

the original arrangement, including the instructions delivered by the experimenter and the

clockwise rotation of tablecloths, menu holders, and corresponding consequences for a selection.

Chapter 3: Results

The results of the free-operant assessment indicated that all three participants preferred the attention-plus-preferred-topics condition. As shown in the left panel of Figure 1, we observed the highest levels of selections toward the attention-plus-preferred topics condition for Walt and Rick; we observed similar outcomes for Lydia after we changed rooms and arranged the chairs in a circle. Across the entirety of the assessment, all three participants spent the highest percentage of total assessment time selecting the attention-plus-preferred topics condition (Walt: 84%, Rick: 78%, and Lydia[1]: 71% of sessions). The attention-on-topic condition was the second most selected context selected by Rick (7% of sessions) and Walt (11% of sessions). Lydia selected the attention-on-topic and no-intervention conditions for an equal amount of time (i.e., 14% of sessions). Walt and Rick spent the least amount of time in the no intervention condition (Walt: 0% and Rick: 8% of sessions). Moreover, as shown in the right panel of Figure 1, when participants were in either intervention context, they engaged in higher levels of on-topic speech.

As shown in the top left panel of Figure 1, Walt never selected the no-intervention condition, and although he selected both interventions in the first session, he exclusively selected the attention-plus-preferred-topics condition for the remainder of the assessment. The upper right panel of Figure 1 shows aggregated data from all sessions of Walt's on-topic speech, problematic speech, and engagement with leisure items while he experienced each condition. Because Walt did not select the no-intervention condition, we excluded that condition from the bar graph.

[1] It should be noted that the percentage of time spent in each condition was only reported for sessions in which procedural modification was made for Lydia.

We saw high levels of on-topic speech, low levels of off-topic speech, and low levels of engagement with leisure items while Walt experienced both interventions.

The middle left panel of Figure 1 shows that Rick selected all three conditions but beginning in session 6, he exclusively selected the attention-plus-preferred-topics condition. The bottom right panel of Figure 1 shows aggregated data of Rick's on-topic speech, problematic speech, and leisure item engagement while in each condition. He engaged in higher levels of on-topic speech and lower levels of off-topic speech in both intervention conditions. When Rick experienced the no intervention condition, we observed low levels of speech overall, and also engagement with his leisure item (Jenga blocks).

The bottom left panel in Figure 1 depicts the duration of selection for Lydia. Because an initial pattern was found in Lydia's selections, it was hypothesized that she might have a side bias as a result of a history from previous assessment arrangements. As a result, her sessions were modified by having chairs arranged in a circle, which is denoted by a phase change line. Following this change in arrangement, the pattern did not persist, and she selected attention-plus-preferred-topics condition three times consecutively. The bottom right panel of Figure 3 shows the aggregated data for Lydia's on-topic speech, problematic speech, and leisure item engagement while she experienced each condition. We saw high levels of on-topic speech and low levels of off-topic speech during intervention conditions. When Lydia experienced the no-intervention condition, she did not engage in on- or off-topic speech, but did engage with the leisure item (Play-doh). Lydia engaged with the Play-doh during all three conditions.

Figure 2 illustrates the latency to the first selection of each condition. The top panel shows latency for Walt's first selection during each session (0–10 s). The middle panel depicts latency for Rick's first selection during each session which varied 5–30 s, and there was a slight

decreasing trend in the latency to selecting the attention-plus-preferred-topics intervention. The

bottom panel demonstrates latency for Lydia which varied from 3–10 s.

Chapter 4: Discussion

Results of this study demonstrated that a free-operant arrangement can be used to assess preference for interventions targeting problematic speech. Additionally, participants showed preference for an intervention that used attention and preferred topics as reinforcement for on-topic speech over using attention as the only form of reinforcement. Moreover, participants preferred intervention over a no-intervention context in which they could interact with leisure items without engaging in conversation. These results suggest that practitioners should consider using preferred topics as reinforcement when targeting problematic speech during conversations.

These findings contribute to the literature on client preference for components of behavioral interventions (see Hanley, 2010). Using concurrent-chains arrangements, past research has evaluated participant preference for interventions targeting aggression (e.g., Hanley, Piazza, Fisher, & Maglieri, 1997; Hanley et al., 2005), self-injurious behavior (e.g., Hanley, et al., 2005), and stereotypy (e.g., Potter, Hanley, Augustine, Clay, & Phelps, 2013). This study adds an example of assessing preference for interventions targeting problematic speech using a free-operant arrangement, and the findings raise questions about designing function-based interventions for attention-maintained problematic speech. When practitioners are asked to address problematic speech and a functional analysis identifies attention as a maintaining variable, practitioners could design function-based interventions that target the reduction of problematic speech (Frea & Hughes, 1997; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003, Wilder et al., 2000). For example, Rehfeldt and Chambers (2003) showed reductions in perseverative speech when they withheld or removed attention for speech about perseverative topics (sirens, coughing, appointments), and only provided attention for talking about other topics (i.e., DRA). Despite showing reductions in perseverative speech, our results indicate that

direct consumers of intervention may be less likely to initiate conversations with caregivers who withhold or remove attention for speech about topics identified by caregivers as excessive or perseverative. Alternatively, as discussed by Premack (1959, 1962), contingent access to high-probability behavior can reinforce lower-probability behavior. Therefore, rather than targeting topics for reduction, practitioners should consider designing interventions that use topics as reinforcement for targeted increases in social skills (e.g., Fisher et al., 2013). Based on our findings, using preferred topics as reinforcement might increase the likelihood that direct consumers will participate in interventions targeting problematic speech or even initiate conversations with their parents at home.

There may be a few other advantages to using topics of conversation as reinforcement when addressing problematic speech. First, unlike token economies (Peters & Thompson, 2015), or tangibles (Frea & Hughes, 1998), changing topics is a naturally occurring event during conversations (Hughes et al., 1998). Moreover, using preferred topics as reinforcement does not cost anything or require the implementer to carry materials (e.g., tokens, toys). Future research could compare using preferred topics as reinforcement for target skills to other events used as reinforcement in previous studies. Second, using preferred topics as reinforcement might facilitate the development of stimulus control over topics of speech, which is arguably the primary goal of targeting problematic speech because most, if not all, topics are socially acceptable under the appropriate conditions. The topics identified as problematic by caregivers in our study (e.g., video games for Rick and Walt) or others (e.g., sirens, coughing, appointments; Rehfeldt & Chambers, 2003) might be considered appropriate with some conversation partners, in certain places, at specific times. Fisher et al. (2013) demonstrated that colored cards could establish stimulus control of speech during conversation, including speech

about perseverative topics. The current study had several potential discriminative stimuli for speaking about on-topic speech and perseverative topics (e.g., verbal instructions, eye contact, body orientation, and statements of interest from the experimenter). Future research should consider discriminative stimuli that might be more typical of natural conversations. For example, stimuli such as a conversation partner initiating conversation about the preferred topics, or someone wearing or doing something affiliated with the topic of conversation could be discriminative stimuli for talking about preferred topics. Subsequent research should also consider using preferred topics as reinforcement to teach individuals when and how to talk about preferred topics. For example, if someone is wearing a shirt with a graphic from a video game, it might be appropriate to approach them and talk about the game. Third, using preferred topics as reinforcement may align with suggestions to embed restricted interests into therapeutic programming for individuals diagnosed with ASD (Gunn & Delafield-Butt, 2016). Harrop, Amsbary, Towner-Wright, Reichow, and Boyd, (2019) reported that of 31 studies embedding restricted interests into interventions, all resulted in positive effects (e.g., improvement in communication, interaction with peers). For example, Koegel et al. (2012) saw increases in social engagement and social initiation when intervention incorporated the perseverative interests of individuals diagnosed with ASD.

Despite the possible advantages of using preferred topics as reinforcement, it is important to note that some topics are considered inappropriate in certain places or with certain conversation partners. Researchers have reported death, violence, and shooting as topics identified as problematic by caregivers (Fisher et al., 2013; McMordie, 1967). Thus, using preferred topics as reinforcement may not be feasible if the topic is not suitable for the context (e.g., home v. school v. church). Under these conditions, practitioners may focus on establishing

stimulus control of speech about topics (see above). However, stakeholders might consider some topics to be inappropriate no matter the context, and may have concerns about their child persisting on those topics. Therefore, practitioners should always conduct social validity assessments with indirect consumers, members of the immediate community, or members of the extended community to determine the acceptability of using certain topics as reinforcement (Schwartz & Baer, 1991).

Although we saw improvements in on-topic speech, producing clinically significant outcomes for some individuals may require addressing other deficits in social skills. For example, we saw high levels of on-topic speech for Lydia during the attention-plus-preferred-topics intervention. Despite the efficacy of the intervention, she continued to engage in the repetitive speech that her mother reported (e.g., "We road on a boat on our trip" and "We went on a trip and road a boat"). Clinicians could address this type of repetitive speech by reinforcing response variability to pre-assigned topics within a lag schedule (Susa & Schlinger, 2012). Additionally, if an individual's behavior is not sensitive to attention, then they might need to be taught rules regarding conversation and differential consequences in the form of tangibles or escape delivered for appropriate responding. For instance, Peters and Thompson, (2015) delivered a rule (e.g., "If I am turned away and not smiling, I am uninterested and you could change the topic or ask me a question") and delivered tokens for adhering to the rule. Because some problematic speech is related to skill deficits, it may be necessary to evaluate and teach the necessary skills for conversation.

Another important area for future research involves evaluating contingencies that improve parental adherence to interventions for problematic speech. For example, Stocco, Thompson, and Rodriguez, (2011) found that individuals with restricted interests were presented

items for longer durations than individuals with distributed interests, and the items presented for longer durations were correlated with fewer negative responses (e.g., vocal protest, loud vocalizations), and more engagement. It is possible that caregiver presentation of conversation topics is similarly influenced by child behavior. If the presentation of preferred topics is followed by engagement, smiles, and approach, caregivers may be more likely to present those topics in the future. It is also possible that conversing with individuals about their preferred or problematic topics may result in reinforcement for caregivers if speaking about preferred or problematic topics are the only types of conversations they can have with their child. The attention-plus-preferred-topics intervention in the current study could provide an opportunity for caregivers to access caregiver-preferred conversation, and their children's positive responses (e.g., smiles, approach) when presenting contingent access to preferred topics. This could also result in parental adherence to the intervention. Alternatively, parents might prefer the intervention without access to preferred topics due to concerns that the problematic speech may persist. Future research could evaluate the contingencies that affect caregiver presentation of topics, as this could help practitioners deliver more precise recommendations for intervention and parent training (Allen & Warzak, 2000; Stocco & Thompson, 2015).

One potential limitation of using a free-operant arrangement is that it may be more time-consuming than simply asking consumers what form of intervention they would prefer to receive. Participants' time in assessment ranged from 4 to 12, 10-minute sessions. However, no study to date has compared an individual's self-reported preferred intervention to direct measures of what they chose to experience. There is reason to believe that the time taken in conducting direct assessments for intervention preference may circumvent challenges that may arise as a result of potentially obtaining inaccurate or undifferentiated information from indirect

assessments. For example, Northup, George, Jones, Broussard, and Vollmer (1996) compared the outcomes of various stimulus preference assessments for children diagnosed with ADHD and found that self-reports on a questionnaire did not produce differentiated responding, and participant responses from the direct method (asking children to pick a picture of an item) resulted in a larger number of reinforcers identified from those results as compared to surveys and self-reports.

An additional limitation of the free-operant arrangement is the potential for position bias that we observed with Lydia. In the initial free-operant arrangement, Lydia always sat in the left seat, and she sat in this seat even as the consequences for selecting this seat changed across sessions. We suspected Lydia's position bias could be the result of sitting in that chair and accessing reinforcement when she participated in the component analysis that preceded this study. Individuals diagnosed with ASD have been reported to exhibit similar position biases when presented with stimuli in an array, and researchers have evaluated interventions for ameliorating position biases (Bourret, Iwata, Harper, & North, 2012; Grow, Carr, Kodak, Jostad, & Kisamore, 2011). For example, Bourret et al. (2012) showed that presenting varying positions of paired preferred items and non-preferred items to individuals exhibiting position biases resulted in reinforcing more varied selections. This is an option if practitioners identify a position bias prior to conducting the free-operant assessment. However, we did not identify Lydia's position bias from the outset; thus, the modifications we made to the arrangement for Lydia might be one way to prevent position biases from interfering with free-operant assessments. Future research could focus on additional solutions to conducting preference assessments with individuals who exhibit position biases.

The free-operant arrangement used in this study can be categorized as translational in nature, as it considers naturalistic aspects of a typical conversation and basic principles of behavior. However, the dissimilarities to the natural environment (e.g., experimental arrangement, structured conversations, cameras, rules) could also be a limitation in this study. For example, at the start of the first session with the procedural modification, Lydia, commented that she wanted the camera to be out of sight for her when we recorded. Although further comments regarding the free-operant arrangement were not made, and all participants complied, it is possible that their past history with ABA might influence the acceptability of the arrangement. It is possible that an individual who has never received ABA services may find the arrangement odd, and this could influence the likelihood of participation.

Our study showed that a free-operant arrangement could be used to identify preference for interventions targeting on-topic speech for individuals who engaged in attention-maintained problematic speech. Participants preferred an intervention for conversation with an added component of access to their preferred topics when given the option to opt out of conversation altogether and play with toys. Further research is necessary on the inclusion of preferred or restricted interests, and how to achieve stimulus control of speech about certain topics. Further research is also necessary on the use of free-operant arrangements for interventions targeting different behaviors, the long-term effect of inclusion of restricted interests on parental adherence to the interventions selected by participants, and parental acceptability of the interventions.

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APPENDIX A: PARTICIPANT CHARACTERISTICS

Table 1: Participant Characteristics and Caregiver Identified Restricted or Target Topics

Participant	Age (years)	Sex	Diagnosis	Preferred Topics	Target Topics
Rick	12	Male	Autism	Gaming systems (e.g. Nintendo Switch™, Wii™)	School, food, books, friends, family
Walt	14	Male	Autism	Disney, role-playing, video games	School, sports, movies/books, music, friends
Lydia	14	Female	Autism	Celebrities, TV shows, Hollywood	Friends, travel, school, family

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

Participant	Attention On-Topic + Preferred Topics	Attention On-Topic	No Intervention
Rick	99.5% (85.5%–100%)	100%	100%
Walt	100%	98% (95.5–100%)	100%
Lydia	100%	99.9% (98.8–100%)	100%

Table 3: Interobserver Agreement for % Engagement M (session range)

Condition with Engagement	Walt	Rick	Lydia
Attention on-topic + preferred topics (On-topic Speech)	95.5% (95%–96%)	87% (85%–90%)	87% (77%–100%)
Attention on-topic + preferred topics (Off-topic Speech)	98.5% (98%–99%)	94% (92%–96%)	98% (97%–100%)
Attention on-topic + preferred topics (Leisure Item)	87% (74%–100%)	99% (98%–100%)	100%
Attention on-topic (On-topic Speech)	100%	100%	88% (65%–100%)
Attention on-topic (Off-topic Speech)	100%	100%	96% (87%–100%)
Attention off-topic (Leisure Items)	99% (98%–100%)	100%	100%
No Intervention (On-topic Speech)	100%	100%	100%
No Intervention (Off-topic Speech)	100%	100%	100%
No intervention (Leisure Items)	100%	100%	100%

Table 4: Interobserver Agreement for Latency M (session range)

Participant	Attention On-Topic + Preferred Topics	Attention On-Topic	No Intervention
Rick	91.7% (83.3-100%)	100%	100%
Walt	100%	100%	100%
Lydia	90% (80-100%)	100%	100%

APPENDIX B: FIGURES

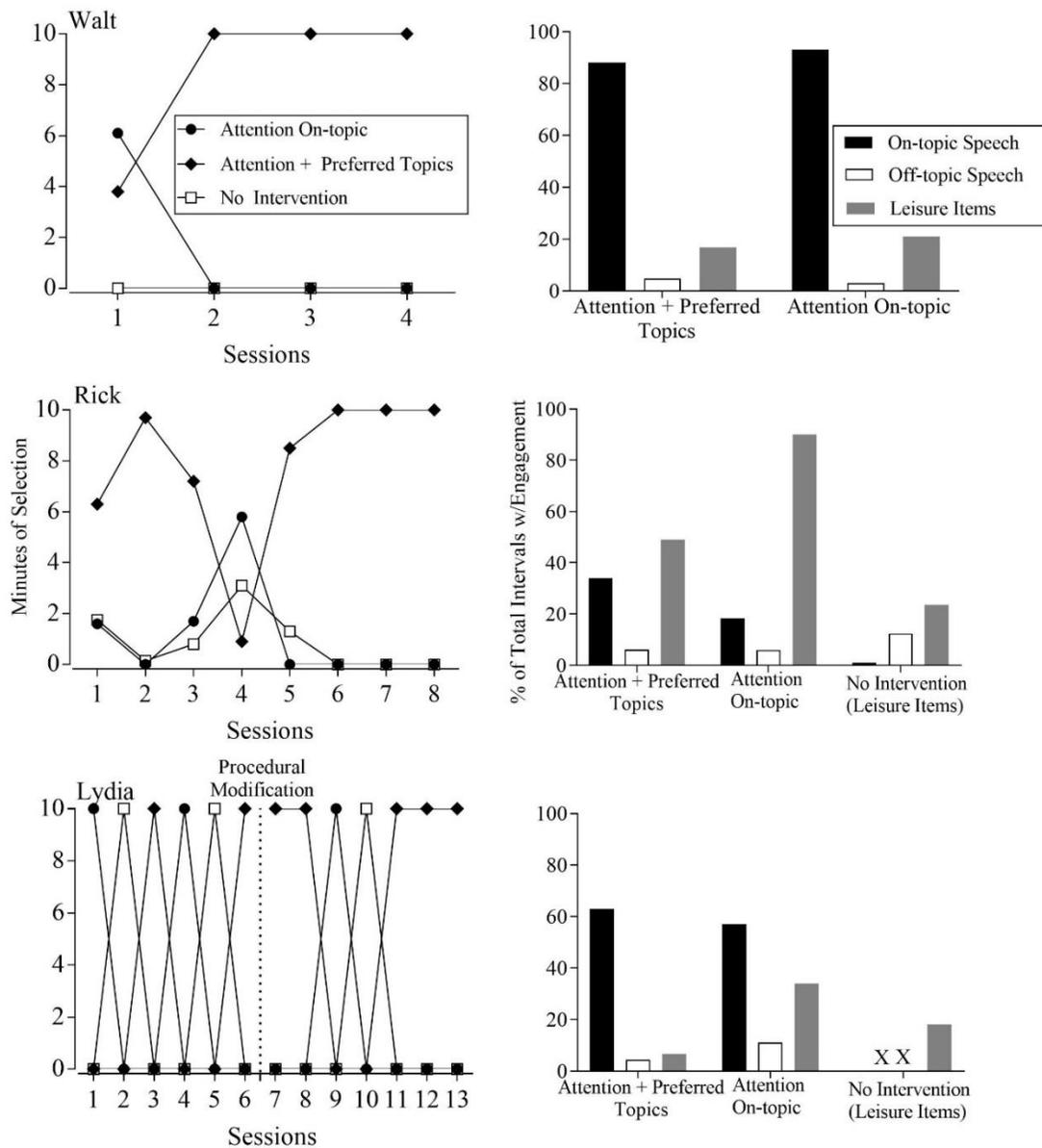Figure 1: The left paneled graphs depict the duration of each participant's selection. The right paneled graphs depict each participant's aggregate data of the percent of engagement with each measure (on-topic speech, problematic speech, and leisure items).
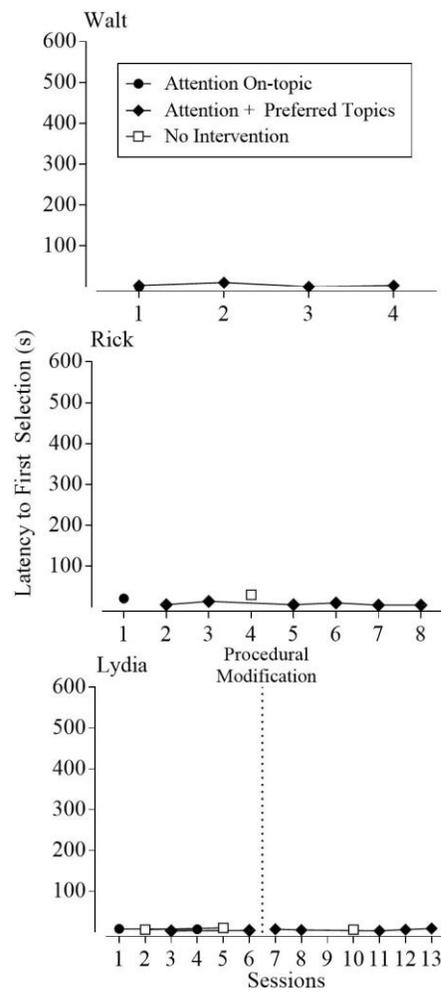
APPENDIX B: (CONT) FIGURES

Figure 2: The graphs above depict latency from an instruction to make a selection to the first selection of that option.

APPENDIX C: PARENT QUESTIONNAIRE

Identifying Topics of Conversation for Individuals with Autism Spectrum Disorders
(Fisher, Bowman, & Amari, 1996; Stocco unpublished)

Individual'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?
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:

APPENDIX C: (CONT) PARENT QUESTIONNAIRE

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:

APPENDIX C: (CONT) PARENT QUESTIONNAIRE

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; 15 = 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 D: PREFERENCE QUESTIONNAIRE

Preference Questionnaire
(Fisher, Bowman, & Amari, 1996)

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.

APPENDIX E: LITERATURE REVIEW

Treating Attention-Maintained Off-topic Speech

People diagnosed with attention deficit hyperactivity disorder (ADHD) or autism spectrum disorder (ASD) often exhibit deficits in social communication (DSM-V, 2013). These deficits can impede the development of normative relationships. Blachman and Hinshaw (2002) reported that girls with ADHD were more disliked and more likely to have fewer or no friends than their typically developing peers at a 5-week Summer camp. The friendships that girls with ADHD did have were of lower quality and less likely to be maintained. Surveys on friendships for individuals with intellectual and developmental disabilities (IDD) and ADHD have reported similar findings (Friedman & Rizzolo, 2017). Orsmond, Krauss, and Selzer (2004) surveyed 50 mothers of adolescents and adults with ASD and found that 46.4% of respondents reported their child had no friends of the same age and 8.1% had at least one friend. Moreover, children with high-functioning autism have reported feeling lonely and wanting to engage in social relationships (Bauminger, Nirit, Kasari, & Connie 1999). Barnhill (2007) reported that these concerns tend to continue into adulthood as adults with ASD have difficulty maintaining social relationships.

Deficits in conversation skills can be a barrier to developing and maintaining relationships (Barnhill, 2007; Berney, 2004). Individuals with ADHD or ASD may deter conversation partners if they do not stay on topic or if they dwell on certain topics. Kim and Kaiser (2000) reported that children with ADHD were more likely to wander off-topic than their typically developing peers during conversation. In addition, parents of individuals with ASD have reported concerns regarding their children's restricted topics and limited social interactions (Mercier, Motron, & Belleville, 2000; Stewart et al., 2007). Mercier et al. (2000) interviewed

family members about the restricted interests of individuals diagnosed with an ASD. Parents expressed concerns about their children being ostracized due to their restricted interests. One family member reported that her daughter often spoke about her restricted interests to the point of "getting on people's nerves" (p.414). A further concern was that these individuals spoke about their restricted interest regardless of whether their conversation partner was interested. In contrast, typically developing adolescents commonly respond to topics raised by their conversation partners (Turkstra, Ciccia, & Seaton, 2003). Black and Hazen (1990) also found that children were rated as less likeable if they did not respond or said something irrelevant when a peer initiated conversation. Therefore, responding to topics initiated by a conversation partner might aid in developing and maintaining social relationships.

Several studies have demonstrated effective treatments for reducing off-topic or perseverative speech and increasing responsiveness to topics initiated by a conversation partner (Butz & Hasazi, 1973; Fisher Rodriguez, & Owens, 2013; Frea & Hughes, 1997; Hood, Luczynski, & Mitteer, 2017; Peters & Thompson, 2015; Rehfeldt & Chambers, 2003; Wilder, Masuda, O'Conner, & Baham, 2001). Although effective treatments exist for reducing off-topic speech, no studies have compared the efficacy or social validity of treatment options.

Behavioral Treatments

Behavioral intervention is an evidence-based approach to the treatment of behaviors concerning individuals with ASDs and ADHD among health care professionals (Ahearn & Tiger, 2013; Neef, Perrin, & Madden, 2013). Behavioral treatments have successfully targeted a number of concerns for individuals with ASD and ADHD, such as skill acquisition, promotion of tolerance to changes and delays, and reduction of problem behavior (American Academy of Pediatrics, 2001; Center for Disease Control and Prevention, 2016; Neef et al., 2013).

Behavioral treatments for ASDs commonly target problem behaviors including self-injurious behavior (SIB) and aggression (Sipes, Horoviz, Worley, Shoemaker, & Kozolowski, 2011). Behavioral treatments for ADHD have typically targeted behaviors such as discounting delayed consequences more steeply, inattentiveness, and impulsivity (e.g., vocal outbursts, answering before question is delivered). These behaviors have been targeted for a variety of reasons, including social importance, the promotion of safety for the individual, and others (Ahearn & Tiger, 2013).

One influential study for treatments in ASD found that when 4-year old children with ASD were provided 40 hours of one-on-one behavioral treatment per week for the span of two years or more, they were placed in less restrictive educational settings and had higher IQs relative to the children in the comparison group who received 10 hours or fewer of one-to-one behavioral treatment per week (Lovaas, 1987). Upon follow-up, McEachin, Smith, and Lovaas (1993) assessed the participants at a mean age of 11.5 and found that the group receiving 40 hours of behavioral treatment preserved gains in intellectual functioning and had a statistically significant higher IQ relative to the participants from the comparison group. In addition, more students in the experimental group were placed in typically developing classes, while all the participants in the comparison group remained in special education classes. Sallows and Graupner (2005) replicated treatment procedures described by Lovaas (1987) without the use of aversive consequences (e.g., a slap on the thigh) for socially undesirable behavior. About half of the participants in the experimental group achieved average posttreatment scores and were integrated into classrooms for typically developing students, which was also consistent with the results from Lovaas' study.

Success with the use of behavioral interventions has also been found for individuals with ADHD. Pfiffner, Villodas, Kaiser, Rooney, and McBurnett (2013) evaluated the outcomes of school and home-based behavioral interventions. Fifty-four participants were provided behavioral parent training, and their children received classroom behavioral intervention and social skills training across 12 weeks. Following the treatment, parents and teachers rated their child's organizational skills, school grades, academic achievement, homework engagement, and ADHD symptoms. Posttest results indicated that the participants showed significant improvements in severity of ADHD symptoms, organizational skills, and homework engagement.

Although behavioral treatments have been shown to improve a variety of target behaviors (Campbell, 2003; Sipes et al., 2011), interventions for reducing off-topic speech or increasing the on-topic speech of individuals with ADHD or ASD are less prevalent. Practitioners who look to the literature to inform treatments for attention-maintained perseverative or off-topic speech will find different options that carry divergent implications. One implies that successful treatment should focus on the reduction of off-topic or perseverative speech (Refheldt & Chambers, 2003); another suggests that speech should be brought under appropriate stimulus control, no matter the topic (Fisher et al., 2013). Further research is needed on the relative efficacy and social validity of treatment options.

Function-Based Treatments

Functional behavior assessments (FBAs) refer to approaches used to test hypotheses regarding relations between environmental variables and a target behavior (Hanley, Iwata, & McCord, 2003, Schlinger & Normand, 2013). Methods used to conduct FBAs include indirect assessments (e.g., anecdotal information), descriptive analyses, and experimental analyses (e.g.,

functional analysis). There is a continuum of accuracy when comparing these types of FBAs and the exactitude of the information they can provide (Cooper et al., 2007). For example, ABC data and conditional probabilities can provide information regarding correlations between a behavior and environmental variables, but a functional analysis is the only method that identifies causal relations.

A functional analysis is a pretreatment assessment based on direct observations of the target behavior that contains at least two conditions which manipulate the environment to evaluate relations between environmental variables and behavior (Hanley, Iwata, & McCord, 2003). A standard functional analysis typically refers to a commonly used pretreatment assessment (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982, 1994). Iwata et al. (1982/1994) developed this type of functional analysis in which the differential effects of environmental variables were assessed to determine which environmental variables evoked and maintained self-injurious behavior (SIB). The conditions of this assessment included a play condition which served as a control. In this condition, toys and attention were available on a 30-s schedule, but demands were not delivered. During this condition, problem behaviors did not occur and were not expected. This condition served as a comparison to the other conditions in which problem behavior was more likely to occur. An academic demand condition was conducted to evaluate whether the SIB was maintained by a negative reinforcement contingency. The condition consisted of delivering demands, following through with the demands, and removing the demand for 30 seconds contingent on the participant engaging in SIB. The alone condition involved the use of an austere environment (e.g., no toys, no people) to gain indication that the SIB could be maintained by sensory reinforcement. The social disapproval condition involved the experimenter directing the participant to toys while the experimenter "did work." If the

participant engaged in problem behavior, the experimenter would provide attention in the form of mild reprimands. These conditions were evaluated within a multi-element design.

Similar methods have been used to conduct functional analyses of inappropriate speech (Fisher et al., 2013; Frea & Hughes, 1997; Liberman, Teigen, Patterson, & Baker, 1973; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003, Roantree & Kennedy, 2012; Wilder, Masuda, O'Connor, & Baham, 2000). Roantree and Kennedy (2012) conducted a functional analysis including an attention, escape, and control condition. Consequences in this functional analysis differed from the standard functional analysis because the consequences were delivered contingent on inappropriate speech and included a peer delivering conversation toward the participant during the attention condition, rather than an experimenter delivering reprimands during this condition. During the escape condition, the experimenter asked the participant questions on a 15-s schedule and questions were terminated for 30-s contingent on engagement in inappropriate speech. During the control condition, the experimenter instructed the participant and peer to eat lunch quietly. In the second phase of the functional analysis, a contingency reversal was conducted for the attention condition and attention was delivered only for appropriate speech.

Although Roantree and Kennedy (2012) did not progress to treatment, functional analyses are preferable over other FBA methods because the results can be used to inform precise, individualized, and efficacious treatments (Cooper et al., 2007; Hanley, 2012; Oliver, Pratt, and Normand, 2015). Function-based treatments (FBT) refer to interventions that are informed by the results of FBAs. For example, if the results of a functional analysis suggest that the off-topic speech of an individual is sensitive to attention, then a precise, efficacious, and individualized treatment might include withholding attention for off-topic speech and delivering

attention for appropriate speech (i.e., differential reinforcement of alternative behavior; DRA).

In contrast, non-function-based treatments (NFBTs) use the principles of behavior analysis but

do not rely on the use of functional assessment to inform treatment (Mulligan, Healy, Lydon,

Moran, & Foody, 2014). When designing NFBTs, therapists identify putative reinforcers and

apply them during treatment. For example, an NFBT might provide items or activities

contingent on the absence of off-topic speech (i.e., differential reinforcement of other behavior;

DRO). Both FBTs and NFBTs can be effective, but NFBTs have a greater potential of being

ineffective or harmful due to a lack of understanding of the contingencies of reinforcement that

influence behavior (Cooper et al., 2007). For example, providing arbitrary consequences for

target behaviors can result in the use of intrusive punishment procedures when NFBTs are

ineffective. In addition, FBTs have been shown to produce greater reductions in problem

behavior compared to NFBTs (Campbell, 2003; Hurl, Wightman, Haynes, & Virues-Ortega,

2016).

Function-Based Treatments for Off-Topic Speech

Even though off-topic or perseverative speech is a common problem for individuals with

ASD or ADHD, there are relatively few demonstrations of FBTs in the literature. In one review,

Matson et al. (2011) reported that of 173 studies using FBTs for the problematic behaviors of

individuals with developmental disabilities, 80 targeted self-injurious behavior, 63 targeted

aggression, 20 targeted stereotypy, and only 10 targeted inappropriate speech. Several studies

have also targeted symptoms of ADHD within functional analyses and have created successful

treatments from the results of these functional analyses (Boyajian, DuPaul, Handler, Eckert, &

McGoey, 2001; Flood, Wilder, Flood, & Masuda, 2013).

Functional analyses from some of the 10 studies on conversational speech indicated that attention was the maintaining variable for perseverative or off-topic speech and corresponding FBTs included withholding attention for off-topic speech and providing attention for non-perseverative or on-topic speech (Fisher et al., 2013; Frea & Hughes, 1997; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003). For example, Rehfeldt and Chambers (2003) identified that the perseverative speech of an individual with ASD and mild mental retardation was sensitive to attention in the form of eye contact and reciprocal statements provided by a conversation partner. The functional analysis used to identify the maintaining variable for perseverative speech included attention, escaping tasks, tangible, and alone conditions. Based on the results of this functional analysis, the FBT involved withholding eye contact and verbal attention (e.g., statements, reprimands) when the participant engaged in perseverative speech, and providing verbal attention and eye contact when he engaged in appropriate speech. Using a reversal design, the results showed higher levels of appropriate speech only when the FBT was in place. Frea and Hughes (1997) also conducted a functional analysis that was composed of escaping social attention, escaping tasks, attention, and play conditions. The results of the functional analysis identified that the perseverative speech of an individual with an intellectual disability was sensitive to attention in the form of conversation by a teacher. Based on the results of the functional analysis, the FBT involved delivering attention contingent on engaging in appropriate speech and withholding attention for inappropriate speech (DRA). After conducting a latency-based functional analysis consisting of an attention, escape, and play condition, Noel and Rubow (2018) used an FBT consisting of non-contingent attention to decrease perseverative speech. For both Frea and Hughes (1997) and Rehfeldt and Chambers (2003), components of differential attention for an appropriate response were used. Notably, in the FBT literature, the maintaining

variable identified was attention and treatment components involved attention delivered using DRA or NCR procedures (Frea & Hughes,1997; Noel & Rubow, 2018; Rehfeldt & Chambers, 2003).

One advantage of FBTs for attention-maintained off-topic speech is that providing attention contingent on alternative speech is inexpensive and non-invasive. In addition, it is important to note that attention is a naturally occurring aspect of conversation. In contrast, NFBT commonly includes treatment components that are atypical of conversation. For example, Butz and Hasazi (1973) showed reductions in the perseverative speech of an individual with an intellectual disability when pennies and praise were delivered contingent on the absence of perseverative speech (i.e., differential reinforcement of other behavior; DRO). Although contingent pennies and praise produced desirable treatment effects, the extent to which performance would transfer to more naturally occurring conversations could present a challenge as pennies are not typically delivered during conversation as a natural consequence. Stokes and Baer (1977) described nine strategies promoting the generalization of treatment effects, two of which highlighted the importance of considering naturally occurring contingencies (i.e., introduce natural maintaining contingencies and program common stimuli). Therefore, an FBT that capitalizes on naturally occurring contingencies, like the attention provided by a listener, is more likely to produce therapeutic outcomes that spread beyond the treatment setting.

Despite notable differences in treatment development and components, the treatments used by Butz and Hasazi (1973) and Rehfeldt and Chambers (2003) were focused on reducing or eliminating off-topic or perseverative speech. Both treatments imply that perseverative or tangential topics should not occur. However, the targeted topics of speech might be considered appropriate under certain conditions. For example, one of the perseverative topics targeted for

reduction in Rehfeldt and Chambers was sirens or alarms, which might be an appropriate topic if the conversation partner is an electrical engineer or firefighter. Moreover, taking turns introducing topics appears to be an influential aspect of good conversation. Therefore, it might be important for FBTs to establish stimulus control of conversation topics.

Rather than targeting perseverative topics for reduction and always withholding attention for its occurrence, Fisher et al. (2013) established stimulus control of the attention-maintained perseverative speech of a 14-year-old boy diagnosed with Asperger syndrome. In addition to leveraging attention as a reinforcer, the therapist provided signaled access to preferred topics (e.g., comic-book characters) contingent on the boy talking about nonperseverative topics or a therapist-selected topic. This was done by using a chain schedule in which a red card was presented to signal it was time to speak about the experimenter's pre-selected topic for 30 s. The experimenter delivered attention contingent on the participant engaging in on-topic speech, while attention was minimized when the participant engaged in speech regarding perseverative topics. Once the participant met the 30 s response requirement for on-topic speech, a green card was used to signal access to 60 s of his preferred topic and attention. During this intervention, on-topic speech levels were high and perseverative speech levels were low when the red card was presented. When the green card was presented, the opposite effect was observed; thus, the on-topic and perseverative speech came under the control of the schedule-correlated stimuli. Despite demonstrating improvement in on-topic speech and stimulus control over preferred topics of conversation, multiple interventions exist for attention-maintained problematic speech. Moreover, it is unknown whether participants would prefer interventions using differential reinforcement of on-topic speech with or without preferred topics.

Although the procedures used by Fisher and colleagues were effective in reducing perseverative and off-topic speech, no studies to date have evaluated client preferences for the procedures. Gunn and Butt (2016) found that including restricted interests in the classroom setting resulted in gains in social and academic areas, but perseveration on restricted interests persisted and sometimes led to off-task behavior. Thus, it is reasonable to question the social validity of the FBT interventions used by Fisher et al., (2013) due to their inclusion of preferred topics as reinforcers, as long-term consequences of this treatment are unknown and access to preferred topics could lead to an increase in engagement in these topics.

Social Validity

According to the Behavior Analyst Certification Board (2014) guidelines, behavior analysts should incorporate the values and preferences of clients, caregivers, and other stakeholders during the assessment and treatment process. Measures of these values or preferences have been referred to as social validity. Wolf (1978) argued that the adoptability of behavior-analytic research and practice depends on assessing social validity across three levels: goals, procedures, and outcomes. He emphasized that if treatments are socially invalid on the level of the direct consumer, clients may "avoid it, or run away, or complain loudly" and "society will be less likely to use our technology, no matter how potentially effective and efficient it might be" (p. 206).

Reviews of the literature on social validity indicated that researchers have typically relied on subjective or indirect measures of stakeholder values (Hanley, 2010; Schwartz & Baer, 1991). Researchers commonly ask stakeholders to rate the acceptability of procedures and outcomes on Likert scales. An advantage of rating scales is that it is an efficient means of measuring social validity. However, a limitation of subjective or indirect measures is that what someone reports

on a questionnaire may not correspond with what he or she would do (Lloyd, 2002). In other words, high ratings of a treatment on a questionnaire do not ensure the use or acceptability of behavioral technology. Objective measures address the barrier of individuals' reports not corresponding with what he or she would do (Pace et al., 1985). Additionally, objective measures help track changes in preference that may not otherwise be communicated and allows for more dignifying and individualized treatment options, as these measures are made on observation and not based on the opinions of others (Cooper et al., 2007).

According to Schwartz and Baer (1991), using choice measures is a preferable way to measure social validity because it is an objective measure that reflects the individual's observable behaviors rather than what they or others say about preference. Thus, when it comes to treatments, it is important to provide choices to ensure that the consumers of treatment receive the most dignifying and individualized treatment possible.

To date, no studies have assessed the social validity of treatments for attention-maintained off-topic or perseverative speech that occurs during conversations. A reasonable starting point is to assess client preference for treatments because they are the direct consumers of treatment. As highlighted by Schwartz and Baer, the direct consumers of treatment "can affect program viability directly and at any moment, by participating or by selective or generalized refusals to participate" (p. 193).

Preference Assessments

Stimulus preference assessments were developed to identify potential reinforcers or preferred items in an objective manner. They refer to procedures that identify an individual's preferred stimuli, the value of stimuli relative to other stimuli, and the circumstances under

which the values may change (Cooper, 2007, p. 275). These procedures include: *self-reporting* preference, conducting a *trial-based assessment*, or a *free operant assessment.*

Asking. Asking about what a person likes is a straightforward way of determining stimulus preference that could allow a practitioner to forgo the use of more contrived stimulus preference assessments to yield information for interventions (Cooper et al., 2007, p. 275). This can involve asking open-ended questions, providing the individual a list from which she or he could rank, or asking preference in a choice format. These methods can be used in cases when the individual has adequate language capabilities. However, it should be noted that poor correspondence may exist between what the individual reports and what the individual actually prefers (Northup, 2000; Pace et al., 1985). In addition, open-ended questions may not yield an accurate ranking of preference, even when ranking is asked of an individual. One way to manage the issue of correspondence is by asking significant others, parents, siblings, and caregivers of their family member's preferences.

Trial-based methods. Another way to identify potential reinforcers is by using *trial-based methods*, which involve the presentation of stimuli in a series of trials (Cooper, 2007, p. 277). Unlike self -reports, an advantage of using this method is the ability to rank stimuli by high, low, and medium preference based on predetermined criteria. There are three types of trial-based stimulus presentations: *single*, *paired*, and *multiple-stimulus presentations*. A *single stimulus* presentation involves successively presenting the individual with each randomly ordered stimulus, one at a time. During this type of presentation, duration of engagement, frequency of touches, or a dichotomous measure of engagement (e.g., yes or no) can be used. A *paired- stimulus* or forced choice presentation involves presenting two stimuli simultaneously. Data are collected during the paired stimulus presentation and can indicate frequency of

presentation and provide a rank order for preference (e.g., low-to high). Although the paired-stimulus presentation method is more time-consuming, it yields more distinct results for identifying rank in preferred stimuli (Cooper, 2007, p. 278). Finally, a *multiple-stimulus* presentation can be used similarly to the *paired-stimulus* presentation, but three or more stimuli are presented at one time and the participant is asked to pick one. The *multiple-stimulus* presentation has two variations, one in which the chosen item remains in the array, called multiple stimulus without replacement (DeLeon & Iwata, 1996), and one in which the chosen item is removed from the array, called multiple stimulus with replacement (Windsor & Piche, 1994).

Free operant observation. The third preference assessment procedure, *Free operant observation,* involves the measurement of duration of time an individual engages with an activity during an observation period in which a variety of activities/toys are unrestricted (Cooper, 2007, p. 277). If an individual engages with an activity or toy for a longer period of time as compared to the other activities/toys, it is inferred that the activity/toy is preferred. This type of assessment is beneficial because the activities/items presented during the assessment are not removed, thus problem behavior is less likely to occur.

There are two kinds of free operant assessments: a *free operant contrived observation* or a *free operant naturalistic observation* (Roane, Vollmer, Ringdahl, and Marcus, 1998). A *free operant contrived observation* is used to assess the extent to which a person engages with a set of activities/items that are made available, scattered across a predetermined area (Cooper, 2007, p. 277). The items are chosen because they may be of interest to the individual, and the individual is granted access to each item prior to starting the assessment to ensure the individual has experienced each item/activity. A *free operant naturalistic observation* entails observing an

individual's engagement with stimuli from their typical environment during a predetermined

time frame and recording the duration of engagement with each item (Cooper, 2007, p. 277).

Ortiz and Carr (2000) compared the use of a *free operant assessment* and a *multiple stimulus preference assessment* and demonstrated that each preference assessment yielded similar results for the three participants. After the assessment, the stimuli were ranked based on high and low preference, and the participants were exposed to the high and low preference items in a *concurrent-operants reinforcer assessment.* During this assessment, stimuli were placed on a table and corresponded to sitting in a certain area. The results indicated that even though the preference assessments identified similar reinforcers, the participants did not always choose the stimuli that were identified as highly preferred. This demonstrates the importance of obtaining frequent and objective measures of preference. Thus, it is reasonable to need to assess preference for treatments using these objective measures rather than self-report.

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