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The American Psychiatric Association (2000) states that the three broad defining characteristics of Autism Spectrum Disorder (ASD) are a qualitative impairment in communication and social skills, and preoccupations and restricted patterns of interests. The latest governmental statistics from a 2008 population examination of eight-year-olds living in 14 monitoring networks claimed that one in 88 children are currently diagnosed with ASD, which breaks down further to one in 54 boys, and one in 252 girls (Center for Disease Control and Prevention, 2012). ASD is the fastest growing developmental disability in the United States, and with the current special education practices that the Individuals with Disabilities Education Improvement Act of 2004 mandates, inclusion of this population in regular education classrooms has become more prevalent.

Contrary to the opinion that inclusion enhances social opportunities for individuals with disabilities, research shows that inclusion in the general education classroom tends to increase social isolation and social rejection for students with ASD due to their social and communication impairments and restrictive behaviors (Chamberlain, Kasari, & Rotheram-Fuller, 2007; Kalyva & Avramidis, 2005; Lasgaard, Nielsen, Eriksen, & Goossens, 2010; Reichow & Volkmar, 2010). Children with ASD experience lower centrality, acceptance, companionship, and reciprocity in the general education classroom compared to students without ASD (Chamberlain et al., 2007). Additionally, demoralization and loneliness may result when children with ASD compare themselves to their normally developing peers (Chamberlain et al., 2007; Eaves & Ho, 2008). Not only does the lack of social acceptance affect an individual's emotional well-being, but it also can negatively affect academic learning by limiting and interfering with their ability to focus

on other subjects. (Boyd, McDonough, Rupp, Khan, & Bodfish, 2011; Pierce & Courchesne, 2001; Sansosti, 2010).

One of the characteristics that can stigmatize and isolate an individual with ASD is restricted interests and the often associated repetitive questioning within those interests. Educational best practice utilizes restricted interests in strategies for socialization and transitions by incorporating the restrictive interest into the activity (Boyd, Alter, & Conroy, 2005), but repetitive questioning tends to be a strain on social interaction in school and home environments (Eaves & Ho, 2008; Lounds, Seltzer, Greenberg, & Shattuck, 2007; Seltzer, Krauss, Orsmond, & Vestal, 2001). Unfortunately, there has been relatively little research conducted in the area of treating restricted and repetitive behaviors (RRB) compared to other symptoms of ASD (Boyd et al., 2011; Turner, 1999).

A strategy used to improve RRB should consider the underlying origin of the perseveration. Some research points to the underlying inflexibility that is characteristic in ASD (Green et al., 2006), while other research points to the cause of the behavior as a seeking to gain or escape intrinsic or extrinsic circumstances (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). There is emerging research, however, that suggests that individuals with ASD have memory deficits that could lead to RRBs (Szelag, Kowalska, Galkowski, & Poppel, 2004; Boucher & Lewis, 1989).

In one study that investigated the underlying cause of RRBs, Green et al. (2006) proposed that RRB is most likely the result of the individual's with ASD inflexibility in routines and environment. The purpose of their research was to develop a scale that could assist educators and families in pinpointing the areas of inflexibility to enable precisely planned intervention of RRB. There were 726 participants in this internet survey with a diagnosis of Down syndrome,

Asperger syndrome, or autism. Through the results of the 15-item questionnaire, five areas were determined to represent the antecedent of major RRBs. The five areas are (a) preferred item unavailable, (b) a desirable event disrupted, (c) unexpected sensory stimulation, (d) failure of a task, and (e) an unfinished task. Though these categories cover a wide range of triggers for RRB, they do not account for many of the RRBs that individuals with higher-functioning ASD exhibit, such as repetitive questioning.

There is evidence in the literature that distinguishes RRB between individuals with ASD that are lower functioning from those that are higher functioning. Researchers use two conceptual categories to classify RRB: lower-order and higher-order (Bodfish, Symons, & Lewis, 1999; Boyd et al., 2011; Cuccaro et al., 2003; Turner, 1999). Lower-order RRBs include object manipulation, such as lining up toys, and body movements, including self-injurious, whereas higher-order RRBs are insistence on sameness, restricted interests, rituals, and routines. Individuals with ASD who are lower-functioning tend to display the lower-order RRBs, while individuals who are higher-functioning tend to display the higher-order RRBs (Boyd et al., 2011). Through their research, Boyd, McDonough, & Bodfish, (2011) recommended the use of evidenced-based intervention strategies for lower-order RRBs that are response interruption and redirection, response cost procedures, differential reinforcement, functional communication training, visuals, physical exercise, and environmental or skill enrichment strategies. The higher-order RRB evidenced-based intervention strategies they recommended are consequence or antecedent based uses of restricted interests, visuals, or differential reinforcement of variability. In most cases, repetitive questioning is considered a higher-order RRB (Bodfish et al., 1999; Boyd et al., 2011; Cuccaro et al., 2003; Turner, 1999).

After defining and classifying the RRB, professionals are encouraged to use a functional behavioral assessment to analyze both types of RRBs to further define the behavior as having one of two purposes: social (i.e., seeking to gain or avoid/escape attention or objects), or nonsocial (i.e., seeking to gain or avoid/escape internal sensory stimulation) (Iwata, Dorsey, & Slifer, 1994). The purpose of defining the cause is to replace the RRB with an appropriate behavior that can give the individual the same desired results. RRBs that seek nonsocial purposes are the most difficult to intervene because internal sensory stimulation has no extrinsic quality to observe, which makes it complicated, but not impossible, to develop a replacement behavior (Boyd et al., 2011; Reese, Richman, Belmont, & Morse, 2005). In targeting only two possible causes, research in this area has overlooked the role that memory can play on some higher-order RRBs. Therefore, these possible motives, social or nonsocial, are limited and do not cover all possible origins of RRBs, specifically repetitive questioning.

In any case, research has shown some success in using this methodology for RRB. Boyd et al., (2011) developed the *Family-Implemented Treatment for Behavioral Inflexibility* (FITBI) intervention program to target both lower- and higher-order RRBs and had success using such methods. The researchers used the FITBI program to perform a study that involved five participants, ages 39-65 months, with a diagnosis of Autistic Disorder, using a single-subject design methodology. The study occurred over a twelve-week period with sessions involving parent and child training that lasted 60 to 120 minutes per session, per week. The study's objective was to teach parents through direct instruction and demonstration how to use the response interruption and redirection and differential reinforcement of variability strategies to reduce RRBs. The researchers taught the intervention response interruption and redirection for lower-order RRB such as lining up objects, repetitive touching, hoarding, fixed interests, and

object attachment. For higher-order RRBs, such as perseveration and preoccupations, they taught the intervention differential reinforcement of variability. The results of the study found substantial reductions in the occurrence of RRB and that as the RRBs decreased, more behavior that was appropriate increased. With all participants, the researchers taught a new behavior to replace the RRB. Although this study's results were favorable using the FITBI program to reduce RRB, it is important to note that all the participants in this study were young (39-65 months) and repetitive questioning was not a RRB that was addressed.

In a similar study, Conroy, Asmus, Sellers, and Ladwig (2005) conducted a case study on a 6-year-old boy diagnosed with high-functioning autism to examine the effect of an antecedent-based intervention on hand flapping, a lower-order, motor movement, RRB. Both the subject's teacher and his parents believed that his behavior was a barrier to his social success in the classroom. Prior to intervention, these researchers conducted a functional behavioral assessment and determined that automatic reinforcement, or a nonsocial purpose, maintained the subject's RRB. For this study, the researchers implemented an alternating treatment design that taught the subject when it was acceptable and unacceptable to engage in hand flapping through the use visual cue cards. However, the intervention did not teach a replacement behavior, as the Boyd et al., (2011) intervention did. The study took place in a regular education classroom during math. Sessions lasted approximately 20 minutes, and the study lasted 32 weeks. The classroom teacher, or teaching assistant, prompted the subject during this time with one of two visual cue card; one card allowed the repetitive behavior, the other did not. The two antecedent conditions each lasted 10 minutes. Although Boyd et al., (2011) suggest using antecedent based strategies on higher-order repetitive behaviors, the use of visuals is appropriate for both types. While Conroy et al. were successful in reducing the RRB with this method during cued times, there was

no overall reduction in the subject's RRB. This could be because the study did not introduce a replacement behavior that would fulfill the nonsocial purpose, or perhaps as Turner (1999) stated that some individuals with ASD engage in these lower-order RRBs to help them gain a physiological state of homeostasis. While both the Boyd et al., (2011) and the Conroy et al. (2005) studies showed some promising methods to decrease RRB, there is a relatively small amount of literature for the treatment of this characteristic of ASD. More research is needed, particularly with older individuals with ASD, and with a wider variety of higher-order RRB.

Taking into account the lack of research, it is a possibility that not all RRBs fit into the categories described in the literature, and that not all RRBs are seeking to gain or escape some intrinsic or extrinsic result. Instead, conceivably there are alternative etiologies. For instance, there is some research that indicates that memory deficits are common in this population. This is contrary to the nonprofessional's belief that individuals with ASD generally exhibit superior, or "savant" memory skills. While it is true that early experimental research established that some individuals with autism exhibit good rote memory through their ability to memorize lists of facts, later research has shown impairments in free recall for recent events (Boucher, 2007; Boucher & Lewis, 1989; Bowler, Gardner, & Grice, 2000). This suggests that perhaps some behaviors that look like RRBs are the result of a memory deficit. The most weighted evidence to support this statement may come directly from high-functioning individuals with ASD.

In 2007, Boucher interviewed JS, a very high-functioning individual with Asperger syndrome, who described his severe difficulties with free recall of episodic and event memory. While JS is higher functioning compared to the other cited study's participants, his account of his own memory ability can possibly give direction to current research. The following is an excerpt from Boucher's interview with JS.

> JS visits the UK quite regularly, arriving at Heathrow. However, when he sets out on his journey, or whilst on the aeroplane, he cannot recall Heathrow, or any detail of how to travel from Heathrow to his destination in the UK (he does, of course, have instructions written down). He has no memory of previous visits, of where to find a shuttle train service to London, or the bus to the hotel, until he has arrived at Heathrow and recognizes something, which then cues a memory of previous visits. Thus, both recognition and cued recall are superior to free recall. Similarly, he cannot readily access technical terms and names of authorities in his subject area unless he is in a work-related situation, such as his office at work, with his laptop in front of him (3).

Boucher sums up her interpretation of JS's account by stating that, "atypical patterns of memory that occur may be important for understanding the RRB diagnostic of autism." In other words, some incidents of RRB could be due to a memory deficit.

Szelag, Kowalska, Galkowski, and Poppel (2004) conducted a research study to investigate the hypothesis of memory deficits in individuals with ASD. The study involved comparing the temporal information processing system of seven individuals with autism to seven normally developing children. Through measuring the participants' ability to reproduce visual and auditory stimuli after a two-second pause, results suggested that the individuals with autism were severely impaired in reproducing these measures. The researchers hypothesized that the results may be due to a faulty working memory which would support the view that the "primary deficit in autism is the disordered memory management" (p. 278). If this statement is factual, making an inference that repetitive questioning is not a RRB, but rather is due to a memory deficit is valid.

An older but relevant study, performed in 1989 by Boucher and Lewis, lends further support in this line of reasoning. In their paper, Boucher and Lewis go as far as to draw parallels between ASD and the amnesic syndrome. In this study, they hypothesized that individuals with high-functioning ASD have memory difficulties that affect their ability to carry out instructions, asks questions without repetition, and answer questions about past activities. They did not imply that memory deficits are the sole reason for this type of communication problem, but rather that it may be part of a complex of causes underlying individual's with ASD communication difficulties. Within this study, Boucher and Lewis carried out three experiments over the course of approximately 15 months, using the same 11 participants with ASD, and a matched control group, with the mean age being approximately 12 years of age.

In Boucher and Lewis' Experiment 1, they tested receptive communication, specifically the ability to respond to instruction. The researchers administered simple instructions through five different conditions; (a) spoken, (b) spoken with an intervening distraction, (c) demonstrated, (d) demonstrated with an intervening distraction, and (e) written format. The results of this experiment showed that individuals with high-functioning autism were impaired in ability to carry out spoken and visually demonstrated instruction, but unimpaired when given the instruction in writing. They concluded that this was because in written condition, the need to memorize instruction was eliminated.

Experiment 2 was set up in a game fashion, similar to the game 20 questions. Participants had to play the game without visual reminders of previously eliminated pictures, and then with visual reminders. The researchers wanted to prove that repetitive questioning was the result of a memory deficit and not simply a RRB. The results of this study confirmed their hypothesis.

Experiment 3 was set up to test the participants' memory of recent events using open-ended questions versus cued recall. The results showed that individuals with high-functioning ASD are significantly impaired when asked to recall recent events, but when cued recall is given, these individuals performed as well as the control group.

The findings of Boucher and Lewis (1989) are significant because they demonstrate that eliminating the need to memorize instructions by supplying them in simple written format will enable individuals with high-functioning ASD to carry out instruction efficiently. Perhaps, these results are also significant in understanding the reason behind these individuals' RRBs; particularly Experiment 2 that showed repetitive questioning was the result of a memory deficit. Understanding the underlying cause, and knowing how to support RRBs can eliminate frustration in parents and teachers, as repetitive questioning can put a strain on relationships in all environments, but most importantly, it can help to support the individuals with ASD, themselves.

There is little and limited research in the area of autism to develop methods to support and decrease or eliminate RRB in individuals with ASD. Most of the research to date has focused on younger individuals, and lower-order RRB. Additionally, the research literature focuses on treating the behavior rather than considering the etiology. Consequently, in some instances, we may be trying to treat a symptom instead of the origin of the problem. Although there has been recent research on the memory deficits in individuals with ASD, research must investigate how to best support this area of need and what affects it may have on RRB. It is possible that a memory deficit is the underlying cause of some RRB.

Furthermore, the participant of this present study states that his repetitive questioning is due to faulty memory. Alex is a 19-year-old male with whom I work on a daily basis, in an

informal setting, who exhibits this characteristics. Alex has a fixed set of topics on which he perseverates that encompasses the majority of his self-initiated conversations. Within these topics, Alex will repeatedly ask the same set of questions. When interviewing Alex on why he asks the same questions repetitively, his response is that, he cannot remember the previous answer. This behavior severely affects Alex's social interaction, which subsequently negatively affects his academic performance by limiting and interfering with his ability to focus on other subjects. The purpose of this study is to examine if repetitive questioning decreases in an individual with high-functioning ASD with the use of a self-managed, written format, tool called the *My Answers Guide* (MAG). This strategy will support the participant's memory deficit. Therefore, the research question for this study is can journaling repetitively asked questions and their corresponding answers decrease repetitive questioning in individuals with high-functioning ASD?

Methods

Single-subject AB research methodology was used to evaluate the effects of MAG on the repetitive behavior of one study participant. This is a proven effective research method used to establish evidence-based practices in the field of education. Furthermore, in the field of special education, single-subject research design can assist in developing individualized educational programs (Horner et al., 2005). This methodology allows casual interpretations to be drawn on a single subject because the subject serves as his own control (Horner et al., 2005). Single-subject design provides a high level of rigor because it utilizes inside comparisons to create internal validity, and can be replicated to create external validity (Horner et al., 2005). This method was functional for the purposes of this action research study because it facilitated the study of how an intervention will or will not affect a targeted behavior on a single participant. Students with

special needs often exhibit behaviors that interfere with learning. To instruct these students using best-practice strategies, action research empowers educators to investigate causal relationships to improve their own teaching skills. In other words, action research is a tool that teachers use to examine their current practices in order to improve their methods to create optimal student learning.

The participant's RRB of repetitive questioning had three topics areas. The intervention for each topic area was introduced in a staggered timeline of three weeks apart. This provided three separate baselines and three separate independent and dependent variables at staggered intervals. Through showing the effect on the dependent variable at three different points within the experiment, experimental control was attained.

Participants

Alex is a 19-year-old Caucasian male diagnosed with high-functioning autism by an independent psychologist according to the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000). Prior to the age of nine, Alex's diagnosis was Pervasive Developmental Disorder-Not Otherwise Specified because although he exhibited severe impairment in social interaction and communication, he was lacking restricted, repetitive, and stereotyped patterns of behavior at that time. Once Alex started exhibiting restricted interests and repetitive behaviors, around the age of seven, his family physician changed his diagnosis to autism. At Alex's last comprehensive formal evaluation in April 2006, a neuropsychologist confirmed his diagnosis of high-functioning autism. At that time, Alex was administered the Wechsler Intelligence Scale for Children-Fourth Edition (Wechsler, 2003) in which he scored a 72 on the full scale IQ (average range 85-115). The subtests of this IQ score included his score for verbal comprehension that was 67, in the 1st percentile, and processing

speed that was 75, in the 5th percentile. Also included was the category of perceptual reasoning, a relative strength, with a score of 102, in the 55th percentile, with his lowest score in working memory with a 62, in the 1st percentile.

At the time of this study, Alex attended a transition program located in a self-contained school that serves students with disabilities, ages 3-21. This transition program is a full day program for individuals that are 18-21. There were eight female and eight male students in his class. The focus of the transition program is to teach job and life skills. Alex was learning how to manage and run a coffee shop, salad bar, and an auto detailing business, along with daily living and leisure skills. Alex had attended this self-contained school since the age of nine, except for two years, 2009 through 2011, in which he unsuccessfully attempted to integrate into the general education public high school. He was reluctant to socialize with his classmates because of his restrictive behavior. He is fixated on heavy metal music and thinks of himself as a metalhead, and only wished to socialize with other metalheads. As a result, he had no friends at the time of this study.

Alex's other restricted topics of interest in addition to heavy metal music included character qualities and relationships. Within these three topics, he will ask the same set of questions repetitively. The family reports that this behavior puts a strain on his relationships and limits his opportunity for other socialization. The staff at his school has observed similar behavior, and has indicated that, "he struggles with following directions and needs to pay more attention to instruction".

Alex's RRB mainly occurred in an unstructured environment; therefore, the behavior was mostly observable at home rather than at school. Alex lives with his mother, who is a special education teacher. He has two sisters that are grown and live outside of the home. Alex sees his

father every other weekend. Permission to participate in this study was sought through a parent consent form (see Appendix A).

Instrument

For the purpose of this study, the researcher created the *My Answers Guide* (MAG). The MAG is a pocket size notebook. The small size is essential so that it is easily transported in either the participant's pocket, or other portable pouches such as a purse, or backpack, or is clipped to the clothing. A small pen was attached with Velcro to the notebook. In order to teach self-management, it is important that the participant have easy access to the MAG. The cover is personalized with the title, "My Answers Guide" and with the individual's with ASD name printed as author. These simple requisites on the cover give ownership to the participant, which is a crucial element to the intervention. For each topic area, an individualized colored tab was fastened to the designated section of the notebook for ease of location. Each topic area was labeled with a tab. The first topic that was targeted for intervention was printed on the first label; the second topic that was targeted for intervention was printed on the second label, and so forth. Individual tabs were labeled starting with the day of intervention for that each specific targeted topic. For example, the tab for the Topic 2, Heavy Metal, was not labeled until week seven when intervention for that topic began. Likewise, the topic of Relationships was not labeled until week nine.

Procedure

The behavior targeted for this intervention was repetitive questioning. The participant, Alex, had three topics that he perseverated on, and within these topics, the questions that he repetitively asked were the target for this intervention. Alex's behavior in this area strained his personal relationships and prevented social growth. The goal was to decrease or eliminate the

questions that Alex asked through creating a personal resource reference tool called the MAG to support his memory. The case study consists of five phases: (a) baseline data collection, (b) pre-teaching the participant, (c) phase one intervention, (d) phase two intervention, and (e) phase three intervention.

Baseline data collection. The three topics that Alex perseverated on were Character Qualities, Heavy Metal, and Relationships. An example question in the Heavy Metal topic area was, "Can adults like heavy metal music?" However, for each question, paraphrasing was acceptable. For example, the same question could be asked in saying, "Heavy metal music is not just for teenagers, is it?" In this example, both questions were considered the same. The specific questions from each topic are available in the Appendix D.

It was determined that the appropriate environment to conduct the study was the environment where the behavior was mainly exhibited. This researcher collaborated with school staff and home caregivers and determined that the least structured environment was where the RRB was most likely to occur. Therefore, baseline data and intervention was collected and conducted in the home environment after school and on weekends, covering 35 hours per week (Monday-Sunday, 4:00p.m.-9:00p.m.). Although the participant spend more hours at home over the weekend, the data collection time periods on the weekend days remained the same as during the week days to keep the recording periods equalized for data analysis.

There were three questions targeted in each topic area. These questions were determined during the baseline data collection period. During the baseline data collection period, any questions related to the three main topics were recorded and given a tally mark for every repetition. The questions were then categorized into one of three focuses (see Appendix D). However, on an ethical basis, the participant was allowed to collect as many answers in his MAG

as he felt was useful. Once the targeted questions were decided upon, their corresponding answers were pre-planned for intervention. Baseline data was collected separately for each topic area over a three-week period immediately preceding intervention. For each time that Alex asked one of the targeted questions, a tally mark was given on the data collection sheet (see Appendix B). The total baseline data was collected over a nine-week period. Topic 1, Character Qualities, was collected weeks 1-3, Topic 2, Heavy Metal, was collected weeks 4-6, and Topic 3, Relationships, was collected weeks 7-9. The case study took place over a 12-week period.

Pre-teaching the participant. Due of the high-functioning ability of the participant, an important step was taken to explain the purpose and procedure of the MAG immediately prior to the start of the each intervention. The participant was informed that he was going to be given the help he needed in remembering information that he believed to be important. He was given examples of memory deficits using his own repetitively asked questions as examples. He was told that the MAG would give him a tool to refer to when he cannot remember previous answers. The response interruption and redirection method was explained to him, at his own level, as the practice that will help him to create his own MAG.

Phase one intervention. Intervention for Topic 1, Character Qualities, began at week-four of the study. The MAG was given to the participant with the instruction to keep it in his back pocket. The response interruption and redirection method was implemented during this phase. During this three-week period, every time the participant asked one of the targeted repetitive questions, he was interrupted and asked to write out the question in his MAG, in that designated topic's area. If the participant asked one of the questions in a slightly different manner, but it had the same meaning, the participant was asked to write that question down in alignment with the similar question. Once the participant had written the question down, the

researcher provided the predetermined answer, and asked the participant to write it verbatim under the corresponding question. Response interruption and redirection was also used when the participant asks an identical question to one already written in his book. The participant was prompted with the phase, "Do you have that answer in your MAG already?" or "Did you check your MAG before asking that question?"

Phase two intervention. Intervention for Topic 2, Heavy Metal, began at week seven of the study. The instruction was identical to phase one of the interventions, except the participant now had two topics labeled in his book. During this period, weeks 7-9, every time the participant asked one of the targeted repetitive questions, he was asked to write out the question in his MAG, in that topic's designated area. If the participant asked one of the questions in a slightly different manner, but it had the same meaning, the participant was asked to write that question down in alignment with the similar question. Once the participant had written the question down, the researcher provided the predetermined answer, and asked the participant to write it verbatim under the corresponding question. The response interruption and redirection was used when the participant asked an identical question to one already written in his book. The participant was prompted with the phase, "Do you have that answer in your MAG already?", or "Did you check your MAG before asking that question?" These prompts were only be used for Topic 2 questions, whereas Topic 1 questions were directly answered. This allowed for a maintenance check on previously learned behavior.

Phase three interventions. Intervention for Topic 3, Relationships, began at week ten of the study. The instruction was identical as in phase one and two of the intervention, except the participant now had three topics labeled in his book. During this period, weeks 10-12, every time the participant asked one of the targeted repetitive questions, he was asked to write out the

question in his MAG, in that topic's designated area. If the participant asked one of the questions in a slightly different manner, but it had the same meaning, the participant was asked to write that question down in alignment with the similar question. Once the participant had written the question down, the researcher provided the predetermined answer, and asked the participant to write it verbatim under the corresponding question. The response interruption and redirection was used when the participant asked an identical question to one already written in his book. The participant was prompted with the phase, "Do you have that answer in your MAG already?", or "Did you check your MAG before asking that question?" These prompts were only used for Topic 3 questions, whereas Topic 1 and 2 questions were directly answered. This allowed for maintenance data collection on previously learned behavior.

Data Collection

Baseline data was collected separately for each topic for a period of three weeks immediately prior to that topic's intervention. Baseline data was collected by documenting every question asked in regards to the specific subject and the frequency that each question was asked (see Appendix B). At the end of the three-week period, the top three repetitively asked questions were targeted for intervention. Interestingly, it was discovered that the entirety of all the repetitively asked questions were able to be worked into the answers to the three most frequently asked questions because they were essentially the definitions to these questions. These three questions were then given a check on the data collection form every time they are asked within a five-hour time frame (see Appendix C).

This intervention data was collected over three-week periods. The three repetitive questions, established during baseline data collection, were tallied during five-hour increments in the home environment. There were seven data collection periods per week as previously

indicated. Once the three-week period of intervention was completed, no further prompting was given to the participant for that specific topic question. However, data continued to be collected and monitored to record the maintenance effect. This data collection method provided a three-week baseline, three-week intervention, and three-week maintenance observation individually on the three separate topics for analysis.

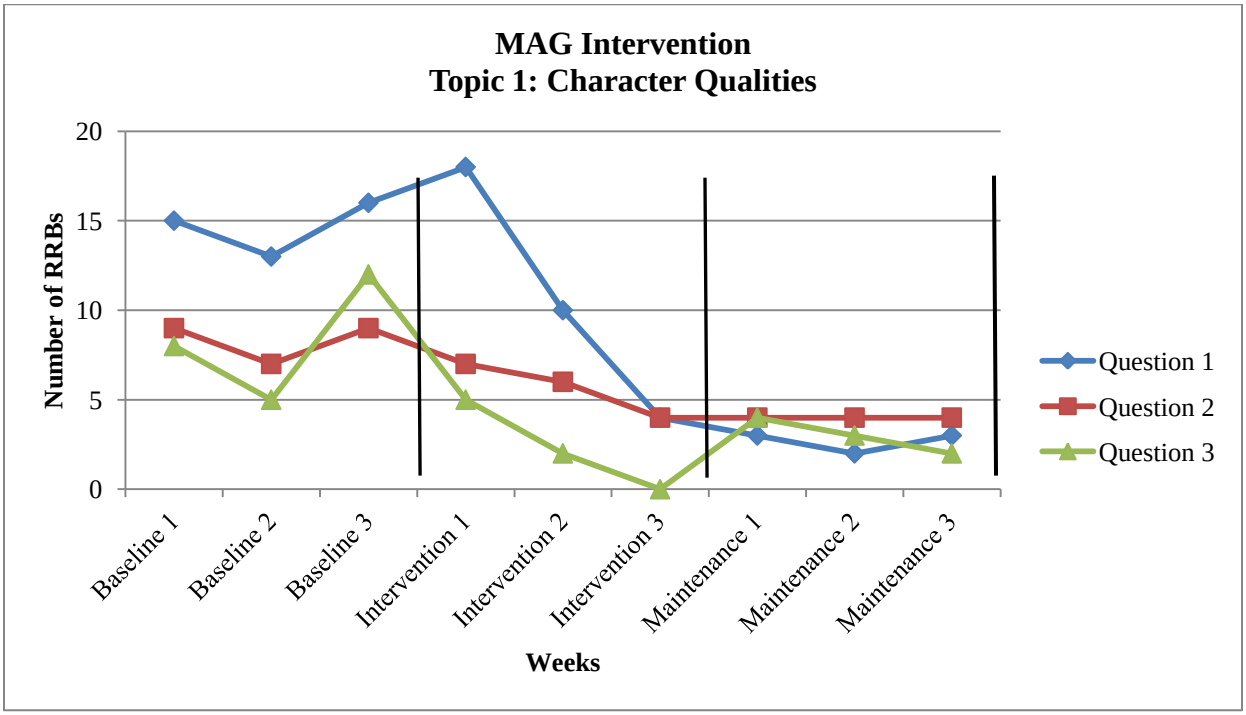
Data Analysis

Changes in the targeted behavior were separately calculated into mean scores for each of the phases of baseline, intervention, and maintenance within each question in all three of the Topics, Character Qualities, Heavy Metal, and Relationships. Through these mean scores, percentages of targeted behavior decrease were calculated between baseline and intervention, and between intervention and maintenance. Overall, the average reduction of repetitive questioning dropped 30 percent by the end of the intervention phase and a 66 percent improvement was achieved by the end of the maintenance phase.

The graph in Figure 1 below shows the results from the intervention in Topic 1: Character Qualities. The means for Question 1 was 15 for baseline and 11 for intervention. This represents a 27 percent decrease in repetitive questioning. The mean for the maintenance for Question 1 was three, which showed an 80 percent decrease from the baseline mean.

The mean for Topic 1: Question 2 was eight for baseline and six for intervention. This represents a 25 percent decrease in repetitive questioning. The mean for the maintenance for Question 2 was four, which showed a 50 percent decrease from the baseline mean.

Figure 1 RRB intervention for Topic 1: Character Qualities



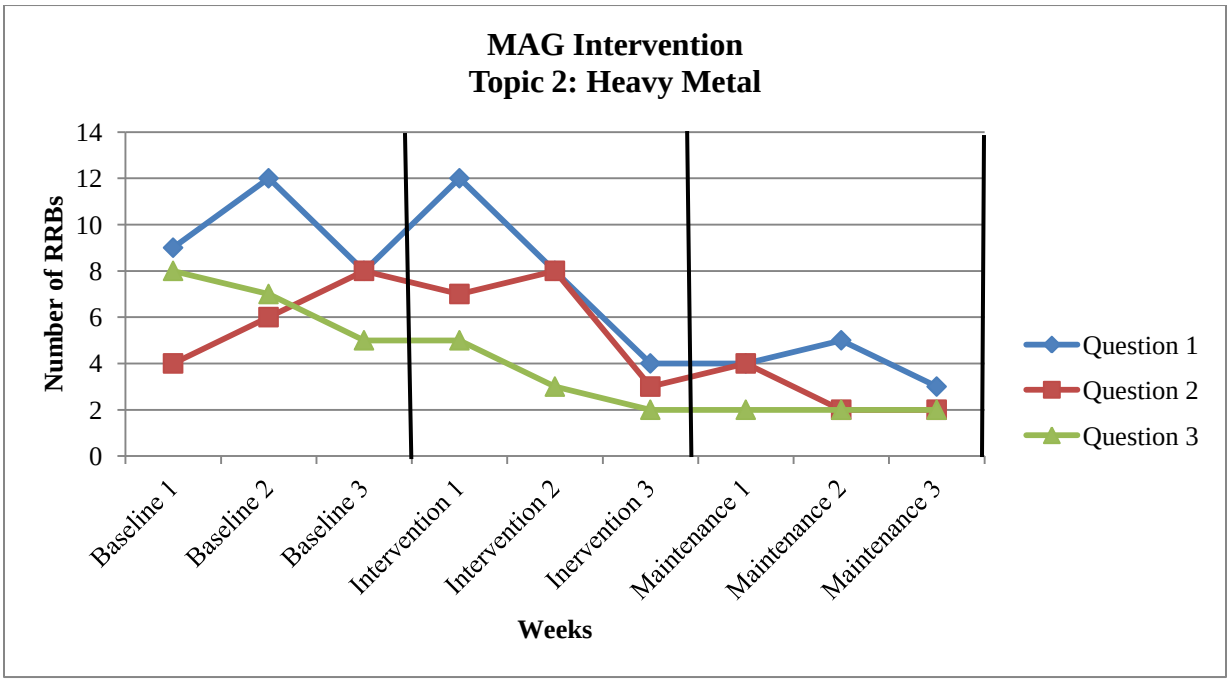
The mean for Question 3 was eight for baseline and two for intervention. This represents a 75 percent decrease in repetitive questioning. The mean for the maintenance for Question 3 was three, which showed a 62 percent decrease from the baseline mean. The overall average decrease of repetitive questioning for Topic 1 was 42 percent by the end of the intervention phase and a 64 percent decrease was achieved by the end of the maintenance phase.

The graph in Figure 2 below shows the results from the intervention in Topic 2: Heavy Metal. The means for Question 1 was 10 for baseline and 8 for intervention. This represents a 20 percent decrease in repetitive questioning. The mean for maintenance for Question 2 was four, which showed a 60 percent decrease from the baseline mean.

The mean for Topic 2: Question 2 was six for baseline and six for intervention. This represents a zero percent decrease in repetitive questioning. As shown below, this zero percent does not represent the final results for intervention and is this percentage is slightly

misrepresentative because of the significant drop during week three. The mean for maintenance for Question 2 was three, which showed a 60 percent decrease from the baseline mean.

Figure 2 RRB intervention for Topic 2: Heavy Metal

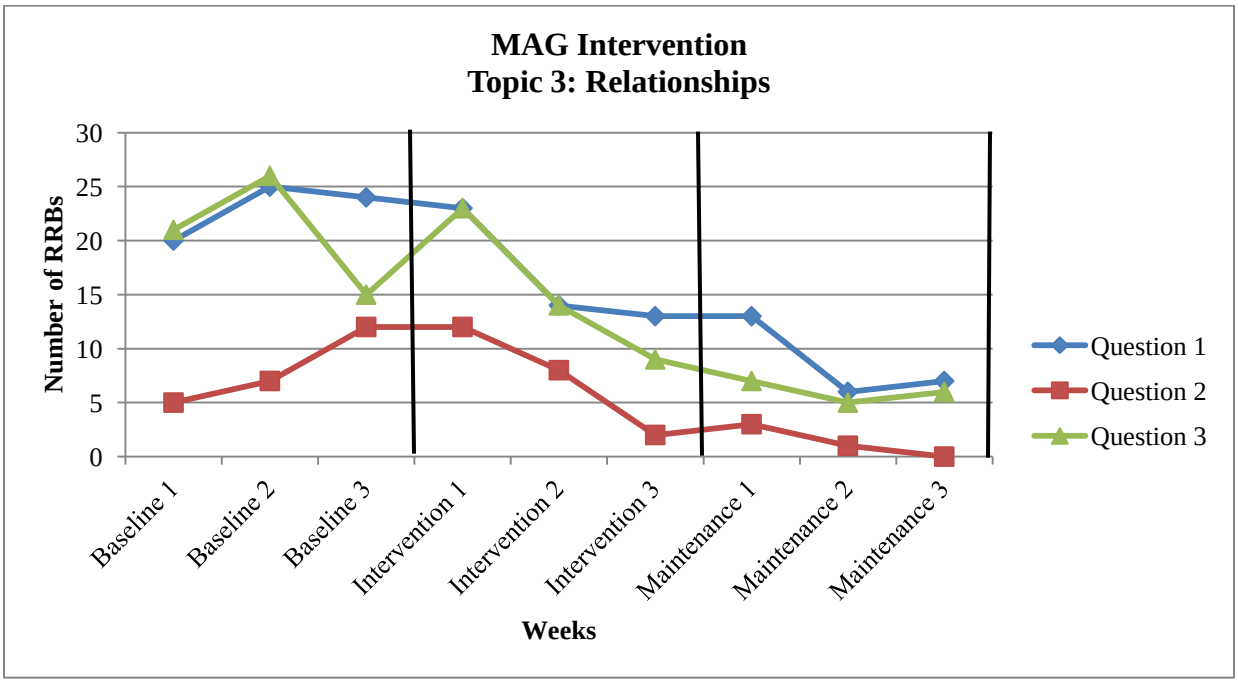


The mean for Question 3 was seven for baseline and three for intervention. This represents a 57 percent decrease in repetitive questioning. The mean for maintenance for Question 3 was two, which showed a 71 percent decrease from the baseline mean. The overall average reduction of repetitive questioning for Topic 2 was 26 percent by the end of the intervention phase and a 60 percent reduction was achieved by the end of the maintenance phase.

The graph in Figure 3 below shows the results from the intervention in Topic 3: Relationships. The means for Question 1 was 23 for baseline and 17 for intervention. This represents a 26 percent decrease in repetitive questioning. The mean for the maintenance for Question 3 was nine, which showed an 61 percent decrease from the baseline mean.

The means for Topic 3, Question 2 was eight for baseline and seven for intervention. This represents a 11 percent decrease in repetitive questioning. The mean for maintenance for Question 2 was one, which showed an 87 percent decrease from the baseline mean.

Figure 3 RRB intervention for Topic 3: Relationships



The means for Question 3 was 21 for baseline and 15 for intervention. This represents a 29 percent decrease in repetitive questioning. The mean for maintenance for Question 3 was six, which showed a 71 percent decrease from the baseline mean. The overall average reduction of repetitive questioning for Topic 3 was 22 percent by the end of the intervention phase and a 73 percent decrease was achieved by the end of the maintenance phase.

Conclusion

The purpose of this study was to examine if repetitive questioning decreases in an individual with high-functioning ASD with the use of the self-managed, written format tool MAG. This strategy was implemented to respond to the hypothesis that the participant's memory needed support in order to reduce this behavior. The results of this study show that a

significant decrease of 66 percent in repetitive questioning resulted when a MAG was used for intervention. The support of this hypothesis is consistent with the results in a prior study by Boucher and Lewis (1989) that suggested that repetitive questioning was the result of a memory deficit and not simply a RRB. Accordingly, what may appear to look like a nonfunctional characteristic of ASD could possibly be a symptom of a short-term memory deficit that can be easily accommodated to alleviate the strain on relationships and improve social interaction.

Practical implication for this research should be considered for school and home applications. While some RRBs may be functional and be a way of seeking to avoid or gain intrinsic or extrinsic attention or stimuli, this research suggests that further assessment of repetitive behavior is needed to guide the intervention selection. Trying to prevent or alter a repetitive behavior that is the result of a memory deficit is counter-productive to the wellbeing of the individual. RRBs that are a result of a memory deficit should be accommodated not restricted further.

The limitations of this study should be considered because it was limited to one participant using the MAG in its first trial ever. The participant had usable reading and writing skills and was able to utilize his skill for memory support. Other visual supports for lower-functioning individuals should be included in future research. Also included should be an extended follow up period to check for long-term maintenance results. Individuals with ASD have monumental challenges to overcome throughout their lives. Providing them with tools that strengthen their weaknesses, rather than using tools to extinguish inappropriate behavior, will improve their lives and promote appropriate social interaction.

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