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The effects of using perseverative interests or obsessions on token economies for individuals with autism spectrum disorder

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The Effects of Using Perseverative Interests or Obsessions on Token Economies for Individuals with Autism Spectrum Disorder

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Abstract

A single-subject, alternating treatments design with initial baseline testing was used to analyze the effectiveness of perseverative interests or obsessions as tokens within a token economy to change behavior. The literature examined in this paper presents several examples of how token economies are used to effect behavior change. Two research questions were addressed in this study; 1) What is the effect of incorporating perseverative interests or obsessions into a token economy designed to decrease problem behaviors? 2) What are the effects over time of incorporating perseverative interests or obsessions into a token economy compared to a traditional token (i.e., a token economy not aligned to a student's obsessions) economy for individuals with autism? The results from this study were inconclusive, as implementation of the intervention phase was not completed. The researcher reported data from baseline and training measures that showed a decrease in problem behavior and slight increase in target behavior when a traditional token economy was implemented. The data does not support any prediction for the implementation of the alternating treatments of a traditional token economy versus a token economy that utilizes a perseverative interest or obsession.

Key Words: alternating treatments design, autism spectrum disorder (ASD), obsessions, perseverative interests, token economy, elementary school

The Effects of Using Perseverative Interests or Obsessions on Token Economies for Individuals Autism Spectrum Disorder

Introduction

In the fields of special education and Applied Behavior Analysis (ABA), token economies have been utilized and applied in various settings and have several advantages in reducing inappropriate behaviors and increasing appropriate behaviors. Token economies are positive reinforcement programs that utilize conditioned reinforcers, generally tangible, in exchange for other back-up reinforcers, which often match the function of the defined behaviors (Cooper, Heron, Heward, 2007). For token economies to be effective, it is important to have target behaviors defined, reinforcers selected, and to establish the tokens as secondary reinforcers (Kazdin & Bootzin, 1972). Training with the subjects needs to occur before implementation, which generally includes modelling and vocal instructions on what the tokens access, what behaviors need to be exhibited, and what the criteria are for accessing the primary reinforcement.

Token economies are utilized with individuals and whole groups of people in contrived and applied settings, such as the general education and special education classroom setting. The advantages of these programs and the conditioned reinforcers used are bridging the delay between back-up reinforcement and the target response, reinforcing the response at any time, and can be used for maintaining responses over extended periods. Token economies are often individualized to each setting, individual, or group of individuals (Cooper, Heron, Heward, 2007).

Research has been conducted on different variations of token economies, such as differing reinforcement schedules, varying treatment packages, and various types of tokens (Carnett et al., 2014; Charlop-Christy & Haymes, 1998). This paper focuses on the manipulation

of the token used within the token economy, specifically targeting the use of obsessions and perseverative interests of individuals with autism spectrum disorder (ASD).

Statement of the Problem

With ASD affecting about 1 in 59 children, there is an increase in research on the symptoms and behaviors of individuals with ASD to better inform the families and individuals affected (Center for Disease Control and Prevention, 2019). However, there is a lag in research on identifying evidence-based interventions to treat problem behaviors or restricted and repetitive behaviors (RRBs; Boyd, McDonough, & Bodfish, 2012). The presence of restricted and repetitive behaviors, such as arm flapping, lining up toys for hours, following fan blades excessively, can have a negative impact on learning and socialization of individuals with ASD (Boyd, McDonough, & Bodfish, 2012).

While RRBs could have a negative impact on learning and socialization, several studies, such as Charlop-Christy and Haymes (1996 & 1998) work, have taken these perseverative and obsessive interests and applied them to token economies to decrease inappropriate or maladaptive behaviors. The main problem lies in the fact that there is limited research on the effects of using these perseverative interests or obsessions in a token economy across an extended period.

Purpose of the Study

The purpose of this study is to extend the work of previous studies in the use of perseverative-base interests and obsessions as tokens in token economies for individuals with autism. This study first determines the preferences and perseverative interests that occur the most often in individuals with ASD, and possible RRBs exhibited by individuals with ASD. Then, the study focuses on defining the individual student's target behaviors. Additionally, the researcher

would like to examine the effect of using traditional tokens versus perseverative interests as tokens on the effectiveness of behavior change. The researcher would also like to investigate the effects of a traditional token economy and a token economy utilizing perseverative interests across an extended period.

The token itself has received limited attention in the research literature (Carnett et al., 2014). This study investigated further the effectiveness of utilizing perseverative interests of individuals with ASD to increase the reinforcing value of the token (Charlop-Christy & Haymes, 1998). The research examined the following questions:

- What is the effect of incorporating perseverative interests or obsessions into a token economy designed to decrease problem behaviors?
- What are the effects over time of incorporating perseverative interests or obsessions into a token economy compared to a traditional token (i.e., a token economy not aligned to a student's obsessions) economy for individuals with autism?

Literature Review

The literature review examines prior research investigating token economies for individuals with ASD, use of perseverative interests or obsessive behaviors as tokens, and use of obsessions as reinforcers. The literature includes scholarly articles, peer-reviewed journals, and education and psychology textbooks which were found using the research database on JMU Library Catalog, ERIC, Psychology and Behavioral Sciences Collection, prior class materials and Google Scholar. The descriptors used in the research were: perseverative interests, token economy, obsession, tokens, reinforcement, autism spectrum disorder, repetitive behaviors, perseverative interests or obsessions and token economies, token economies and autism,

obsessions and token economy and reinforcement, perseverative interests or obsessions and token economies and autism.

The initial database search produced over 2,000 studies, meta-analyses, and reviews of perseverative interests and token economies. The researcher then narrowed the results to 805 studies with the word 'autism.' Narrowing the search results required the use of effects of obsessions, perseverative interests as tokens, effects on appropriate behavior, token economy with participant's interests. The search yielded a total of five studies directly related to the use perseverative interests or obsessions within token economies (Carnett, Raulston, Lang, Tostanoski, Lee, Sigafoos, & Machalicek, 2014; Charlop-Christy, & Haymes, 1996; Charlop-Christy, & Haymes, 1998; Harrop, Amsbary, Towner-Wright, Reichow, & Boyd, 2019; Hung, 1978). Four out of the five studies were focused on implementing token economy interventions with individuals with autism (Carnett, et al., 2014; Charlop-Christy, & Haymes, 1996, Charlop-Christy, & Haymes, 1998; Hung, 1978). The researcher included one study outside direct implementation of token economies due to the systematic review of information provided on restricted and repetitive behaviors in individuals with autism (Harrop, et al., 2019).

Token Economies and Autism

Research has established that token economies have established benefits, but there is limited research on the effects of token reinforcement on the behaviors of individuals with ASD (Tarbox, Ghezzi, & Wilson, 2006). Many studies have shown that the establishment of conditioned reinforcers such as tokens could have significance in behavior change programs for children with autism (Tarbox et al., 2006). According to Cooper et al. (2007), the basic steps to designing and preparing to implement a token economy are:

1. Select tokens that will serve as a medium of exchange.

2. Identify target behaviors and rules.
3. Select a menu of back reinforcers.
4. Establish a ratio of exchange.
5. Write procedures to specify when and how tokens will be dispensed and what will happen if the requirements to earn a token are not met.
6. Field-test the system before full-scale implementation.

Tokens within this behavior intervention should be durable, accessible, inexpensive, and not desirable (Cooper et al., 2007). However, this contradicts the findings in the following review and studies, which align interventions with subjects' perseverative interests or obsessions. Thus, the research gap remains in the use of obsessions and perseverations to further interest the participant into the token economy and improved student performance.

Circumscribed Interests and Autism

A review completed by Harrop, Amsbary, Towner-Wright, Reichow, and Boyd investigated incorporation of circumscribed interests (CI) in interventions for individuals with ASD. Circumscribed and restricted interests are described as a focused and intense interest in a narrow range of items and are considered a subcategory of restricted and repetitive behaviors that occur most commonly in individuals with ASD. The researchers described CI of typically developing individuals, like Legos and computers, and CI that are less functional and less age-appropriate, such as washing machines and clocks.

The researchers used a systematic review recommended by the Cochrane and Campbell Collaborations and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis. A total of 246 articles were assessed for eligibility and of those, 31 studies were eligible for analysis. The criteria for the review were based on the study population, intervention, design,

and the outcome variables. The study population must have reported that the child has a label or diagnosis of ASD, with an exclusion of subjects with comorbid genetic diagnosis (Fragile X) or if ASD was not the primary diagnosis. Intervention criteria was focused on interventions using CI as intervention delivery and/or reinforcement. All studies that were included in the review included at least one outcome directly related to subject behavior, such as social, adaptive cognitive, communication, etc.

The results of this review indicated that the use of CI within interventions had positive outcomes in a variety of domains for individuals with ASD. The researchers found that the incorporation of individualized interests and/or designing interventions around these interests is a "strength-based approach" to teaching individuals with ASD. While it was determined that CI are an understudied area of ASD, they are clinically relevant and important for treatment. This review determined that further research needs to be conducted on how subject interests can be best incorporated within large-scale trials and the effects of the incorporation of interests into interventions overtime, to study generalization and maintenance (Harrop et al., 2019).

Perseverative Interests or Obsessive Behaviors as Tokens

The incorporation of obsessive behaviors and obsessions into social skills instruction, according to Baker, Koegel, and Koegel (1998), suggest that it could be successful in two ways: 1) produce interest in appropriate behaviors and activities, and 2) intrinsic motivation in the intervention could be the result of the obsessive behavior. Often, the obsessive themes of children with ASD are viewed as problematic can be transformed into positive social skills instruction and behavior change programs (Baker et al., 1998). Attempts to show this transformation are in the following studies.

In a study by Charlop-Christy and Haymes (1998), the researchers compared the use of tokens based on obsessions with the use of typical tokens for children with autism. Three participants with autism in an after-school behavior management program participated in the study. The ages ranged from 7.9 years to 9.2 years. These participants were selected based on the pervasive lack of motivation to work, engagement in off-task and self-stimulatory behaviors, as well as exhibiting obsessions over specific objects, all of which were determined by parent and teacher reports. A multiple baseline design across children, with an additional within-child reversal analysis (ABAB) was utilized in this study. The baseline (A) was the token economy with typical tokens(i.e., stars) traded in for food, and the intervention (B) was the token economy with obsessions as tokens (e.g., beads and trains) traded in for food. For each participant, the obsession token remained the same for each implementation of condition B. The intervention included a 15-minute work session with selected tasks, present in varied orders. The researcher provided vocal praise and a token for correct responses and would for an incorrect response the researcher would say, “Let’s try again” and provided a correction trial.

Data was collected on task performance each session, which measured the percentage correct on task. The results showed that with tokens based on obsessions, all the children met the 80% correct criterion quickly. The data also indicated that there were marked decreases in inappropriate behaviors while using obsessions as tokens. Overall, the study provided more information on the use of using obsessions or perseverations as reinforcers as opposed to traditional reinforcers (Charlop-Christy and Haymes, 1998).

A study completed by Carnett et al. (2014) investigated the effects of a token economy intervention that either did or did not make use of the subject’s perseverative interests. One participant, a 7-year-old boy diagnosed with autism in elementary school, participated in the

study. It was reported by his special education teacher that he engaged in challenging behaviors, such as screaming, falling, and/or lying on the floor too frequently to participate in an inclusion classroom, which was required by his individualized education plan (IEP). The researchers compared the effects of the two token economies using alternating treatments with an initial baseline design. The intervention included a preassessment of the participant's challenging behaviors using the Questions About Behavior Function (QABF) Scale (Matson, Tureck, & Rieske, 2012), five baseline sessions, 11 intervention sessions, and 3 generalization probes. Baseline and intervention phases were conducted in the life skills classroom, while generalization probes occurred in the inclusion classroom. The results of this study replicated and extended the findings in Charlop-Christy & Haymes (1998) by showing that interventions (token economies) that are aligned with perseverative interests or obsessions can reduce challenging behaviors and increase appropriate target behaviors more effectively than an intervention without perseverative interests. The researchers also suggested that future research focus on investigating the extended use of a traditional token economy compared to the perseverative-based interest token economy, which is critical to the inspiration of this research study.

Obsessions as Reinforcement

A study completed by DW Hung (1978) investigated the reinforcing effects of using self-stimulatory behavior for spontaneous utterances. This intervention investigated the number of spontaneous vocal utterance per hour. Two participants, diagnosed with autism, with ages of 11.9 years and 10.2 years, were selected for this study. This study was conducted at a three-week summer camp, where both boys were enrolled in activities to improve their communication skills. They were also selected because most of the subject's free time was used by themselves

and they both exhibited self-stimulatory behaviors (e.g., rocking back and forth repeatedly). A reversal (ABABA) design was utilized, in which in which condition A was the condition where the subject would be allowed to engage in self-stimulation contingent upon engaging in a correct vocal response, and condition B the subjects were allowed free access to self-stimulation. In condition A the subject received one token for each spontaneous appropriate sentence and paid two tokens for every two minutes of self-stimulation. In condition B, the subject no longer required tokens to engage in self-stimulation but was only allowed to engage in self-stimulation during non-structured times. While the tokens were not considered the independent variable in this study, the contingency or association of the token and self-stimulation differed.

The results of this study displayed that the rate of vocal utterances increased when self-stimulation was contingent upon the responses. The results also indicated not only can self-stimulatory behaviors be controlled, but also used as reinforcement, and self-stimulation or perseverative interests might just be as potent and effective than food, in its reinforcing effects (Hung, 1978).

A study completed by Charlop-Christy and Haymes (1996) investigated the efficacy of using obsession of children with ASD to reduce their inappropriate behaviors. Obsessions were used in isolation and in conjunction with mild reductive procedures to decrease the inappropriate behaviors. Four participants with autism in an after-school behavior management program participated in the study. The participants' ages ranged from 5.5 years to 6.10 years. According to the researchers, the children were selected to participate based on parent and therapist reports on inappropriate behaviors such as severe tantrums, throwing furniture, aggression, stereotypy, and material destruction.

A multiple baseline across children was used to assess three different treatment conditions: (1) obsessions as reinforcers contingent upon the nonoccurrence of inappropriate behaviors, (2) obsessions as reinforcers for the nonoccurrence of inappropriate behaviors plus mild reductive procedures, and (3) food reinforcement for nonoccurrence of inappropriate behaviors, coupled with mild reductive procedures. The results indicated the use of obsessions and obsessions with mild reductive procedures were the most effective in decreasing inappropriate behaviors. The highest occurrence of inappropriate behaviors was during the food reinforcement phases of the experiment. Therefore, obsessions as reinforcement with a contingency of the nonoccurrence of inappropriate behaviors were the most effective in the reduction of inappropriate behaviors, and the use of these obsessions may be a pragmatic approach for the treatment of problem behaviors in children with autism (Charlop-Christy & Haymes, 1996).

While this study utilized a multiple baseline design across participants, it continued the research of Hung (1978) by using obsessions as reinforcement. Utilizing a previously conditioned reinforcer (obsession) for children with ASD, within a token economy was shown to increase the on-task behavior at a higher level when compared to the typical token economy. This study also emphasized the importance of identifying the participants' reinforcers or obsessions prior to the start of the study (Charlop-Christy & Haymes, 1996).

Research Gap

After conducting the literature review, there were multiple studies that investigated the implementation of perseverative interests and obsessions into a token economy, either as reinforcement or as the token itself within applied and clinical settings. However, there is a limited amount of research that focuses on and demonstrates the effects of continued use of these

token economies with individuals with ASD over time. The researcher hopes to replicate the findings of Charlop-Christy and Haymes (1998) and Carnett et al. (2014), and to expand the research on the extended use of the interventions, to assess generalization and maintenance of behaviors, through this study.

Method

Participants and Selection Criteria

The target participants for this study were elementary school-aged students, ranging from five years old to ten years old. Other criterion for the study were students with a diagnosis of autism spectrum disorder (ASD) or students who were going through the evaluation process for special education services for ASD and exhibited perseverative interests or obsessions of an item or topic. There was no criterion for the type of obsession or perseverative interest. The target population included students who participated in the general education and/or the special education setting.

Purposive sampling was utilized in this study, which means the researcher used personal judgement to select a sample population (Fraenkel, Wallen, & Hyun, 2019). The researcher collected information regarding diagnosis, discipline reports, and instances of problem behaviors using the students' cumulative file, teacher reports, and medical diagnoses. Within the cumulative file, the researcher collected data on any Individualized Education Plans (IEPs), 504's, and/or Behavior Intervention Plans (BIPs) that have already been utilized in the school setting. Once the researcher collected the needed information from the files, one participant was selected based on the severity of the obsessions or perseverative-based interests. Severity was determined based on teacher reports and teacher interviews conducted by the researcher. This sample selection was also guided by the student's need of a behavior intervention, based on

problem behaviors identified by professionals and colleagues in the school setting. The researcher selected one participant from the school. Initially, two participants were selected however, due to external circumstance describe below, one participant was excluded.

Participant description. VS was six-year-old, first grade, elementary school participant who had been served in a self-contained special education classroom since kindergarten. VS met all selection criteria outlined above for participation in this study. Reported by his IEP and teacher, he was diagnosed with developmental delay and speech and language impairment at age four in 2017 and was currently undergoing more educational testing with a suspected diagnosis of ASD, and he was also being evaluated for an intellectual disability and a speech impairment. VS was able to form short sentences, consisting of 3-5 words, however his words were muffled, and most were intelligible. During the study, VS was reevaluated through an IEP team and continued to be eligible for special education services under the label of ASD and a speech impairment. VS also exhibited perseverative interests or obsessions of an item or topic, such as matchbox cars, and participated in both the special education and general education settings. VS spent approximately 80% of his school day in his special education classroom, and around 20% in the general education setting, which was in specials, such as gym, art, music, and technology.

Another potential participant was selected at the beginning of the study due to his diagnosis of ASD. However, after further discussions with the parent and teacher, the student was not asked to participate. This was due to the fact that the student was utilizing 2-3 token economies in both the school and home setting. The researcher did not want to interrupt the current success and progress of that student.

The researcher was a full-time graduate student working towards a Master of Education degree with a behavior specialist concentration. The researcher previously acquired a Master in

the Art of Teaching for special education K-12 general curriculum. One peer in the same concentration as the researcher served as a researcher assistant for the purpose of interobserver agreement data collection.

Setting

The researcher conducted the study at a local public elementary school that serves students from preschool to sixth grade in the United States. The elementary school was located in a small rural town in the eastern part of the United States. The student selected for the study participated in a self-contained, special education classroom setting, with at least six other students with intellectual and/or physical disabilities. This classroom setting contained a large, kidney-shaped table in the middle of the classroom, where the lead teacher would provide most of the instruction. Around the classroom, there were a multitude of assistive devices, such as wheelchairs, lifts, changing tables, etc. Also, in this setting, there were three areas of play: 1) kitchen and library area, 2) smart board area, and 3) calm down, quiet area.

Within this study, there were data collected for generalization in an alternative setting, which was the PE gym. This setting consisted of two general education classrooms, which included an approximate total of 45-60 students, with two PE teachers present, as well as one paraprofessional assigned to the participant. The gym was a wide-open classroom, with exercise materials spread out on the floor around the perimeter of the room. The boundaries of the gym floor were outlined using purple tape.

Each phase of the study was conducted in that specific classroom setting with the lead teacher, three paraprofessionals, one supervising Board-Certified Behavior Analyst (BCBA) and the researcher. During the study, other related service providers, such as occupational

therapists, speech therapists, and guidance counselors would enter the classroom setting at different times. The researcher sat or stood next to the student during each session.

Data

Prior to collecting data, the researcher used a researcher-designed severity scale (Appendix A). This severity scale was designed using information from the Repetitive Behavior Scale for Early Childhood (RBS-EC) (Wolff, Boyd, & Elison, 2016). The scale was used to determine the participant's interests or obsessions, how often these interests occur, and how they impact the participant's learning in the classroom. The researcher used the data collected from this severity scale to inform decisions on interests to use in the token economy intervention phase. The severity scale had a total of nine questions which were used to identify the perseverative interest and determine the impact on instructional time and social interactions.

As seen in table 1the teacher reported that VS had limited and intense interests in cars and puzzle balls, a strong attachment to cars, as well as having a fascination with movement of cars. The teacher also reported on the severity scale that those three behaviors, previously mentioned, occurred multiple times per day. Another behavior reported was VS's sensory interests toward hitting others and pressure from others on his body, which occurred multiple times per day. The researcher notes that the "hitting others" behavior may serve a different function than seeking pressure. Hitting may also serve as a way to get another peer's or staff's attention.

Table 1

Perseverative Interest Severity Scale Results: Restricted Interest or Behavior

Restricted Interest and Behavior category	**Rating 0-behavior does not occur to 4-behavior occurs multiple times per day**	**Listed Interests**
Limited & intense toward items	4	Cars Puzzle balls
Sensory Interests	4	Hitting pressure
Preoccupation with parts of objects	0	N/A
Strong attachment to specific items	4	Cars
Fascination with movement of objects	4	Movement of Cars

In table 2, the researcher reported of the ratings the participant's teacher are provided on how the restricted interests or behaviors impacted the student's activities, learning and time spent in class. The data show that VS's behaviors always require redirection during instruction, and often interferes with social interactions between peers and teachers. However, the behaviors never warrant the removal from the classroom environment. The researcher used the data to inform decisions made about when to implement the intervention. The teacher reported that VS's perseverative interests interfere with social interactions, thus, the researcher planned to implement intervention during semi-directed play to see the effect on social interactions and redirections.

Table 2

Perseverative Interest Severity Scale Results: Impact of Behaviors

Question	Rating
Redirection during instructional time	4- Always
Interfering with social interactions between student and peers	3-Often
Interfering with social interactions between student and teachers	3-Often
Removal from the classroom	0-Never

An informal interview prior to baseline and intervention was conducted with the participant's teacher. This interview informed the researcher on what problem behaviors and target behaviors would be used for the scoring procedure. The problem behavior was defined as any instance of the student engaging in any incident of inappropriate physical contact (pinching, hair pulling, flicking, hitting, punching, laying on top of, or bear hugging) with another student or teacher. The target behavior was defined as when the student wants another peer or staff member's attention, he would tap the person on the shoulder or hand. Once defined, the researcher used a researcher-developed frequency recording data sheet (Appendix B). The data collection sheet included an operational definition for both the problem behavior and the appropriate behavior to enhance the reliability of the measurement. The duration of each observation period was 10 minutes. The researcher stored all the deidentified data in a locked file box housed in the Exceptional Education department and data were transferred from hard-copy sheets into Excel spreadsheets after the session concluded. The Excel spreadsheets file was stored on a USB thumb-drive, which was also located in the locked file box.

Design

The purpose of the study was to extend and replicate the work of previous studies in the use of perseverative interests or obsessions as tokens in token economies for individuals with autism (Carnett et al., 2014; Charlop-Christy & Haymes, 1998). The researcher aimed to investigate the effect of traditional tokens versus perseverative interests as tokens on the effectiveness of behavior change across an extended period. The change in behavior was measured using frequency data collection, which was created by the researcher. The data were compared using the design below.

The token economy interventions were compared using an alternating treatments design with initial baseline measures similar to that of Carnett et al. (2014). The alternating treatments phase was conducted in the self-contained, special education classroom described previously. The treatment phase was conducted in the special education classroom, the same as the baseline phase, but there was a probe in an alternative setting. The alternative setting for the participant was in the aforementioned PE gym, where the token economy would generalize. After the alternating treatment phase, a generalization probe was conducted in the alternative setting. The following six conditions were held constant across all three phases: (1) session duration (10 minutes), (2) type of sticker(s) used , (3) the backup reinforcers available, (4) number of opportunities for exchange of tokens, (5) time of day of sessions, and (6) activities the student engages in the classroom.

The stickers used in the study for the traditional token economy, which was implemented in training, and was to be implemented in the intervention phase, was a picture of a yellow star. This picture of a yellow star was a one and a half inch, laminated square that had velcro on the back, in order to be attached to the token board. For the perseverative interest token economy,

which was to be implemented in the intervention phase, the stickers created were pictures of a red race car. This picture was also laminated and had a piece of velcro on the back to be attached to the token board. The red race car was chosen based on anecdotal data collected from the teacher. The teacher reported that the red car in the toy bin was the car he most often chose to play with and the one that he did not allow others to have. The token to be used in the perseverative interest token economy was determined through the researcher-designed severity scale.

The backup reinforcers available to the participant during training and intervention were cars, M&Ms, and a fidget chain. These were determined through the multiple stimulus without replacement preference assessment described in a later section. Baseline, training, intervention, and generalization were all scheduled to be implemented between the hours of 11:30 AM and 1:00 PM. The window for implementation is large, because the participant's schedule for related services changed daily. As for the activities, the participant engaged in semi-directed play during all sessions and phases of the study. The lead teacher utilized technology (smart board), and the toys around the classroom to engage the participant in play activities. The participant engaged in these activities with the peers in his classroom as well as the teacher and paraprofessionals present.

A brief multiple stimulus without replacement preference assessment was used to select 1-3 items to be used as backup reinforcers (University of Missouri, 2011). The researcher conducted this assessment prior to token economy training and intervention and used knowledge collected from the cumulative file and teacher reports to guide the item selection. The highest ranked item(s) on the assessment were used as the backup reinforcers. For the intervention using perseverative interests or obsessions as tokens, teacher reports and the researcher-designed

severity scale were used to identify 1-2 items that would act as the actual token in the alternating treatments design. (See Appendix A).

The preference assessment was conducted with VS over five sessions across three consecutive days. Items used for the preference assessment were cars, M&Ms, goldfish, playdoh, and a fidget chain. These items were selected based on teacher interview and severity scale completion. The fidget chain was a novel item. The results from the preference assessment showed that VS's highest preferred items were the fidget chain and M&Ms, and his moderately preferred items were cars. These three items were used as choices for backup reinforcers for training and intervention sessions. While there was a discrepancy between the perseverative interest reported by the teacher in the perseverative interest severity scale and the preferred items chosen in this assessment, the researcher noted that novel items (i.e., fidget chain and M&Ms) were introduced for the preference assessment.

The results of the preference assessment are reported in table 3. The results show the sum of the number of trials that each item was chosen by the participant. If the item was chosen first it was assigned the number one, second, the number two, third, the number three, and fourth, the number 4, and if it was chosen last, it was assigned the number five. Once the five sessions of the preference assessment were completed, the researcher calculated the sum of trials per item and produced the numbers in table 3. According to the preference assessment, the highest preferred items had the lowest summed trial numbers, the moderately preferred items had the middle-summed trial numbers, and the lowest preferred items had the highest summed trial numbers. Based off the data, the highest preferred items were the fidget chain and M&Ms, the moderately preferred item was cars, and the least preferred items were playdoh and goldfish. The researcher planned to use the first three items for the training and intervention phases of the study.

Table 3

Preference Assessment Results

Item	Fidget Chain	M&Ms	Cars	Playdoh	Goldfish
Sum of trial numbers for each item	7	11	14	20	23

Procedure

COVID-19 pandemic disclaimer. In the middle of March 2020, the COVID-19 virus was labeled a pandemic for the nation and the state governor was ordered to close all K-12 schools, which included the school used in this study. Due to the school closures, the alternating treatments phase and the social validity survey was not implemented. The researcher had no control over the circumstances stated above.

Baseline. During this phase of the study, the participant engaged in a pro-social classroom activity, such as requesting attention from peers or staff members, as he usually did while at school. The participant was not utilizing a token economy at this point in the study. Teachers, paraprofessionals, and other personnel were instructed to not change their routine during baseline measures. Data were collected on the occurrences of the appropriate target behavior and inappropriate problem behaviors during a 10-min block of instructional time. Baseline was conducted across roughly five sessions or until stable responding was determined. Baseline sessions occurred across two school weeks. Five out of the six sessions were conducted in the participant's self-contained, special education classroom as described above, and one session was conducted in an alternative setting. This alternative setting for the participant was in the physical education (PE) gym, where the token economy was targeted to generalize. The researcher used the researcher-designed data collection sheet outlined in the data section above.

Preference assessment. A brief multiple stimulus without replacement preference assessment was used to select 1-2 items to be used as backup reinforcers. The highest ranked item(s) on the assessment were used as the backup reinforcers. As stated above, interests and/or obsessions identified in the severity scale were used in the token economy intervention with perseverative interests. The preference assessment was not counted in the training or intervention session time. (See Appendix D)

Token economy training. Token economy training was conducted for approximately five days following the baseline condition. During this training the participant learned to use the token economy, specifically how to earn and exchange tokens for the backup reinforcer. Training was conducted with the participant approximately 10-15 minutes per training session. Training was conducted by the researcher and took place in a small office space outside of the participant's classroom. Training consisted of the researcher introducing the token board and explaining the purpose of the tokens. The researcher said, "We are going to use a tool to earn tokens and rewards for good behavior. Remember when you earn a token, you put it on the board. Once you earn three tokens, you can exchange it for a prize!" The participant was able to earn the backup reinforcers identified by the preference assessment, which were the fidget chain, M&Ms, and cars. The participant was given one minute to manipulate the token board (i.e., look at, touch, play with the tokens, etc.). Then the researcher asked the participant, "What do you want to work for?" and the participant chose an item picture from the reinforcer list. Then the researcher provided the participant with a non-aversive task direction (e.g. Hand me ____, Sit here, Write your name). When the participant provided an appropriate response to the task direction a token was given to the participant immediately. When the participant earned three tokens, the researcher instructed the participant to exchange the tokens for a backup reinforcer.

This process continued until the duration of the training session had ended. During the training sessions, the researcher also collected frequency data using the same instruments outlined in the data section. The target behavior and problem behavior were the same across phases.

Token economy without and with perseverative interest. The same procedure was to be used for both token economy interventions, except for the type of tokens utilized. The participant would have earned a token for each occurrence of the appropriate target behavior within the 10-min time block. Once VS would have earned three tokens, he would have exchanged it for the backup reinforcer. For the traditional token economy, a picture of a sticker was to be used on a token board, and for every occurrence of appropriate target behavior, the student would receive a token. The pictures were to be controlled by the researcher using the same token throughout the entirety of the intervention, which were yellow stars. In the perseverative interest token economy, the researcher replaced the sticker tokens with a picture of the perseverative interest or obsession (e.g., unicorns, minions, Frozen, etc.). After earning three tokens, the participant would have exchanged the tokens for the backup reinforcer, which was identified by the preference assessment prior to intervention. The participant would have been given a choice between 1-3 items as the backup reinforcement and chose it prior to the session starting. These choices were between cars, a fidget chain, and M&Ms. The researcher would have given VS approximately 1-2 minutes to interact with the backup reinforcer before returning to the instruction or activity. Once the tokens were exchanged the process would have repeated for earning tokens.

The alternation of treatments was scheduled to be conducted in semi-random fashion, determined by a random sequence generator. The number one was assigned to the perseverative interest token economy, and the number two was assigned to the traditional token economy. The

sequence of at least 10-15 sessions were predetermined prior to intervention implementation. However, due to the COVID-19 pandemic and school cancellations, the researcher was not able to implement the above procedures with the participant.

Generalization. After the intervention phase of the study, the generalization of the skill would have been assessed by conducting a probe in the alternative setting. Prior to conducting the generalization probe in the third phase of the study, the researcher would have chosen the best treatment, which would have been the intervention that was associated with most appropriate target behaviors and the least problem behaviors in the intervention phase. The best treatment would have been implemented in the alternative setting (PE gym). Data would have been collected during a 10-min instructional time block using the same data sheet that was used in baseline and the intervention phases. However, this phase of the study was not implemented due to the COVID-19 pandemic and school cancellations.

Teacher Questionnaire. After the study concluded, teachers would have been asked to provide answers to a series of questions related to the effectiveness of the two token systems. These questions related to the impact on the behavior change. The teacher questionnaire had a total of five questions, as seen in appendix C. The researcher would have used the data collected from the questionnaire to determine social validity of the study. The teacher questionnaire was not implemented due to the COVID-19 pandemic and school cancellations.

Reliability. To ensure the data collection procedures were reliable, the researcher conducted trial-by-trial interobserver agreement (IOA) using a research assistant in several sessions. IOA is defined as “the degree to which two or more independent observers report the same observed values after measuring the same events” (Cooper et al., 2007). IOA was calculated using by the following formula (Cooper et al., 2007):

Number of trials (items) agreement X 100 = Trial-by-trial IOA %

Total number of trials (items)

The mean agreement for both variables is required to be at or above 80% to show reliability of measurement. IOA data was collected across 33% of all baseline sessions, which was a total of two out of six sessions. Utilizing the above formula, the researcher calculated that IOA yielded 100% agreement for baseline sessions. IOA data collection was not conducted for intervention sessions because of COVID-19 and school cancellations.

Procedural fidelity. The researcher remained the sole implementor of the baseline and training phases of the study. Procedural fidelity was assessed in 30% of all training conditions through in person fidelity checks, completed by the research assistant(s). The research assistant used a researcher-designed fidelity checklist, with the requirement of 90% of all steps correctly implemented (Appendix E). For VS, the research assistant conducted procedural fidelity the researcher's implementation of the training for 100% of the training sessions. Using the checklist created in appendix E, the researcher calculated procedural fidelity as 100% accuracy across all training sessions.

Social validity. Social validity was going to be assessed by asking the participant's teacher(s) to complete a researcher-designed questionnaire (Appendix C), which would have been provided at the termination of the study. The purpose of the questionnaire was to determine if teachers noticed any changes in behavior, if the token economy was feasible for implementation, and how likely teachers would be willing to implement the procedure in the classroom. The questionnaire was not able to be administered due to the COVID-19 pandemic and school cancellations.

Ethical Approval

All the procedures performed in this study were in accordance with the ethical standards of the institutional review board by James Madison University. The researcher began implementation after acceptance from the review board.

Informed Consent

The researcher obtained informed consent from legal guardians for all individual participants included in the study. The researcher also obtained child assent for the individual participant included in the study.

Results

Two research questions that directed this study were 1) what is the effect of incorporating perseverative interests or obsessions into a token economy designed to decrease problem behaviors, and 2) what are the effects over time of incorporating perseverative interests or obsessions into a token economy compared to a traditional token (i.e., a token economy not aligned to a student's obsessions) economy for individuals with autism? The data collected from baseline and training are limited, however they are imperative to understanding that token economies, regardless of incorporating perseverative interests or obsessions, are evidence-based practices for practitioners. This section describes the results from baseline and training phases of the study. Extenuating circumstances prevented the full implementation of the intervention.

Baseline

VS participated in a total of six baseline sessions across six days in addition to sessions used for preference assessments. Five of the six sessions were conducted in the special education setting with VS's peers that also had disabilities, and one session was conducted in the general education setting (PE) with his same aged peers. For baseline, the researcher collected data on the target behavior, appropriate attention getting behaviors, and on the problem behavior, inappropriate attention getting behaviors. VS had low-level and stable data with a zero trend for the target behavior and had high-level and variable data with an increasing initial trend and later zero trend for the problem behavior (Figure 1). The researcher decided to move to training after the generalization probe due to the consistent high-level in the problem behavior both in the special education setting and in the generalization probe setting.

Training

VS participated in five total training sessions, in which the researcher recorded frequency data on both the same target behavior and problem behavior mentioned previously. When training was implemented, VS's frequency of behavior decreased significantly from baseline sessions. For the target behavior, VS had mid-level, stable data with an increasing trend. For the problem behavior, VS had low-level, stable data with a decreasing trend (Figure 1). The last three sessions of training, VS had zero instances of the problem behavior, leading the researcher to conclude training and schedule intervention in the next session.

Intervention and Generalization

Unfortunately, due to the circumstances of COVID-19, the researcher had to conclude the research prior to intervention because access to the research setting and participant was cut off. The researcher was not able to implement intervention, which also resulted in no data collection for all phases after intervention. The data only reflects that of baseline and training results. Based on only the slight increase in level of target behavior during training, the researcher is not able to make a clear prediction of what the frequency of behavior would have been had the intervention been implemented. The researcher cannot conclude that if there would have been a difference related to the use of perseverative interest tokens versus the traditional tokens.

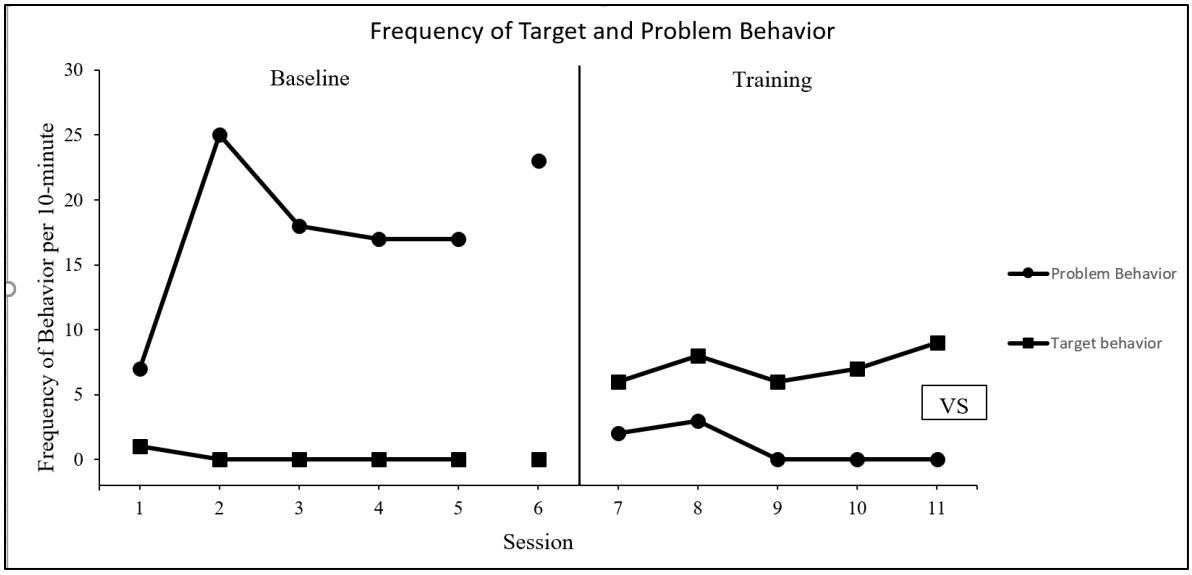

Figure 1. Frequency of target and problem behavior for baseline and training for VS

Discussion

Research Questions

The study was guided by two research questions that addressed the effectiveness of incorporating perseverative interests or obsessions into token economies to decrease problem behavior, and what the effects of that incorporation was over time for individuals with autism. However, due to the lack of intervention results, the researcher is unable to answer either question with substantial evidence. In baseline, where no token economy was utilized or implemented, the target behavior was at a low frequency or at zero. When training was implemented, which incorporated a traditional token economy and did not incorporate the participant's perseverative interest or obsession, there appeared to be a reduction in problem behavior and an increase in the target behavior (Figure 1). While the data collected are limited to baseline and training, the information gathered provided support for the usage of token economies as a general practice for decreasing problem behavior for students with ASD.

However, future research should be completed to determine if the incorporation of perseverative interest or obsessions changes the outcome and to answer the researcher's original questions.

Limitations

The researcher notes two main limitations for this study. The first limitation is that one participant was used. The researcher only had one participant in the study due to the lack of individuals that met the criterion of having an ASD diagnosis or being considered for the ASD label at the public school. Along with limited students with ASD, one student was excluded due to the amount of token economies he was already participating in. Having more than one participant could have expanded the scope of the study, by controlling for external variability, and improve application of the findings for other students.

Another limitation related to the COVID-19 pandemic, which caused all K-12 public schools to shut down before intervention could be implemented. This limitation restricted the results that the researcher could collect from the participant and resulted in an incomplete study. This limitation was outside the control of the researcher and could not have been changed.

Future Research

An area for future research would be to finish the study with other participant(s) to be able to analyze intervention data. The completion of the study in the future could result in answers to the research questions that guided the study. Completing the intervention could also lead to a contribution to the field.

The researcher also notes that using different types of preference assessments, in addition to that of the multiple stimulus without replacement preference assessment, could be investigated in the future. More review of the literature as it relates to preference assessments variability would be an area that should be investigated. This can be researched to determine if the backup

reinforcement of a token economy correlates to a change in the problem and/or target behavior frequency.

The researcher chose to use participants that had a diagnosis of ASD or participants that were undergoing evaluation for ASD, and future research could be done in the implementation of perseverative interest tokens past this population. The research could be expanded to individuals with different disabilities, such as developmental delay, down syndrome, intellectual disabilities, etc. Future research could also expand beyond individuals in elementary school.

Recommendations for Practice

The researcher recommends the use of token economies as a general practice in the classrooms of individuals with and without autism. The use of a token economy is considered an evidence-based practice, specifically designed to reduce challenge behavior and increase desired behaviors (Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008). Providing the data collected from this study, the researcher recommends that token economies, regardless of perseverative interests or obsessions, should be and can be used as a classroom management practice. However, it is important that the implementation of the token economy be tailored to individual students, as to match the students' preferences. The researcher recommends that preference assessments and teacher interviews be conducted to determine such preferences. With these recommendations, practitioners could plan to use token economies within classrooms, clinics, and home settings.

Appendix A

Perseverative Interest Severity Scale

This severity scale will act as a measure of restricted interests and/or behaviors for students involved in the present research study.

Instructions: Please rate the student's behavior for each item listed by circling the score that best describes how often the behavior occurs. Be sure to read and score each item. Base your ratings on your student's behavior over the past month.

If an item in the list is "not applicable" because your child does not engage or exhibit the defined behavior, the item should be scored as "0" (behavior does not occur).

Today's date: _____

Your relationship to child: _____

Child's date of birth: _____

Child's age: _____

Child is: ____ Female ____Male

INSTRUCTIONS: Read each of the items listed and circle the score that best describes how often the behavior occurs. Be sure to read and score all items. Make your ratings based on your child's behavior over the past month.

0—behavior does not occur

1—behavior occurs once per week or less

2—behavior occurs several times per week

3—behavior occurs daily

4—behavior occurs multiple times per day

Restricted Interests and Behavior:
Behaviors with a limited or inflexible range of focus; intense interests towards activities and/or items.

Limited & intense interests towards items or activities (e.g., trains, flowers, bears, collecting items, e.g., ducks, coins, markers)	**0**	**1**	**2**	**3**	**4**	If so, list interests here:
Sensory Interests (seeks specific tactile sensations)	**0**	**1**	**2**	**3**	**4**	If so, list interests here:
Preoccupation with parts of objects (focuses on parts rather than the whole object, e.g., wheels on toy cars, eyes on stuffed animals)	**0**	**1**	**2**	**3**	**4**	If so, list interests here:
Strong attachment to specific objects (insists on having/carrying object to multiple activities)	**0**	**1**	**2**	**3**	**4**	If so, list interests here:
Fascination with movement of objects (intense interest or focus on things that move, e.g., fans, toys that spin, bounce, etc.)	**0**	**1**	**2**	**3**	**4**	If so, list interests here:

INSTRUCTIONS: The following questions will be used to determine the impact of the restricted interests and/or behaviors mentioned above on the student's activities, learning, and time spent in class. Make sure to answer all questions. Please circle the best rating based on your student's behavior in the past month.

1. How often do the above behaviors require redirections during instructional time?

0	1	2	3	4
Never	Rarely	Sometimes	Often	Always

2. How often do the above behaviors interfere with social interactions between the student and peers?

0	1	2	3	4
Never	Rarely	Sometimes	Often	Always

3. How often do the above behaviors interfere with social interactions between the student and teachers?

0	1	2	3	4
Never	Rarely	Sometimes	Often	Always

4. How often do the above behaviors require removal from the classroom?

0	1	2	3	4
Never	Rarely	Sometimes	Often	Always

Appendix B

Frequency Recording Data Sheet

*Student:*_____***VS***_____ *Date*_____

*Observer:*_____ *Start Time*_____ *End Time*_____

Target Behavior: When student wants another peer or staff member's attention, he will tap the person on the shoulder or hand.

Problem Behavior: Student engages in any incident of inappropriate physical contact (pinching, hair pulling, flicking, hitting, punching, laying on top of, or bear hugging) with another student or teacher.

Behavior	***Tally***	***Total***
Target Behavior		
Problem Behavior		

Appendix C

Teacher Questionnaire

1. Did you see any significant changes in behavior post-intervention? (yes/no) If so, what changes have you seen?
2. Did you see any changes in participation post intervention? (yes/no)
3. Did you notice a decrease or increase in perseverative interests or obsessions after intervention?
4. If given instructions, would you continue implementing the token economy intervention? (yes/no)
5. Could you see yourself implementing this intervention with other students? (yes/no)

Appendix D

Multiple Stimulus without Replacement Preference Assessment

MSWO for 6 items

Item A: ______________________________ Sum of trial #s for A: ___________________

Item B: ______________________________ Sum of trial #s for B: ___________________

Item C: ______________________________ Sum of trial #s for C: ___________________

Item D: ______________________________ Sum of trial #s for D: ___________________

Item E: ______________________________ Sum of trial #s for E: ___________________

Item F: ______________________________ Sum of trial #s for F: ___________________

Date:		
Child name:		
Teacher name:		
Trial #	**Item selected**	**Placement of item selected**
1		x x x x x x
2		x x x x x
3		x x x x
4		x x x
5		x x
6		x

Date:		
Child name:		
Teacher name:		
Trial #	**Item selected**	**Placement of item selected**
1		x x x x x x
2		x x x x x
3		x x x x
4		x x x
5		x x
6		x

Date:		
Child name:		
Teacher name:		
Trial #	**Item selected**	**Placement of item selected**
1		x x x x x x
2		x x x x x
3		x x x x
4		x x x
5		x x
6		x

Date:		
Child name:		
Teacher name:		
Trial #	**Item selected**	**Placement of item selected**
1		x x x x x x
2		x x x x x
3		x x x x
4		x x x
5		x x
6		x

Date:		
Child name:		
Teacher name:		
Trial #	**Item selected**	**Placement of item selected**
1		x x x x x x
2		x x x x x
3		x x x x
4		x x x
5		x x
6		x

Highest preferred items (lowest summed trial #s):

Moderately preferred items (moderate summed trial #s):

Lowest preferred items (highest summed trial #s):

Appendix E

Procedural Fidelity Training Checklist

Training Fidelity Check	**Session_____**	
Steps for Training	Yes	No
1. We are going to use a tool to earn tokens and rewards for good behavior.		
2. Remember when you earn a token, you will put it on the board. Once you earn 3 Tokens, you can exchange it for a prize!		
3. To get a token, you have to show me how to get someone's attention nicely (tapping hand or shoulder or saying their name).		
4. Give participant time to interact with board and tokens. (1 min. max)		
5. T says, "What do you want to work for?" [L picks item picture from reinforcer list]		
6. T gives L a task direction: "Hand me _____" "Write your name" "Sit here." Remember if you want my attention, you can tap my hand or shoulder, or say my name."		
7. T provides L with token upon completion of an appropriate behavior		
8. When L earns all 3 tokens, L receives reward.		
Total Correct	**_____/_8____**	
Percentage Correct	**_____/100%___**	

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