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Abstract

A common characteristic of students with autism spectrum disorder is difficulty attending to and staying on task in classrooms, which can lead to inappropriate and/or disruptive behavior.

Benefits of a token economy have been examined with various individuals but few have examined its effects with children with autism spectrum disorder. This study examined the effectiveness of a token economy combined with a mystery motivator in decreasing inappropriate behaviors displayed by a student with an autism spectrum disorder in a small group setting. Results indicated that the token reinforcement program was effective in decreasing the inappropriate behaviors displayed by the student.

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The Centers for Disease Control and Prevention estimate that one in 59 children in the United States have a diagnosis of autism spectrum disorder by age 8, which is a 15% increase from the last reported rate (Bail et al., 2018). The increasing prevalence rate has led to trends and factors related to educational programs that include an increase in the inclusion of students with autism in general education classrooms, the use of invalidated interventions by teachers and parents, and issues related to the preparation of teachers and other professionals to serve students with autism (Simpson & Myles, 2016). For these reasons, it is crucial that teachers have access to efficient, teacher-friendly, and research-based interventions for students with autism.

A common characteristic of students with autism is difficulty attending to and staying on task in classrooms. This can lead to inappropriate and/or disruptive behavior. These behaviors can affect an individual's academic and social progress as well as the progress of others in the classroom. As a result of this, teachers of students with autism must plan specific programs and strategies to enable students to attend to task (Simpson & Myles, 2016).

Token Economy

One method of decreasing inappropriate and/or disruptive behavior is the use of a token economy to reinforce or reward positive behavior. A token

economy is a systematic way for delivering reinforcement following desired behavior. Students are taught desirable behaviors that will earn tokens. Tokens can include points, chips, tickets or other items. Tokens are periodically exchanged for tangible items once students have accrued sufficient amounts. Token systems allow the teacher the flexibility to reward individuals, small groups, or entire classes. Benefits of a token economy have been examined with individuals with psychiatric disorders who were hospitalized (LePage et al., 2003), students with behavior disorders (Truchlicka, McLaughlin, & Swain, 1998), students with learning disabilities (Higgins, Williams, & McLaughlin, 2001), and university students (Boniecki & Moore, 2003), but few have examined the effects of a token economy with children with autism (Kahng, Boscoe & Byrne 2003; McDonald & Hemmes 2003; Odom, Hoyson, Jamieson, & Strain, 1985; Steeves, Martin, & Pear, 1970; Tarbox, Ghezzi, & Wilson, 2006).

Token systems can be adapted and used in a variety of settings and for numerous types of target behaviors, as well as being combined with other techniques or procedures. (Vaughn & Bos, 2009). These multi-component interventions have not only shown to be effective but can also be economical and teacher friendly, which is important for practical use in the classroom setting. (Musser, Bray, Kehle, & Jenson, 2001). Furthermore, when a multi-component intervention is comprised of procedures that have been empirically validated

individually, results have shown that each treatment enhances and complements the other (Kehle, Bray, Theodore, Jenson, & Clark, 2000).

Mystery Motivator

A mystery motivator is an unknown positive reinforcer that has been shown to be effective in decreasing inappropriate behavior (Moore & Waguespack, 1994; Musser et al., 2001; Murphy, Theodore, Aloiso, Alric-Edwards, & Hughes, 2007). For example, a teacher could have a box that contains a mystery motivator for the day. The teacher could explain to the students that if they earn a specific number of tokens or complete a previously determined set of tasks, they will receive the mystery motivator in the box at the end of the class period or the end of the day. The mystery motivator is designed to create anticipation and engagement in the student through the excitement of uncertainty of the reward. Combining mystery motivators with a token economy has been shown to be effective in reducing inappropriate and disruptive behavior (Rhode, Jenson, & Reavis, 1993). In addition, teachers in studies have rated the mystery motivator as highly acceptable and easy to implement in the classroom, and students gave the intervention a high acceptability as well (Moore & Waguespack, 1994).

Back-up Reinforcers

Although there have been many studies conducted on the effectiveness of the token economy, few have conducted assessments pertaining to the reinforcing properties of the items used as back-up reinforcers. A back-up reinforcer is a previously determined tangible item or privilege for which the student may exchange earned tokens. For example, back-up reinforcers may include a homework pass, additional computer time, pencils, erasers, student-of-the-day privileges or any other items determined to be of value to the student. Back-up reinforcers can be selected by providing students a menu of items, by observing the students and their preferences, or by simply asking the student. Didden, Moor, and Bruyns (1997) suggested that possible ineffectiveness of a reinforcement procedure using back-up reinforcers may be due to the fact that the items used were not reinforcing. This stresses the importance of the selection of back-up reinforcers to ensure that this does not threaten the effectiveness of the interventions being implemented. If a chosen item or activity does not increase the desired behavior, then it is not a reinforcer.

The teacher's selection of reinforcers becomes crucial when working with children with autism. Keeping students with autism engaged in the learning process can be difficult for teachers due to differences in motivation. Simpson and Myles (2016) stated "although all learners may have motivational challenges at one time or another, students with autism can be withdrawn and preoccupied, unmotivated to explore new environments, and uninterested in expanding their

spheres of interest" (p. 31). Charlop-Christy and Haymes (1998) suggested token reinforcement systems involving students with autism have had varied success due to the difficulty of finding reinforcers that students are willing to work for and find reinforcing. A reinforcer assessment may increase the effectiveness of a token reinforcement program for individuals with autism, because it will increase the likelihood of finding social reinforcers, activity reinforcers, and/or tangible reinforcers that will motivate and keep them engaged. Furthermore, the reinforcer assessment incorporates offering students choices, which is an important skill to learn for students with autism, because it gives them control over their environment, promotes independence, and increases motivation to learn (Simpson & Myles, 2016).

Schedules of Reinforcement

It has been demonstrated that inappropriate or disruptive behavior can be decreased through a token economy, but when and how often reinforcement is given may vary. Some studies have researched token reinforcement where reinforcement was dependent on student compliance to prompts (DeMartini-Scully, Bray, & Kehle, 2000; Tarbox et al., 2006); however, most of the studies have used a time interval schedule of reinforcement. The intervals of reinforcement varied from at the end of each minute (Higgins et al., 2001; Didden et al., 1997) to 15-minute intervals (Murphy et al., 2007; Zlomke & Zlomke, 2003). Although the length of time varied in these studies, all used a fixed interval

schedule of reinforcement. In contrast, few studies have been found examining the effects of a variable interval schedule of reinforcement on inappropriate behavior (Martens, Lochner, & Kelly, 1992; Van Camp, Lerman, Kelley, Contrucci, & Vorndran, 2000) and, within these studies, a variable interval schedule of reinforcement with a token economy has not been examined. Variable interval schedules of reinforcement allow reinforcement to be delivered on a randomized schedule so that students do not become accustomed to the delivery schedule. This tends to help students maintain high rates of desirable behavior as they are unsure of when reinforcement will come for their appropriate behavior.

The purpose of this study was to demonstrate the potential effectiveness of token reinforcement combined with a mystery motivator in decreasing inappropriate or disruptive behavior displayed by a student with autism. It is known that token reinforcement combined with other techniques has shown effectiveness in a wide variety of subjects, and this study offers further validation for use in a special education classroom with a student with autism who is displaying inappropriate and disruptive behavior. This study also incorporated an assessment pertaining to the reinforcing properties of the items used as back-up reinforcers to control threats to the validity of the intervention. All of the various token economies in the examined literature have used a fixed interval schedule of reinforcement with some studies thinning the reinforcement over a period of time.

This study evaluates the effectiveness of a token economy using a variable interval schedule of reinforcement.

Method

Participants and Setting

The participant in the study, Jacob, was a nine-year-old student diagnosed with autism spectrum disorder and attention deficit hyperactivity disorder. Jacob received special education services for three hours a day (i.e., two hours resource; one hour collaboration) and spent the rest of the time in the fourth grade general education classroom with a personal assistant. At the time of the study, the special education teacher was working on increasing Jacob's social skills and on-task behavior. During the school day, Jacob was most productive when schedule and routine were consistent and class rules were reviewed daily. During instructional activities, Jacob had difficulty attending to and staying on task (i.e., playing with objects, staring at or focusing on other objects/people); he required frequent prompts to initiate and/or complete a task independently; and Jacob needed assistance through prompts and correction to interact with peers in socially acceptable ways during group discussions (i.e., initiating conversations, responding in appropriate manner, responding to relevant non-verbal cues).

The intervention was implemented in a special education resource classroom during the subject area of writing and instruction and was provided by a special education teacher in a small group setting with four students. Within the

classroom, there also was another small group of students being instructed by another special education teacher. Although this study only targets and analyzes the results of one student with autism, it is important to note that the token economy combined with a mystery motivator included all four students. The reasoning behind this was not only to avoid drawing individual attention to the student, but also to give support to the other students in the group who also were displaying disruptive behavior.

Design

This study employed an ABAB reversal design (Baer, Wolf, & Risley, 1968). Data were collected before the initial intervention to establish a baseline (Baseline 1). After baseline data were collected, the intervention was implemented (Intervention 1) and changes in the dependent variable (i.e., inappropriate behavior) were compared to the data in the initial baseline condition to see if there was a change. Once the data were steady during the first intervention, the intervention was removed (Baseline 2) and data were evaluated to see if the dependent variable returned to or returned close to the initial baseline condition. Once the data were steady during the second baseline, the intervention was implemented again (Intervention 2). After data were collected in the second intervention, changes in the dependent variable were compared to not only the data in the second baseline condition to see if there was a change but also to see if the data returned to or close to the data in the first intervention.

Independent variable

The independent variable was the token economy system combined with a mystery motivator. It consisted of the *Get 'Em On Task* computer signaling program, a points chart, and manila envelope with question mark. *Get 'Em On Task: A Computer Signaling Program to Teach Attending and Self-management Skills* (Althouse, Jenson, Likins, & Morgan, 1999) is a computer program that creates beeps or signals and is designed to assist in the implementation of a behavior management system for an individual student or classroom. The program allows the user to set the length of the session, the number of signals in the session, whether the signals will occur randomly or on a fixed schedule, and how the signals will sound. The *Get 'Em On Task* computer-signaling program served as the variable interval schedule of reinforcement. The schedule of reinforcement was set at a Variable Interval-3 min schedule, meaning the program signaled the students by announcing "Working hard?" on the average of every 3 minutes during the session. This prompted the teacher to make appropriate marks on the point sheet and provide verbal praise for appropriate behavior. The points chart was maintained by the teacher and served as a visual performance record for each student. The chart, from the *Get 'Em On Task* program, contained each student's name, the days of the week, and a total for the week (Althouse et al., 1999). Students had access to view the chart at the beginning and end of each session. The manila envelope with question mark was posted in the classroom

where the students could view it. The envelope contained a piece of paper with the mystery motivator reward written on it.

Dependent Variable

For the purpose of this study, inappropriate behavior was defined as (a) student talking out or making noise as defined by any verbal statements directed at classmates or teacher(s) without teacher permission; (b) playing with objects as defined by the manipulation of non-work-related materials or objects; (c) verbal aggression as defined by swearing or name calling and/or (d) staring or orienting in a direction other than the teacher or work materials (Musser et al., 2001).

Data Collection

Sessions were conducted five times a week during writing instruction, each session lasting 30 minutes. The data were collected at the same time for each session. The dependent variable was measured using a momentary-interval recording system with three-minute record intervals. The observer was prompted to record every 3 minutes by a vibrating digital timer. At each interval, the observer would mark a "+" if the student was displaying appropriate behavior and mark a "-" if the student was displaying inappropriate behavior at the end of the interval. In addition, if the student displayed an inappropriate behavior, the observer identified the behavior by marking the letter that corresponds with the following inappropriate behavior: a) Student talking out or making noise as defined by any verbal statements directed at classmates or teacher without teacher

permission; b) playing with objects as defined by the manipulation of non-work-related materials or objects; c) Verbal aggression as defined by swearing or name calling; or d) staring or orienting in a direction other than the teacher or work materials

Reinforcer Assessment

To identify reinforcing items for the students, a reinforcer assessment was conducted. Before implementation of the study, each student was asked to circle five of his most preferred items or activities from a list of reinforcers (e.g., listening to music, free time, computer time, positive phone call home, snack). The assessment was carried out individually and in seclusion from the other students. Each reinforcer on the list was read aloud to the student by the teacher as well as a brief explanation of each to ensure that the student understood what he was choosing.

Procedure

Baseline 1. Baseline data were collected for five sessions until a stable rate was established. During this phase, the student received no component of the intervention. The teacher instituted the typical method of classroom management, which included review of classroom expectations at the beginning of the lesson, verbal praise for appropriate behavior, and verbal redirections for inappropriate behavior.

Intervention 1. Before implementation of this phase, the teacher discussed with the students the new classroom procedures. The teacher introduced the mystery motivator envelope to the students and told them that they have a chance to earn a mystery reward at the end of the week for appropriate behavior. Students were told that the rewards were picked by them and will change each week. The teacher then explained the procedure to the students by introducing the Get 'Em On Task program. The students were told that when they hear "Working hard?" the teacher will put a check on the points chart for each student displaying appropriate behavior at that time and will count as one point. The teacher then explained that if they hear "Double Bonus", the teacher will put two checks on the points chart for each student displaying appropriate behavior at that time and will count as two points. There was one opportunity to earn the double bonus for each session. The term appropriate behavior was explained to the students along with examples and modeling of these behaviors. The rules of appropriate behavior were posted beside the mystery motivator in the classroom and in a location where the students could see at all times during instruction. The class rules were: 1) Look at teacher when he is talking and work when you are supposed to, 2) Raise your hand and wait for permission to speak, 3) Keep hands, feet, and body to yourself, 4) Use nice words to other students and teacher, and 5) Follow teacher's directions. The students were told that they have an opportunity to earn

a total of 11 points each day and will be able to attain their mystery reward at the end of the week if they have at least 40 total points for the week.

Prior to each session, the teacher reviewed the procedure with the students along with the rules for appropriate behavior. During the session, the teacher put a check on the points chart for any student displaying appropriate behavior when the prompt was signaled as well as giving verbal praise to the students who were displaying the appropriate behavior. After each session, the points chart was reviewed with each student individually.

At the end of the week, the teacher took out the mystery motivator from the envelope during the last 15 minutes of class, and the students who acquired at least 40 points received access to the reward. Students who did not accumulate the predetermined points continued working on math assignment.

Baseline 2. This phase was identical to the first baseline condition. The components of the intervention were discontinued and the teacher returned to the original method of classroom management, which included review of classroom expectations at the beginning of the lesson, verbal praise for appropriate behavior, and verbal redirections for inappropriate behavior.

Intervention 2. This phase was identical to the first intervention phase. Before each session, the teacher reviewed the procedure with the students along with the rules for appropriate behavior. During the session, the teacher put a check on the points chart for any student displaying appropriate behavior when

prompt was signaled as well as giving verbal praise to the students that were displaying the appropriate behavior. After each session, the points chart was reviewed with each student individually.

At the end of the week, the teacher revealed the mystery motivator that was in the envelope during the last 15 minutes of class and the students who acquired at least 40 points received access to the reward. Students who did not accumulate the predetermined points continued working on their writing assignment.

Results

Figure 1 depicts the percentage of on-task behavior across all phases of the study for Jacob. Jacob's attending during the initial baseline (5 sessions) phase ranged from 30% to 50% with a mean of 38%. During the first intervention phase (12 sessions), the percentage of appropriate behaviors increased, ranging from 70% to 90% with a mean of 82.5%. Once the second baseline phase (5 sessions) was introduced, appropriate behaviors declined with percentages ranging from 40% to 60% and a mean of 52%. When the second intervention phase was re-established (12 sessions), percentages of appropriate behavior increased again, with percentages ranging from 60% to 90% and a mean of 79%. Downward trends can be seen in both baseline phases. In contrast, there is a stable trend in the data during the two intervention phases. There was an 8.3% overlap

percentage ($1/12 \times 100 = 8.3\%$) between the second baseline phase and the second intervention.

Discussion

The results of this study suggest that token reinforcement on a variable interval schedule combined with a mystery motivator selected from preference assessments can be effective in decreasing inappropriate or disruptive behaviors displayed by a student with autism in a small group setting. Prior research has demonstrated that inappropriate or disruptive behavior can be decreased through a token economy system and results from this study support and extend this by using a token economy system with a student diagnosed with autism spectrum disorder as well as including reinforcer assessment.

Most of the literature regarding token economies uses a fixed interval schedule to reinforce appropriate behavior. A shortcoming of this procedure is that the students, over time, can figure out when the scheduled prompt will be delivered, which would affect the success of the intervention. If a variable interval schedule of reinforcement is used with a token economy, the students will not know when the reinforcing prompt will be delivered which will increase the likelihood that the target behavior will continue throughout the intervention.

There are a number of possible limitations to this current study. First, the data collection procedure was conducted by the teacher and there were no interobserver reliability sessions conducted to assess the fidelity of

implementation of the token economy. This lack of reliability poses a threat to the internal validity of this study. Second, although the token economy was conducted during the student's writing time, instructional practices varied that may have influenced the student's behavior. Because the instructional practices were not controlled for, there is a possibility that certain teaching sessions may have been more or less difficult than others or the student preferred certain activities over others.

There was an 8.3% percent overlap in the data between the second baseline phase and the second intervention phase. There was a possible extraneous variable that affected this single overlapping data point in the second intervention. As stated before, the setting of this intervention was a special education resource classroom. During this session, there were two students who were brought into the classroom to "cool down". The interaction between these students and the other special education teacher may have led to the decline of appropriate behaviors in the targeted student.

The rationale for setting the objective at approximately 73% for a student to attain the mystery motivator reinforcer was an attempt for all students to be successful, therefore, foster engagement in the token economy and mystery motivator during the study. It is important to note that the reinforcement schedule should be thinned as well as the objective increased based on visual data analysis. In addition, the mystery motivator reward was attainable on a weekly basis

instead of daily. The rationale behind this was that the students already receive rewards for a behavior point sheet that is maintained daily. The students can attain a small reward at the end of the day for making a predetermined amount of points based on their behavior. The weekly back-up reinforcer for the mystery motivator was to be of more value to the students than the small daily reward to differentiate the token economy from the daily point sheet. By making the reward weekly, there is a risk that a student who knows that they will not receive the reward may not be engaged in the intervention. An attempt to address this was through keeping the objective at a level that could be attained by every student as well as adding the bonus points to the component of the token economy.

Inappropriate behavior of students can lead to loss of instructional time for the student demonstrating these behaviors as well as the other students in the classroom. By having a behavior management system that reduces these inappropriate behaviors, it can allow all students in the classroom the opportunity for greater academic success. The interventions used in the study are efficient, economical, teacher-friendly, and can be easily implemented in the classroom. With the increasing numbers of students with autism that teachers are working with in their classrooms, it is imperative teachers have a "toolbox" of empirically validated procedures to help manage social behavior while increasing student engagement in appropriate academic behavior. Token economies and mystery motivators are relatively simple procedures for teachers to use to decrease

undesirable behavior while increasing appropriate desirable behavior in their

students.

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Figure 1. Effects of Token Economy with Mystery Motivator on Jacob's Percentage of Appropriate Behavior