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Effects of a Peer-Administered Token Economy on Second Grade Physical Education Students' Overhand Throw Performance

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Abstract

Token economies have been shown useful in a variety of settings to improve physical activity–related behaviors. However, few researchers in empirical research have examined the effects of token reinforcement targeting motor skill performance implemented specifically in physical education with typically developing children. Therefore, the purpose of this study was to examine the effects of a token economy on the overhand throw performance of second grade physical education students. An alternating treatments design was used with students participating in overhand throwing sessions that alternated between baseline and token economy phases. Performance scores for each session were inspected for response differentiation between the two phases. In analysis, it was revealed the token economy was effective in all seven participants. Additionally, participants increased the number of overhand components performed correctly during token phases by 10% to 27% per session. A functional relation between token reinforcement and overhand throw performance was evident in most participants. Therefore, it was concluded that token reinforcement can be an effective tool for physical educators.

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Physical education (PE) teachers have ample responsibilities as educators. Of these responsibilities, one of the most important in their job description is to help their students develop competency in a variety of motor skills. As described in Standard 1 of the National Standards for Physical Education, a physically educated person "demonstrates competency in motor skills and movement patterns needed to perform a variety of activities" (National Association for Sport and Physical Education [NASPE], 2004, p. 11). Additionally, achieving competency in motor skills has further importance. According to Pangrazi and Beighle (2011), PE students' motor skill success should be at a high level. It has been suggested that if students' success rate is high, they may be more likely to find physical activity to be an enjoyable experience. However, if achievement is low, they may develop an aversion to PE and physical activity that may continue into adulthood (Pangrazi & Beighle, 2011). Further evidence supports the importance of the development of motor skills as well. Stodden, Langendorfer, and Roberton (2009) found a relationship between young adults' competence in three motor skills (i.e., throwing, kicking, and jumping) and their overall fitness. These findings indicate that developing motor skills during childhood may have a positive impact on physical activity levels into young adulthood. Based on these rationales, strategies to increase student achievement and aid in the teaching of motor skills in PE should be of great value to physical educators. One strategy that may be valuable to physical educators is the token economy; however, few researchers have examined the effectiveness of token systems implemented specifically within PE classes. Therefore, in this study, the effectiveness of a token economy on the technique second grade PE students use to perform the overhand throw, one of the skills Stodden et al. found to be associated with higher fitness levels in young adults, was examined.

Behavior Analysis in Physical Education

One theoretical perspective that has been explored in the PE literature has its foundations in behavior analysis (Ward & Barrett, 2002). Interventions based in behavior analysis have been used in PE and other physical activity settings, such as sport or recreation, to modify skill-related behaviors methodically, including skills in tennis (Ziegler, 1987), volleyball (Ward, Crouch, & Patrick, 1998), basketball (Ward, Smith, Makasci, & Crouch, 1998), striking (Johnson & Ward, 2001), football (Smith & Ward, 2006; Ward & Carnes,

2002), soccer (Rush & Ayllon, 1984), track and field (Shapiro & Shapiro, 1985), and gymnastics (Wolko, Hrycaiko, & Martin, 1993). Teaching and coaching techniques based in behavior analysis have a well-established foundation in PE and sport literature.

Token Systems in Physical Education

One technique that has its foundations in applied behavior analysis is the token economy system. Originally developed as a motivational tool for use in a rehabilitation setting (Ayllon & Azrin, 1968), token economies consist of (a) an operationally defined behavior targeted for change; (b) tokens, tickets, or points to be rewarded to individuals when they engage in the target behavior (or when they do not engage in the behavior if it is one targeted for reduction); and (c) a selection of backup reinforcers for which individuals can exchange their earned tokens (Cooper, Heron, & Heward, 2007). Specifically within PE settings, the implementation of a token system has several recommended benefits: (a) unlike traditional tangible reinforcement, token reinforcement does not interrupt the educational process (Rushall & Siedentop, 1972); (b) tokens can be administered immediately following engagement in the behavior without interrupting educational activities, while delaying tangible reinforcement until a convenient time (Lavay, French, & Henderson, 2006); (c) by having available backup reinforcers from which to choose, the chance of satiation on a single reinforcer is reduced (Rushall & Siedentop, 1972); and (d) individual students are likely to find at least one item in the token store with reinforcing properties, thereby servicing the diverse student body found within a singular class (Alstot, 2012).

Token economies have been found useful in several physical activity settings to improve behaviors, including attention and time on task (Mangus, Henderson, & French, 1986; Reitman, Hupp, O'Callaghan, Gulley, & Northrup, 2001), exercise and physical activity behaviors (Alstot, 2012; Bernard, Cohen, & Moffett, 2009; DeLuca & Holborn, 1985, 1990, 1992), distance walked (Wiggam, French, & Henderson, 1986), and 1-mile walk/jog times (Trocki-Ables, French, & O'Connor, 2001). Despite the recommendations for implementing token economies in PE (Alstot, 2012; Lavay et al., 2006; Rushall & Siedentop, 1972) paired with the successes reported in a wide variety of physical activity behaviors and settings, only two studies were identified in which the effectiveness of a token system implemented specifically within a PE setting was examined.

Mangus et al. (1986) introduced a token economy in an integrated PE class; however, their target population was children diagnosed with autism, and Alstot (2012) implemented a token system to increase jump rope activity of elementary students. Therefore, no studies were found in which a token system implemented in a PE setting with typically developing students that targeted a specific skill-related behavior was examined. Consequently, the primary purpose of the current study was to examine the effectiveness of a token economy on typically developing elementary PE students' technique used to perform an overhand throwing skill. Overhand throw was selected as the target behavior due to the complexity of the task that involves several sequential steps in the correct execution of the skill.

A secondary purpose of the study was to examine the effect reinforcing correct overhand throw technique had on the result of the throw (i.e., throw distance). It is believed that correctly performing the process of the overhand throw will positively impact the product of the throw. Finally, the purpose of this study was also to examine the accuracy with which elementary-aged PE students administered token reinforcement and process assessments to their peers. Ward and colleagues (Crouch, Ward, & Patrick, 1997; Ward, Crouch, & Patrick, 1998; Ward, Smith, et al., 1998) conducted a series of behavior analysis–based studies using elementary-aged peers to assess performance in PE, and Mangus et al. (1986) and Alstot (2012) used peers to administer token reinforcement. In each case, the peers were able to assess and/or reinforce with a high degree of accuracy. These were combined in the current study to examine the accuracy with which elementary-aged students can perform a peer assessment and administer reinforcement based on the results of the assessment.

Method

Participants

Participants were chosen from an intact second grade PE class. Informed consent was sought from each student's legal guardian, and informed assent was obtained from each student. From the class, seven students (four girls, three boys) were selected as participants. Participants were given pseudonyms. The university institutional review board approved the procedures of this study.

Setting and Personnel

Most of the 10 sessions were conducted in the gymnasium of a suburban elementary school located in the southeastern United States. However, two sessions had to be moved outside to the outdoor tennis courts at the school due to events being held in the gym at the school (e.g., book fair, school assembly). The class had PE instruction approximately once per week. Personnel involved in implementing the study included the PE teacher—a female with 8 years of teaching experience, who implemented the token economy and conducted all sessions—and the researcher, who was present during all sessions to collect relevant data.

Data Collection and Equipment

Each of the 10 sessions was recorded using a Kodak Zi6 Pocket video camera. Additional equipment included five bean bags for each student in the class, tokens (i.e., .75-in. Bingo "coins") to be distributed during the intervention, a personalized container (i.e., 4-in. square plastic containers, each with a removable lid with a 1-in. hole for easy token administration) for each student's tokens, and a selection of backup reinforcers (e.g., balls, yo-yos, glow sticks, stickers) available for purchase in the token store.

Experimental Design and Procedures

An alternating treatment design (Barlow & Hayes, 1979) was used to evaluate the effectiveness of the token economy. In an alternating treatments design—a single-subject design variation—treatment conditions are implemented on an alternating schedule to assess whether levels of the target behavior are different under the varying conditions. This design was selected because single-subject research design is used in all behavior analysis–based research (Kennedy, 2005) due to behavior being viewed as an individual phenomenon in this theory (Skinner, 1953) wherein individual responses to implementing an intervention would be lost if traditional group designs and statistics were used. In alternating treatment designs, a functional relation can be determined if response differentiation occurs between the two conditions (Kennedy, 2005).

Experimental conditions. The baseline and token economy experimental conditions are described in the following section. On most occasions, two data collection sessions were conducted each day the class met, one at the beginning of the class and one at the end, with a condensed version of the teacher's PE lesson in between.

These lessons were not a part of the study and did not involve overhand throw tasks (i.e., during these lessons, the teacher provided instruction on other topics, such as gymnastics and fitness). Before the class entered the gym, the researcher randomly selected which condition was to be implemented at the beginning of the class. The opposing condition was then executed at the end of the class. This strategy was used to ensure an equal number of baseline and token economy sessions. Each session took approximately 5 min.

Baseline. The teacher gave instruction on the proper technique of performing an overhand throw as she usually would during a typical PE class. The researcher then divided students in the class into pairs. While one member of the pair performed five trials of the overhand throwing task, the partner used a peer process assessment to assess the form his or her partner used to perform the skill. The process assessment consisted of two components: (1) side to target and (2) step toward target with opposite foot (Graham, Holt/Hale, & Parker, 2007). On the assessment sheet, the partner placed an *X* next to the component(s) the thrower performed correctly for each of the five trials during the session. After each participant performed five trials, the partners switched roles and the process was repeated, giving each student in the class the chance to perform five throws as well as conduct the peer assessment.

During the activity time, the teacher only gave feedback to the observers who were conducting the assessment regarding the accuracy with which the assessment was being conducted. Corrective or positive feedback was not given to the students who were performing the overhand throw task. The teacher only gave a minimal amount of feedback regarding the accuracy of the assessment; the participants were able to understand the assessment process quickly and accurately.

Token economy. During the intervention phase, the participants followed a similar procedure as was followed during the baseline sessions, with the addition of the administration of token reinforcement. Each participant performed five trials of the skill while his or her partner performed the process assessment. After each trial, if the participant performed both of the components of the skill correctly, the partner picked up two tokens (i.e., one token for each correctly performed component of the skill) from a plastic cup that contained a large amount of tokens and placed them in the thrower's personalized token container that was located on the ground near where the task was being performed. If only one of the components was

performed correctly, one token was awarded. No tokens were given for incorrect performance of both components. Participants had an opportunity to earn up to 10 tokens during each token economy session. Throughout the study, the participants did not remain with the same partner. Pairs were exchanged four times, resulting in each participant having five partners throughout the study.

Students had an opportunity approximately once a week to exchange their tokens for backup reinforcers in the "token store." The teacher requested to forego a preference assessment that was to be administered to the participants. Instead, she suggested items that she believed to be of interest to the students; these items were purchased and used to stock the store. The store consisted of four bins, each containing backup reinforcers of different value: 5, 10, 15, or 20 tokens. Larger items, such as glow sticks and yo-yos, cost 20 tokens each, and smaller items, such as small stickers and erasers, cost 5. Students also had the option to retain their tokens for a later date to save up for more "expensive" items. Throughout the duration of the study (i.e., approximately two months), the operation of the store cost approximately 38 cents per student per month.

Teacher training. Prior to the onset of the intervention, the researcher conducted two 20-min training sessions with the PE teacher regarding the procedures of the study. Training sessions included verbal instructions and modeling of the procedures. The teacher's competency of the study was assumed when she was able to completely describe the steps in implementing the components of the study with complete accuracy.

Token training. Prior to implementing the intervention, the teacher and researcher conducted a short token training session with the PE class. According to Cooper et al. (2007), token training with typically developing children can mainly consist of verbal instructions and modeling. Therefore, the teacher and researcher discussed with the class how they could earn tokens, modeled to them how tokens were to be distributed, and gave them an opportunity to see what was available for purchase in the token store. Token training was completed in one session that lasted approximately 10 min.

Assessment training. The teacher conducted two assessment training sessions with the students, each lasting approximately 5 min. These sessions consisted of a verbal description of how the assessment was to be conducted and a demonstration of correct and incorrect execution of the assessment. Training sessions also included the teacher performing the overhand throw skill while the

students completed an assessment of the teacher's performance. The accuracy with which the participants assessed the teacher's performance was evaluated by comparing the participants' completed assessments to the researcher's assessments of the teacher's performance. Participants achieved the criterion of 80% accuracy within two training sessions.

Intervention integrity. For each token session, the researcher determined if the intervention was administered correctly by calculating the absolute percent error (APE) of token distribution; APE was calculated by subtracting the criterion amount (how many tokens the participant should have received for the session) from the actual amount (how many tokens the participant actually received), dividing by the criterion amount and multiplying by 100. The resulting APE represents the percent error with which tokens were administered to each participant for each session. The mean absolute percent error (MAPE) was then calculated for each participant, providing insight into the accuracy with which tokens were administered across sessions. Only one participant, Mary, received tokens with greater than 10% error. All other participants were administered tokens with a high degree of accuracy. The MAPE for each participant across all token sessions is displayed in Table 1.

Table 1
Accuracy With Which Participants Were Assessed and Administered Tokens

Participant	Token sessions assessed accuracy (%)	Baseline sessions assessed accuracy (%)	Assessed accuracy across all sessions (%)	MAPE of token administration (%)
Alexis	100.00	92.50	96.25	0.00
Connie	100.00	92.00	96.00	0.00
Carly	100.00	96.67	98.33	0.00
Mary	88.00	80.00	84.00	32.00
Larry	90.00	86.00	88.00	10.00
Jack	94.00	80.00	87.00	6.00
Chris	100.00	88.00	94.00	0.00

Note. MAPE = mean absolute percent error.

Social validity. After the close of the intervention, a questionnaire was given to the PE teacher to evaluate her perception of the intervention as well as her opinion regarding the practicability of using token economies in a PE setting. The questionnaire was also used to inquire of the teacher's perception of the costs of implementing the token economy as well as her intentions of implementing a token system in her future PE classes.

Data Analysis

Overhand throw technique was evaluated using the following criteria, adapted from Graham et al. (2007): (1) Participant positions his or her body perpendicular to the target with the side of the body opposite of the throwing arm facing the target (side to target); (2) participant takes a long contralateral step toward the target with the foot opposite of the throwing arm (step with opposite foot); (3) throwing arm moves in a rotational motion back with the hand behind the head and then toward the target with the elbow at or slightly above shoulder level (arm way back and throw); and (4) after the ball is released, the arm should continue in an arc and end up near the knee (follow through). The researcher observed video recordings of each session in slow motion, analyzing the overhand throw technique based on the criteria described above. For each of the four components of the skill performed correctly, the researcher gave 1 point; 4 points were possible per trial (i.e., 1 point per component of the skill). Each session consisted of five trials. Twenty points were possible for each session.

For each trial, the distances thrown were evaluated via video data. The students were instructed to try to throw the bean bag as far as they could while maintaining correct technique. In the gymnasium, strips of tape were placed at 1-ft intervals along the side of the wall. While observing each session in slow motion, the researcher paused the video at the point where the bean bag initially hit the floor. The bean bag's location was then compared to the markings on the gym wall and rounded to the nearest foot. A similar technique was used during outside sessions. Cones were placed at regular intervals along the side of the tennis court. The location of the bean bag was compared to the marker cones and rounded to the nearest foot.

Interobserver agreement. Interobserver agreement (IOA) was assessed for approximately 27% of the sessions. While watching the recorded videos, a trained independent observer coded each of the

four components of each practice trial as correct or incorrect. Percentage agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%. Overall agreement was 91.8%. Additionally, the observer recorded the distance thrown for each trial and calculated the average distance per session for each participant. The mean difference between the researcher's and second observer's distance per session was less than 2 ft (i.e., 1.6 ft per session).

Assessment accuracy. The accuracy with which participants were assessed by their peers was analyzed for all sessions, including baseline and token economy sessions. Accuracy was calculated for each participant for each session by dividing the number of correctly assessed components of the overhand throw by the correctly assessed components plus incorrectly assessed components and multiplying by 100%. Participants' assessment accuracy data are shown in Table 1.

Results

Overhand Throw Components Performed Correctly

Visual analyses of the line graphs reveal that all seven participants showed response differentiation between baseline and token economy sessions. Mary had two sessions (one token economy and one baseline; Sessions 7 and 8, respectively) that deviated from the trends typical to the remainder of her data. During these sessions, she was assessed and administered tokens with a high degree of inaccuracy. If these two data points are removed due to the inappropriate administration of tokens and feedback, the trends indicate response differentiation as found in the other participants' data. Each participant's total number of overhand throw components performed correctly per session based on condition is shown in Figure 1. During Session 3, the first token economy session, participants showed an immediate improvement in overhand throw performance over baseline, indicating the effectiveness of the intervention.

Additionally, participants increased their mean number of overhand throw components performed correctly per session by at least two components compared with baseline sessions. Within these participants, mean improvement ranged from an increase of 2.0 components per session (i.e., Carly and Chris) to a mean of 5.0 (i.e., Jack). This represents a range of improvement within the participants from 10% to 27% from baseline to token conditions. Based on the re-

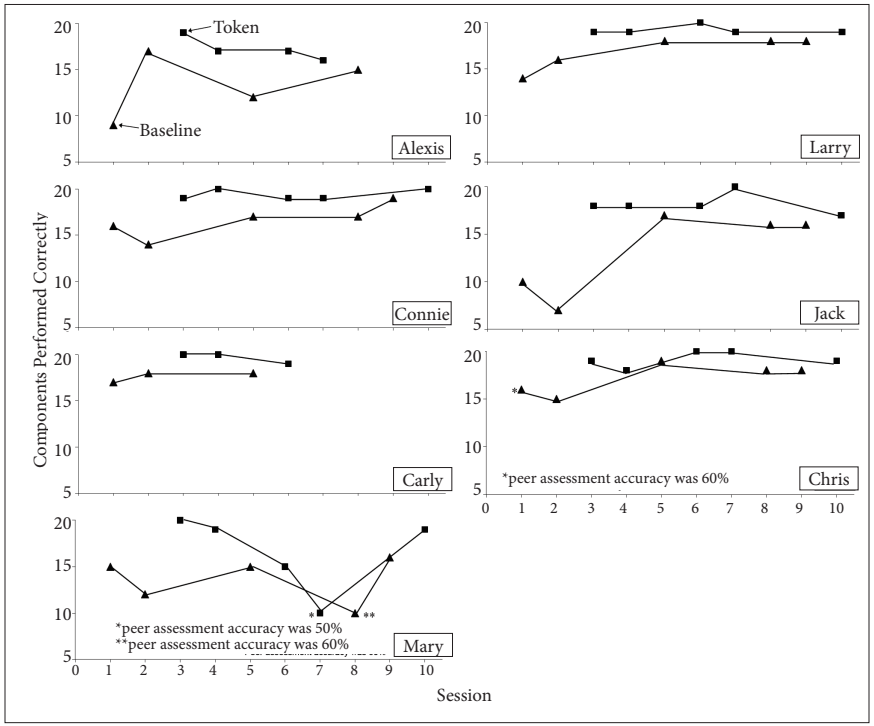

Figure 1. Number of overhand throw components performed correctly per session.

sponse differentiation evident in the graphs as well as the differences present in the number of correctly performed overhand throw components during token sessions, it can be determined that a functional relation between the administration of token reinforcement and an improvement in overhand throw performance is evident in each of the participants.

Distance Thrown

All seven participants showed an increase in mean distance thrown during token sessions compared with baseline sessions. Improvement ranged from an increase in 0.3 ft per throw (i.e., Larry) to 4.4 ft per throw (i.e., Alexis and Chris). The differences in the mean distance the participants threw the bean bags based on session type are represented in Figure 2. In further analysis, it was also revealed that, with only one exception, the mean throw distance across participants increased when tokens were introduced and then subsequently decreased when a baseline session was implemented.

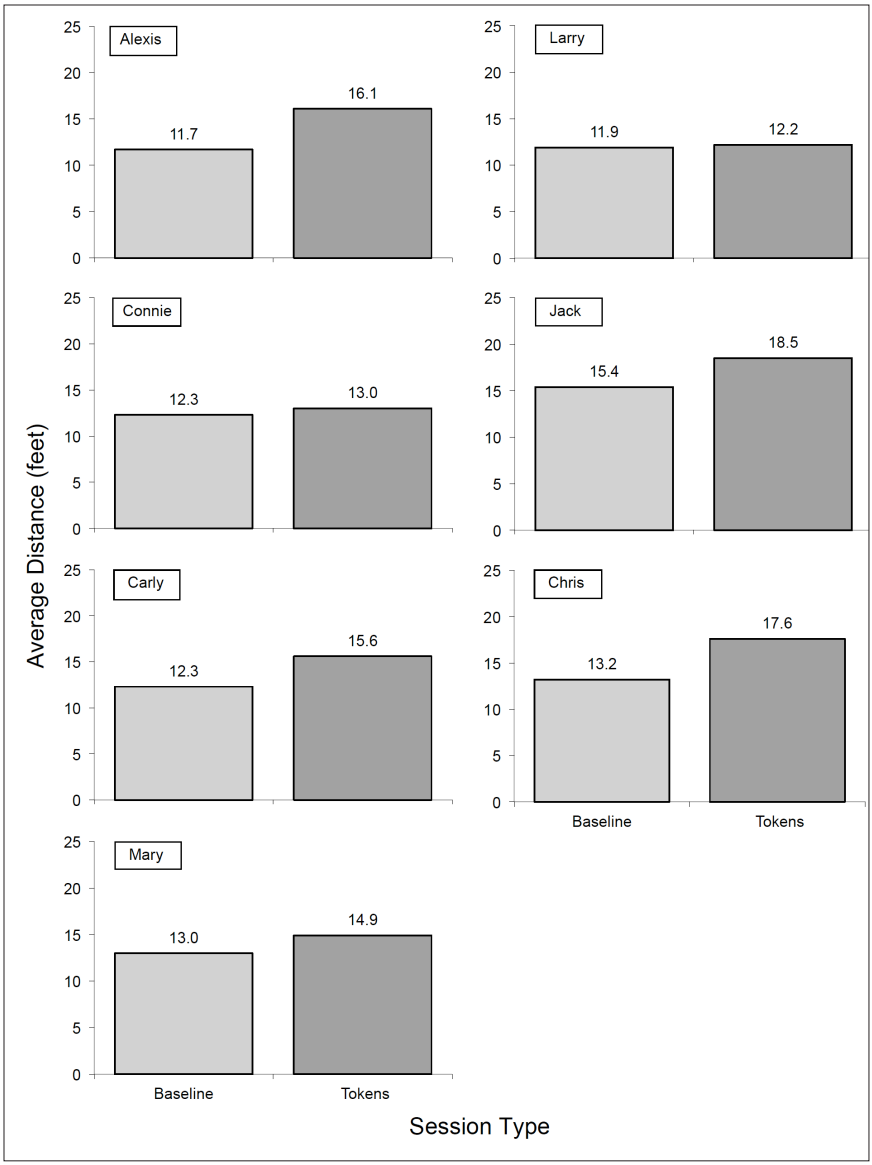

Figure 2. Average distance (in feet) of all throws based on session type.

Assessment and Token Distribution Accuracy

The accuracy with which each participant was assessed throughout the study is displayed in Table 1. Across all sessions, no participant was assessed with less than 85% accuracy. Although there may have been instances when a single session's assessment accu-

racy was low, the overall accuracy was very high (i.e., above 85%). Assessment accuracy tended to be higher during token economy sessions (i.e., ranged from 88.0% to 100.0% accurate) than during baseline sessions (i.e., ranged from 80.0% to 100.0% accurate).

With the exception of Mary, the participants tended to receive tokens with a high degree of accuracy. The mean absolute percent error of token administration was calculated for each participant (Table 1). These data show that token distribution was completed with little error, indicating that peers were able to administer tokens accurately (i.e., peers gave tokens only for correct performance of the throwing task and not when their partners performed the task incorrectly). More than half of the participants (i.e., Alexis, Connie, Carly, and Chris) received tokens with complete accuracy (i.e., 0% error) throughout all token economy sessions, and the remaining participants, Larry and Jack, received tokens with 10% error or less.

Social Validity

The PE teacher responded to the social validity questionnaire with consistently favorable remarks. She felt that the token economy system was *very effective* in helping her students improve overhand throw skills and *very easy* to implement. Although she stated that the benefits of the token system were worth the cost of its implementation, she was only *somewhat likely* to use a token economy in the future due to the costs associated with the store.

Discussion

The main purpose of the current study was to examine the effectiveness of peer-administered token reinforcement on the technique second grade PE students use to perform an overhand throw skill. Results indicated that all seven participants showed response differentiation between baseline and token sessions. Based on the visual analysis of the graphs, it can be determined that implementing the token economy had a positive impact on the overhand throw behavior of the aforementioned seven participants. Researchers in the existing literature supported the use of token economies with children in physical activity settings across several capacities (DeLuca & Holborn, 1985, 1990, 1992; Reitman et al., 2001; Trocki-Ables et al., 2001). The results of the current study further these findings by extending the use of token systems into a PE class with typically developing children while targeting a specific motor skill–related behavior. Several recommendations for the use of token economies in

PE were available (Alstot, 2012; Lavay et al., 2006; Rushall & Siedentop, 1972), but empirical evidence for the use of these systems in PE classes was lacking in the literature. In the current study, it was revealed that implementing a token economy in a PE class can motivate students to use correct technique when performing motor skills.

As mentioned previously, each of the seven participants showed an improvement in overhand throw technique during the token condition; however, there was a peculiar occurrence during two of Mary's sessions (see Figure 1). Mary was assessed with a high degree of error during Sessions 7 and 8 (i.e., with 50% and 60% accuracy, respectively). During Session 7, Mary received tokens despite performing the skill incorrectly. Then, during Session 8, she received incorrect feedback (i.e., from her partner based on the peer assessment); that is, despite her incorrect performance of the skill, she was given positive feedback regarding her engagement in the components of the overhand throw. These incidents exemplify what Cooper et al. (2007) labeled the "arbitrariness of the behavior selected"; that is, despite the intended result, the behavior that immediately precedes a reinforcing consequence will be strengthened. In the current example, because Mary's behavior (i.e., incorrect skill execution) was immediately reinforced with tokens and/or with positive feedback via the assessment, the behavior continued. It was not until the proper behavior was reinforced during Session 9 that Mary increased correct execution of the overhand throw skill.

Participants were awarded tokens for correctly executing the first two components of the overhand throw skill (i.e., "side to target" and "step with opposite foot"). However, data from all four components of the skill (i.e., the first two components plus "arm way back and throw" and "follow through") were included in the data analysis, despite the intervention being focused only on the first two. When the first two components are analyzed separately from the second two, there is little or no response differentiation in the first two, which were specifically targeted by the token system. Most of the response differentiation between token and baseline sessions occurred in the second two components. It appears that with the introduction of token reinforcement, participants were able to generalize quickly performance of the first two components of the skill to baseline and token sessions, whether or not tokens were awarded. Specifically during token sessions, however, participants typically performed all four components more consistently than they did during baseline sessions. This may be explained by what Cooper

et al. (2007) labeled "behavioral momentum" or a "high-probability request sequence," which are characterized by individuals performing a difficult task (or a task with a lower likelihood of compliance) immediately after completing a series of easier tasks (or tasks with higher incidence of compliance) for which they are reinforced. In the current study, performing a series of easier tasks (Components 1 and 2) with token reinforcement resulted in an increased likelihood of correct performance of the more difficult tasks (Components 3 and 4). Awarding tokens for correct performance of "side to target" and "step with opposite foot" had a behavioral momentum carryover effect on performance of the more difficult components of "arm way back and throw" and "follow through." Based on this analysis, students may benefit when teachers reinforce the first step or two of a sequential skill such as throwing.

The secondary purpose of the study was to examine the effect the reinforcement of the technique participants used to perform the overhand throw had on the outcome of the throw (i.e., distance the bean bag traveled). The preliminary analysis indicated that sessions in which participants were reinforced with tokens for performing the skill correctly resulted in an improved product; that is, participants threw the bean bags farther when they received tokens for their correct performance. However, a more in-depth examination showed that the improvement in the product may have been more of a result of the cumulative number of appropriate responses over time; as the number of most participants' correctly performed components accumulated, the trend in the distance the bean bags were thrown increased as well. Several researchers have demonstrated the relationship between practice trials using correct technique and student achievement in PE settings (Ashy, Lee, & Landin, 1988; Buck, Harrison, & Bryce, 1990; Silverman, 1985); however, in these studies, whole trials were used as the variable for examination. A preliminary indication of the current study is that student achievement may improve as a result of an accumulation of correctly performed components of a skill.

A tertiary purpose of the current study was to investigate the accuracy with which second grade students perform a peer process assessment and administer token reinforcement based on the results of the assessment. Within behavior analysis in PE literature, researchers have found evidence supporting the use of peer assessments (Crouch et al., 1997; Ward, Crouch, & Patrick, 1998; Ward, Smith, et al., 1998) and peer-administered token reinforcement (Alstot,

2012; Mangus et al., 1986). The results of the current study indicate that students as young as second grade can effectively and simultaneously perform a process assessment and dispense token reinforcement with a high degree of accuracy. The process of assessment training was simple. Two 5-min sessions were all that were necessary for participants to achieve the criterion of 80% accuracy during training. Then, throughout the duration of the study, with few minor prompts and quick verbal reminders of how to conduct the assessment from the teacher, the students were able to assess accurately the technique their peers used to perform an overhand throw. These findings provide evidence that, with relatively little training, lower elementary-aged students have the capability to assess and reward their peers' motor performance accurately. Therefore, all students in the class can receive immediate and individualized feedback from their peers regarding their skill performance as well as receive reinforcement for the correct execution of the skill, which can have a positive impact on the achievement of the student within the PE context.

Implementing token economy systems, however, is not without complication. Kazdin (1982) identified several barriers to the proper and effective execution of a token economy system, including issues related to administrative and organizational concerns. Despite the potential obstacles in its implementation, the token system in the current study was introduced with little difficulty, especially with the students administering the reinforcement. The responses the teacher provided on the social validity questionnaire indicated that the implementation of the token system was *very easy* and that it was *very effective* in helping her students learn the overhand throw skill. However, she was only *somewhat likely* to use a token system in future classes. She revealed that the major barrier to her future use was related to the costs associated with upkeeping the token store. She explained that although 38 cents per student per month seemed sensible, when multiplying that by the hundreds of students she sees weekly, the costs exceed what she considers reasonable. After a short discussion on this topic, she was willing to try a token system again in the future if more "inexpensive" backup reinforcers (e.g., line leader privileges, free choice time, choice of activities, other free or inexpensive items) were used to stock the store.

The main limitation associated with the current study is related to the amount of improvement participants showed over the baseline condition. Although most participants improved, it may be argued

that the difference between baseline and token session performance was not enough to make the token system worthwhile. This may have been more of a function of the boundaries confining the study. More specifically, the maximum performance participants could achieve during any given session was set at 20 points (i.e., 20 components performed correctly across five practice trials); therefore, a greater difference may not have been as evident as it may have been if a target behavior were selected that did not have a maximum performance level (e.g., throw distance). Despite this limitation, participants showed an average improvement of 3.02 overhand throw components performed correctly during the token sessions included in the study. It may, therefore, be assumed that if the token system were expanded to 10 or 20 sessions, the mean number of additional components performed correctly would jump to 6.63 or 13.25, respectively. In several seminal studies, correct practice in PE has been linked to achievement by students (Ashy et al., 1988; Buck et al., 1990). The increase in correct practice due to implementing a token economy across five, 10, or 20 sessions may be invaluable to the achievement of students within PE settings.

Further investigation into implementing token economies in PE needs to be conducted. The token economy implemented in the current study was shown useful with second grade students. However, additional token economy research should be conducted with an older population, such as middle or high school PE students. Also, preliminary evidence was revealed in the current study that an accumulation of correctly executed components of a skill performed over time may be associated with achievement; further examination is needed to confirm this result.

Conclusions

The results of the current study indicate that peer-administered token reinforcement can be useful in motivating typically developing elementary-aged students to perform skills correctly and increase achievement in PE. Also, the implementation of a token economy can be done with relative ease in a second grade PE class. Taken together, these two results indicate that the token economy can be an effective and appropriate tool for physical educators.

It was also revealed in this study that students as young as second grade can accurately perform a process assessment on their peers' motor performance, which has implications outside of token economy research. Teachers can use peer assessments with children

in PE with the assertion that students will be receiving a relatively accurate assessment of their performance.

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