



Implications for the Use of Token Economies in Physical Education: A Literature Review

Système de gages et éducation physique : Survol de la documentation

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Abstract

Token economies have been shown effective and useful within behaviour analysis and general educational literature. However, despite several recommendations for the use of token reinforcement within physical education and the documented effectiveness of token systems applied in physical activity settings, little research has examined these systems specifically within a physical education context. The following review examines the existing literature that applies token systems in physical activity situations. Based on the findings from these studies, paired with the recommended uses in physical education, it can be concluded that token systems may be a useful tool for physical educators. However, further research needs to be conducted, particularly in physical education settings. This review provides a rationale and an impetus for conducting such research.

Résumé

Les analyses comportementales et la littérature pédagogique semblent confirmer l'efficacité et l'utilité du recours à un système de gages en éducation physique. Par contre, même si certains ont recommandé l'utilisation d'un tel système pour améliorer les comportements des élèves en éducation physique et démontré son efficacité dans des contextes d'activité physique, peu d'études ont porté sur l'usage du système aux fins particulières des cours d'éducation physique. Cet article passe en revue la littérature sur l'application du système de gages dans des contextes d'activité physique. Quoique les conclusions des études et les usages recommandés confirment l'utilité du système pour les enseignantes et enseignants d'éducation physique, il importe de poursuivre les efforts de recherche, surtout dans des contextes d'éducation physique. La présente étude propose une argumentation en faveur de telles recherches tout en cherchant à donner l'élan nécessaire à la poursuite de ces travaux

Introduction

Research examining the implementation of behaviour analysis principles into physical education dates back to nearly 40 years ago when Siedentop and Rushall (1972) proposed a model for applying behavioural strategies to physical

education and sport settings in order to systematically change motor behaviours. The science of behaviour analysis is based on the premise that environmental stimuli can be systematically manipulated in order to produce corresponding behaviour changes in individuals (Skinner, 1968). Because of the endless possibilities for practical application of this science, it is no wonder pedagogy researchers so thoroughly examined behaviour analysis throughout the years following its introduction to develop empirically-based tools physical education teachers could utilize (see review by Ward & Barrett, 2002). Despite numerous research and practical successes, however, physical education researchers have overlooked several techniques that have a foundation in behaviour analysis. One of these tools, the token economy, has been applied in a variety of settings to help improve skills and increase the frequency of appropriate behaviour. This review examines how token economies were derived from behavioural theory and applied to therapeutic, educational, and finally, physical activity settings. In addition, suggestions for further research and applications of token economies to physical education are discussed.

Behavioural Theory

Behavioural theory, or behaviorism, has its foundations in the influential early works of Ivan Pavlov, John Watson, and B.F. Skinner, among others (Cooper, Heron, & Heward, 2007). Their collective works culminated in what Skinner (1953) termed “operant conditioning,” a method of behaviour analysis that focused on manipulating the consequences for engaging in a specified behaviour in order to change the behaviour. Operant conditioning has two main categories of consequences: punishers and reinforcers. A punisher is a stimulus that, when applied immediately following a specified behaviour reduces the likelihood the behaviour will occur again in the future in a similar situation (Cooper et al.; Skinner, 1953, 1974). Conversely, a reinforcer is a consequence that increases the likelihood the behaviour will occur again under similar circumstances (Cooper et al.; Skinner, 1953, 1974). Through the process of consequence manipulation, behaviours can be systematically altered (Skinner, 1968); problem behaviours can be decreased while desirable behaviours can be increased (for a more thorough discussion of behaviorism and operant conditioning, see Chiesa, 1994; Cooper et al.; Skinner, 1953, 1974). These basic principles have been applied in a wide variety of settings for the purposes of systematic and practical behaviour change. The focus on external stimuli as the controlling agents for behaviour has allowed practitioners across a variety of disciplines to systematically manipulate environmental stimuli, resulting in corresponding behaviour changes. This review, however, will focus on how behaviour analysis has been used in educational and physical activity settings.

Behaviour Analysis in Education

One of the more frequently examined areas of behaviour analysis application is in the field of education. Despite some criticisms of using extrinsic rewards to increase appropriate academic behaviours (Kohn, 1998), behavioural principles are often present in classrooms in such forms as tangible reinforcers (e.g., stickers, pencils, edibles, etc.), intangible reinforcers (e.g., extra recess time, social praise, high grades, attention, etc.), and punishers (e.g., time out, extra assignments, low grades, etc.). Alberto and Troutman (2006) describe

numerous educationally-appropriate behavioural principles, many of which have been examined through applied research and have been shown to be an effective method of increasing appropriate classroom behaviour (e.g., Ardoin, Martens, & Wolfe, 1999) and decreasing inappropriate classroom behaviour (e.g., Lalli, Browder, Mace, & Brown, 1993). Additionally, principles based in behaviour analysis have been shown useful to improve academic skills and behaviours, such as math skills (e.g., Fueyo & Bushell, 1998), homework performance (e.g., Miller, & Kelley, 1994), and class participation (e.g., Gardner, Heward, & Grossi, 1994). Further, a meta-analysis examining the effects of a variety of teachers' instructional methods on student academic achievement revealed that principles based in applied behaviour analysis (i.e., reinforcement, cues, and feedback) produced large effect sizes (Walberg, 1984). Numerous education-related behaviours, settings, and populations have been improved through the use of techniques based in applied behaviour analysis.

Behaviour Analysis in Physical Education, Sport, and Physical Activity

As a subdiscipline of general education, physical education (and similarly, sport and physical activity) practitioners were formally introduced to the field of behaviour analysis in the early 1970s when Siedentop and Rushall proposed a model of operant conditioning for the improvement of motor skills (Rushall & Siedentop, 1972; Siedentop & Rushall, 1972). From that point, the use of behavioural principles in physical education was expanded. As identified by Ward and Barrett (2002), researchers examined behaviour analytic interventions within four areas of the discipline: in student learning (Patrick, Ward, & Crouch, 1998; Sharpe, Brown, & Crider, 1995; Ward, Smith, Makasci, & Crouch, 1998), for class and behaviour management (Paese, 1982; White & Bailey, 1990), with special needs populations (Houston-Wilson, Dunn, van der Mars, & McCubbin, 1997; Leiberman, Dunn, van der Mars, & McCubbin, 2000), and in teacher training (Eldar, 1990; Lounsbery & Sharpe, 1999; van der Mars, 1987). Throughout all areas of application, the literature reveals the effectiveness of behavioural interventions in both physical education and sport settings (Donahue, Gillis, & King, 1980; Lee, 1993; Ward & Barrett).

Several behavioural analysis based teaching techniques have been identified in physical education and sport literature. Differential reinforcement (Buzas & Ayllon, 1981; Fitterling & Ayllon, 1983) is a procedure where the teacher reinforces (e.g., with verbal praise) only the component(s) of a skill that were performed correctly while ignoring components that were not correctly performed. This technique places an emphasis only on desired behaviour (i.e., correct skill performance) in order to increase the likelihood of repeated correct performance. When components of the skill that were previously incorrectly performed are executed acceptably, the teacher reinforces them immediately. Eventually, each component of the skill is performed correctly. Another teaching technique found in the literature, public posting (Brobst & Ward, 2002), reinforces students' physical activity behaviours through social reinforcement and attention. Using this technique, the teacher sets a criterion for acceptable performance. If a student meets the criterion, his/her name is written on a list, which is in public view. This public posting of names serves as social reinforcement, thereby increasing the probability of the behaviour(s) being repeated by the students who made the list. A benefit of public posting of names

involves the individualistic nature of behaviour and skill performance; teachers can set individual criteria that are specific to each student. Criteria for lower skilled students to make the list are set at a lesser level than criteria for higher skilled students. That way, each student can be challenged at an appropriate level and reinforced when that level of performance is achieved. Self-monitoring feedback (Hume, Martin, Gonzalez, Cracklen, & Genthon, 1985) has also been identified as an effective behaviour analysis based teaching technique. Students perform several trials of a skill while performing a self-assessment. Then the student will practice skills (or components of skills), which he/she judged to be poor. The self-assessment serves as both reinforcement (i.e., of skill components performed correctly) and identification of deficiencies. Additionally, form training (Kladopoulos & McComas, 2001) is a technique where the teacher reinforces correctly performed components of a skill. However, if one or more components are performed incorrectly, without drawing any attention to incorrectly performed components, the teacher will review the correct technique to be executed. Then the student will perform another trial and the teacher will reinforce appropriately. And finally, goal setting (Wanlin, Hrycaiko, Martin, & Mahon, 1997) is an intervention that involves goal determination (i.e., identification of a target behavior), goal setting, and goal reviewing (i.e., evaluating the appropriateness of the goal). Goals serve as an antecedent manipulation, steering students' behaviours toward a specified target. Teachers can additionally reinforce with tangible or social rewards when students reach the goals. Each of these behavioural interventions has been shown to be useful means of improving motor behaviours.

These and other interventions based in behaviour analysis have been used to improve a wide variety of physical education-related (Crouch, Ward, & Patrick, 1997; Ward, Crouch, & Patrick, 1998; Ward et al., 1998), sport-related (Brobst & Ward, 2002; Kladopoulos & McComas, 2001; Komaki & Barnett, 1977), and physical activity-related skills (Fitterling & Ayllon, 1983) throughout the literature. Teaching techniques based in applied behaviour analysis can be useful tools for physical education, sport, and physical activity practitioners. None of the aforementioned studies, however, examined the effectiveness of a token economy, a tool that has its foundation in behaviour analysis.

Token Economies

According to McKenzie (1979), "...token reinforcement systems [are] one of the most widely used and effective behavior management strategies to evolve from behavior analysis" (p. 102). Introduced by Ayllon and Azrin (1968) for use in a therapeutic setting, the token economy system consists of three basic components: (a) selection and definition of behaviour(s), (b) administration of tokens (e.g., popsicle sticks, bingo chips, points on a token board, stickers on a chart) as a result of individuals engaging in the selected behaviour, and (c) a scenario (i.e., a "store" or other setting) in which individuals can exchange the tokens they have earned for a variety of rewards (i.e., back-up reinforcers). Upon engagement in a targeted behaviour, the participant is awarded a secondary reinforcer (i.e., tokens or points), which have little or no inherent value to the individual. At a later time, the secondary reinforcers are then exchanged for primary reinforcers (i.e., back-up reinforcers; tangible or social rewards), which are of value to the individual. Tokens can be awarded quicker, easier, and with a

smaller delay than traditional reinforcement (i.e., tangible rewards) and can be exchanged for a variety of primary reinforcers. This variety can reduce the likelihood the individual becomes satiated with the reinforcers (Rushall & Siedentop, 1972).

Token economies have been recommended for use in a variety of settings. For example, Stainback, Payne, Stainback, and Payne (1973) proposed a model for implementing token economies in educational settings, specifically within the classroom. Researchers have examined the effects of token reinforcement in classrooms and have found them to be effective across a variety of academic areas, including math behaviours (McGinnis, Friman, & Carlyon, 1999), reading behaviours (Ayllon & Roberts, 1974), and class participation (Boniecki & Moore, 2003).

Token economies in physical activity settings. Specifically within physical education, sport, and other physical activity settings, the use of token economies has been suggested to decrease problem behaviours, improve skill acquisition, and increase other appropriate physical activity behaviours. Rushall and Siedentop (1972) first introduced the concept of token reinforcement to physical education practitioners, citing two main advantages of using token systems. First, the ongoing educational process that occurs in physical education and sport settings does not necessarily have to be disrupted as it is when administering traditional reinforcement. In other words, giving a student a token or points promptly will minimally interrupt his/her skill practice or other educational activities. Second, the token(s) earned by students can be exchanged for a wide variety of back-up reinforcers. This variety reduces the likelihood the student(s) will become satiated with the traditional reinforcers (Rushall & Siedentop). Additionally, Lavay, French, and Henderson (2006) reiterate the advantages of implementing a token economy, stating that it is not always convenient to administer traditional tangible reinforcement, especially in physical activity settings. Further, Cooper et al. (2007) discuss the importance of avoiding delays in reinforcing desired behaviour, stating, "...behaviors other than the target behavior occur during the delay...the behavior temporally closest to the presentation of the reinforcer will be strengthened by its presentation" (p. 259). Tokens can be given out immediately following successful engagement in the desired behaviour during physical activity (Lavay, et al.).

Empirical support for the use of token economies in physical activity settings. Token economies have been found to be effective in improving attentive and on-task behaviours during physical activity (Mangus, Henderson, & French, 1986; Reitman, Hupp, O'Callaghan, Gulley, & Northrup, 2001) as well as exercise time and output behaviours (Bennett, Eisenman, French, Henderson, & Schultz, 1989; Bernard, Cohen, & Moffett, 2009; DeLuca & Holborn, 1985, 1990, and 1992). Additionally, other physical activity behaviours, such as distance walked (Wiggam, French, & Henderson, 1986), distance walk/run times (Trocki-Ables, French, & Henderson, 2001), and pole vault height (Brock, Brock, & Willis, 1972) were improved using token reinforcement. In-depth discussion of each of these studies follows. Table 1 includes a summary of each study.

Table 1

Studies Examining the Effects of Token Economies on Physical Activity Behaviours

Study	Participants	Setting	Target Behaviour/s	Intervention	Results
Alstot (2011)	9 second grade students; 10 third grade students	Mainstream physical education class	Overhand throw technique; Successful jump rope trials	Token economy	<ul style="list-style-type: none"> • Six out of nine 2nd grade students improved overhand throw technique • Nine out of ten 3rd grade students increased the number of jump rope trials
Bennett et al. (1989)	3 women with Down syndrome, aged 24 to 26	Experimental room at the participants' school	Revolutions and time on task on a stationary bike	Token economy	<ul style="list-style-type: none"> • Participant 1 (P1) increased mean time on task from 184.3 sec to 493.7 sec • P2 increased from 186.1 sec to 356.9 sec • P3 increased from 520.6 sec to 862.0 sec
Bernard et al. (2009)	3 girls with Cystic Fibrosis, aged 8 to 12	Participants' homes	Total exercise time measured by minutes of exercise per day	Token economy	<ul style="list-style-type: none"> • All participants increased mean daily exercise time and mean days per week exercised

Brock et al. (1972)	2 boys on a high school track team, age 15	High school track and field facilities	Pole vault height	Token economy	<ul style="list-style-type: none"> • P1 increased pole vault height from under 9.0 ft. to 10.5 ft. • P2 increased from under 9.0 ft. to 10.0 ft.
DeLuca & Holborn (1985)	4 boys (2 obese, 2 non-obese), age 11	Elementary school seminar room set up with stationary bicycles	Minutes of exercise on a stationary bicycle and mean revolutions per minute	Token economy on a fixed interval (FI) 1-min schedule	<ul style="list-style-type: none"> • Obese boys exercise time increased; mean revolutions decreased from 84.0 per min. to 74.9 • Non-obese boys exercise time increased; mean revolutions slightly decreased from 99.4 per min. to 98.6
DeLuca & Holborn (1990)	6 boys (3 obese, 3 non-obese), age 11	Elementary school nurse's office set up with stationary bicycles	Minutes of exercise on a stationary bicycle and mean revolutions per minute	Token economy on a fixed interval (FI) 1-min schedule and a fixed ratio (FR) schedule	<ul style="list-style-type: none"> • Obese boys' mean exercise time increased from 12.3 min to 30.0; mean revolutions per min decreased • Non-obese boys' mean exercise time increased from 14.6 min to 30.0; mean revolutions per minute remained similar

DeLuca & Holborn (1992)	6 boys (3 obese, 3 non-obese), age 11	Elementary school nurse's office set up with stationary bicycles	Minutes of exercise on a stationary bicycle and mean revolutions per minute	Token economy on a variable ratio (VR) schedule with changing criteria	<ul style="list-style-type: none"> • Obese boys' mean exercise time increased from 12.9 min to 30.0; mean revolutions per min increased from 59.2 (baseline) to 85.5, 101.2, and 117.0 (VR1, VR2, and VR3 subphases, respectively) • Non-obese boys' mean exercise time increased from 15.2 min to 30.0; mean revolutions per minute increased from 71.9 to 98.9, 114.2, and 130.0 • 4 out of 5 participants increased their time on task for at least one phase of the study
Mangus et al. (1986)	5 children with autism	Integrated physical education class	Time on task measured by time on a balance beam	Token economy with tokens distributed by trained peer tutors	

Reitman et al. (2001)	3 children (2 girls, 1 boy) with ADHD, ages 4 to 7	Summer treatment program for children with ADHD	Attentive behaviour measured by a "total attention score" (% of correct ready position + correct "attention question" answers)	Methylpheni-date (ADHD medication), placebos, token economy, and medication + token economy	<ul style="list-style-type: none"> • P1 increased from 26% (placebo) to 43 (medication) to 52 (token economy) to 64 (medication + token economy) • P2 increased from 39% to 58 to 78 to 93 • P3 increased from 26% to 34 to 90 to 96 • Token economy was effective in reducing 1-mile walk/run times; token economy + verbal praise was most effective for 4 out of 5 participants
Trocki-Ables et al. (2001)	5 boys with ADHD, ages 8 to 10	Elementary school outdoor field	1-mile walk/run times	Token economy, verbal praise, token economy + verbal praise	<ul style="list-style-type: none"> • P1 increased mean daily walking distance by 110% • P2 increased by 84% • P3 increased by 73% • P4 increased by 56% • P5 increased by 114% • P6 increased by 71%
Wiggam et al. (1986)	6 women, ages 70 to 92	Retirement center where the participants resided	Mean distance walked per day	Token economy	

Attentive and on-task behaviours. Reitman et al. (2001) examined the effectiveness of a token economy in conjunction with medication used for treating Attention Deficit Hyperactivity Disorder (ADHD) symptoms on children's attentive behaviour during physical activity. During games of kickball played while in a summer program, two measures of "attentive" behaviour were assessed. First, the researchers observed the participants to see if they were in the ready position before each pitch. Second, following each pitch, the participants were asked questions inquiring of their knowledge of the number of balls and strikes on the batter, the number of outs, or the current score. Tokens were awarded when participants were in the ready position and when they correctly answered the questions. Introduction of the token economy improved the attentive behaviour of the participants more than medication alone. It is apparent that the token economy was effective in increasing the attentive behaviour of children diagnosed with ADHD during physical activity.

Mangus et al. (1986) examined the effects of a token economy on the on-task time of children with Autism during physical education. Trained peer tutors were appointed to administer token reinforcement to partners. Each participant was assigned a target time on task; when the participant had remained on task for the target time, the peer tutor reinforced the behaviour by dropping a token into a clear plastic container. When five tokens were earned, they were exchanged for a variety of edible back-up reinforcers. Results indicated that on-task time increased for four out of the five participants for at least one of the phases of the study. However, only one participant's data indicated a reversal upon withdrawal of the intervention. There may not be enough appropriate data to support the premise that a functional relation was present in this study. Despite this, there is negligible evidence that supports the use of token reinforcement for students with Autism in physical education settings.

Exercise time and output behaviours. A token economy was implemented to improve the exercise behaviour of three young adult women with Down syndrome (Bennett et al., 1989). Tokens were administered when participants reached a predetermined number of revolutions at a specified intensity on the stationary bike. Tokens were then exchanged for preferred items immediately following the exercise session or were accumulated and exchanged at a later date. Results showed that with the introduction of the token economy, time riding the stationary bicycle increased for all three participants. It was concluded that the use of a token economy could be effective in increasing exercise time for women with Down syndrome.

Bernard et al. (2009) also examined the effectiveness of a token economy on exercise time. Using a reversal design, they investigated the effectiveness of a token economy on the minutes of exercise per day by three school-aged children with cystic fibrosis. During the intervention phases, participants earned one point for every 10 minutes of exercise. Points accumulated and were later exchanged for tangible or social rewards. Time spent exercising increased for all three participants during the two intervention phases as compared to the initial baseline and reversal phases of the study. In addition, the average number of exercise days per week increased for all participants during the two intervention phases. These results indicate token economies can be effective in increasing the general exercise time and days of exercise of children with cystic fibrosis.

DeLuca and Holborn (1985, 1990, 1992) conducted a series of studies examining the effects of token economies on exercise behaviours of obese and non-obese boys. In their 1985 study, DeLuca and Holborn administered a fixed interval (FI) schedule of token reinforcement to fifth grade boys to improve exercise time and output. Across all four participants, the time spent exercising increased upon introduction of the token economy. The mean revolutions per minute, however, either remained the same during the intervention phase or decreased. These results indicate that token reinforcement can positively influence the time spent exercising. It is interesting to note, however, that only exercise time was reinforced, while mean revolutions per minute were not. This may explain why exercise time increased during the intervention while mean revolutions per minute remained constant or decreased.

In their second study, DeLuca and Holborn (1990) examined the effectiveness of FI and fixed ratio (FR) schedules of token reinforcement on fifth grade boys. Similar to the previous study, all six participants' exercise time increased during both the FI and FR schedules of reinforcement phases. Also like the previous study, the mean number of revolutions per minute decreased during the intervention phases. Again, this dependent variable was not reinforced. The behaviour that was reinforced with token reinforcement (i.e., time spent exercising) was the dependent variable that showed an increase. This study again shows that implementing a token economy can have a positive effect on the specific target exercise behaviour that is reinforced.

In the final study, DeLuca and Holborn (1992) examined the effectiveness of a token economy administered on a variable ratio (VR) schedule with changing criteria on the exercise behaviours. The intervention phase consisted of three subphases. For each subphase, the criterion for token reinforcement was set at 15% above the mean number of revolutions per minute of the previous subphase. When the participants' exercise intensity reached the criterion level, they were reinforced with tokens on a VR schedule. As with the previous two studies, results indicated that the time spent exercising increased upon implementation of the token economy. In fact, the performance of all six participants stabilized at 30 minutes, the maximum time allotted for exercise. Unlike the previous two studies, the mean number of revolutions per minute increased as well. This result may be due to the target behaviour in this study being mean revolutions per minute, not exercise time as in the previous two studies in the series.

Other physical activity behaviours. Wiggam et al. (1986) implemented a token economy targeting walking distance for senior citizens. Tokens were given to participants when they showed an increase of 5% over their mean baseline distance walked. Tokens were later exchanged for a variety of tangible items, such as edibles, entertainment tickets, and household goods. As a result of the intervention, all six participants increased their walking behaviour by at least 56% over baseline with a mean increase of 85%. The results of the study indicate that token economies may be an effective tool to increase the exercise behaviour of female senior citizens.

Trocki-Ables et al. (2001) used a token economy to decrease the one-mile walk/run times of boys diagnosed with ADHD. The intervention consisted of three elements: token economy, verbal praise, and a token economy paired with verbal praise. Tokens were given when a lap was completed in less time than the

previous lap, which allowed the participants to earn up to five tokens per day. Results indicated that token reinforcement, verbal praise, and a combination of tokens and praise all resulted in decreased one-mile times, indicating that token reinforcement can be an effective means to decrease distance run times of boys diagnosed with ADHD.

Brock et al. (1972) examined the effects of token reinforcement on the athletic performance of two high school track athletes. Points were awarded to the participant who performed the highest pole vault of the day and subtracted if the participant did not improve from his previous day's height. Once five points were accumulated, they could be exchanged for either a milkshake or an excused absence from a regular track team workout. Despite the authors' conclusion that the token economy system was an effective tool to improve pole-vaulting behaviours, a visual inspection of the graphs does not clearly reveal a functional relation between the treatment and the participants' pole-vaulting behaviours.

More recently, Alstot (2011) completed two studies examining the effectiveness of a teacher-implemented token economy in an elementary physical education setting. In study one, tokens were administered when participants completed jump rope trials and, in study two, participants were rewarded with tokens when they performed the overhand throw correctly. In both studies, participants exchanged their tokens for small toys and/or school supplies. Results indicated that token reinforcement had a positive influence on the number of successful jump rope practice trials performed by third grade participants as well as on the overhand throw technique of second grade participants. The token economy was an effective tool for positively influencing physical activity behaviours of elementary aged students when implemented in a physical education setting.

Summary and Recommendations

Although several studies were identified that used token reinforcement to improve motor behaviours, only a few were conducted in school settings. DeLuca and Holborn's (1985, 1990, 1992) research was conducted in a clinical setting within the participants' school site; stationary bicycles were set up in the nurse's office or a seminar room in the school. Brock et al. (1972) implemented a token economy in a high school sport setting. And, Trocki-Ables et al. (2001) conducted their study on a school's outdoor field. Although improving physical activity behaviours in schools would most logically fit into physical education settings, only a few studies were identified that examined the effectiveness of token reinforcement systems in physical education. Mangus et al. (1986) implemented a token system in physical education with some success; however, the target population of that study was children with Autism. Therefore, the studies conducted by Alstot (2011) were the only ones identified that examined the effectiveness of token reinforcement systems in physical education classes with typically developing students.

More than 30 years ago, in his literature review for physical educators, McKenzie (1979) wrote, "although little research has been completed in physical activity settings, token reinforcement systems appear to be a largely untapped resource for improving social and skilled behaviors in sport and physical education environments" (p.112). Despite several recommendations to implement token economies in physical education settings (Lavay et al., 2006; Rushall &

Siedentop, 1972), the scarcity of existing published empirical work in this area indicates that research is still needed. Alstot (2011) found token reinforcement to be very effective with second and third grade participants, but it is unknown if a token economy implemented with older physical education students would be as impactful. Also, one of the potential drawbacks to the implementation of token systems in physical education is related to the costs associated with purchasing reinforcers. Research should examine the use of inexpensive or free reinforcers (e.g., free choice time, line leader privileges, etc.) included in a physical education class's token system. Despite the need for additional research, the overall findings of the studies discussed above suggest token systems can be an effective tool for widespread use in physical education.

Additionally, one of the main criticisms of using extrinsic rewards in educational settings is that it supposedly decreases students' intrinsic motivation for engaging in the extrinsically rewarded activity (Kohn, 1998). Within educational literature, however, there is some contradictory evidence, which indicates when rewards are introduced and then subsequently withdrawn in a proper and systematic fashion; intrinsic motivation remains high (McGinnis, Friman, & Carlyon, 1999). Further research should examine if this systematic introduction and withdrawal of tangible reinforcement will result in increased motivation in physical activity situations as well.

"That token programs are effective in altering behaviors, and offer numerous advantages as treatment programs, cannot be disputed from an examination of the literature" (Kazdin & Bootzin, 1972, p. 367). Based on the results found in the reviewed studies, the same conclusion can be drawn for the implementation of token economies in physical activity settings as well. Teacher educators and researchers should more closely examine the benefits of utilizing token economies because they can be tools that increase physical activity levels and efficiently aide in the improvement of movement competency for students in physical education.

Author's Note

This article was completed as part of the author's doctoral work at Middle Tennessee State University, Murfreesboro, Tennessee, USA.

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