I, Chele McKissick, hereby submit this original work as part of the requirements for the degree of Doctor of Philosophy in School Psychology.

It is entitled: Using nonrandomized vs. randomized interdependent group contingency components: Comparing the effects on disruptive behaviors and academic engagement in elementary students

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Using nonrandomized vs. randomized interdependent group contingency components:
Comparing the effects on disruptive behaviors and academic engagement in elementary students

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by

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Abstract

Disruptive behaviors in the classroom affect the learning environment by taking time away from academic instruction. This study compared the effects of two types of interdependent group contingencies (nonrandomized and randomized) on classwide engagement and disruptive behavior of 53 students across three first-grade classrooms in a sub-urban Midwestern elementary school. Using a combined multiple baseline across settings and ABCBC design, baseline levels of group disruptive behavior and engagement were compared to intervention levels across different intervention phases in all participating classrooms. Results examine overall effectiveness for each intervention phase. Social validity and future areas of research are discussed.
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Introduction

Effective classroom management strategies are important to promote learning in the classroom. Without effective management, disruptive classroom behaviors (e.g., out of seat, talking, etc.) can become a constant struggle for classroom teachers. Such behaviors can lead to decreased academic learning time, decreased academic performance, and lowered standardized test scores (Canter, Paige, Roth, Romero, & Carroll, 2004). Effective instruction combines classroom management strategies into the daily lesson plan in such a way that disruptive behaviors are minimized, while maximizing academic learning time. In order to increase the utility of classroom management strategies (as a component of effective instruction), they must be effective and efficient in order to be easily implemented within the classroom. For a classroom management strategy (i.e. behavioral intervention) to be considered effective and efficient, it must improve important target behaviors to a socially meaningful degree without wasting resources such as time, money, and energy.

It is well known that contingency management programs can be used to decrease disruptive behavior and/or increase appropriate behavior (Alexander, Corbett, & Smigel, 1976; Ascare & Axelrod, 1973; Barrish, Saunders, & Wolf, 1969; Theodore, Bray, Kehle, & DioGuardi, 2003). What is less commonly considered is the idea that when disruptive behaviors are occurring in multiple students or across the whole classroom, it may be advantageous to implement a group-oriented contingency. Group-oriented contingencies have been shown to be as effective as individual contingencies, while potentially reducing overall teacher efforts and paying greater dividends in regards to overall academic success (Kamps et al., 2011; Ling, Hawkins, & Weber, 2011; Little, Akin-Little, & Newman-Eig, 2010; Theodore, Bray, & Kehle, 2004). Research suggests a variety of effective and efficient classwide behavioral interventions
including curricular modifications (Kern, Bambera, & Fogt, 2002), social skills training (Langland, Lewis-Palmer, & Sugai, 1998), and group contingencies for behavior (Barrish et al., 1969; Turco & Elliot, 1990).

**Group Contingencies**

Litow and Pumroy (1975) categorized three types of group contingencies: independent, dependent, and interdependent. In independent group contingencies, the same behavior, criteria, and reinforcement are in place for each individual in the class. Delivery of the positive consequence is contingent on each individual student’s behavior. The same contingency expectations are applied to all students, but the reward is based on individual performance and occurs independently of peer performance (Kirk et al., 2010; Skinner, Williams, & Neddenriep, 2004; Skinner, Skinner, & Burton, 2009). For example, if a teacher attempted to reduce talking out behavior and had set a criterion level for earning a contingent reward at four or less talk outs per class, student A with eight talk outs would not earn the reward, while student B with two talk outs would. Thus, all students within an independent group contingency have the opportunity to earn rewards based upon their own behavior.

Research has shown two practical benefits of using independent group contingencies in the classroom. First, because the same contingency is applied to the whole class, the teacher does not have to manage multiple contingencies. One target behavior is monitored and evaluated against one criterion and one type of reward is delivered across all students in the class. Another benefit is being able to treat the class as a whole group, which addresses concerns related to targeting one or a couple of students (Skinner, Cashwell, & Dunn, 1996).

Research has demonstrated that independent group contingencies are effective in the reduction of disruptive behavior (e.g., Broden, Hall, Dunlap, & Clark, 1970). In addition,
independent group contingencies also have been used successfully to improve academic achievement (Chadwick & Day, 1971), positive classroom behavior (Ringer, 1973), study behavior (Hall, Panyan, Rabon, & Broden, 1968), attending behavior (Kazdin & Klock, 1973), and rates of students’ following directions (Schutte & Hopkins, 1970). Independent group contingencies also have been shown to reduce disruptive behavior, while at the same time increasing academic performance (Bednar, Zelhardt, Greathouse, & Weinberg, 1970) and on-task behavior (Hewett, Taylor, & Artuso, 1969).

The second type of group-oriented contingencies, dependent group contingencies, delivers rewards to the entire group based on the performance of one student or a small subset of students. The behavior of a subgroup of students determines whether or not the whole class receives the reward, thereby making class access to the reward “dependent” on the actions of a single student or small set of students (Litow & Pumroy, 1975; Hulac & Benson, 2010; Skinner et al., 2004; Skinner et al., 2009). For these targeted students, the same target behavior and criteria are typically applied and the entire class earns the same reward. Referring back to the previous example used to explain independent group contingencies, perhaps within this fictional classroom most students are able to control talking out, but there are two students for whom it remains a concern. In a dependent group contingency, whether or not the class earns the reward depends on the behavior of the two targeted students. If the two targeted students were able to keep their talking out at four occurrences or below, then the class would earn the reward. Similarly, if either of the targeted students had more than four occurrences of talking out, then no one in the class would earn the reward.

Dependent group contingencies are efficient for the teacher because only one contingency is implemented and the teacher monitors the behavior of a small group of students.
rather than all students in the class. In addition, inclusion of peers as behavior change agents within the intervention may increase socialization and cooperation (Davis & Blankenship, 1996). Peers will be more likely to support the target students’ performance and encourage their effort because the peers themselves want to gain access to the positive consequence (Theodore et al., 2003).

Most of the research on dependent group contingencies has focused on the reduction of disruptive behavior, documenting significant positive effects (Coleman, 1970; Kubany, Weiss, & Sloggett, 1971). Dependent group contingencies also have been effectively implemented to increase student popularity (Alden, Pettigrew, & Skiba, 1970), academic achievement (Evans & Oswalt, 1968), and on-task behavior (Ascare & Axelrod, 1973; Heering & Wilder, 2006).

As with independent and dependent group contingencies, interdependent group contingencies also employ the same target, criteria, and reward for the entire class. However, in an interdependent group contingency, a specified criterion is applied to the whole group’s performance. Thus, either the entire class is rewarded based on overall class performance, or no one is rewarded (Litow & Pumroy, 1975; Kirk et al., 2010; Skinner et al., 2004; Skinner et al., 2009). There are multiple methods of establishing the terms of an interdependent group contingency. Some of the most common consist of: (a) each student in the class meeting the criteria (i.e., each student has the same goal, but delivery of the reward to the group is contingent upon each student achieving the goal level across the entire class); (b) averaging performance across the class (i.e., the class accesses reward if the class average is above the criterion); (c) setting a goal criterion for individuals in the class (i.e., each students in the class has an individualized performance goal and, if all students in the class meet their goals, the class earns
reward). Regardless of which version is implemented, the performance of each student is important in that it affects the attainment of the reward (Litow & Pumroy, 1975).

Interdependent group contingencies also offer several practical advantages, especially when compared to both independent and dependent group contingencies. First, interdependent group contingencies require minimal teacher time, as a single contingency is implemented (Davis & Blankenship, 1996). In addition, since the reward is delivered to the whole class, segregation of peers within the classroom is prevented. Also, because the class is treated as a whole, selection and access to reinforcers is improved, allowing for more naturally occurring reinforcers, such as educational activities. Interdependent group contingencies may encourage collaboration because all students must work collectively to gain access to the reinforcement. Another benefit to interdependent group contingencies is that all students are given the opportunity to celebrate their success together (Kelshaw-Levering, Sterling-Turner, Henry, & Skinner, 2000: Skinner et al., 1996).

Research has shown that interdependent group contingencies effectively reduce disruptive behavior (Barrish et al., 1969; Cowen, Jones, & Bellack, 1979). Similarly, interdependent group contingencies have been shown to be effective in improving a variety of behaviors including homework completion (Little et al., 2010), attending behavior (Willis & Crowder, 1972), noise levels in the classroom (Wilson & Hopkins, 1973), socially appropriate behavior (Gamble & Strain, 1979), academic skills (Bear & Richards, 1980), and to simultaneously reduce disruptive behavior and increase academic performance (Sloggett, 1971).
Comparing the Effects of Independent, Dependent, and Interdependent Group Contingencies

Numerous two-way comparative studies have been performed to determine if there is differential effectiveness of the three types of group-oriented contingencies in reducing disruptive behavior and improving the academic performance of students. In regards to the relative effects of the various group contingencies on challenging behavior, results remain inconclusive (Theodore et al., 2003; Theodore et al., 2004), although some studies have resulted in clearer differential effects when using an interdependent group contingency on non-challenging target behaviors including academic performance (Hall et al., 1968) and on-task performance (Crouch, Gresham, & Wright, 1985).

When comparing independent vs. interdependent group contingencies used for the reduction of disruptive classroom behaviors, results have been mixed, with some studies showing superior improvement with the interdependent contingency (Brown & Reschly, 1974; McReynolds, Gange, & Speltz, 1981; Page & Edwards, 1978), some showing more improvement with the independent contingency (Edwards, 1976; Hall et al., 1971), and some showing no difference (Axelrod, 1973; Ellery, Blampied, & Black, 1975). In one study, the two types of contingencies were combined, leading to positive results (Robertshaw & Hiebert, 1973). However, the interdependent group contingency has been shown to be more effective than the independent group contingency when applied to a variety of other target behaviors including academic achievement (Lloyd, Ebergardt, & Drake, 1996), job productivity (McNally, Norusis, Gentz, & McConathy, 1983), social behaviors (Frankosky & Sulzer-Azaroff, 1978), class attendance (Alexander et al., 1976), study behavior (Hall et al., 1968), curfew violations
(Alexander et al., 1976), and control of alcohol-related misbehavior (Liebson, Cohen, & Faillace, 1972).

When comparing dependent to interdependent group contingencies, studies have shown both to be equally effective with respect to spelling performance (Margolis, 1982; Shapiro & Goldberg, 1990; Turco & Elliot, 1990). No data were available comparing the effects of these two types of contingencies on disruptive behaviors. Similarly, the few studies that examined the relative effects of dependent vs. independent group contingencies also targeted spelling but showed dependent group contingencies to be more effective (Shapiro & Goldberg, 1990; Turco & Elliot, 1990).

Two studies compared the treatment effects of all three types of group contingencies (i.e., independent, dependent, and interdependent). In one study, Gresham and Gresham (1982) found that while both the dependent group contingency and the interdependent group contingency were effective at reducing the disruptive behaviors of 12 students in special education, the interdependent contingency was slightly more effective. In this study, the independent group contingency had minimal effects. Research comparing the three types of group contingencies applied to reading fluency and spelling found all three contingencies equally effective (Shapiro & Goldberg, 1986; Alric, Bray, Kehle, Chafouleas, & Theodore, 2007). When considered across all comparisons and target behaviors the superiority of one type of group contingency over another has not been demonstrated.

**Advantages of Interdependent Group Contingencies**

Research has shown that interdependent group contingencies are effective in reducing disruptive classroom behavior (Gresham & Gresham, 1982). While data have not consistently demonstrated the superiority of interdependent group contingencies versus independent or
dependent group contingencies (Shapiro & Goldberg, 1986; Alric et al., 2007), research does consistently demonstrate that interdependent group contingencies are at the very least as effective as the other two group contingency types (Alric et al., 2007; Coogan, Kehle, Bray, & Chafouleas, 2007; Gresham & Gresham, 1982; Hayes, 1976; Kelshaw-Levering et al., 2000; Shapiro & Gold, 1986; Theodore, et al., 2003). In addition, research suggests numerous advantages to the use of interdependent group contingencies (Coogan et al., 2007; Hayes 1976; Gresham & Gresham, 1982; Turco & Elliot, 1990; Theodore et al., 2004; Litow & Pumroy, 1975).

The positive effects of interdependent group contingencies have been demonstrated across a variety of settings and student populations. Researchers used interdependent group contingencies to effectively manage student behavior in school, home, and a variety of outside settings such as the workplace and hospital settings (Theodore et al., 2003). Although the typical population targeted in research on interdependent group contingencies has been first-through sixth-grade students (Barrish et al., 1969; Darveaux, 1984; Davies & Witte, 2000; Gresham & Gresham, 1982; Medland & Stachnik, 1972; Robertshaw & Hiebert, 1973), this intervention strategy has been effectively used with preschoolers (Simmons & Wasik, 1973), adolescents (Phillips & Christie, 1986), and adults (Lutzker & White-Blackburn, 1979). The traditional research participant population included students of typical development or students with chronic behavior problems (Bear & Richards, 1980; Alexander et al., 1976). The few studies involving students with disabilities included students with cognitive delays (Broden et al., 1970), students with emotional disturbances (Hewett et al., 1969), and students with ADHD (Davies & Witte, 2000). In each case, the interdependent group contingency was found to be effective (Tingstrom, Sterling-Turner, & Wilczynski, 2006).
There also are data to support the social validity of interdependent group contingency interventions. Studies publishing social validity information have demonstrated that interdependent group contingencies are both an acceptable intervention and are well liked amongst participant populations (e.g., students, teachers, and principals; Barrish et al., 1969; Darveaux, 1984; Davies & Witte, 2000; McKissick, Hawkins, Lentz, Hailley, & McGuire, 2010). In interpreting these social validity data, it is important to note that in all circumstances, researchers upheld a realistic criterion for behavior and did not anticipate groups of students to have perfect compliance with classroom expectations (Tingstrom et al., 2006). The use of interdependent group contingencies effectively changed student behavior and satisfied classroom teachers.

There are numerous practical advantages for teachers in implementing interdependent group contingencies in the classroom. First, minimal time and effort are required on the part of the teacher because the contingency is applied classwide (Skinner et al., 1996; Skinner et al., 2004; Stage & Quiroz, 1997; Theodore et al., 2003). Either the class as a whole accesses the reward, or it does not. This prevents a situation in which those students that do not receive a reward antagonize those who do receive the reward (Skinner et al., 1996; Theodore et al., 2003). Next, similar to the use of other types of group contingencies; teachers can use reinforcers that naturally occur in the school setting. Although research shows positive effects when tangible reinforcers (food, prizes, etc.) are used (Sloggett, 1971), activity reinforcers also have been proven effective (Hopkins, Schutte, & Garton, 1971). The following activity reinforcers have been used effectively as part of an interdependent group contingency: free time, additional recess time (Barrish et al., 1969), additional activity time (Darveaux, 1984), going to the library (Gresham & Gresham, 1982), being a teacher’s helper (Medland & Stachnik, 1972), reading...
(Robertshaw & Hiebert, 1973), playing games in the classroom or working on a special art and science projects (Grandy, Madsen, & DeMersseman, 1973), watching movies, listening to music, tutoring a younger student, going outside to talk or read, helping the art or music teacher on special projects, lining up first for lunch, a special visit from the school principal, a party, and lunch with a staff member (McLaughlin & Malaby, 1973). In addition to the practical advantage of using activity reinforcers within interdependent group contingencies, activities are easily incorporated, cost effective (often free), and cannot be stolen, which can occur with tangible reinforcers.

Interdependent group contingencies also capitalize on group cohesiveness and cooperation. Studies have shown that classmates have the ability to be a strong source of motivation and reinforcement that usually results in more student interaction and cooperative behaviors (Skinner et al., 1996; Skinner et al., 2004). Positive side effects such as increasing prosocial and cooperative behaviors have been observed (Salend & Lamb, 1986). By design, interdependent group contingencies constructively use positive peer influence to aid in behavior management. Also, all students are recognized for meeting classwide behavioral expectations (Davis & Blankenship, 1996) and students are not singled out as they may be in some types of dependent contingencies, which reduces ethical concerns related to privacy and fairness (Elliot, Turco, & Gresham, 1987; Theodore et al., 2003).

Finally, some of the most effective interventions for reducing inappropriate classroom behavior include multiple components, such as group contingencies, self-monitoring, direct instruction, and peer feedback. Coogan et al. (2007) examined the effectiveness of an intervention package including an interdependent group contingency, student self-monitoring, and peer feedback. The intervention package targeted the reduction of inappropriate classroom
behaviors. The results showed the intervention to be highly effective at reducing students’ disruptive behaviors displayed in class.

Research has shown interdependent group contingencies to be as effective as independent and dependent group contingencies (Alric et al., 2007). Interdependent group contingencies have proven effective in an array of settings and student populations (Theodore et al., 2003) and have been rated favorably by participants (Davies & Witte, 2000). The use of interdependent group contingencies also provides a variety of practical advantages for the teacher, including efficient use of time and resources (Skinner et al., 1996). This type of contingency capitalizes on group cohesion and cooperation, using peers as a positive influence. Overall, interdependent group contingencies provide an effective means of improving student behavior through the use of positive peer influence, while allowing for efficient use of teacher time and resources.

**Potential Disadvantages to Interdependent Group Contingencies**

While peer influence can be positive and is often considered to be an advantage of an interdependent group contingency, this same peer influence also can be a disadvantage (Cashwell, Skinner, Dunn, & Lewis, 1998; Romeo, 1998). In some cases, undue peer pressure may be directed toward the student who does not exhibit the target behaviors and prevents the group from accessing the reward. In addition, some students may perceive a lack of fairness when others cause the loss of activities (Hulac & Benson, 2010). An additional potential disadvantage of interdependent group contingencies is that planned reinforcers may not be motivating enough to compete with the reinforcement from peer attention gained by “sabotaging” the intervention or refusing to comply with classroom expectations (Kelshaw-Levering et al., 2000; Skinner et al., 2004). Traditionally, those offending students might be removed from the group contingency or a separate team with those offenders may be formed so
as not to punish other team members. Another effective strategy is to combine group-oriented with individual contingency strategies (i.e., maintain the group contingency, but put more intensive and more individualized contingencies in place for those students who need more motivation) (Hayes, 1976).

**Randomizing Contingency Components**

Research documents the usage of group contingencies since the 1960s, and a large body of research supports their effectiveness. The field of school psychology, in an effort to keep pace with the ever-changing face of the student population, continues to adjust interventions to best meet the needs of a variety of students. Though group contingencies are common, they continue to be modified and used in novel ways as part of a classroom management system. In recent years, it has been suggested that the randomization of components within an interdependent group-oriented contingency is an effective way to surmount many of the potential problems associated with undue peer pressure and sabotage (Coogan et al., 2007; Freeland & Noell, 2002; Hulac & Benson, 2010; Little et al., 2010; Theodore, Bray, Kehle, & Jenson, 2001; Kelshaw-Levering et al., 2000). By using randomized components, students may be less likely to sabotage the intervention because they do not like the proposed reward or because the criterion level is perceived as unattainable (Kelshaw-Levering et al., 2000; Skinner et al., 1996).

Within any group contingency, several components may be randomized including the criterion level for reward, target behaviors, and rewards. The randomization of components involves an element of surprise (Coogan et al., 2007). This “unknown” may drive students to display appropriate behaviors throughout the intervention because they do not know the specific behavior, criteria, or reward will be involved in the contingency. Research in this area has shown that randomization of certain aspects of a group contingency is effective in reduction of
disruptive behavior (Kelshaw-Levering et al., 2000; Coogan et al., 2007; Theodore et al., 2001). More specifically, the novelty of unknown contingency components may prevent the degradation of the contingency and reinforce effectiveness over time. In addition, the unpredictability of the contingency may allow for greater generalization and higher levels of independent maintenance of behavior after the intervention is faded (Cooper, Heron, & Heward, 2007).

Randomization of contingency components may reduce ethical and logistical concerns present in group contingencies. First, randomization of rewards addresses the concern that chosen consequences might not serve as a positive reinforcer for all students. Research has shown that consequences in a group system not preferred by a specific student may result in minimal behavior change or no change at all (Kelshaw-Levering et al., 2000). Within randomization for consequences, items are pooled together and availability randomized, lowering the possibility that a student will intentionally sabotage the contingency program because the reward is not preferred. In addition, when students do not gain access to the desired consequence, discontentment may not be seen, as randomization has ensured that the positive consequence was not specified prior to beginning the intervention (i.e., students don’t really know what they were missing out on) (Skinner et al., 1996).

By randomizing the target behavior, students must modify all the potential target behaviors in order to maximize the chance of reinforcement, thereby reducing the likelihood of an increase in other non-targeted disruptive behaviors, specifically those incompatible disruptive behaviors (Skinner et al., 1996; Skinner et al., 2004). Also, by randomizing the criteria for reinforcement, the occurrence of appropriate student behavior may be high and the occurrence of disruptive behaviors low because students do not know how well behaved they need to be in order to access the reward (Kelshaw-Levering et al., 2000; Popkin & Skinner, 2003). When the
criterion for reinforcement is set (i.e., known by students), students may increase acting out if they know they have surpassed the set criterion (i.e., the frequency of talk outs has exceeded the criterion and the student can no longer earn reward).

Several studies have examined the use randomized contingency components within interdependent group contingencies. Some or all components (i.e., target behavior, criteria for reward, and rewards) can be randomized. Research has demonstrated the effectiveness of using randomized interdependent group contingencies to decrease disruptive student behaviors (Kelshaw-Levering et al., 2000; Theodore et al., 2001; Coogan et al., 2007; Alric et al., 2007; McKissick et al., 2010). Kelshaw-Levering et al. (2000) found that randomization of all three components within an interdependent group contingency was effective in reducing the disruptive behavior of elementary-age general education students. Likewise, Theodore et al. (2001) found that the randomization of criteria and reinforcers within a dependent group contingency was effective in reducing the disruptive behaviors of high school students with emotional disturbances. While these researchers looked at reducing inappropriate behaviors, a recent study (McKissick et al., 2010) examined the effectiveness of randomization at increasing academic engagement, in addition to reduction in disruptive behaviors. The study used randomization of three components (criteria, behavior, and reward) within an urban elementary setting. Results showed that randomization of all three components was effective at reducing problem behaviors while increasing academic engaged time simultaneously. In addition, consumer satisfaction data showed high acceptability from both the student participants and the teacher implementing the intervention.

While some studies have looked at the effectiveness of randomization within an interdependent group contingency, research has not yet been conducted to investigate the
effectiveness of an intervention with randomization versus the effectiveness of the same intervention without randomization. The purpose of this present research is to compare the effects of an interdependent group contingency with no randomization to the effects of an interdependent group contingency with three randomized components.

**Current Study**

The current study used a combined multiple baseline across classrooms and ABCBC design to compare the effects of an interdependent group contingency without randomized components to an interdependent group contingency with randomized components. Specifically, the current study investigated whether randomization caused the interdependent group contingency intervention to be more effective. Research has shown that each intervention can be effective, but has not directly compared the effectiveness of the two. An interdependent group contingency without randomized components is simpler and should therefore be easier to implement in the classroom. An interdependent group contingency with randomized components targets known disadvantages to group contingencies; however, it may be more tedious to implement in a classroom setting. The intervention implemented and data collected were the same for all classrooms, though the target behaviors, criteria levels, and positive consequences were at times different. Implementing the intervention in three classrooms provided greater confidence that the results obtained were due to the intervention and not other extraneous variables.

This research also reported information about classroom engagement levels, whereas typical studies of this nature report information solely about disruptive behaviors (Barrish et al., 1969; Brown & Reschly, 1974; Gresham & Gresham, 1982). In addition, components of social
validity were measured for both the implementing teachers and students participating in the intervention and allowed another dimension for comparison.

**Method**

**Participants and Setting**

Participants were 53 students (25 male and 28 female) enrolled in three first-grade elementary classrooms in a suburban school in the Midwestern United States. The participating classrooms were inclusion classrooms and contained a total of six students who had been identified as students with disabilities (Specific Learning Disability = 2; Other Health Impaired = 1; Autism=1; Emotional Disturbance = 2). Average daily student enrollment in the school was 492 for the 2010/2011 school year. Approximately 7.9% of the student population belongs to an ethnic minority group. Almost one-half of the student population (42.9%) is considered economically disadvantaged and 10.7% of the student population is students with disabilities. Classroom teachers were approached to participate based on school-wide behavior referral data indicating a higher number of referrals for disruptive behavior as compared to other classrooms in the same school building.

**Experimental Design**

A combined multiple baseline design across classrooms and ABCBC design (Cooper et al., 2007) was used to compare the effects of the two interventions on problem behavior and student engagement. For each classroom, data were collected during one instructional period of the school day (reading or math). Following collection of baseline (A) data, the nonrandomized version of the intervention was implemented (B), followed by the randomized phase (C). The nonrandomized version of the interdependent contingency was reintroduced (B), followed again by the randomized interdependent contingency condition (C). Following the second C phase, the
classroom teacher selected the preferred version of the interdependent group contingency for independent sustained implementation. This was considered the end of the research study and student behavior was not monitored on a formal basis, though teachers continued to collect frequency of occurrence data for intervention usage. The ABCBC design allows for a direct comparison of student behavior in the two intervention conditions. The introduction of the first nonrandomized interdependent group contingency phase (B) was staggered by time across the three participating classrooms. Assessment and data collection procedures remained constant across baseline and intervention phases. Baseline and experimental phase data were collected in all three classrooms until a steady trend was observed in engagement data (3-5 data points). The order of intervention implementation across classrooms was randomly assigned once all three classrooms had established stable baseline data. Once baseline data were collected in all three classrooms, each classroom was assigned a number (1, 2, 3). These numbers were each written on a separate slip of paper, folded, and placed into a container. The first slip drawn represented the class that first received intervention, followed by the second classroom for implementation, and the third. Classroom number designations were then re-assigned to match the order of intervention implementation.

**Dependent Variables**

Student engagement and disruptive student behaviors served as the dependent variables in the study. The behaviors were observed during one targeted instructional period each day (reading or math). Observation sessions lasted the entire instructional period (roughly 50 min), with both disruptive behaviors and engagement being recorded throughout. Following collection of initial baseline data, the teachers confirmed that the levels of behavior observed during baseline were reflective of a “typical” day in the classroom. Due to the interdependent nature of
the group contingency, and the focus on classwide performance, group data has been determined to be an appropriate level of analysis (Levin & Wompold, 1999).

The Behavior Observation of Students in Schools (BOSS; Shapiro, 2004) was used to observe and code student engagement and student off-task behaviors. The BOSS uses 15-s interval recording. Using the classroom seating chart as a guide, the observer monitored and recorded the on-task and off-task behaviors of one student in the class for each interval. At the end of an interval, the observer moved on to the next student until all students had been observed, and then the sequence was repeated. For data reporting purposes, the metrics for each day were (a) the percent of intervals recorded as engaged and (b) the percent of intervals recorded as off-task.

Student engagement included two categories of behavior: active engaged time (AET; coded when a student is actively engaged in academic responding; e.g., reading aloud, writing notes, or talking with the teacher or another student about class work if they had received teacher permission to do so), and passive engaged time (PET; coded when a student is passively participating; e.g., listening to the teacher, looking at the board while the teacher is writing notes). Data on student engagement (both AET and PET) were collected using a momentary time sampling observation procedure. Each interval, the observer recorded whether or not the student was engaged at the very beginning of the 15-s interval; the student was coded as engaged based on that single moment in time. If at any point during the 15 s, the student was not engaged, the off-task behavior was coded (described below).

The BOSS monitors three categories of off-task behavior (i.e., off-task verbal, off-task motor, off-task passive; Appendix A). Off-task verbal behavior was defined as any vocalization made by the student without teacher permission and not associated with the academic task (i.e.,
talking or singing to self or others). Off-task motor behavior was defined as any motor movement not directly related to the academic task (e.g., out of seat, playing with materials on desk, or hands on another student/student’s materials). Off-task passive behavior was defined as not engaged in classroom activities, but is not off-task verbal or off-task motor (e.g., the student is staring at the wall or looking out the window). Off-task behavior data were collected using a partial interval procedure. Using the interval recording sheet (Appendix A), the observer recorded if the student displayed off-task behavior at any time during the 15-sec interval.

In addition, data were collected in each classroom on the specific behaviors of concern identified by classroom teachers and verified through baseline observations. These disruptive behaviors were then monitored as part of the interdependent group contingency procedures. In order to predefine disruptive student behaviors in each classroom, a consultative interview was conducted with each classroom teacher. The classroom teacher was asked to describe typical disruptive behaviors occurring in the classroom. The primary investigator worked with the classroom teacher to operationally define these identified behaviors. These predetermined definitions determined how observed behaviors were coded during the initial frequency count.

For intervention purposes and reward contingencies, the classroom teacher collected a frequency count of disruptive classroom behaviors (previously defined with the primary investigator). An event recording sheet (Appendix B) was used to record the number of occurrences of each problem behavior during observation sessions. During the intervention session, the classroom teacher placed a tic mark in that day’s cell for each occurrence of a specific problem behavior. Each disruptive behavior had its own cell, in order to record occurrence of all behaviors separately. The graduate observer also maintained a frequency count of disruptive behaviors using a copy of the event recording sheet, that was used to monitor the
reliability of teacher-collected data on specific occasions. Initial baseline observation was conducted to determine what problem behaviors were occurring within the classroom. The disruptive behaviors with the three highest frequencies of occurrence were selected as the target behaviors for the interdependent group contingency. The problem behaviors were selected as a result of the observation process and consultation with the classroom teacher. Using the BOSS, data were collected across the three types of off-task behavior included in the code (i.e., off-task verbal, off-task motor, and off-task passive). In order to determine an overall level of off-task behavior each day, multiple occurrences of off-task behavior happening within the same interval were collapsed (i.e., only counted as 1 interval off-task). In addition, described above, each classroom teacher identified the most problematic behaviors to be targeted in the group contingencies, with one behavior targeted in the nonrandomized contingency condition. Classrooms 1 and 3 targeted off-task verbal behaviors, while Classroom 2 targeted off-task motor behaviors. The BOSS off-task behavior category (i.e., verbal, motor, or passive) that captured the disruptive behavior with the highest frequency was identified and graphed separately for each classroom (i.e., off-task verbal was monitored when talking out was the behavior of concern). These graphs were analyzed to determine intervention effects on the behaviors explicitly targeted in the intervention conditions.

Trained graduate students in school psychology acted as data collectors. Each data collector read and fully understood the definitions of problem behaviors and student engagement. In order to measure understanding of dependent variable definitions, all data collectors completed a brief assessment (Appendix C). The assessment included being able to match definitions and appropriately label a variety of different observation scenarios. Each trained graduate student was required to score 100% on the brief assessment prior to conducting a co-
observation for interobserver reliability. Each data collector was also trained to use the problem behavior recording sheet and the interval recording sheet for engagement and off-task behavior. Prior to any independent data collection, each observer participated in training co-observation sessions lasting minimally 20 min each. Eighty percent agreement with the primary investigator on all categories was obtained before independent data collection.

**Procedures**

Following baseline data collection, the interventions were implemented on a daily basis during a selected academic instructional period (reading or math). The teacher explained to the class that during one targeted instructional period they would be playing a new game. The teacher explained the procedures to be used during a particular phase using a script created by the primary researcher (Appendix D). This script detailed the intervention procedures, classroom expectations, problem-behavior(s), and possible positive consequence(s). Each day, the students were reminded of the interdependent group contingency through the use of a script. Also, the conditions of the contingency were displayed on a poster at the front of the classroom. Separate scripts were used to introduce the interdependent group contingency with and without randomized components. In addition, brief instruction scripts were provided, containing faded instructions to be used after the third time each contingency condition was implemented in each experimental phase. The use of the faded script was continued for the duration of the phase.

After reviewing the script for the day, the teacher began the lesson and proceeded with academic instruction. An observer was present to record student engagement and off-task behavior for intervention sessions. Students were not informed of their progress during the intervention session. At the end of the instructional period, the teacher followed the script of the day to determine whether or not the class earned the reward. For both contingency conditions, if
the class failed to meet the contingency, the class expectations were reviewed, definitions for the problem behaviors were re-read, and students were prompted to “do better tomorrow”. Each day, the students had the opportunity to earn a positive consequence if the class met the criteria.

**Experimental Conditions**

**Baseline.** During baseline (A), the teacher was directed to continue with usual classroom management strategies. Data collection for disruptive behaviors and engagement (BOSS) occurred during the targeted instructional period by the trained graduate students without any changes to classroom instruction or behavior management. Classroom teachers also began using the event recording sheets to collect frequency count data to be used during the intervention phases.

After this baseline phase, all students completed a preference assessment to guide reward selection for inclusion in the contingency conditions. The choices on the preference assessment were pre-selected by the classroom teacher during the consultative interview. On the preference assessments, which were completed independently with pen and paper, students were asked to rank order a variety of positive consequences provided by the teacher. The number one ranked consequence was used as the positive contingency within the nonrandomized version of the intervention. The number one ranked consequence was the option receiving the most number one ratings. In the event of a tie, each option was written on a slip of paper, folded, and put into a container. One piece of paper was randomly selected and used as the number one ranked consequence. The top three ranking consequences were used in the randomized version. In the case where three options all received the same (highest) number of votes, these three items were used in the randomized contingency. If there were more than three options all receiving the same (highest) number of votes, each option was written on a slip of paper, folded, and put into a
container. Three slips of paper were randomly selected and used in the randomized contingency phase. Across the three classrooms, the following rewards were used: sit with a friend, free talk time, edible treats, extra gym time, and points for a class party.

**Interdependent group contingency (Nonrandomized).** In the interdependent group contingency condition (B), the target behavior, criterion, and positive consequence all remained constant and were announced to the class at the beginning of the instructional period. Students knew what behavior was being monitored, how many times it could be displayed, and what reward they had the chance to earn. During all intervention phases, the appropriate (for that phase) information was posted on the board in the front of the classroom to remind students throughout the instructional period. The nonrandomized contingency phase was selected for primary implementation because it is the “standard” version and due to the simplicity of the condition (no variability within the components in theory means potentially less work/effort on the part of the classroom teacher).

At the end of the instructional period, the teacher reminded the students of the criterion level and behavior. Then, the teacher reported to the class how many times they displayed the target behavior. If the class performance was at or below the known criterion, the class gained access to the previously announced reward. Tangible rewards were delivered immediately; however, some activity rewards were delivered on a delayed schedule. If the class failed to meet the criterion, the class expectations were reviewed, definitions for the problem behaviors re-read, and students prompted to “do better tomorrow”. Student engagement was used as the basis for phase change decision rules. While disruptive behaviors were used in the classwide contingency, in order to focus on the positive outcome, the deciding factor for phase changes
was engagement. The phase was changed and intervention implemented in subsequent classrooms after a minimum of three data points of 80% engagement or higher.

**Interdependent group contingency with randomized components.** For the second intervention phase (C), all contingency components were randomized. Students did not know the target behavior, criterion level, or the positive contingency. They were told all possible options for each variable at the beginning of each period (as per the script). At the end of the instructional period, the teacher randomly selected each contingency component. The teacher randomly selected the target behavior, by withdrawing a slip of paper from a container. In order to safeguard random selection within the randomized version of the game, all options were included in the containers five times (i.e., there were five slips of paper for each target behavior, criterion, and positive consequence). In addition, all slips of paper were folded so the selection could not be seen. The target behavior selected was announced to the class. Then, the teacher randomly selected the criterion level from another container by selecting a slip of paper. The level was announced to the class. The teacher then told the class their observed behavior level for the target behavior selected. If the class was at or below the criterion level for the selected target behavior (based on teacher collected observation data), the teacher randomly withdrew a slip of paper containing a reward or item from the third container, to act as positive consequence for the class. If the class failed to meet the criterion for that behavior, they were informed of the criterion level, and what their level was. Then, the class expectations were reviewed, definitions for the problem behaviors re-read, and students prompted to “do better tomorrow”.

**Behavior Criterion Levels for Contingency Conditions**

For the purpose of the intervention, the teacher and the primary researcher determined the maximum number of acceptable occurrences of targeted disruptive behaviors. Baseline
observation data on frequency of occurrence of disruptive behaviors were used to determine the maximum number of acceptable occurrences of the specified target behaviors during each condition. Given that a reduction to zero within any given classroom was a lofty expectation, the teacher and the primary investigator determined the appropriate goal level through the consultative interview. The goal levels were predetermined based on what each classroom teacher believed to be meaningful change (a 50% reduction was used as a starting point). These levels made up the various criterion levels used when randomizing the criteria variable. For example, if the teacher determined the maximum number of acceptable occurrences of a behavior to be four, then possible levels for randomization purposes included 4, 3, and 2. Two occurrences was set as the lowest criterion level, as complete reduction to zero was considered an unrealistic expectation.

**Interobserver Agreement**

An independent observer (a previously trained graduate student) collected interobserver agreement for both student engagement and off-task behaviors. Interobserver agreement was also evaluated for the teacher-recorded frequencies of disruptive behavior. Interobserver agreement data were collected on 30% of observation sessions. Interobserver agreement for engagement and off-task behaviors was calculated by the number of intervals on which observers agreed or disagreed on the occurrence or nonoccurrence of a behavior (agreements divided by agreements plus disagreements and multiplied by 100; Cooper et al., 2007). Interobserver agreement for engagement and disruptive behaviors averaged 93.6% and ranged from 77% - 100%. On the date where 77% was the level of agreement, the observers noted that their Motivaiders were not in sync, which may have caused some issues. Each observer in question co-observed in another classroom with a different observer and obtained high levels of agreement.
Interobserver agreement for teacher-recorded disruptive behaviors was calculated by using the event recording method (Cooper et al., 2007); to compute interobserver agreement the lower number of tallied disruptions was divided by the higher number of tallied disruptions and multiplied by 100. If the frequency counts done by the teacher fell below 80%, the definitions of disruptive behaviors were reviewed with the teacher and the graduate observer’s data were used for that day. In the event the classroom teacher’s frequency counts continued to disagree with the trained graduate observer’s counts, the graduate observer data continued to be used and the definitions continued to be reviewed with the teacher until 80% agreement was reached. Average agreement for teacher recorded disruptive behaviors was 84.8% and ranged from 61% - 100%. Each classroom teacher had at least one session where 80% agreement was not reached. In addition, it should be noted that on the day 61% agreement was obtained, the observer reported that the intervention had begun prior to the observation starting and continued after the observer left.

**Intervention Adherence**

Trained graduate students measured intervention adherence during 37% of the instructional sessions post baseline. Raters used the Intervention Adherence Checklist (Appendix E) to observe and document completion of intervention steps. Across all three classrooms the average intervention adherence was 97.4%, with a rage of 67% - 100%. The 67% adherence occurred on the day a substitute teacher was present. Based on the high levels of reliability and teacher adherence data, teachers accurately followed the script (i.e. delivered the reward when they earned it; didn’t deliver the reward when they didn’t earn it) during 90% of intervention sessions.
Social Validity

A teacher acceptability survey (Appendix F) and student acceptability (Appendix G) survey were used to evaluate aspects of social validity for the intervention. The teacher survey included questions focusing on ease of implementation, degree of effectiveness, perceived sustainability, and side effects of the intervention. Both the teacher and student surveys were completed two weeks after research participation had concluded (from date of last observation). The surveys were created by the primary researcher and included Likert-type response statements with space provided for additional comments.

Results

The results are organized by dependent variable including disruptive behaviors, classroom specific target behaviors, and engagement. Visual analysis was used as the primary method of analysis for all dependent variables. Percent of non-overlapping data points ($PND$) was used as a secondary measure of data analysis in order to better distinguish the relative effects of each version of the intervention. Suggested guidelines from research were used for the interpretation of $PND$ data, with $PND > 90\%$ indicating highly effective intervention, 70-90% moderately effective, 50-70% mildly effective/questionable, and $< 50\%$ ineffective (Scruggs & Mastropieri, 1998; Scruggs, Mastropieri, & Castro, 1987; Scruggs, Mastropieri, Cook, & Escobar, 1986). $PND$ data were calculated by comparing data from adjacent phases (i.e., A-B, B-C, C-B etc.). For engagement, where the desired effect of the intervention was an increase, the following formula was used: number of intervention points above the highest point in the previous phase divided by the total number of intervention points (in the current phase) and multiplied by 100. However, for disruptive behaviors and target behaviors, where a decrease was the desired intervention effect, the following formula was used: number of intervention points
below the lowest point (in the previous intervention phase) divided by the total number of
intervention points (in the current phase) and multiplied by 100. Social validity data also are
reported.

**Disruptive Behaviors**

Table 1 shows that across classrooms, the percentage of intervals disruptive behaviors
were observed during baseline averaged approximately 33% (Classroom 1 $M = 44.0\%$, $SD =
17.1$; Classroom 2 $M = 25.7\%$, $SD = 14.6$; Classroom 3 $M = 30.6\%$, $SD = 11.7$). Both versions
of the intervention led to lower levels of student disruptive behaviors than those seen during
baseline across all three classrooms.

Table 1. Disruptive Behaviors Data

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Baseline (A)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
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<td>25</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>$SD$</td>
<td>11.7</td>
<td>7.2</td>
<td>5.7</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td>$PND$</td>
<td>16.7</td>
<td>25</td>
<td>25</td>
<td>0</td>
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</tbody>
</table>
Note. Data reported are percent of intervals in which off-task behaviors were recorded. *PND* values are for comparisons between the phase for which the *PND* is reported and the previous phase.

Figure 1 displays the percentage of intervals in which disruptive behaviors were observed across the three targeted classrooms for baseline and all intervention phases. The multiple baseline graphs show a decrease in the occurrence of disruptive behaviors subsequent to intervention implementation. In Classroom 1, after implementation of the nonrandomized group contingency, disruptive behaviors decreased immediately and remained below the lowest baseline data point throughout all subsequent intervention phases. Initial baseline disruptive behaviors averaged 44% of observed intervals. Across the five data points collected during baseline, the data were variable with a slightly decreasing trend. After the initial implementation of the nonrandomized intervention, average disruptive behaviors were demonstrated at 15.5%; the data were relatively stable, but had no discernable trend. After implementation of the randomized intervention, average disruptive behaviors were observed at 17%; the data were stable with a slight decreasing trend. Subsequent to the second implementation of the nonrandomized intervention phase, disruptive behaviors were demonstrated at 19.4%; the data had a steady decreasing trend. The second implementation of the randomized intervention showed average disruptive behaviors at 16.3% of observed intervals; the data collected were variable with a slight increasing trend.
Figure 1. Disruptive Behaviors Multiple Baseline Graph
In Classroom 2, after the nonrandomized group contingency was introduced to the classroom, disruptive behaviors levels decreased and remained below the initial baseline average for the duration of the intervention phases. Initial baseline levels of disruptive behaviors were measured at 25.7% of the observed intervals. Across the eight data points collected, the data were relatively stable (three outliers), with no trend. After the nonrandomized intervention was implemented in Classroom 2, disruptive behaviors decreased to 19.2%. Initial data collected were stable, but became increasingly more variable during the last three observation sessions.

After implementation of the randomized intervention phase, average disruptive behaviors decreased to 15.8%; the data were variable with a moderate increasing trend. Subsequent to the second implementation of the nonrandomized intervention, disruptive behaviors were demonstrated at 21.5%; the data were variable with a strong increasing trend. After the second implementation of the nonrandomized phase, average disruptive behaviors were demonstrated at 22.2%; the data were variable with a strong decreasing trend.

When the nonrandomized group contingency was implemented in Classroom 3, disruptive behaviors decreased and remained below baseline averages throughout all subsequent intervention phases. Initial baseline levels of disruptive behaviors in Classroom 3 were measured at 30.6% on average. Across the 12 data points collected, the data were highly variable with a slight increasing trend. After initial implementation of the nonrandomized intervention phase, disruptive behaviors decreased to 21.2%. An initial reduction in disruptive behaviors was observed; however, towards the end of the observation sessions, the data began to increase strongly in trend. When the randomized intervention phase was implemented, average disruptive behaviors decreased to 16.2%; the data were variable with a moderate increasing trend. The second implementation of the nonrandomized intervention phase showed the average disruptive
behaviors were observed for 19.6% of the intervals observed. These data were highly variable with no discernable trend. The final implementation of the randomized intervention phase demonstrated average disruptive behaviors at 18.7%. These data were variable but a decreasing trend was evident.

Visual analysis suggested that in two of the participating classrooms disruptive behaviors became more consistent throughout intervention phases as compared to baseline. In Classroom 1, the baseline standard deviation for disruptive behaviors was 17.1, but ranged from 4.7 – 7.1 across intervention phases. In Classroom 2, the standard deviation for disruptive behaviors was 14.6 during baseline, but ranged from 7.0 – 10.2 during intervention implementation. The results from Classroom 3 were not consistent with the results from Classrooms 1 and 2, but did show a decrease from baseline ($SD = 11.7$) to intervention ($SD$ ranged from 5.7-11.9).

As compared to baseline, the percent of non-overlapping data points suggested that the nonrandomized interdependent group contingency was highly effective for Classroom 1, mildly effective for Classroom 2, and ineffective for Classroom 3. Similar to the results for engagement, at times, Classroom 2 demonstrated desired low levels of off-task behavior during baseline, leading to a lowered $PND$ statistic. In Classroom 3, one low level data point, which could be considered an outlier, combined with an increasing data trend during the first intervention phase, contributed to the low $PND$. Visual analysis did not suggest that one version of the intervention (i.e., randomized versus nonrandomized) was more effective than the other at decreasing disruptive behaviors and, generally, this analysis was supported with $PND$ data. All but one comparison between the nonrandomized and randomized contingencies (i.e., in Classroom 2) resulted in $PND$ values below 50% suggesting that behavior was consistent across intervention conditions. In Classroom 2, the comparison between the first implementations of the
nonrandomized and randomized contingencies led to a PND of 66.7%, indicating that the randomized contingency was mildly effective as compared to the nonrandomized.

**Target Behaviors**

During the nonrandomized intervention phase, only one target behavior was used to determine if the class earned the reward for the day. Data reported in the Disruptive Behaviors section above included all disruptive behaviors (verbal, motor, and passive); however, the current results will include the target behavior only. During initial consultation with the classroom teacher, disruptive behaviors were identified for intervention purposes and reward contingencies; all disruptive behaviors fell into the BOSS categories being used for observation. After baseline data collection, the disruptive behavior with the highest frequency of occurrence (using the BOSS) was denoted as the target behavior.

Observation data in Table 2 indicated that across classrooms, the percentage of intervals in which target disruptive behaviors were displayed averaged 10% (Classroom 1 $M = 13.4\%$, $SD = 7.6$; Classroom 2 $M = 11.3\%$, $SD = 6.6$; Classroom 3 $M = 5.1\%$, $SD = 3.2$). Both versions of the intervention led to lower levels of the target behaviors than those seen during baseline across all three classrooms. Figure 2 displays the percent of intervals in which target disruptive behaviors occurred across the three classrooms for baseline and all intervention phases. The multiple baseline graphs show a decrease in disruptive behaviors occurring subsequent to intervention implementation.
Table 2. Target Behaviors Data

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Baseline (A)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
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<tr>
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</tr>
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</table>

*Note.* Data reported are percent of intervals in which targeted off-task behaviors were recorded. *PND* values are for comparisons between the phase for which the *PND* is reported and the previous phase.
Figure 2. Target Behaviors Multiple Baseline Graph
In Classroom 1, initial baseline levels of target behaviors averaged 13.4%; the data were variable with a moderate increasing trend. Upon implementation of the nonrandomized group contingency, target behaviors decreased immediately and remained below the lowest baseline data point collected for most of the observation sessions. When the nonrandomized intervention phase was initially implemented, target behaviors were reduced to 3.4%; the data were relatively stable with no trend. After implementation of the randomized intervention phase, target behaviors were measured at 3.8%; these data were slightly variable with a decreasing trend. The second implementation of the nonrandomized intervention phase showed target behavior averages at 3.2%; these data were stable with a strong decreasing trend. The final implementation of the randomized intervention phase measured target behaviors at 4.4%. The data collected in this final phase were highly variable with no discernable trend.

In Classroom 2, after the nonrandomized group contingency was introduced into the classroom, target behaviors initially decreased, but began increasing over the course of the intervention. While averages in each intervention phase remained below the baseline average overall, there were multiple individual data points that were in the upper extremes of the baseline data. Initial baseline levels for target behaviors averaged 11.3%. Across the eight points collected during the baseline phase, the data were variable with a slight increasing trend. Subsequent to nonrandomized intervention implementation in Classroom 2, target behaviors decreased to 8.2%. The data in this phase started out stable with an increasing trend, but shifted to variable with a slight decreasing trend. After implementation of the randomized phase, average target behaviors decreased to 5.4%. These data were stable with a slight increasing trend. Upon the second implementation of the nonrandomized intervention, average target behaviors were demonstrated at 9.7%; these data were variable with a strong increasing trend. After the second implementation
of the randomized intervention, average target behaviors were observed at 10.8%. These data were highly variable with a strong decreasing trend.

Following the implementation of the nonrandomized group contingency, target behaviors decreased and remained low throughout the subsequent intervention phases in Classroom 3. Baseline target behaviors were observed on average for 5.1% of observed intervals. Across the 12 data points collected, data were variable with a moderate decreasing trend. After the first implementation of the nonrandomized intervention phase, target behaviors decreased to 1.2%; these data were stable with a slight decreasing trend. When the first implementation of the randomized intervention phase was introduced into the classroom, the target behaviors decreased to 0.9%. These data were stable, with no trend. The second implementation of the nonrandomized phase demonstrated target behaviors at 1.6%; the data were stable with a slight increasing trend. The final implementation of the randomized intervention phase measured target behaviors at 1.5%; the data were stable with a slight decreasing trend.

Visual analysis suggested that in two of the participating classrooms target disruptive behaviors became more consistent throughout intervention phases as compared to baseline data collection. In Classroom 1, the standard deviation for target disruptive behaviors was 7.6 during baseline, but ranged from 1.4 – 3.4 across intervention phases. In Classroom 2 the standard deviation for target disruptive behaviors was 6.6, but ranged from 1.2 – 6.9 during intervention implementation. The results from Classroom 3 were consistent with the results from Classroom 1, and showed a decrease from baseline (SD = 3.2) to intervention (SD ranged from 0.7-1.4).

Comparing baseline to the initial implementation of the nonrandomized interdependent group contingency, PND values indicated that the intervention was moderately effective for Classroom 1, ineffective for Classroom 2, and mildly effective for Classroom 3. An increasing
data trend during the intervention phase in Classroom 2 and three low level data points during baseline in Classroom 3 led to these statistics. Visual analysis did not suggest that one version of the intervention was more effective than the other at decreasing target disruptive behaviors and the $PND$ reported support this analysis. Across all classrooms and for all intervention comparisons, all reported $PND$ values were below 50%, indicating that the targeted behaviors did not vary according to intervention condition.

**Engagement**

Table 3 displays means, standard deviations, and percent of non-overlapping data points for engagement in each classroom. In order to compare the effects of each intervention condition $PND$ was calculated comparing each intervention phase to the previous phase. Across all classrooms, the average percentage of intervals students were engaged during baseline was below the minimal expectation suggested by research (i.e., 80%; Gettinger & Seibert, 2002). Both versions of the intervention led to consistently high levels of student engagement across all three classrooms. As previously stated, the goal level was set at 80%.
### Table 3. Engagement Data

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Baseline (A)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
<th>Nonrandomized (B)</th>
<th>Randomized (C)</th>
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*Note.* Data reported are percent of intervals in which engagement was recorded. *PND* values are for comparisons between the phase for which the *PND* is reported and the previous phase.

Figure 3 displays engagement data across the three targeted classrooms for baseline and all intervention phases. The multiple baseline graphs show an increase in engagement occurring subsequent to intervention implementation. In Classroom 1, upon implementation of the nonrandomized group contingency, engagement increased immediately and remained at or above goal level throughout all subsequent intervention phases. Initial baseline levels of engagement averaged 62.6%. Across the five data points collected during baseline, the data were variable.

39
with a slight decreasing trend. After the first implementation of the nonrandomized intervention, average engagement was demonstrated at 85.3%; the data were relatively stable, but had no discernable trend. After implementation of the randomized intervention, average engagement was demonstrated at 85.3%; the data were stable and had a slight increasing trend. Upon the second implementation of the nonrandomized intervention phase, average engagement was demonstrated at 85.5%, and was relatively stable with a slight increasing trend. The second implementation of the randomized intervention led to average engagement at 87.3%; the data collected were stable with a slight decreasing trend.
Figure 3. Engagement Multiple Baseline Graph
In Classroom 2, after the nonrandomized group contingency was implemented, engagement quickly increased and remained at or above goal level throughout the majority of subsequent intervention phases. Baseline levels of engagement averaged 78.7% of observed intervals. Across the eight baseline data points collected, the data were relatively stable (two outliers) with a slight decreasing trend. Subsequent to nonrandomized intervention implementation in Classroom 2, average engaged behaviors increased to 84.2% of observed intervals. The data collected in this phase of the intervention started out stable, but became more variable during the last two observation sessions. Initially there was a slight decreasing trend, followed by significant variability in the last two data points of the phase. After implementation of the randomized intervention phase, average engagement increased to 89.9% of observed intervals. The data in this phase were stable with a moderate decreasing trend. Upon the second implementation of the nonrandomized intervention, average engagement was demonstrated at 82.5%; these data were relatively stable with a moderate decreasing trend. After the second implementation of the randomized intervention phase, average engagement was demonstrated at 81.3%; during this phase, data were relatively stable with a moderate increasing trend.

After the nonrandomized group contingency was implemented in Classroom 3, engagement initially decreased, but quickly increased to above baseline levels. Throughout the following intervention phases, engagement was observed to be at or above goal level for the majority of observation sessions. Initial baseline levels of engaged behaviors in Classroom 3 were observed on average for 73.6% of observed intervals. Across the 12 baseline data points collected, the data were relatively stable (three outlying points) with no discernable trend. After the nonrandomized intervention was implemented, average engagement levels increased to 80.6%; the data were relatively stable with no discernable trend. When the randomized
intervention phase was implemented, average engagement increased to 85.9%; the data were stable with a slight increasing trend. After the second implementation of the nonrandomized intervention, engagement was demonstrated at 82.1%; data during this observation session were stable with a slight increasing trend. Upon the second implementation of the randomized intervention phase, engagement increased to 83.0%; the data were stable with a slight decreasing trend.

Visual analysis suggested that in two of the participating classrooms engagement became more consistent throughout intervention phases as compared to baseline data collection. In Classroom 1, the standard deviation for engagement during baseline was 16.4, but ranged from 4.3 – 5.3 across intervention phases. In Classroom 2, the standard deviation for engagement during baseline was 16.2, but ranged from 4.7 – 13.1 during intervention implementation.

Comparing baseline to the initial implementation of the nonrandomized contingency, the percent of non-overlapping data points suggested that the intervention was highly effective for Classroom 1, ineffective for Classroom 2, and mildly effective for Classroom 3 (Scruggs et al., 1986). At times, Classroom 2 demonstrated engagement at goal level during baseline, contributing to the low PND. The variability in baseline data combined with the decreasing trend evident in the first intervention phase, contributed to the mild PND statistics for Classroom 3. Visual analysis did not suggest that one version of the intervention (i.e., randomized versus nonrandomized) led to higher engagement levels and this analysis was supported by PND statistics. Across all classrooms and comparisons between intervention phases, PND statistics were below 50%, suggesting that there was no difference in behavior based on intervention condition.
Social Validity

The teachers were asked to answer the same series of questions assessing acceptability for each version of the intervention. Overall, the ratings were higher for the randomized version, with all items receiving an “Agree” or “Highly Agree” designation. One comment was: “The children loved the randomized phase the best. We will be using it for the rest of the school year.” Noticeably, two items were scored lower on the nonrandomized phase: “I would be willing to use this intervention in the future” and “There were no negative side effects experienced by students”. One teacher commented that students got bored with the nonrandomized version. This would suggest that while the randomized version may take more effort, it is preferred by teachers.

Student acceptability surveys were completed anonymously by all 53 participants. The student acceptability survey addressed the student’s perception of the game, and asked students to reflect on their behavior while the games were being played. Additionally, students were asked if they preferred one version of the game to another. Eighty-seven percent of students reported that they liked the game, with 8% stating they “sometimes” liked the game and 5% not liking the game. Seventy percent of students shared that they felt that they “act better in class now than before the game” (26% sometimes; 4% no). When participants were asked if the game had made them a better student, 85% responded yes, 11% sometimes, and 4% no. Though students had reported to like the game, only 59% of students surveyed stated they would like to play the game more during the day, 13% of students said sometimes, and 28% of students said no. Sixty-eight percent of students felt there were no bad parts to the game, 8% said there were sometimes bad parts, and 24% felt there were definitely bad parts. An overwhelming majority
(91%) reported preferring the randomized version of the intervention to the nonrandomized version. One student went so far as to comment: “I like this game. It makes me a better person.”

**Discussion**

The current study was designed to compare the effects of a nonrandomized versus a randomized interdependent group contingency on the engagement and disruptive behaviors of students in three first-grade classrooms. This study contributed to the knowledge base in a variety of ways. First, based on a thorough review of the literature, it was the first known comparison of a nonrandomized and randomized interdependent group contingency. In addition, the study was unique in that it assessed multiple behaviors, including overall levels of classwide engagement, classwide disruptive behaviors, and targeted behaviors. Finally, data on social validity also were added to the existing knowledge base on interdependent group contingencies.

Data support that both interventions contributed to increased engagement and decreased disruptive behaviors. Across each classroom and for each dependent variable, a significant change in behavior was seen during intervention phases as compared to baseline. These results are consistent with previous research (Gresham & Gresham, 1982; Theodore et al., 2003; Barrish et al., 1969; Kelshaw-Levering et al., 2000; McKissick et al., 2010). Results, however, did not indicate that randomizing contingency components led to further improvements in behavior as compared to the nonrandomized interdependent group contingency condition. Previous studies have demonstrated the effectiveness of nonrandomized group contingencies in regards to disruptive behaviors (Barrish et al., 1969; Cowen et al., 1979). Research has also demonstrated the effectiveness of randomized group contingencies in regards to disruptive behaviors (Kelshaw-Levering et al., 2000; Coogan et al., 2007; Theodore et al., 2001). Prior to this study, research that analyzes the comparative effectiveness of the two interventions has not been
available. Across classrooms and for each dependent variable, classroom behavior immediately improved upon first implementation of the nonrandomized group contingency. Improved behavior then remained fairly consistent across subsequent intervention phases.

Students demonstrated higher levels of engagement during both versions of the interdependent group contingency than they did during baseline. When looking at average levels of engagement for each contingency condition (nonrandomized vs. randomized) across all three classrooms, average levels were similar (Classroom 1 = 85.4% nonrandomized vs. 86.3% randomized; Classroom 2 = 83.4% nonrandomized vs. 85.6% randomized; Classroom 3 = 81.4% nonrandomized vs. 84.5% randomized). Through visual analysis supported by PND comparisons, data suggest that both contingency conditions led to similar levels of engagement in the classroom. Previous research has suggested that in some cases, where several baseline data points are collected, an outlier can skew the PND, in such a way that an intervention appears ineffective (White, 1987). Based on the high engagement levels seen in Classrooms 2 and 3, it would have been difficult to demonstrate a high level of effectiveness using PND.

Data also demonstrate that both intervention phases were effective at decreasing overall student disruptive behaviors. When looking at average levels of disruptive behaviors for each phase (nonrandomized vs. randomized) across the three participating classrooms, disruptive behavior levels were not notably different (Classroom 1 = 17.5% nonrandomized vs. 16.7% randomized; Classroom 2 = 20.4% nonrandomized vs. 19% randomized; Classroom 3 = 20.4% nonrandomized vs. 17.5% randomized). In addition, PND would also suggest that the intervention phases were equally effective. Data suggest that both contingency conditions led to similar reduced levels of disruptive student behaviors.
Similar to the other dependent variables in this study, decreased levels of target behaviors were seen during the implementation of both contingency conditions. Once again, when examining average levels of target behaviors for each phase (nonrandomized vs. randomized) across each classroom, target behavior levels were not notably different across contingency conditions (Classroom 1 = 3.3% nonrandomized vs. 3.6% randomized; Classroom 2 = 9.0% nonrandomized vs. 8.1% randomized; Classroom 3 = 1.4% nonrandomized vs. 1.2% randomized). Similar to what was observed with the other dependent variables, PND suggested that the two phases were equally effective. Both versions of the intervention led to similar reduced levels of the classroom specific target behaviors.

The results for both the disruptive behaviors and the target behaviors are particularly interesting. They support the idea that students will maintain similarly low rates of overall disruptive behaviors even when they do not know which behavior is the target of the contingency. One version of the group contingency focused on one, classroom-specific target behavior (nonrandomized), while in the other version, that target behavior had a one in three chance of being the focus (randomized). Overall, classroom behaviors were reduced using both versions of the intervention. The randomization of intervention components successfully resolves potential disadvantages often seen within traditional procedures; however, randomization was not proven to be more effective at increasing engagement or decreasing disruptive behaviors.

Current results indicate that interdependent group contingencies can improve the consistency of students’ classroom behavior, even when appropriate behaviors are being demonstrated close to goal levels during baseline data collection. In Classrooms 2 and 3 in particular, the levels of engagement during intervention phases were not significantly higher than
the average baseline data collected. The reduction in standard deviation, however, suggests that the data became more consistent during the intervention phases, resulting in more “good days”.

Previous research would suggest that when selecting target variables for intervention, you should select the behavior you intend to modify (i.e. if you want to increase engagement in the classroom, then target engagement)(Lentz, 1988). While disruptive behaviors are a nuisance in the classroom, the end effect is that they take away a teacher’s time to teach and minimize a student’s time to learn. Although the contingency for reinforcement within these interventions was based on criterion level for disruptive behaviors, the main goal was to increase academic engaged time and determine the best way to maximize this increase. Although a decrease in disruptive behaviors may lead to students being calm, silent, and compliant, an increase in academic engaged time will have more effect on academic performance.

After final data collection in each classroom, the teacher was allowed to keep all intervention materials and determine which intervention they would continue to implement, if any, for the remainder of the year. Two weeks after data collection, all participating students and classroom teachers were asked to complete social validity surveys. Teachers were asked at that time if they had continued to implement an intervention; all teachers reported they had continued to implement the randomized intervention. While this intervention version had a higher cost (i.e. was more time consuming) and may not have had significantly more effective results, it was preferred by both students and teachers. Fawcett (1991) suggested that intervention adoption is a general procedure for measuring social validity and that adoption demonstrates the appropriateness of the procedures. It could be suggested then, that adoption of intervention procedures is a high standard for social validity.
Research suggests that randomizing components may address concerns typically associated with using interdependent group contingencies (Coogan et al., 2007; Kelshaw-Levering et al., 2000; Mckissick et al., 2010; Popkin & Skinner 2003; Theodore et al., 2001; Theodore et al., 2004). Although the current study found no evidence to suggest that randomizing contingency components leads to further improvements in behavior as compared to using a nonrandomized interdependent group contingency, social validity results do indicate that students and teachers may simply prefer the game-like format of a randomized interdependent group contingency. The results of this study demonstrated that teacher and student perception of an intervention (i.e. how they feel about the game) may be valued more highly than efficacy.

Limitations and Future Research

While this study provided new information to the knowledge base of classroom management strategies, there are, however, several limitations. First, the order of intervention conditions may have had unknown sequence effects on behavior. The nonrandomized contingency phase was selected for primary implementation because it is the “standard” version and due to the simplicity of the condition (no variability within the components in theory means potentially less work/effort on the part of the classroom teacher). It is unknown, however, what the effects would have been had the randomized intervention been implemented first. In addition, since students improved to a marked degree during the initial nonrandomized phase, there was a ceiling effect when looking at the data. Engagement had been increased to high levels and could not increase much more upon implementation of the randomized intervention condition. Similarly, disruptive behaviors decreased and did not leave much room for improvement in subsequent intervention phases.
Second, reinforcer selection was an issue. In an effort to increase social acceptability, teachers were first asked to create a list of potential reinforcers (both tangible and non-tangible). Students then voted on their teacher’s list in order to determine overall class preference. While this procedure increased teacher and student buy-in, it resulted in significant variability in both the type of rewards used (tangible vs. non-tangible) as well as the reward schedule (immediate vs. delayed). In classrooms where a delayed reinforcer (e.g., extra gym time or other activity later in the day) was included as a reward, the class earned a ticket when this choice was selected from the reward container. While this token represented time the class had earned towards the activity reward, some students may have had difficulty remembering this relationship (based on the average age of the population). This may have impacted the results because students, in some cases, did not receive an immediate reward, which may have reduced their motivation to demonstrate appropriate behaviors when the game was next played. Future research should address reinforcer quality for both type and schedule. In addition, the top ranked reinforcers were not analyzed in order to determine if every student had something motivating them in the top three choices. It may have happened that even with three options, students did not have something on the list that was motivating to them.

A third limitation is related to teacher-collected data. Teachers expressed concerns regarding the method of data collection used for intervention purposes (teacher recorded frequency count of disruptive behaviors on a data collection sheet). Over time, teachers did become more comfortable with this method of data collection; however, initial concerns related to ease of use may have resulted in skewed data during early phases of intervention implementation. If these teacher-collected data were inaccurate, students may have accessed the reward when they, in fact, had not met the criterion. Conversely, the teacher may have failed to
reward the class when they had met the criterion. It is important to note that the data that teachers collected was used solely for intervention purposes (i.e., determining if the class met the criterion for reward). All formal data collection (interval recording for engagement, disruptive behaviors, and target behaviors) was completed by trained graduate students. Future research could explore easier ways for teachers to collect data on multiple disruptive behaviors at the same time.

Also, another limitation of the study was that while data collection was regularly scheduled, due to the time of year data was collected (January through April), there were several holidays as well as snow days that affected the consistency of data collection. This is a potential limitation for any research done in the school setting, but may be circumvented by selecting a time of the school year with fewer holidays and less potential for snow days.

As another potential limitation, there were different amounts of data collected in each phase of the study and in each classroom. The decision rule used was based on level of effect seen (three data points above the goal or five data points with a stable trend). This resulted in varying amounts of data being collected across the four intervention phases. In most cases, more data points were collected in the nonrandomized phase. The varying number of data points collected in each phase should be considered when interpreting results. While the interventions were demonstrated to be relatively equally effective, it took more time for the initial effects of the nonrandomized intervention to be seen. Future research could implement a set number of data points to be collected in each phase in order to increase the consistency of the data. While the decision rules were logical, during data analysis, it was noted that it took longer for the nonrandomized phases to meet the decision rules. There is the potential that if the randomized version had an equal number of data points, it may have appeared to be more effective (because the means would have been higher and the standard deviations lower).
The brief time allotted for interviews with teachers and classroom selection was another limitation of the study. Once teachers had agreed to participate in the study, they engaged in a consultative interview and attended an information session detailing the aspects of the intervention. The interviews and information sessions occurred over a 2-week period. While teachers were given a detailed script and participated in practice situations as part of the information session, researchers did not model the intervention for them in the classroom. Initially, teachers had some logistical questions. These questions were promptly addressed, but did not come up until teachers were attempting intervention implementation in the classroom. Future research might consider implementing a 2-week intervention trial period (one for each intervention phase) to allow teachers to become familiar with the interventions and address concerns before they occur during data collection.

The current study also points to further directions for researchers examining the use of classwide group contingencies. One area of research is target selection. While previous research has looked at target selection (engagement vs. disruptive behaviors) we do not know how randomization may affect other targets. Other areas of research include: expansion to other ages/demographic populations and efficacy of tangible vs. non-tangible reinforcers.

Conclusions

In spite of limitations to the study, results are consistent with other research in the area of group contingency procedures in demonstrating that both versions of the intervention were effective (Gresham & Gresham, 1982; Kelshaw-Levering et al., 200; McKissick, et al., 2010; Stage & Quiroz, 1997; Theodore, et al., 2004). This study added to the knowledge base by comparing traditional group contingencies (nonrandomized) to randomized contingencies. Data related to both disruptive behaviors as well as engagement were collected. Additionally,
reliability and social acceptability data were also collected. While randomization within an interdependent group contingency effectively corrects and accounts for possible shortcomings often encountered within the traditional procedures, it does not appear to be more effective at increasing engagement or decreasing disruptive behaviors in the classroom based on the results of this study. In addition, the randomized method may be less efficient (i.e., take more time and effort) than the traditional non-randomized method. However, teacher and student acceptability surveys demonstrated that the randomized version was preferred by the majority of participants, both teachers and students. This information is important for school psychologists and teachers alike as they are examining different behavior management strategies to implement in the classroom.
References


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Appendix A

BOSS Interval Recording Form, Cover Sheet, and Directions

Directions: Each of the shaded gray boxes represents one interval. During the 15-second interval, record engaged or off-task behavior by placing a tic mark in the appropriate coded box (AET, PET, Off-T V, Off-T M, or Off-T P) in the white box below that interval. If the student was on task at the beginning of the 15-second interval, then mark one of the engaged boxes. If at any time during the interval, the student displays one or more off-task behaviors, place a mark in the appropriate off-task boxes. After each 15-second interval, move on to the next interval and the next student. At the end of the observation, draw a box around the last interval observed.

Engaged:
- Active Engaged Time (AET): when a student is actively engaged in academic responding (i.e. reading aloud, writing notes, or talking with the teacher or another student about class work if they had received teacher permission to do so)
- Passive Engaged Time (PET): when a student is passively participating (i.e. listening to the teacher, looking at the board while the teacher is writing notes)

Off-task:
- Verbal (V): any vocalization made by the student without teacher permission (i.e. talking or singing to self or others)
- Motor (M): any motor movement not directly related to the class activity (i.e. out of seat, playing with materials on desk, or hands on another student/student’s materials)
- Passive (P): the student is not engaged in classroom activities, but is not off-task verbal or off-task motor (i.e. the student is staring at the wall)

Date: ________________ Activity: __________________________

Start Time: ________________ Ending Time: ________________

Observer: __________________

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<td>PET</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-T V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-T M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-T P</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Appendix B

Weekly Problem Behavior Tracking Sheet

During the intervention session, place one tick mark in the appropriate day’s column for every behavior displayed (See example to the right). At the end of the intervention session, tally the tick marks and record in the “Daily Total” cell. Based on this number, proceed with contingency selection.

<table>
<thead>
<tr>
<th>Behaviors of Concern</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out of seat</td>
<td>III</td>
<td>III</td>
<td>III</td>
<td>III</td>
<td>II</td>
</tr>
<tr>
<td>Talking out</td>
<td></td>
<td>II</td>
<td>III</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Disrespect</td>
<td>II</td>
<td>II</td>
<td>II</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Daily Total</td>
<td>16</td>
<td>11</td>
<td>9</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Week of:   Instructional Period:

Behaviors of Concern

Minutes Observed

Number of Students Present

Daily Total
Appendix C

Dependent Variables Brief Assessment

*Match the definition on the right to the dependent variable on the left*

_____ Student Engagement

A. any motor movement not directly related to the class activity (i.e. out of seat, playing with materials on desk, or hands on another student/student’s materials)

_____ Off-task Verbal

B. students being in their seats and oriented towards the teacher, papers, books, or other work-related materials

_____ Off-task Motor

C. the student is not engaged in classroom activities, but is not off-task verbal or off-task motor (i.e. the student is staring at the wall)

_____ Off-task Passive

Please read the following observation scenarios and determine how to best code the scenario (engaged, off-task verbal, off-task motor, off-task passive)

1. The target student is tapping his pencil on his desk after the teacher instructed the class to get out their books and turn to page 57.

2. The target student is talking to a peer while the teacher is giving instructions.

3. The target student is watching the student to his right who is drawing a picture instead of taking notes.

4. The target student is taking notes after the teacher has asked all students to look up at the board.

5. The target student is oriented to the board at the front of the room where the teacher is drawing a picture.

6. The target student is staring out the window.

7. The target student answers a question without raising his hand (one of the rules of the classroom).

8. The target student is reviewing for the test with a peer, after the teacher has told the students it was time for “partner test review”.
Appendix D

Scripts for Contingency Conditions

Nonrandomized Interdependent Group Contingency

Read the following:

☐ Class, today we are going to start playing a new game. It is a game that focuses on how good the whole class can be. It is going to help us act better in class. Each day during (fill in instructional time) class we will play the game.

☐ Today the adults in the room will be paying special attention to (fill in targeted behavior; only 1). If the whole class does a good job, and meets the goal of (to be determined by teacher/baseline data), then the whole class is going to get (fill in selected reinforcer).

☐ We know the behavior the adults are focusing on, what the goal is, and what we can earn. If the whole class’s behavior is equal to or less than the goal, the whole class will earn the reward.

☐ We will only play this game during (insert academic instruction period) class. While class is being taught, the adults in the room will be watching everyone and marking on this paper (hold up recording form) if they see (the selected behavior). Only the occurrence of the behavior will be recorded, not who did it.

☐ Does anyone have any questions about the game? (Answer any questions that may be asked).

☐ Does everyone understand the game?

☐ Ok. Let’s start class and begin the game.

Randomized Interdependent Group Contingency

Read the following:

☐ Class, today we are going to another version of our good behavior game. Remember this game focuses on how good the whole class can be. Each day during (fill in instructional time) class we have been playing the game.

☐ Today we are playing a new version of the game. The whole class will have the opportunity to earn a reward.

☐ In this version of the game, the goal level, the behavior, and the reward are all unknown.
We have three containers at the front of the room. One has target behaviors. The second has goals and the third has a variety of possible rewards, preferred activities and items that you all said you liked.

Throughout (instructional period) class, the adults in the room will be watching for (list the 3-5 teacher selected disruptive behaviors).

At the end of class, the teacher will select a slip of paper from the behavior container. Then, occurrences of that behavior will be tallied up.

Next, a slip of paper will be selected from the goal container.

If the whole class behavior was equal to or less than the goal, a slip of paper from the reward container will be selected, and everyone in class will receive the item or get to do the activity.

Does anyone have any questions about the new version of the game? (Answer any questions that may be asked).

Does everyone understand the game?

Ok. Let’s start class and begin the game.

_Faded Instruction Script_

As the students become familiar with game, use these scripts.

*Nonrandomized Interdependent Group Contingency*

Read or paraphrase the following:

- I just want to remind everyone we are still playing the good behavior game.
- Today we will know what behavior is being watched, the goal level, and what reward the class can earn (fill in reward).
- Let’s begin

*Randomized Interdependent Group Contingency*

Read or paraphrase the following:

- I just want to remind everyone we are still playing the good behavior game.
Today the behavior, the goal, and the reward are all unknown.

The possible behaviors we are watching are (fill in target behaviors here and give operationalized examples and non-examples).

The possible rewards are (fill in reward options).

The goal, behavior, and reward will be selected at the end of class.

Let’s begin.
## Appendix E

### Intervention Adherence Checklist

Place a check mark in the Completed? Column if the teacher performs the action to be taken. If the teacher does not perform the action, leave the Completed? box empty.

<table>
<thead>
<tr>
<th>Action to be taken</th>
<th>Completed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher reads the script (full or faded) at the beginning of class</td>
<td></td>
</tr>
<tr>
<td>Teacher writes known variables on board/ question marks if the randomized version</td>
<td></td>
</tr>
<tr>
<td>Teacher tallies the number of disruptive behaviors</td>
<td></td>
</tr>
<tr>
<td>Teacher shares the number of disruptive behaviors with the class</td>
<td></td>
</tr>
<tr>
<td>Teacher compares class behavior to the class goal</td>
<td></td>
</tr>
<tr>
<td>Teacher follows script for determining consequence</td>
<td></td>
</tr>
<tr>
<td>Teacher delivers positive contingency (when appropriate)</td>
<td></td>
</tr>
</tbody>
</table>
Appendix F

Group Contingencies Teacher Intervention Acceptability Questionnaire

Purpose: The purpose of this questionnaire is to get feedback concerning your overall satisfaction with the intervention(s) implemented in your classroom.

Directions: Please read the following statements and circle the number (1-5) that best describes your agreement or disagreement with each statement.

<table>
<thead>
<tr>
<th>Non-Randomized Phase</th>
<th>Randomized Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>The intervention script was easy to follow</td>
<td>The intervention script was easy to follow</td>
</tr>
<tr>
<td>I liked the procedures used in this intervention</td>
<td>I liked the procedures used in this intervention</td>
</tr>
<tr>
<td>The intervention was easy to include in my daily routine</td>
<td>The intervention was easy to include in my daily routine</td>
</tr>
<tr>
<td>I would be willing to use this intervention in the future</td>
<td>I would be willing to use this intervention in the future</td>
</tr>
<tr>
<td>I was satisfied with the intervention</td>
<td>I was satisfied with the intervention</td>
</tr>
<tr>
<td>Overall, this intervention was beneficial for the student(s)</td>
<td>Overall, this intervention was beneficial for the student(s)</td>
</tr>
<tr>
<td>There were no negative side effects experienced by students</td>
<td>There were no negative side effects experienced by students</td>
</tr>
</tbody>
</table>

Which phase would you choose to continue implementing on your own (please circle): non-randomized randomized

Please make any additional comments below

(Adapted from Erhardt et al., 1996 and Martens, Witt, Elliot, & Darveaux, 1985)
Appendix G

Student Social Validity Survey

*Directions for students:* Please read the following statements and circle the answer that best describes your agreement with each statement. There are no wrong answers.

1. Did you like the game?
   
   YES  SOMETIMES  NO

2. Do you think that you act better in class now than before the game?
   
   YES  SOMETIMES  NO

3. Do you think that the game has made you a better student?
   
   YES  SOMETIMES  NO

4. Would you like to play the game more during the day?
   
   YES  SOMETIMES  NO

5. Were there any bad parts to the game?
   
   YES  SOMETIMES  NO

6. Did you like one version of the game better than another?
   
   YES  NO

   If yes, circle which version you liked better.

1- when you knew what behavior your teacher was watching and the reward you could earn

   Or

2- when you didn’t know what behavior your teacher was watching and the reward was a surprise

7. Would you like to tell me anything else about the game? *(write answer)*