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# JOURNAL OF BEHAVIORAL HEALTH AND MEDICINE

## *Contents*

# THE EFFECTS OF ANTECEDENT MANIPULATION ON MISBEHAVIOR DURING A PLAYGROUND GAME

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A growing body of research identifies the benefits of antecedent manipulation in reducing problem behaviors. We studied the effect of antecedent manipulation on misbehavior within a playground game, aiming to create an opportunity to practice, rather than avoid, challenging situations. Four versions of the "Are You Square" game (Eldar, Morris, Da Costa, & Wolf, 2006) were played for 16 weeks by 16 male high-school students. The dependent variable, Misbehaviors (MBs), was defined as: Rule violations; Passivity; Physical violence; and Verbal violence. A Multielement Design presented the MBs emitted under the various antecedent manipulations. Overall, misbehaviors were differentially affected by the different versions of the game. The highest levels of MBs, mainly in the form of rule violations, occurred when the Intensity of the game was increased.
*Keywords*: Antecedent manipulation, Misbehavior, Movement game

Traditionally, interventions for misbehaviors focused on consequence approaches, often relaying on aversive procedures. Yet, a growing body of research identifies the benefits of antecedent manipulation as means for reducing problem behaviors and increasing appropriate conduct (see Kern, Choutka, & Sokol, 2002, for a review). Antecedent interventions may be more easily integrated into a teacher's multiple-student classroom setting (Allday & Pakurar, 2007), often serving as a preventative method rather than a reactive one (Kern, et al.).

Existing research have demonstrated the effects of antecedent interventions, sometimes used in combination with other intervention approaches, on subsequent behavior (e.g., Boelter, et al., 2007; Call, Wacker, Ringdahl, Cooper-Brown, & Boelter, 2004; Ervin,

DuPaul, Kern, & Friman, 1998; Kern, Childs, Dunlap, Clarks, & Falk, 1994). These studies have shown that manipulation of antecedent variables such as task difficulty, task amount, attention, or choice, can influence challenging behavior (e.g., aggression, noncompliance) as well as desirable behavior (e.g., task engagement, work productivity).

In general, antecedent interventions have focused on two classes of antecedent events (Kern, et al., 2002). The first class, refers to discriminative stimuli - variables that signal the availability of reinforcement such as attention, task removal, reward, etc. (Boelter, et al., 2007; Mueller, Wilczynski, Moore, Fusilier, & Trahant, 2001). Thus, if cheating in exams leads to high marks, then these graded demands become the trigger for the deceitful behavior. The second class of antecedent events refers to stimuli that function as motivating operations - altering the reinforcing properties of another event (Laraway, Snycerski, Michael, & Poling, 2003). Task dimensions that affect behavior tend to fall under this category, thus, altering the task to decrease difficulty or amount can reduce problem behavior (Call et al., 2004).

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Notably, antecedent interventions have been applied mainly to reduce problem behavior, while its potential in increasing adaptive behavior has yet to be adequately explored (Kern, et al., 2002). Furthermore, in most cases the approach relies on the removal of triggers for misbehavior, which may eventually limit the child's opportunity to learn important skills. Indeed, in natural settings, parents and educators often remove or mask difficulty in order to eliminate unpleasant situations, avoid disturbances, and ease emotional reactions from students. This "walking on eggshells" strategy may achieve temporary relief, however it does not teach the students self control or how to cope with difficulties (Eldar, 2006, 2008). Even in the more structured field of research, Kern and colleagues found that antecedent interventions were very rarely withdrawn, leaving out the necessary consideration of long-term implications. From an applied perspective, great promise is held in utilizing antecedent manipulation as an opportunity to practice, rather than avoid, challenging situations.

Eldar (2006, 2008) presented a model that utilizes physical activities and games as a supportive context for behavior change. In the proposed model, lessons are comprised of short teaching segments (about 5 minutes), named *scripts* (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994; Rolider & Axelrod, 2000; Rolider & Van Houten, 1993), that present physical activities or games that incorporate triggers associated with misbehavior, creating an opportunity for behavior change. For example, when functional assessment identifies demand as an antecedent for problem behavior, students are presented with requirements carefully planned to include manageable tasks. Next, dimensions of the task are altered to gradually increase difficulty, in a process that exposes the students to challenges which they used to decline by emitting an aberrant behavior. An attractive task as well as access to reinforcement in the form of praise or victory, contingent upon persistency in performance, should lead to greater perseverance. In other words, this model addresses task adaptations that aim to alter reinforced misbehaviors, while at the same time gradual exposure is used to desensitize inappropriate respondent behavior. Indeed, self-control procedures, used to reduce impulsivity are quite similar in principle, as self-control has been shown to develop by gradually increasing the delay to a larger reinforcer (Dixon et al., 1998; Neef, Bicard, & Endo, 2001).

Movement games and competition hold special merits as a context for behavioral interventions in general and antecedent manipulation in particular (Eldar & Ayvazo, 2009; Eldar, Hirschmann, & Elran, 2008). These activities are governed by clear rules (e.g., start with the blow of a whistle), they consist of discrete and repetitive actions (e.g., running between stations), produce visible and measurable outcomes (e.g., score), and can be easily adapted to target pro-social behavior (e.g., cooperation). Most importantly, movement games and competition often generate frustrating situations in which an expected positive consequence fails to follow (Eldar, 2008). As an example, think of a competitor that fell behind despite fierce efforts. With careful planning, frustrating triggers (e.g., waiting, difficulty, losing) can be interspersed within inherently enjoyable activities (Kalyvas & Reid, 2003; Rikard & Banville, 2006). This combination allows for desensitization to occur, as the conditioning between the triggers and the elicited emotions are gradually decreasing within the positive context (Taylor & Arnow, 1988; Wolpe, 1958). Instruction and feedback by the teacher, regarding appropriate responding in the dissatisfying situation, should teach the student how to address frustration in an appropriate manner (Rolider & Axelrod, 2000). Notably, mere participation in sporting activities does not automatically result in the

desired behavior change (Eldar, 2008; Hellison, 2003; Ward & Ayvazo, 2006). Rather, it serves as context that can facilitate the successful implementation of well planned and organized interventions.

Indeed, a playful yet competitive element adds an interesting component to the tasks examined within the antecedent manipulation field of research. The reinforcing properties of either victory (positive reinforcement) or avoiding loss (negative reinforcement) are likely to motivate students to remain on task. This stands in contrast to escape from demand scenarios (Boelter, et al., 2007; Call, et al., 2004) or attention / tangible reinforcement scenarios (Call, et al.; Mueller, et al., 2001) cited in the literature, most of which are associated with off task behavior.

Interestingly, early basic research has showed that increase in required response effort is an effective response-reduction procedure (for a review see Friman & Poling, 1995). These, mainly non-human studies demonstrated that by increasing the physical effort required for an operant response, response rate decrease, escape from the situation becomes more likely, and preference is shown towards lower effort responding. While this line of research examined physical effort, human studies in the field of antecedent manipulation tended to focus on cognitive tasks (Kern, et al., 2002) with few exceptions. Human studies exemplified that increased effort in pressing the gas pedal (Schulman, 1986) and heavier wrist weights (Van Houten, 1993) have decreased speeding and self injury respectively.

With the potential and uniqueness of the sporting context in mind, the current study aims to demonstrate that antecedent manipulation within a playground game, can lead to measurable differences in misbehavior across conditions. Such findings can lay the foundation for antecedent interventions using physical activities as the context for behavior change.

METHODS

*Participants and Setting*

Participants were 16 high-school students enrolled in a special education school in central Israel specifically designed for "students at risk". Students were accepted to the school only if their academic level was low, with a GPA average below 6.5 out of 10. All the participants were male, aged 14-17 (average age 15.5 years old). The students displayed high frequency of escape behaviors during lessons in almost all of the school subjects offered. However, no significant "behavior problems" (e.g., violence, severe disobedience) were reported for the participants of this study. Students in the school were organized in learning groups based on their favorite school subject – e.g., music, orienteering, and sports. For the purpose of the current study, a sports group was chosen, thus all the participants had an inclination towards sporting activities.

Data were collected during a weekly extra-curricular PE program that was conducted in a PE teacher education college in central Israel. During these sessions, a carefully designed game was implemented by a PE teacher with 22 years of experience, who had previously practiced this game with various groups of students. In addition, this teacher was a familiar figure to all the participating students. Attendance was at 100% for all lessons with the exception of one, thus, data for that particular lesson were not collected for any of the students. The "research game" was played on a wide grass field equipped with a high ramp, enabling a clear view for observation and videotaping.

*The Research Game and the Independent Variable*

The "Are You Square" game (Eldar et al., 2006) served as the context for the study. The Basic game starts with four groups, each placed near a home-base station (marked by hula hoops), with an equal number of ob-

(e.g., rings) distributed across the stations. The game challenges participants to collect as many objects as they can from other stations within a limited time frame (one minute) and to place these objects in their own station. Thus, objects are transferred back and forth between stations until the ending whistle is blown. At the end of this brief game, the number of objects inside the boundaries of each station determines the score of that game - and the winning team. During the game, the participants are required to follow several basic rules:

- The game starts with an opening whistle
- Each participant can transfer only one object at a time
- Participants are not allowed to throw or pass objects
- Participants cannot interfere with players from other groups (e.g., no blocking, pushing, etc.)
- Participants cannot "guard" their home-station by standing more than five seconds at a distance that is less than 50 centimeters from their base
- Participants are expected to cease all activity when the ending whistle sounds, and to drop any objects they are holding at the time.

Antecedent manipulation, as the independent variable, was comprised of five levels: (a) the Basic game, as described above; (b) the Duration manipulation extended the length of the game by 50% from 60 to 90 seconds; (c) in the Intensity manipulation, the final score was calculated by adding the number of times participants traveled between stations carrying an object and placing it in their station (i.e., legs) to the number of objects in the home-base at the end of the game. Participants counted legs aloud so their score has been monitored continuously; (d) the Complexity of the game was manipulated by a requirement to carry the transferred object between one's legs, hence, creating a more coordinately complex movement task; and (e)

the Distracters manipulation introduced interferences to the flow of the game in the form of teacher's unexpected remarks.

*Definition and Measurement of Dependent Variables*

The dependent variables encompassed various MBs according to the following definitions: (a) Rules violations – guarding one's station, throwing or passing objects, carrying more than one object at the time, and failing to stop the game at the sound of the ending whistle; (b) Physical violence – any form of pushing, hitting, kicking and physically blocking other participants (through use of legs, arms, or body); (c) Verbal violence – cursing or yelling; and (d) Passivity – staying in one place for more than five seconds without moving toward a station (with or without possessing an object). To ensure the students' familiarity with the rules and procedures of the game, each game was preceded with clear instructions.

The total number of MBs for all sixteen students was calculated per one minute (the standard length of a game). When duration exceeded 60 seconds, the total number of MBs was divided by the number of seconds the game was played multiplied by 60, to create an MB rate for one minute. Further data summaries were made in order to identify patterns in students' behavior. First, a leg was defined as a single object transition between stations. Based on this definition, the total number of legs completed by all 16 students per minute was measured. For longer games, the total number of legs was divided by the number of seconds the game was played, multiplied by 60. In addition, each MB type (Rules violation, Physical or Verbal violence, and Passivity) was counted separately and calculated into percentages showing the relative occurrence of each MB type for each level of the independent variable manipulated in the study.

*Interobserver Agreement*

Interobserver agreement was obtained by having two experienced observers independently record the videotaped lessons. It was necessary to use recorded footage to ensure the reliability of the data, as it allowed for repeated observations, each focusing on a different participant. Agreement was measured for 50% of the games played. Percentage of agreement was calculated by dividing the smaller number of events observed for each participant, by the higher number recorded for that same participant, multiplied by 100. The interobserver agreement score was calculated for each game played. The average interobserver agreement was 85%, ranging from 80%-92%.

*Experimental Design and Procedure*

A Multielement Design was used to evaluate the effect of antecedent manipulation on students' behavior, as previous studies have shown it to be an appropriate design for this purpose (call, et al., 2004; Cooper et al., 1992). The game was played once a week at the beginning of the extracurricular PE lessons. Each session included 4-6 replications of the research game, presenting its variations, as described next. A one-minute break was given between games, during which basic instructions were repeated. Encouraging remarks of similar quantity and quality were delivered during the games throughout the study.

The first phase of the study was comprised of three sessions in which four replications of the Basic game were conducted. The first session presented a 4-time repetition of the Basic game, while the second and third sessions introduced a contingent consequence procedure. That is, the participants were notified that the three losing teams would perform 30 pushups at the end of each game. In session 2, this push-ups manipulation was applied in the second and fourth games, while the Basic game procedure was maintained in

games one and three. In session 3, the order of "contingent/no contingent" games was reversed, aiming to control for order effect (i.e., games one and three included the pushups addition). This phase served as a preliminary verification that different rates of MBs can indeed surface in this 1-minute game. Following this, the antecedent manipulations commenced.

Sessions 4-8 comprised the second phase of the study. The game was played five times during every session and each game manipulation was presented once (i.e., Basic game, Duration, Intensity, Complexity, and Distracters). The order of these game variations was counterbalanced across the sessions. The third phase of the study (sessions 9-13) was similar to the second phase, with one exception – during these sessions one of the antecedent manipulations was omitted while another was repeated twice (excluding Basic) in each session. Duration was repeated in two sessions as a result of the random selection.

Clear instructions based on a written protocol were given to the participants prior to each game. They were notified when the Basic game was played and were reminded of the basic rules; for Duration, participants were told that the game would be longer, but no quantity measure was given; for Intensity they were encouraged to complete as many legs as they could since it directly contributed to the team's score. The Complexity task (i.e., item between legs) was demonstrated prior to each game; and for the Distracters' manipulation, the participants were asked to play the Basic game to best of their ability under the distracting conditions.

The fourth phase of the study (session 14) was added to the design as the study unfolded, in order to investigate the effect of further manipulations within the Intensity domain on participants' MBs. Thus, session 14 manipulated Intensity into three levels: Intensity1 – counting legs aloud to be added to the score

Table 1: Summary of the Design of the Study

| Phase | Session | Description |
|---|---|---|
| 1 | 1 | Total of 4 repetitions<br><br>Basic game only |
|  | 2-3 | Total of 4 repetitions, in reversed order across sessions<br><br>Basic game, no contingent consequence – 2 repetitions<br>Basic game, with contingent consequence – 2 repetitions |
| 2 | 4-8 | Total of 5 repetitions (one per manipulation) in counterbalanced order across sessions<br><br>Basic Game, Duration, Intensity, Complexity, Distracters |
| 3 | 9-13 | Total of 5 repetitions in counterbalanced order across sessions<br>One antecedent manipulation omitted while another is repeated twice<br><br>Basic Game, Duration, Intensity, Complexity, Distracters |
| 4 | 14 | Total of 6 repetitions, focusing on Intensity, in the following order:<br><br>Basic game<br>Intensity1 = counting legs<br>Basic game<br>Intensity2 = target of 50 legs<br>Intensity3 = target of 55 legs<br>Intensity1 = counting legs |

of the game (as in previous parts of the study); Intensity2 – setting a target of at least 50 legs for the team; and Intensity3 – completing more than 55 legs. The order of the games in this session, as well as the overall design of the study, is summarized in Table 1.

*Integrity of the Independent Variables*

The implementation of the various game conditions was conducted according to clear protocols. Moreover, all verbal communication conveyed from teacher to participants (including instructions, reminders, and encouragement) followed precise scripts and remained consistent throughout the study. An independent observer evaluated integrity in 30% of the sessions through videotaped footage. The observed instructions were compared to the protocols and showed 100% integrity across all sessions.

RESULTS AND DISCUSSION

Figure 1 presents the number of MBs the participants emitted per minute throughout the various phases of the study. The first phase of the study replicated the Basic game with and without contingent consequences. Figure 1 shows a higher rate of MBs per minute under the push-ups contingency (averaged at 33.5) compared to the Basic condition (averaged at 20.38), as evident in sessions 2 and 3. In other words, within each of these sessions more

MBs were emitted when the push-ups contingency was declared prior to the game. Thus, the constructed game was shown to be a suitable context for variable manipulation with the aim of measuring MBs.

The data for the second and third phases of the study present the results of the antecedent manipulation within a Multielement design. The data clearly indicate that when the Intensity of the game was increased, MB rates were the highest with an average of 37 per minute. Moreover, MBs under the Intensity condition were consistently higher than in any other game condition within every single session. This pattern can be seen in Figure 1 through the lack of overlap between Intensity and the other conditions. Complexity and Duration were associated with fewer MBs per minute, with an average of 27 and 23, respectively. Despite this difference in means, overlap is clearly evident between these two manipulations. Finally, Distracters and Basic

game, tended to produce the lowest rate of MBs within each specific session, with an overall average of 20 and 19, respectively. Notably, Distracter and the Basic game yielded very similar results both in pattern and in frequency of MBs.

During the third phase of the study, one antecedent manipulation was repeated twice in the same session. Interestingly, the second time tended to generate more MBs than the first one. For Complexity, MBs per minute increased from 24 to 28 in session 10, MBs under the Intensity condition raised from 35 to 46 in session 11, session 12 saw a slight change from 22 to 23 MBs for the Duration manipulation, and in session 13 the number of MBs per minute measured for Intensity increased from 18 to 22. The only exception to this pattern occurred in session 9, as the MBs measured for the twice-repeated Duration domain decreased from 26 to 21.

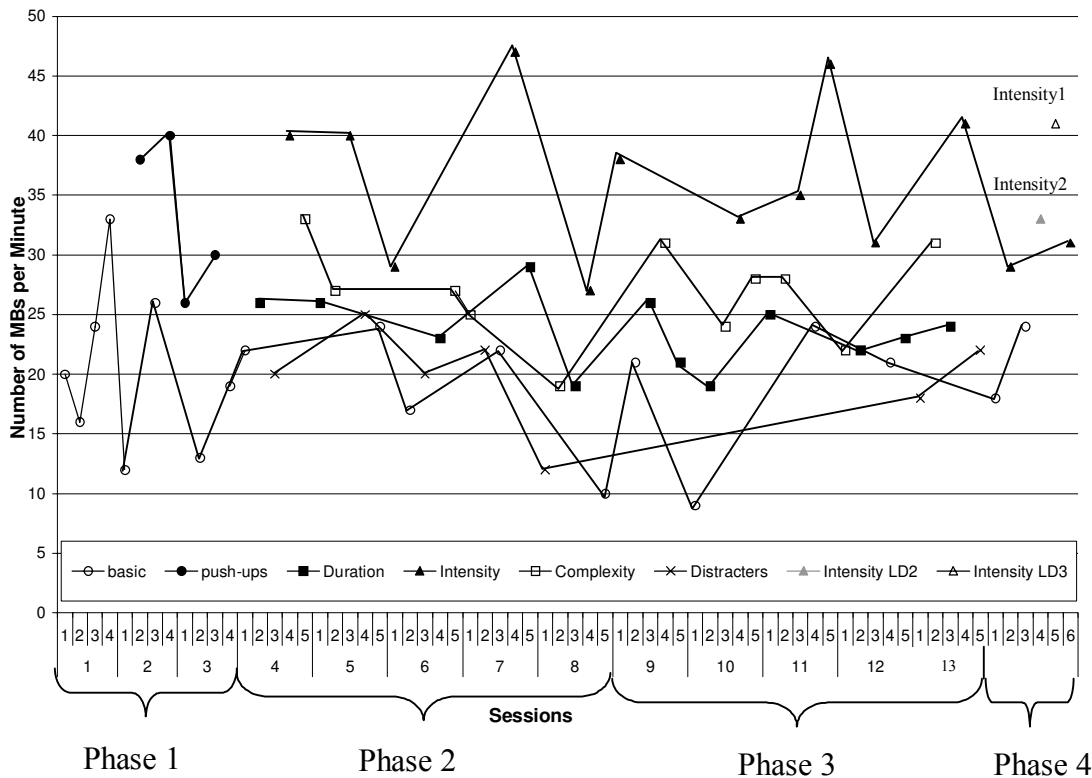Session 14, the fourth phase of the study,



*Figure 1.* The number of MBs per one minute throughout the four phases of the study.
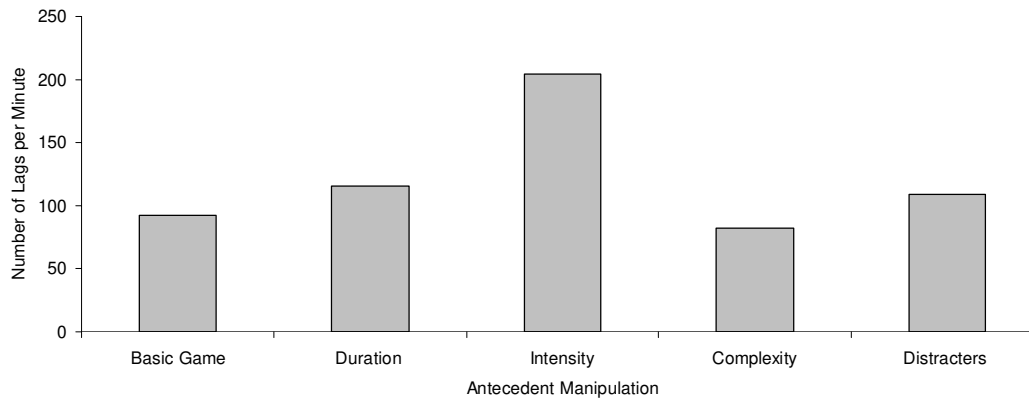
*Figure 2*. The average number of legs performed in one minute for each antecedent manipulation.

presented a further manipulation of the Intensity condition. The first three games replicated conditions that were previously employed in the second and third phases of the study. Consistent with previous findings, the data show that the Basic game was associated with fewer MBs than the Intensity condition. Additionally, a greater number of MBs was recorded the second time the Basic game was played compared to the first time. In the fourth and fifth games in this session, the rate of MBs per minute increased to 33 when a target of 50 legs was introduced (Intensity2), and to 41 MBs per minute when a target of 55 legs was set (Intensity3). Reversing back to the regular Intensity manipulation was accompanied by a MB decrease to 31.

Figure 2 presents the average number of legs counted in each antecedent manipulation during sessions 4-13 (i.e., the second and third phases of the study). The data clearly indicate that Intensity elicited greater effort to shift objects into one's station, as measured by the high number of legs run under this condition (average of 204 legs per minute). Duration (115), Distracters (109), and Basic game (92) all yielded considerably less running between stations. Complexity was associated with the smallest number of legs (82), probably because the mere manipulation

(item between legs) reduced the speed of the participants.

Figure 3 presents the distribution of the various types of MB for each antecedent manipulation throughout session 4-13. The Basic game yielded a rather even distribution, as 27% of the MBs were attributed to rule violations, 26% were recorded as physical violence, 35% were classified as verbal violence, and 12% of MBs were marked as passivity. While overall this condition elicited the lowest rate of MBs, the occurrence of all types of the defined MBs, suggest that the Basic game is a challenge in its own right. Under the Duration manipulation, passivity was the prominent type of MB (58%), while rules violations, physical violence, and verbal violence occurred less frequently (10%, 18%, and 14%, respectively). Perhaps this result points to an "escape from demand" pattern of behavior. On the contrary, passivity was a negligible MB type for the Intensity (3%), while rule violations were the dominant MB (69%). An even distribution between physical violence (12%) and verbal violence (16%) completed the Intensity jigsaw puzzle. As more legs were completed under this condition than in any other game variation, it is likely that the participants were more physically fatigued. Thus, it is possible that the rule

violations observed (e.g., throwing or passing objects, carrying more than one at a time) were negatively reinforced by the reduction of the physical effort while remaining on task and still achieving the desired score. Rule violations were the primary MB for the Complexity condition as well (67%), with 7%, 12%, and 14% for physical violence, verbal violence, and passivity, respectively. Finally, the MBs under the Distracters manipulation were distributed as 13%, 31%, 47%, and 9% percent for rule violations, physical violence, verbal violence, and passivity, respectively. Notably, the overall number of MB's in this condition, remained as low as in the basic game. Perhaps the participants found it easier to ignore distractions in the already "noisy" and less cognitively-demanding environment of the "Are You Square" game. It could be interesting to examine the effect of Distracters if cognitive tasks (e.g., memory, simple arithmetic) are integrated into the physical game.

The current study aimed to validate the use of antecedent manipulation within the context of a playground game. Indeed, the results show that misbehavior was differentially affected by the different versions of the game. Specifically, when scoring was different (i.e., Intensity) rules violations were more frequent. When the length of the game (i.e., Duration) was increased by 50%, more passivity was observed. When Distracters were added, a greater percentage of physical and verbal violence was measured, and when more coordination was needed (i.e., Complexity), participants tended to display rule violations more than any other form of misbehavior. Nonetheless, it should be noted that the various variations in game type across phases should weaken the internal validity of the findings. Further replications of a refined independent variable are suggested for future research.

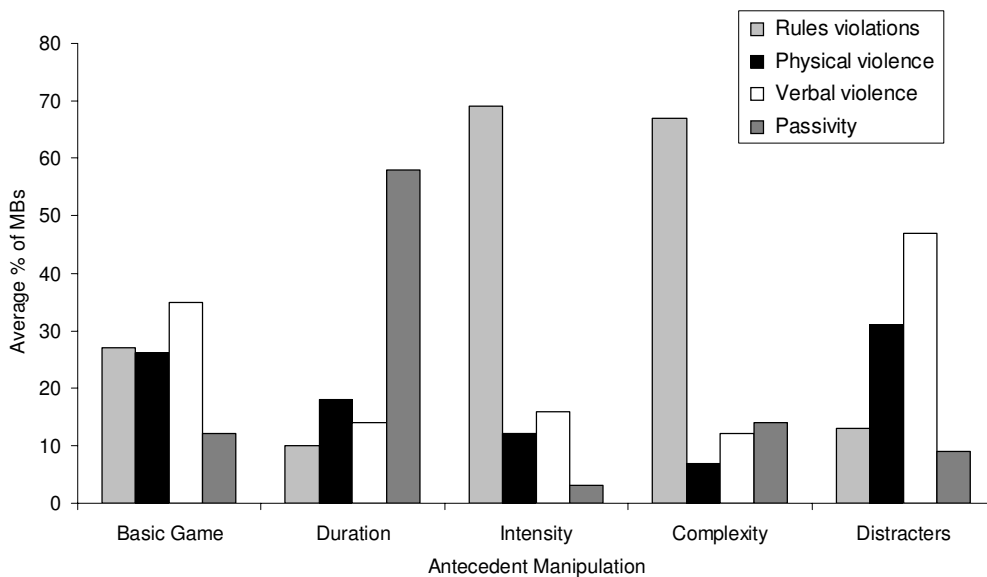These preliminary results suggest that structured changes in a physical game are



*Figure 3*. The average percentage of the different MBs presented for the various antecedent manipulations.

expected to influence MBs emitted by the participating students. This can be used to either eliminate or gradually present challenging triggers in the task. Remarkably, the MBs recorded in this study were emitted within a very short space of time. Therefore, the activity proves to be a useful "training tool" for practicing appropriate behavior when faced with difficulty. The implementing educator does not need to challenge the students for prolonged periods of time or expose them to severe aversion. The findings of the current study suggest that a controlled environment filled with antecedents or triggers for MBs can be created within 60 seconds of a fun, strenuous, competitive task.

## REFERENCES

Allday, R. A., & Pakurar, K. (2007). Effects of teacher greetings on student on-task behavior. *Journal of Applied Behavior Analysis, 40,* 317-320.

Boelter, E. W., Wacker, D. P., Call, N. A., Ringdahl, J. E., Kopelman, T., & Gardner, A. W. (2007). Effects of antecedent variables on disruptive behavior and accurate responding in young children in outpatient settings. *Journal of Applied Behavior Analysis, 40,* 321-326.

Call, N. A., Wacker, D. P., Ringdahl, J. E., Cooper-Brown, L. J., & Boelter, E. W. (2004). An assessment of antecedent events influencing noncompliance in an outpatient clinic. *Journal of Applied Behavior Analysis, 37,* 145-157.

Cooper, L. J., Wacker, D. P., Thursby, D., Plagmann, L. A., Harding, J., Millard, T., & Derby, M. (1992). Analysis of the effects of task preferences, task demands, and adult attention on child behavior in outpatient and classroom settings. *Journal of Applied Behavior Analysis, 25,* 823-840.

Dixon, M. R., Hayes, L. J., Binder, L. M., Manthey, S., Sigman, C., & Zdanowski, D. M. (1998). Using a self-control training procedure to increase appropriate behavior. *Journal of Applied Behavior Analysis, 31,* 203-210.

Eldar, E. (2006). Educating through the physical – Procedures and implementation. *International Journal of Behavioral and Consultation Therapy, 2,* 399-415.

Eldar, E. (2008). Educating through the physical – Behavioral interpretation. *Physical Education and Sport Pedagogy, 13,* 215-229.

Eldar, E., & Ayvazo, S. (2009). Educating through the physical: Rationale. *Education and Treatment of Children, 32,* 471-486..

Eldar, E., Hirschmann, M., & Elran, E. (2008). A unique physical education curriculum – Supporting classroom management. *Journal of Behavior Analysis in Health, Sport, Fitness & Medicine, 1,* 103-116.

Eldar, E., Morris, D., Da Costa, R., & Wolf, T. (2006). Are you square? A game for developing self-control and social skills. *Strategies, 19,* 17-21.

Ervin, R. A., DuPaul, G. J., Kern, L., & Friman, P. C. (1998). Classroom-based functional and adjunctive assessments: Proactive approaches to intervention selection for adolescents with attention deficits hyperactivity disorder. *Journal of Applied Behavior Analysis, 31,* 65-78.

Friman, P. C., & Poling., A. (1995). Making life easier with effort: Basic findings and applied research on response effort. *Journal of Applied Behavior Analysis, 28,* 583-590.

Gickling, E. E., & Armstrong, D. L. (1978). Levels of instructional difficulty as related to on-task behavior, task completion, and comprehension. *Journal of Learning Disabilities, 11,* 32-39.

Hellison, D. (2003). *Teaching responsibility through physical activity* (2nd ed.). Champaign, IL: Human Kinetics.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1982/1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27,* 197-209.

Kalyvas, V., & Reid, G. (2003). Sport adaptation, participation, and enjoyment of students with and without physical disabilities. *Adapted Physical Activity Quarterly, 20,* 182-199.

Kern, L., Childs, K. E., Dunlap, G., Clarks, S., & Falk, G. D. (1994). Using assessment-based interventions to improve the classroom, behavior of a student with emotional and behavioral challenges. *Journal of Applied Behavior Analysis, 27,* 7-19.

Kern, L., Choutka, C., & Sokol, N. (2002). Assessment-based antecedent interventions used in natural settings to reduce challenging behavior: An analysis of literature. *Education and Treatment of Children, 25,* 113-130.

Laraway, S., Snycerski, S., Michael, J., & Poling, A. (2003). Motivating operations and terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis, 36,* 407-414.

Mueller, M. M., Wilczynski, S. M., Moore, J. W., Fusilier, I., & Trahant, D. (2001). Antecedent manipulations in a tangible condition: Effects

of stimulus preference on aggression. *Journal of Applied Behavior Analysis,* 34, 237-240.

Neef, N. A., Bicard, D. F., & Endo. S. (2001). Assessment of impulsivity and the development of self-control in students with attention deficit hyperactivity disorder. *Journal of Applied Behavior Analysis, 34,* 397-408.

Neef, N. A., & Lutz, M. N. (2001). Assessment of variables affecting choice and application to classroom interventions. *School Psychology Quarterly, 16,* 239-252.

Rikard, G. L. & Banville, D. (2006). High school student attitudes about physical education. *Sport, Education and Society, 11,* 385-400.

Rolider, A., & Axelrod, S. (2000). *How to teach self-control through trigger analysis.* Austin, TX: Pro-Ed.

Rolider, A., & Van Houten, R. (1993). The interpersonal treatment model: Teaching appropriate social inhibitions through the development of personal stimulus control by the systematic introduction of antecedent stimuli. In R. Van Houten & S. Axelrod (Eds.), *Behaviour analysis and treatment* (pp. 127-168). New York: Plenum Press.

Schulman, R. (1986). Deaccelerator: Behavioral control of highway speeding. Paper presented at the meeting of the Association for Behavior Analysis, Milwaukee.

Taylor, C. B., & Arnow, B. (1988). *The nature and treatment of anxiety disorders.* New York: The Free Press.

Van Houten, R. (1993). The use of wrist weights to reduce self-injury maintained by sensory reinforcement. *Journal of Applied Behavior Analysis, 26,* 197-203.

Ward, P., & Ayvazo, S. (2006). Classwide peer tutoring in physical education: Assessing its effects with kindergartners with autism. *Adapted Physical Activity Quarterly, 23,* 233-244.

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition.* Stanford: Stanford University Press.

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