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The Effect of Control-Based Group Games on Self-Controlled Behavior in a Primary Montessori Classroom

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Abstract

This action research study aims to determine the effect of control-based group games on self-controlled behavior in a Montessori primary classroom. The study took place over a period of four weeks and included 17 participants ages 35 months to 6 years. A control-based group game, such as Red Light/Green Light or Simon Says, was implemented daily. Both quantitative and qualitative data was collected from these games, as well as from observations of behavior in the classroom. Though the study found no significant correlation between game outcomes and self-controlled behavior in the classroom, the self-control skills needed to succeed in the games increased notably over the duration of the study. This drastic improvement in self-control skills suggests the need for future, more targeted research opportunities.

Keywords: self-control, Montessori, early childhood, impulsive behavior, group games, control, motor inhibition

Self-control is necessary for human survival. It allows us to regulate our emotions, manage impulses, prevent unwanted or dangerous behaviors, change harmful habits, make sacrifices, delay gratification, and ultimately, achieve long-term goals. The ability for self-control is crucial in effective decision-making and appropriate social interaction. “The capacity for self-control over our thoughts and actions is a fundamental human faculty” (Moffitt et al., 2013, p. 352). However, like any other skill, this faculty must be practiced, strengthened, and honed, and this work must begin in childhood.

The idea of self-control beginning in childhood is not a novel one. In fact, it is an accepted concept often studied in the scientific community. So much so that one of the most well-known studies on self-control, Mischel’s Marshmallow Test, utilized children as participants (Petti, 2015). The test involved participants aged 4 to 5 who were given the choice between eating one marshmallow immediately or waiting 20 minutes to receive two marshmallows. Mischel’s book describing the outcomes of the study, as well as a series of follow-up assessments, showed that children who were able to demonstrate self-control early in life were more likely to have better cognitive and social functioning and a stronger sense of self-worth, as well as a healthier body (Petti, 2015). These findings have also been upheld by a subsequent longitudinal study on self-control, the Dunedin Study, which added that children with poor self-control skills were more likely to experience poverty, substance abuse, and unwanted pregnancy (Moffit et al., 2013).

With all of this in mind, programs and interventions in early childhood have been developed to promote self-control (Moffit et al., 2013). However, these programs are still in their infancy, and implementation is largely up to parents, teachers, extra-curricular organizations, or television shows. My own observations in the classroom showed that providing opportunities for

a specifically targeted intervention to strengthen self-control could be a helpful tool in supporting students' academic success and overall development. This study is built on the findings of various studies indicating that games utilizing physical movement, rhythmic timing, and repetition in a group setting can support the development of self-control (Williams, 2018; Zhao et. al, 2015; Best, 2010; Doebel and Munakata, 2018). Data was collected over a four-week period at a small, urban Montessori school in a classroom of 17 children aged three to six of primarily upper-middle class to upper class socioeconomic status. This study aimed to determine the effect of control-based group games on self-control in the classroom.

Theoretical Framework

The phrase "Monkey See, Monkey Do" is often used when describing children. This idea of learning behavior by observing and imitating others is not just a common expression; rather, it describes the human social learning experience, encapsulated by Albert Bandura's social learning theory. Originally a psychology theory developed in the 1960s and 70s, social learning theory posits that new behaviors can be obtained from observing others. This also includes observing the punishments doled out to others for negative behavior and rewards given for positive behavior. There are four main elements of social learning theory. The first is attention, which requires that in order for learning to occur, a person's focus must be placed on the modeled action. The second is retention, or the process of internalizing information, either visually, auditorily, or both. The third is reproduction, which signifies an opportunity to execute learned behaviors. The fourth and final element is motivation, which refers to the decision to perform, or avoid, observed behaviors. Bandura identified that certain behaviors could have potential consequences or rewards. Additionally, social expectations and the social value attached to these certain actions could all be possible motivators for behavior. In fact, Bandura's

beliefs have been described to single out the importance of social setting: “the most common and powerful aspect of environment is the social aspect, or the presence, contributions, and influence of the persons in that environment” (Sullivan, 2009).

By utilizing this theory, my research intended to focus on the effect of control-based group activities on impulse control in a Primary Montessori environment. Social learning theory served as the lens through which the intervention and data were developed and analyzed. I applied the four theoretical elements of social learning theory to develop and execute my methodology: control-based group games and activities. I encouraged focus on the desired behavior through game-style presentation. By using visual, physical and verbal cues, I hoped to support the children in retention of the modeled behavior. Opportunities for reproduction were provided repeatedly throughout game play. Additionally, I am specifically interested in this third step, reproduction, because it requires that “symbolic representation now must be converted into appropriate actions similar to the originally modeled behavior” (Grusec, 1992, p. 782). My research attempted to discern the effect of observing others’ positive behaviors in a game-based context on positive behavior changes in other social situations. The final element of Bandura’s theory is motivation through consequences, rewards, and social value. This motivation was clearly embedded in the game’s directions, as those who did not reproduce the desired behavior were out of the game.

Because it places importance on social environment, observation, and reproduction of behavior, Bandura’s social learning theory provides an important framework through which to operate. In the same way, the following collection of relevant literature has been reviewed and analyzed through the same lens of social learning theory.

Review of Literature

The purpose of this action research project was to explore the effect of control-based group activities on self-control in a Primary Montessori environment. This section reviews relevant, peer-reviewed research published on the topics of the importance of self-control, physical movement and games, and group influence, preceded by a key terms component.

Key Terms

Several key terms will be continually utilized and referenced within both this literature review and research paper as a whole. Because of this, it is crucial to establish an agreed-upon definition of these terms. The first key term is *self-control*. This concept has several aliases used commonly and interchangeably in the field, including impulse control and effortful control (Blahut, 2012; Duckworth and Steinberg, 2015). However, "whatever the moniker, self-controlled behavior refers to voluntary actions in which individuals engage to advance personally valued longer term goals despite conflicting urges that are more potent in the moment" (Duckworth and Steinberg, 2015, p. 32). Blahut explained this concept as "the ability to override a dominating, impulsive response with a more appropriate response in the context of a particular situation" (2012, p. 1). Duckworth and Steinberg establish a clear indicator of self-control: "to conclude that a child is exercising self-control, one must be confident that his or her personally valued long-term goals are in conflict with competing, short-term desires" (2015, p. 33). By compiling these explanations, a working definition was developed for the purpose of this research paper: self-control is the ability to intentionally execute or prevent actions in pursuit of a long-term goal despite immediate desires.

A second key term is *inhibitory control*, a critical element within the definition of self-control. Inhibitory control is the ability to suppress, delay, or terminate an undesired behavior

entirely. Geeraerts et al. explained that “inhibitory control develops especially fast during the early preschool years” (2020, p. 1).

A third key term is executive functioning, which is a general term describing overall appropriate developmental functioning regarding problem solving and behavioral responses. As defined by Best, “executing functioning is an umbrella term that encompasses the cognitive processes responsible for organizing and controlling goal-directed behavior” (2010, p. 2). Similar to the definition of self-control presented by Duckworth and Steinberg, executive functioning requires planning of behavior to pursue a long-term goal and simultaneous suppressing of impulsive behaviors that prevent the achievement of such a goal.

Importance of Self-Control

The importance of self-control for young children is somewhat obvious. Self-control leads to less impulsive behavior, the ability to delay gratification, and higher levels of self-regulation. In fact, Rimm-Kaufman et al. found that children higher in self-control are more likely to display adaptive and appropriate behavior in the classroom, develop effective work habits, and exhibit higher levels of classroom engagement (2009). However, the importance of self-control stretches far beyond the classroom. In several studies, childhood self-control has been determined as a significant predictor of health, success, and general happiness in adulthood (Moffitt et. al, 2013; Bogg and Roberts, 2012; Shen et al., 2019).

Childhood Self-Control as a Predictor for Behavior in Adolescence

According to Moffitt et. al, children with low levels of self-control are more likely to display risky behaviors in adolescence, including smoking at younger ages, unplanned pregnancy, and low levels of educational achievement, than their counterparts with higher levels of self-control (2013). This correlation is brought into question by Duckworth and Steinberg,

who point out that, despite the fact that behaviors supporting self-control show a linear increase between childhood and adolescence, reckless behaviors spike temporarily in early adolescence; this can be explained by a drop in reward sensitivity during that period of development (2015).

Impact of Childhood Self-Control in Adulthood

The impact of self-control in childhood carries into adulthood through health, success, and happiness. Moffitt et. al's longitudinal study on the lifelong impact of early self-control found that "boys and girls with weaker self-control had worse health, less wealth, less skilled parenting, and more crime as adults than those with stronger self-control" (2015, p. 356). This conclusion was echoed by Bogg and Roberts, who found that behaviors supporting self-control were linked with lower rates of drug use, tobacco use, obesity, and other risky behaviors, such as unprotected sex and risky driving behaviors (2004). Similarly, in the field of both criminology and sociology, researchers have found that low levels of self-control in childhood are a consistent predictor of violence and crime in adulthood; this shows that "low self-control characterizes law-breakers" (Moffitt et al., 2013, p. 354). Perhaps even more interestingly, children with high self-control were found to have high levels of life satisfaction as adults, while those with low self-control were more likely to have suicidal thoughts or attempts (Moffitt, 2013).

Physical Movement and Games

Physical movement gives children an opportunity to strengthen their executive functioning, including the ability for self-control (Best, 2010). Movement supports executive functioning through the mental demands necessary for goal-directed exercise, such as sports and cognitive engagement of the body to execute gross motor movements (Best, 2010). The

executive functioning skills utilized during physical activity have been found to positively impact behavior in other situations. Best writes in his 2010 study:

> Participation in aerobic games likely requires many of the same cognitive processes as more traditional executive functioning tasks, such as strategic and goal-directed behavior in the face of a novel game experience, and those skills gained during aerobic game participation may transfer to executive functioning tasks. (p. 12)

Thus, control-based games, in which the participant is required to utilize self-control, are a possible support for the development of self-control and the potential transfer of self-control skills to other situations.

Control-based games

The impact of control-based games on behavior has been explored in several studies. A study by Zhao et. al. utilized a simple go/no go, also called red light/green light, game design in which children alternatively asked to move and stop moving. Zhao's study found that repeatedly playing a game that involves the inhibition of physical action could effectively support children in executing self-control in other tasks that involve similar motor inhibition. (Zhao et. al, 2015). This potential transfer of skills from a control-based game was also seen in Carlson and Wang's 2007 study in which children participated in a simplified version of the classic "Simon Says" game. This study found that the ability for inhibitory control was much higher among older 3-year-olds and 4-year-olds than it was among younger 3-year-olds.

Games Involving Music

Games involving music can also provide crucial opportunities for children to exercise self-control. Guided group musical play, handclapping, circle games, etc., requires children to utilize self-control, behavior planning, and cognitive control; instrument play was found to

provide the most opportunity to use these skills (Williams, 2018). “It is highly promising that activities that build beat synchronization and coordinated rhythmic movement skills in children, while simultaneously targeting specific self-regulation skills, would be effective in enhancing self-regulatory development” (Williams, 2018, p. 93). Similarly, complex singing, such as rounds, alternate singing, volume modification, require children to regulate and control their performance to match the musical composition (Shen et. al, 2019).

Group Influence on Self-Control

Self-control does not exist in a vacuum. Rather, self-control emerges in a “rich sociocultural context that may influence how it is exercised and develops” (Doebel and Munakata, 2018, p. 738). As with any social behavior, ability for self-control is influenced by the societal norms, values, and behaviors surrounding it. Because of this, Doebel and Munakata studied the impact of a group on an individual’s self-control. They found that children were more likely to display self-control when they believed that the group also displayed and valued self-control. These findings demonstrate that, in addition to the individual’s ability for self-control, it is essential to take into consideration the social context the behavior is performed in when observing for self-control. This echoes the previously discussed success of group games as a possible intervention for supporting self-control in children. By placing value on self-control as a means to victory in a group game setting, one is inherently supporting the success of children individually performing self-control. Similarly, Williams found that children who did not typically display self-control were able to utilize this behavior in group settings. “It might be the motivating aspect of group music engagement that stimulates this behavior” (Williams, 2018, p. 93).

Conclusion

The importance of self-control is clear: not only does it aid the child in academic success in the classroom, it is also a necessary skill in future behavior and decision-making. Because of this, there is a need for a targeted approach to the development of self-control. Studies by Zhao et. al (2015), Williams (2018), Shen et. al (2019), and Doebel and Munakata (2018) provide evidence that an intervention involving control-based group games could be potentially successful in supporting the development of self-control in the classroom.

Research Process

Introduction

This study sought to determine the effect of daily participation in control-based group games on self-control in the classroom. Data was collected in a primary Montessori classroom at a private school in an urban neighborhood of Nashville, Tennessee. The participant class consisted of 17 children—8 boys and 9 girls—between the ages of 35 months and six years, all of upper-middle to upper class socioeconomic status. Twelve children were White, two children were Asian American, one child was African American, and two children were biracial. Mid-way through the study, a new child entered the classroom, whose data was not collected in this study.

Intervention

Each day, following a brief set of instructions, a game requiring either specific action or the prevention of action was played. All children were invited to play, but they could request to sit out. These games included Red Light/Green Light, Simon Says, Freeze Dance, and rhythmic musical play. Red Light/Green Light is a classic playground game in which the instructor calls out “Green Light” to signal participants to run toward them and “Red Light” to stop their motion.

Simon Says is an instructional game in which "Simon" gives an action that the participants must perform only if it is prefaced by the phrase "Simon Says;" if it isn't, the participants should remain still. Freeze Dance is a musical game in which music is played and paused repeatedly. When the music is playing, participants should dance, but when the music is paused, participants should freeze their body immediately, maintaining whatever position they are in. Rhythmic music play consisted of guided beats and rhythms that participants copied with their own simple instruments (i.e. maracas, rhythm sticks, etc.). The games followed a weekly schedule: Red Light/Green Light on Monday, Simon Says on Tuesday, Freeze Dance on Wednesday, Red Light/Green Light or Simon Says on Thursday, and rhythmic musical play on Friday. All games were played inside directly before lunch with the exception of Red Light/Green Light, which was played outside directly after lunch. The intervention was implemented for four weeks. During this time, data was recorded both qualitatively and quantitatively through several data collection tools including a behavioral log (appendix A), a game outcome tally (appendix B), an observational log (appendix C), and a game atmosphere scale (appendix D).

Behavioral Log (Appendix A)

The behavioral log served as a place to record impulsive/undesirable behaviors, including emotional impulses toward another person (i.e. yelling, hitting, etc.) and physical impulses (i.e. ripping up a paper, pushing over a tower, throwing a block, etc.). Originally, observations were set to be on a rotating schedule of three children per day. However, it quickly became clear that observing the whole class at once was easier and more effective. This log allowed for collection of data on how many impulsive behaviors occur in the classroom and if the rate of impulsive behavior increased or decreased following intervention. Observations were recorded by both myself and my assistant.

Game Outcome Tally (Appendix B)

This data collection tool was utilized to record data regarding the number of rounds each child successfully completed in each game. These outcomes were then compared with the behavioral and observational logs to determine if increased success in the games correlated with an increase in self-controlled behavior in the classroom. Because I was functioning as the instructor in the group games, my assistant took video recordings of each session, which were used later to record data in the game outcome tally and game atmosphere scales.

Observational Log (Appendix C)

Similar to the behavioral log, the observation log was used to collect narrative-style, anecdotal data regarding either the exceptional use of self-control or the notable lack thereof. Longer narratives were able to provide more detail about changes in behavior and specific moments of self-control. Observations were recorded by both myself and my assistant.

Game Atmosphere Scale (Appendix D)

This scale measured the overall quality of the group game (active participation, respectful play, level of engagement, etc.). This scale was also used to record weather and any other notable circumstances that may have affected game play. This gave context about each group game and helped determine if the children were interested or invested in the particular game.

Analysis of Data

The purpose of this study was to determine the effects of control-based group games on self-control in a Montessori primary classroom. This research study consisted of 17 participants ages three to six—8 boys and 9 girls (see table 1). Data was collected for four weeks. Throughout the data collection period, there were several unexpected hurdles. This study taking place during a global pandemic created several student and teacher absences due to potential

exposures, an overabundance of caution, and vaccine distribution. In addition, there was a week-long pause in data collection between weeks two and three due to an unusually severe snowstorm. During the second week of data collection, a new student joined the classroom, and although they will not be included in the study, their presence is important to note as a potentially altering variable.

Table 1
Class Demographic Breakdown[1]

Age	# of Boys	# of Girls
3	3	4
4	2	4
5	3	1
6	1	0

With the exception of teacher absence days, a control-based group game was played daily, either directly before or after lunch. This resulted in the completion of a total of 17 control-based games, including six games of "Simon Says," five games of "Red Light/Green Light," four games of "Freeze Dance," and two opportunities for directed, rhythmic musical play (see figure 1).

[1] Table 1 reflects the class demographic breakdown at the end of the study. Several participants celebrated birthdays during the period of intervention.

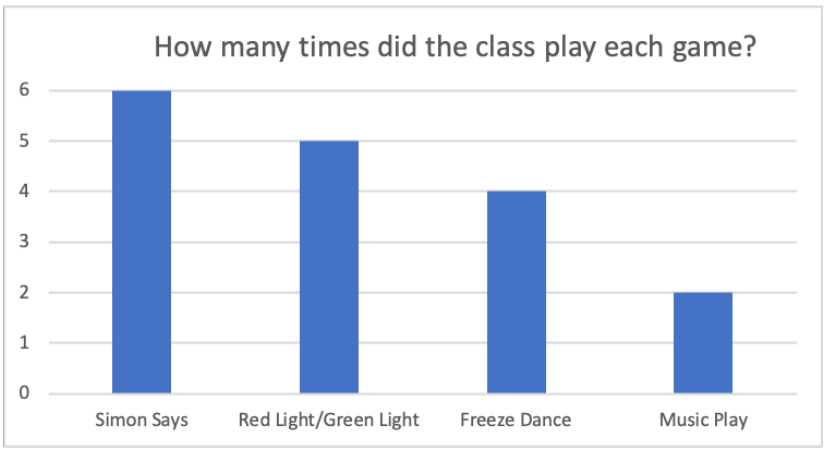

Figure 1. How many times did the class play each game?

Success in Game Play

Following school each day, a video recording of the daily game was reviewed. The number of successful rounds completed by each student was logged and calculated into a percent. For example, a child who successfully completed four out of eight rounds would be logged as a 50% score. The class' average percent of successfully completed rounds was then determined. Over the four-week intervention, the participants' gameplay noticeably improved, and the average percent of success reflected this. In Simon Says, the class started at an average successful round rate of 24% and steadily improved to a rate of 73% (see figure 2).

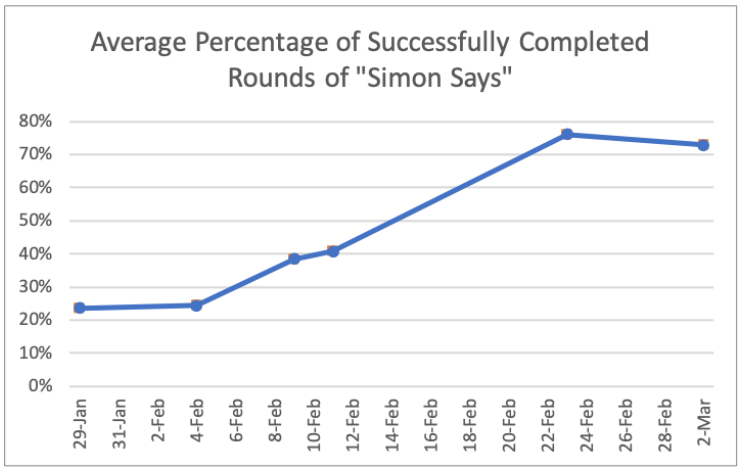

Figure 2. Average Percentage of Successfully Completed Rounds of "Simon Says"

Similarly, in Freeze Dance, the beginning average success rate was 62%, which increased to 100% for the final two games (see figure 3).

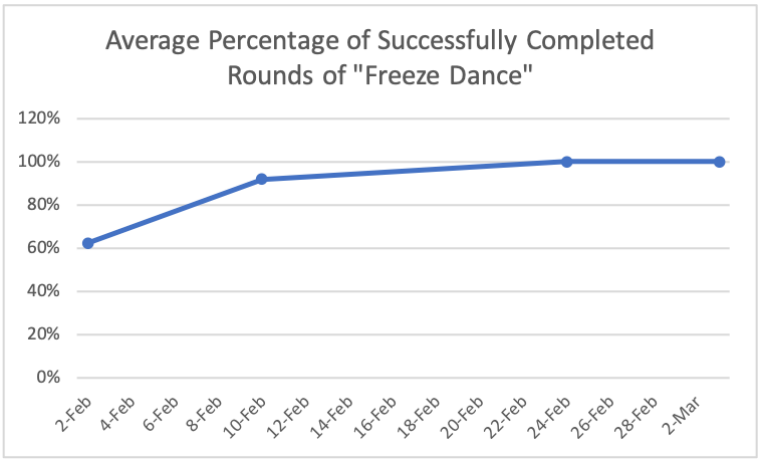

Figure 3. Average Percentage of Successfully Completed Rounds of "Freeze Dance"

The same effect was noticeable in Red Light/Green Light as well. Though less consistent, the average success rate of the first game was 85%, and the average success rate for the final game was 93% (see figure 4). It is important to note that Red Light/Green Light was the only game played outside, which made for an inconsistent environment regarding temperature, weather, and outerwear. In fact, there is a noticeable dip in average game scores on the February 22nd game.

This game was played on the first day back from a week-long snowstorm, the day was unseasonably cold, and there was snow still on the ground.

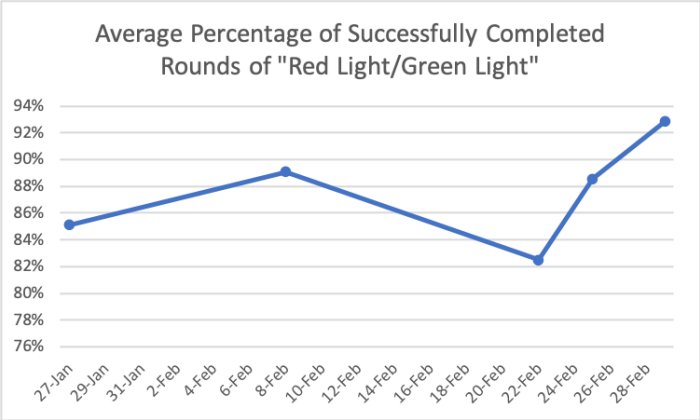

Figure 4. Average Percentage of Successfully Completed Rounds of "Red Light/Green Light"

As a supplementary activity, students also had the opportunity to practice self-control in a guided, rhythmic musical play. Students were asked to play their instruments when the teacher was playing, but quiet their instruments when the teacher quieted hers. This was repeated in several rhythms. Observations by the teacher and assistant reflected an increased ability for students to inhibit their motions by quieting their instruments. Overall, in both games and musical play, the data showed an increase in the participants' abilities for self-control, as each game required self-control for success.

Game Atmosphere Data

Data collected via the Game Atmosphere Scale (Appendix D) showed an overwhelmingly enthusiastic attitude toward daily games. Regardless of the weather, assistant absences, presence of a substitute teacher, or other notable circumstances, the majority of children in the class elected to participate. If a child chose not to participate, their decision was due to toileting needs, minor injuries, or fatigue, rather than a disregard or apathy for the game.

Self-Controlled Behavior in the Classroom

The intervention addressed a lack of self-control in the classroom seen in impulsive behaviors. These behaviors included physical impulses, such as ripping up papers, knocking over work, or throwing materials, as well as emotional impulses, such as use of mean language or yelling. The vast majority, 78 percent, of impulsive incidents in the classroom were physical, while only 22 percent were emotional (see figure 5).

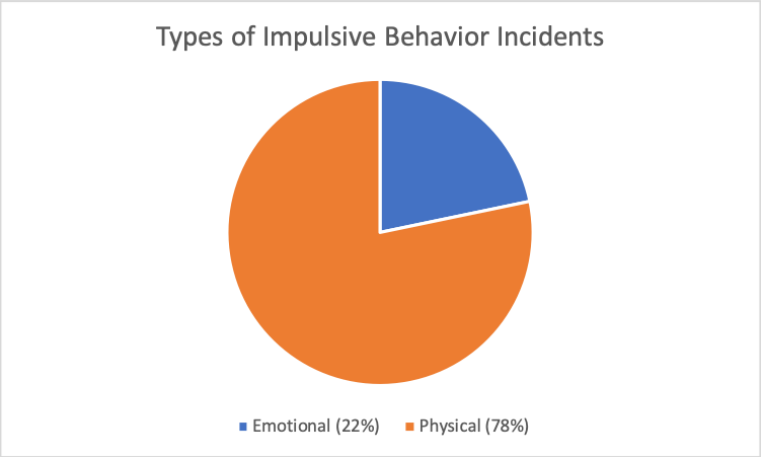

Figure 5. Types of Impulsive Behavior Incidents

Physical and emotional impulses were recorded using a Behavior Log (Appendix A), which noted the date, time, participant, physical or emotional impulse code, and description of behavior. Observations were logged by both myself and my assistant, ranging from zero to three incidents each day. There was no distinguishable pattern in the number of impulsive behavior incidents per day (see figure 6). However, the final few days of the intervention had a low number of incidents. This suggests a potential connection between successful use of self-control in a game setting and use of the same skills in a classroom setting.

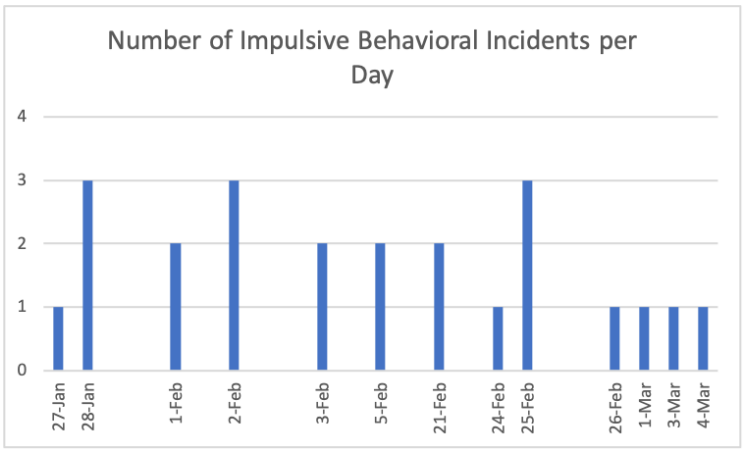

Figure 6. Number of Behavioral Incidents per Day

In addition to the Behavioral Log, an Observational Log (Appendix C) was used to collect specific behaviors in the classroom. The Observational Log was utilized for narrative, anecdotal data regarding behavioral incidents. Several moments of notable self-control were observed during the later weeks of the intervention. For example, a child who often struggles with returning learning materials to a shelf was able to decline an invitation to work with another child until his own work was completed and cleaned up. This child was able to calmly explain the situation to his friend and join him after returning his original materials to the shelf. In another logged observation, a child with frequent impulsive behaviors showed great patience in waiting for a material to become available.

Discussion

The aim of this study was to determine the effect of control-based group games on self-control in the classroom. By playing a daily control-based group game, such as Red Light/Green Light, Simon Says, or Freeze Dance, participants had the opportunity to strengthen their self-control skills in a game setting. These games encouraged participants to practice motor inhibition and self-control in order to be successful. This study sought to conclude if this opportunity for

consistent play of control-based games in a group setting would decrease the number of impulsive behavior incidents in the classroom.

Conclusion

The findings of this study establish that overall self-control skills in the game setting increased rapidly and noticeably. The data showed a 49% average increase in successfully completed rounds of Simon Says, a 38% increase for Freeze Dance, and an 8% increase for Red Light/Green Light. Additionally, the intervention included two guided, rhythmic instrument activities. The second iteration of this activity was significantly more successful than the first. This shows that consistent opportunities to practice self-control in a game result in an overall increase of related skills.

Changes in impulsive behavior in the classroom throughout the duration of the intervention were not significant. Still, it was clear that the vast majority of impulsive incidents were physical (i.e., pushing over a tower, throwing a block, ripping a paper) rather than emotional (i.e., yelling, hitting). This information could be used for implementation of more targeted interventions in the future. Though generally inconsistent, the behavior log data showed a decrease in impulsive incidents in the final days of the study. This could be due to a variety of factors and cannot be contributed fully to intervention. However, this may mean that continued practice of self-control skills via consistent play of control-based games could be effective in reducing impulsive behavior, as shown in Zhao' 2015 study.

Recommendations

This study was implemented during a global pandemic, which posed several challenges. A high number of absences of both teachers and students were caused by potential virus exposure, other illness, and distribution of the vaccine. In addition, there was a week-long

snowstorm during the third week of the study, which delayed data collection and disrupted consistency in the intervention. Because of this, in addition to the sharp decrease of impulsive behavior noted in the last days of the study, a longer implementation of the intervention could be more effective in affecting behavior outside of the game setting. It was clear that the participants became more proficient at the games with each opportunity for play. This suggests that continued play could lead to a strengthening of skills and ability to access these skills outside of the game setting. Results of this study may have been more conclusive had the intervention been longer and more consistent. Alternatively, utilizing only one or two games, rather than four, could also allow for increased opportunity for play, improved success in the games, and more noticeable use of self-control skills outside of the game context.

While the connection of success in control-based group games and use of self-control in the classroom was inconclusive, I still plan to implement these games in my classroom on a consistent basis. The students were unfailingly excited to participate, noticed their own improvement, and, without prompting, showed motivation to increase their success with each game. The games themselves were easy and fun to execute and were an interesting alternative to other group time activities. Most of these games were also simple enough for children to play during outside time without an adult, which promoted independence and confidence.

The importance of self-control as a skill for future success in academics and a predictor for health, wellness, and financial security is undeniable. As an educator, I am constantly seeking ways to holistically prepare my students for life and providing opportunities to strengthen important skills, such as self-control, is crucial in fulfilling this responsibility.

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Appendix A

Behavioral Log

*Codes: PI = physical impulse, EI = emotional impulse

DATE	TIME	CHILD	CODE	DESCRIPTION OF BEHAVIOR

Appendix B

Game Outcome Tally

Child: _____

Game: Simon Says

Date	How many rounds did the child successfully complete?

Game: Red Light/Green Light

Date	How many rounds did the child successfully complete?

Game: Freeze Dance

Date	How many rounds did the child successfully complete?

Appendix C

Game Atmosphere Scale and Tally

Date:
Time:
Game:
Weather:
Notable Circumstances:

How many children were actively participating in the game?_____

Overall Level of Respectful Play* 1 2 3 4 5
If any, what children were not respectful:_____

Overall Level of Visible Enjoyment (smile, laugh, cheer) 1 2 3 4 5
If any, what children were not enjoying the game:_____

*Respectful play includes, but is not limited to, behaviors such as safe physical actions, listening to directions, and following the rules.
*Disrespectful play includes, but is not limited to, behaviors such as unsafe physical actions, a lack of listening, and a lack of following the rules.

Appendix D

Observational Log

*a narrative log of an instances/behaviors of either exceptional self-control or notable lack of self control

Date	Time	Children Involved	Description of the Event