

REDUCING PROBLEM BEHAVIOR IN THE CLASSROOM FOR STUDENT WITH
DEVELOPMENTAL DELAY USING VARIABLE MOMENTARY DIFFERENTIAL
REINFORCEMENT OF OTHER BEHAVIOR

by

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ABSTRACT

Children with developmental delays are more likely than their typically developing peers to engage in challenging behavior in classroom settings (Baker et al., 2003). Many interventions require substantial time commitments on the part of the teacher due to constant observation of the student. This study evaluated the use of a variable momentary differential reinforcement contingency to reduce the occurrence of throwing in a prekindergarten classroom setting. Only positive reinforcement of other behavior was used to decrease rate of throwing.

INDEX WORDS: differential reinforcement of other behavior, developmental delay,
classroom, problem behavior, disruptions, throwing

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DEDICATION

I would like to thank my sons, Logan and Sawyer for inspiring me to learn and teaching me more than I thought possible. To Adam, I would not be in this program without you and I am extremely grateful for your love and support. I would also like to thank my sons' BCBA Theresa Taylor and Hannah Boatwright who is on staff at his ABA Clinic. They are intelligent and wonderfully caring people who have helped my family and inspired me to do the same for others.

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CHAPTER 1

INTRODUCTION

Behavior problems are a common occurrence in many classrooms. Students with developmental delays often have higher rates of problem behavior than their typically developing peers (Baker et al., 2003). These disruptions in the classroom can be difficult to mitigate for many reasons including low staff to student ratio, higher importance being placed on academic achievement, and inadequate training in behavior management practices for teachers (Oliver et al., 2007). With these factors to consider, behavior analysts can support teachers by developing effective treatment plans to reduce challenging behavior that is accessible and able to be implemented with fidelity.

Differential reinforcement of other behaviors (DRO) has been shown as an effective method to reduce problem behaviors (Haring et al., 1990). Traditionally a DRO has been effective when used with a variable-interval (VI) or a fixed interval (FI) reinforcement schedule. A limitation of a VI DRO or FI DRO is that each requires the individual to be observed for the entire interval (Hammond et al., 2011). The need for constant observation of one student makes a VIDRO or FIDRO a difficult task to implement with fidelity for a teacher with a classroom of other students also requiring attention.

VI DRO and FI DRO interventions use either whole or partial interval recording. When considering the use of a whole interval recording, the implementers of the intervention are required to maintain constant observation of the student. This becomes incredibly resource dependent, and therefore is not always a reasonable possibility. This is largely due to the many other students and activities occurring simultaneously within a classroom setting. In order to maintain constant observation, an individual must be solely devoted to one single student.

Theoretically, in a typical classroom setting where one teacher can maintain fidelity of behavior intervention plans of many students, this may require staffing levels to be increased for the purposes of a single individual. Results of whole interval recording also typically underestimate the occurrence of the targeted behavior (Cooper, 2020, p. 90-92). This is because the behavior must occur during the entire interval, not just a portion. If the behavior occurs for part or a majority of the time block, it will not be counted because it did not take up the entire interval.

When using a DRO with partial interval recording, the student still must be observed for the entire interval, which still requires constant observation and increased personnel to accommodate this need. Partial interval recording can also overestimate the frequency of the problem behavior and reduce the amount of contact the student has with the reinforcer (Cooper, 2020, p. 90-93). When recording results of this type of data, each interval is scored by whether the targeted behavior occurred at all during the block or not. This does not differentiate between the number of occurrences within each block, which may present the behavior as having occurred more than in actuality. For example, a behavior could occur for only ten seconds, but it would then register as an entire five-minute block of observation in which the behavior occurred.

A variable momentary differential reinforcement of other behavior procedure (VM DRO) offers a unique opportunity as the contingency is given or withheld based on a single moment in time (Cooper, 2020, p. 477-478). A VM DRO has previously been successful in reducing other problem behaviors such as self-injurious behavior (SIB) in a clinical setting (Toussaint et al., 2012). In a study by Toussaint and Tiger (2012) the authors of the study were able to reduce the behavior of high-frequency skin picking by an observed child, who had multiple diagnoses which included autism spectrum disorder. In a clinical setting, the authors used calculated check-in intervals based on the inter-response time of the child's skin picking behavior to deliver a

preferred leisure item in the absence of skin picking at the moment the researcher entered the room. Using this method, the authors were able to reduce the amount of skin picking behavior while also thinning the schedule of reinforcement and increasing the variable interval duration that they delivered the preferred item.

A major benefit of VM DRO in the classroom is the flexibility when compared to other DRO procedures. For example, VM DRO intervention does not require the teacher to observe the student for the entire interval, which can benefit the teacher as well as the student. One benefit is that the teacher is not restricted to observations of one student for an extended period of time. This allows the teacher to fulfill their duties to the rest of the students while also conducting interventions through scheduled observations. Secondly, with the use of a VM DRO the teacher is able to arrange the contingencies and deliver reinforcement based upon an individual observation. This allows for more freedom of the teachers' time and can enable the student to come in contact with more reinforcement opportunities because they are receiving the contingency based on a brief moment in time and not an extended period of time (Lindberg et al., 1999).

The purpose of this study was to expand on this research by Toussaint and Tiger (2012) by examining the use of a VMDRO in a Pre-Kindergarten classroom as opposed to a clinical setting, which was utilized in the previous study. The procedures in this study vary from the Toussaint and Tiger study (2012) in that the target behavior was disruptions in the form of a student throwing toys rather than SIB and the classroom context. The research question was: What are the effects of a VM DRO on disruptions with a student with a developmental delay?

CHAPTER 2

METHOD

Participant

This intervention was implemented with Dwayne, a four-year-old African American boy diagnosed with significant developmental delay and speech or language impairment. Prior to his selection for the study, Dwayne had shown the ability to play with toys functionally and for extended periods of time. The classroom teachers observed Dwayne moving wooden trains on a track, building towers and objects with variably shaped magnets, and manipulating toy people in motion to nursery rhymes. Classroom staff observed Dwayne actively engaging with toys for extended lengths of time before subsequently tossing them out of the play area. Staff also observed Dwayne selecting toys from bins or from the table and immediately throwing them out of the play area without any type of play interaction.

At the time of the study, Dwayne exhibited limited expressive vocal communication skills; on occasion he spoke in one-to-two-word tacts and mands. Teachers observed Dwayne asking for help independently when he needed help to tie his shoe. Dwayne's tacts and mands occurred more frequently after he observed them first being modeled by a teacher. While teachers occasionally observed these instances happening independently, they were primarily the result of modeling and prompting from a teacher. Dwayne was able to vocally imitate 40 words/phrases, although his assessment for the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) had not yet been completed. Dwayne was also capable of communicating with sign-language to communicate. For instance, he independently signed for "help" while simultaneously saying the word vocally. Dwayne had limited receptive language

skills, but after consistent teaching through modeling and prompting, he was able to follow one-step directions such as “stand up,” “come here” and “clean up.”

Dwayne was selected for this study based on classroom data indicating high rate of disruptions in the classroom. According to his behavior data for disruptions taken by classroom staff, as shown in Figure 1, prior to this study instances of Dwayne throwing objects or swiping materials occurred as frequently between 37 and 54 times a day. Disruptions included any instance where Dwayne threw or swiped materials where Dwayne released the item through the air a distance of 6 inches outside of the designated area.

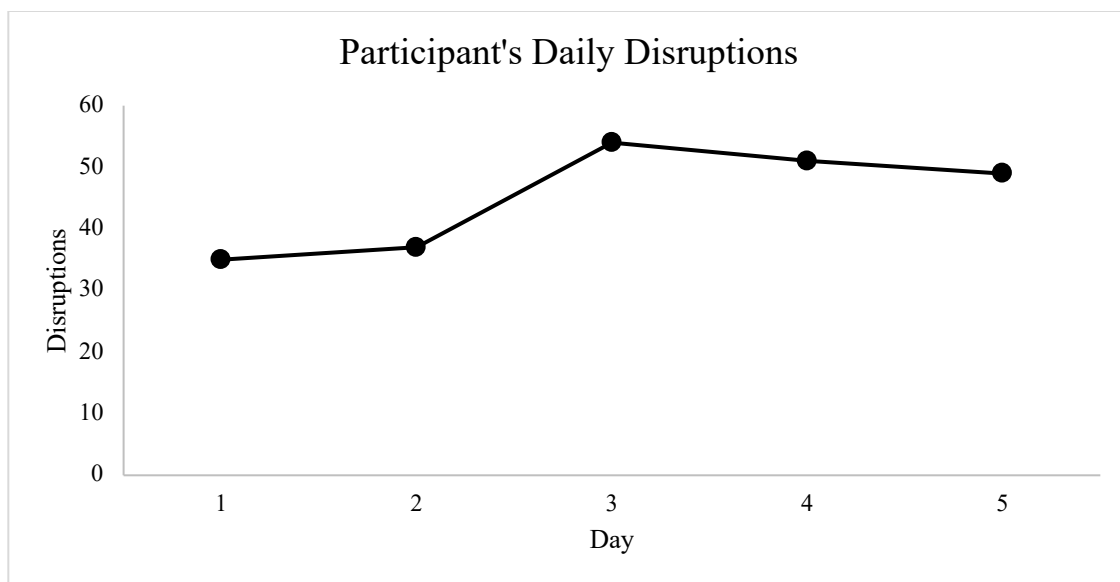


Figure 1. Participant’s’ count of disruptions during 7.25-hour school day prior to study

Prior to the initiation of the study, teachers attempted to teach Dwayne how to appropriately put a toy away instead of throwing the toy out of the play area. After teachers observed Dwayne throw a toy, he was immediately prompted to simultaneously sign and speak “all done” with a toy and then place it in an appropriate container while the behavior was also

modeled for him. These attempts were ineffective, as Dwayne failed to initiate the appropriate behavior without a model prompt and continued to throw toys outside of the designated play area.

Setting

Dwayne attended an elementary school in the southeastern United States in an urban Title I school system. He received special education services in a self-contained special education preschool classroom. On a typical day in the classroom Dwayne attended, there were typically six other children and approximately six staff. Dwayne was at the school for 7.25 hours per day and had high rates of disruptions recorded by the teaching staff. The disruptions were frequently observed during free play when Dwayne was in a designated play center with other children and a staff member.

All sessions were conducted in two designated play centers located within Dwayne's classroom. The two play centers were roughly the same size, with shelves and containers filled with age-appropriate toys such as toy vehicles, large magnets in various shapes, building blocks, alphabet magnets, and plastic animals and human figures. Each session was conducted with Dwayne, one other student in the center, which varied by session, and the primary therapist. In addition to participating in this study, Dwayne still participated in scheduled classroom activities with several other staff and students, outside of these intervention sessions.

Procedures

Preference assessments. During this study, the student participated in a direct assessment using a multiple stimulus without replacement (MSWO) preference assessment. This was used to determine which edibles were likely to be most preferred by the student to serve as possible reinforcers to any behavior other than the target behavior. The student was offered five

edibles and allowed to select one edible at a time. After selection of an edible, the remaining edibles were then hidden, rearranged and offered again. This was done until all edibles had been chosen, with the process repeated four additional times. After the first round of offering, the student was allowed to choose the edibles in the order in which he preferred. Following the initial round, the student chose the edibles in the same order from rounds two through round five. This consistency would typically indicate a highly preferred edible to be used as a possible reinforcer.

Functional analysis. The primary researcher and classroom staff member conducted an indirect assessment in the form of a Question About Behavior Function (QABF); (Matson et al., 1995) with the student's lead teacher. The QABF is an assessment questionnaire that has been shown to be an effective method to determine the function of a student's behavior. Using the function of a behavior to guide treatment decisions can greatly increase the effectiveness of treatment (Matson et al., 1999). Utilizing the QABF, Dwayne's highest score was in the non-social category, where he scored a 12 out of 15. He only scored points in one other category, which was tangible, with a score of 4 out of a possible 15. This score suggests that the function of Dwayne's throwing was automatically maintained.

Baseline. All sessions were conducted in five-minute intervals within a designated play center in a classroom setting. Teachers did not block or redirect problem behavior. During baseline there were no edibles or verbal praise offered for playing appropriately with toys. Dwayne received teacher interaction approximately once per minute. The primary therapist leading the session in play divided their attention between Dwayne and the other student in the play center in order to maintain a more naturalistic setting. This was done because in a typical

scheduled play time, Dwayne was often in a play center with a classroom staff member and at least one other child.

Intervention. In order to determine the average inter-response time between the target behavior the number of disruptions were totaled for the last three sessions of baseline prior to intervention. The total for each session were added together and then divided by three to give the mean instances that throwing occurred. This gave an inter-response time (IRT) of five disruptions per five-minute session. Using this data, five DRO intervals were calculated using levels of 50%, 75%, 100%, 125%, and 150%. For the first round of intervention using the VM DRO the check-in times were 25 seconds, 38 seconds, 50 seconds, 63 seconds, and 75 seconds. These check-in intervals were set in a different random order for each intervention session. At the randomized variable moment indicated, the primary staff member offered the student their preferred edible if they were not engaging in problem behavior. If the student was engaging in the problem behavior, there was a five second delay before presenting the edible. When the student received the edible, they also received verbal praise such as “I like how you are playing with your toys on the table” or “Thanks for playing with your toys.”

Reliability

For this study, disruptions were measured by the frequency of the student throwing toys out of the play area. This was defined as any instance where the student launched or swiped an object a distance of more than six inches outside of the appropriate toy play area. Objects were counted as one if there were connected (e.g., a stack of magnets) and counted individually if separate (e.g., a handful of cars.). Data were also taken for the number of teacher interactions with Dwayne per session.

Data were collected using pen and paper and also electronically. Video recordings were taken for 14 of the 31 sessions. Data were taken to record the frequency of objects thrown and the frequency of staff interactions with Dwayne within each five-minute session. A mobile app was used to take data electronically. This application was used to record an accurate length of time for each session as well as tracking the frequency of teacher interactions and student disruptions. Data collection and observations used in this study were conducted by graduate students assigned to the classroom by the University of Georgia.

Interobserver agreement (IOA) for the student's disruptions and teacher interactions were taken either during live observation or through review of the video recordings. Prior to observing the session, staff were given definitions of the targeted behavior with examples and non-examples. Reliability data were collected by various staff members during classroom observations across 48% of all sessions. IOA was calculated using a total count for a gross agreement. The IOA for disruptions were calculated by tallying the total disruptions recorded by the primary research and the secondary staff. The smaller number was divided by the larger total and then multiplied by 100. Using this measurement IOA occurred 85% of the time throughout this study. IOA for teacher disruptions was calculated using the same method and resulted in 98% agreement.

Procedural Fidelity (ProFi) was taken during each intervention session to ensure the integrity of the intervention. A trained staff member took data to ensure that the preferred edibles were given at the correct variable moment. The same staff also recorded occurrence and non-occurrence of the delivery of the preferred edible at the correct time during each session. ProFi occurred at 100% during all 11 session of intervention.

Design

The study was conducted using an ABAB reversal design. The purpose of this design was to show a functional relationship between the intervention and the student's target behavior. An ABAB design allows the researcher to evaluate the effects of an intervention on the dependent variable. This design provides experimental control and replication further enhancing the internal validity of the outcome. Once an intervention has been implemented and data has shown a therapeutic trend, experimental control is then shown when an intervention is withdrawn, and data indicate a countertherapeutic trend. This study was conducted with one participant, although it is preferred that multiple participants are assessed in the course of a single study to increase internal validity (Ledford, 2018, p. 215-227).

CHAPTER 3

RESULTS

The first implementation of baseline was conducted over six five-minute sessions. In the first baseline condition, Dwayne's count of throwing ranged from zero to ten instances. Although disruptions varied in frequency per session, teachers observed throwing in all session except for one. Once the first baseline condition showed an increasing trend of higher levels of throwing, sessions switched to intervention conditions.

The first intervention condition lasted for five sessions. The number of disruptions varied; however, all five sessions were at or under the mean level of disruptions from the last three sessions of the first baseline condition. The last three sessions of baseline were used to average the inter-response time for the variable momentary intervals in intervention. When the data indicated a decreasing trend in disruptions, researchers withdrew the intervention to demonstrate a functional relation.

The second condition of baseline showed great levels of variability in Dwayne's throwing. Due to the inconsistency of Dwayne's throwing, the second condition of baseline ran for 14 sessions. The count of Dwayne's throwing ranged from zero to 16 occurrences per session. Once there were three sessions that captured higher rates of throwing, the condition reverted back to the second iteration of intervention. The last three sessions of the second baseline condition averaged five occurrences of throwing per five-minute session. This was the same mean per session as the first baseline condition.

The second implementation of intervention continued to show high rates of variability in of throwing. After stable higher levels of disruptions during this second implementation of baseline, treatment then went back to intervention conditions. Figure 2 displays the results of the

study, showing the occurrence of disruptions in each condition of baseline and intervention following an ABAB design.

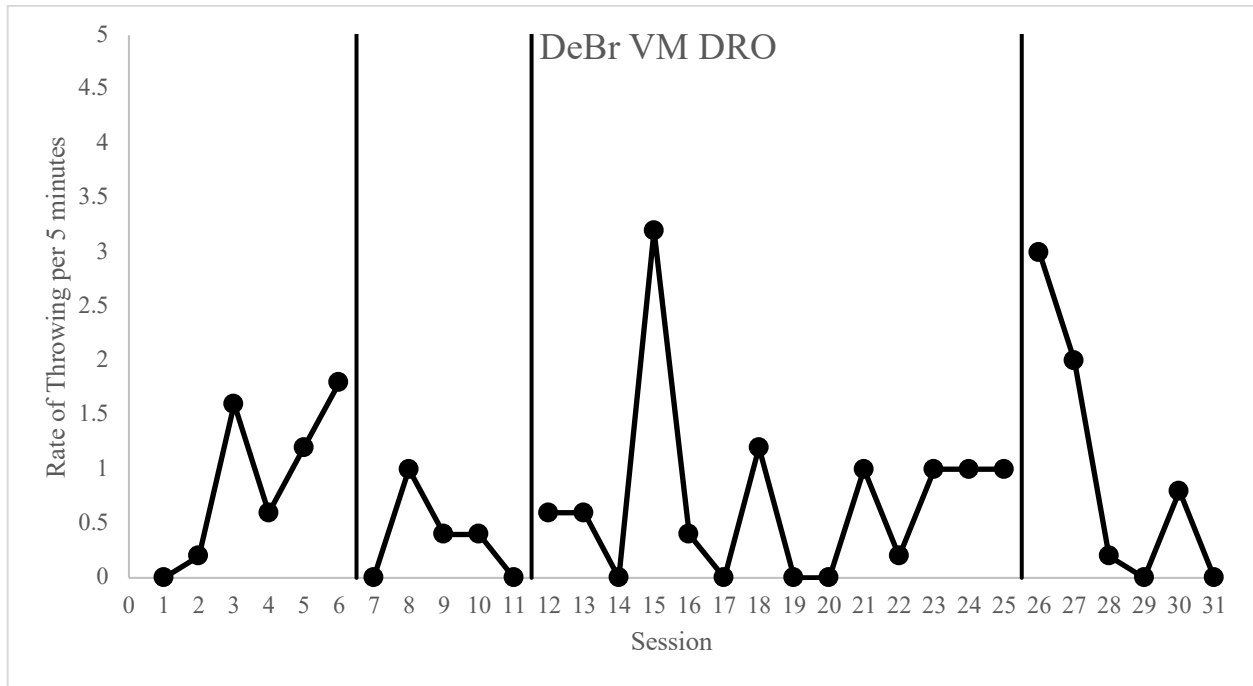


Figure 2. Participants' rate of throwing per five-minute session.

CHAPTER 4

DISCUSSION

Results of this study were inconclusive in determining the effectiveness of utilizing a VMDRO to reduce problem behavior by a student with a developmental disability within a classroom setting. While VM DRO has been used in previous studies to decrease automatically maintained challenging behavior, persistent variability within this study contributed to unreliable and problematic results (Toussaint et al., 2012). After more time and observations with the student, it is hypothesized that disruption was likely socially maintained by negative reinforcement in the form of escape. The classroom team hypothesizes that the behavior is maintained multiply maintained by escape and automatic reinforcement. Additional assessment is necessary to truly verify the function.

It is unlikely that the targeted behavior was maintained by a tangible function, because the student was physically throwing the items out of his area and essentially escaping from interacting with said item. It is also unlikely that the target behavior was attention maintained, as the student was observed throwing while engaging with a teacher and also in their absence. During each session, time was shared between the participant and one other student. During this shared time Dwayne was shown a substantial amount of attention. Occurrences of disruptions were not dependent on attention being shown or withheld from the student. Targeted behaviors were demonstrated while the student was given specialized individual attention but were likewise observed in the absence of staff member interaction.

If the behavior was escape maintained or had varying functions, it offers a possible explanation as to why implementation of the VM DRO was not effective. The procedure for this study targeted a behavior previously thought to be maintained by automatic reinforcement. The

intervention attempted to positively reinforce any other behavior that was not throwing a toy. If escape was the main function of the targeted behavior, which appears evident following additional observation of the student, then in retrospect this procedure did not provide a properly matched intervention for the function of the behavior. The use of a VM DRO gives no alternative options for the escape of the items in the play center, and because of this an alternate intervention would have been preferable.

CHAPTER 5

LIMITATIONS AND FUTURE RESEARCH

Limitations

There were many limitations to consider in this study to determine the effectiveness of the VM DRO for Dwayne. First, the ability to run sessions consistently with the student was highly limited. Secondly, the number of opportunities the student had to come in contact with his preferred items were low. Further, the lack of familiarity with the student impacted the design of the study based on a lack of understanding of the function of his behavior. Finally, attempts to follow a natural classroom schedule limited the frequency of conditions needed for implementation of the intervention.

A major limitation within this study was the inconsistency of being able to run sessions with the student, largely due to COVID-19. Contact with the student was irregular due to COVID-19 precautions creating extra virtual learning days in the normal school week routine. These virtual learning days, combined with virtual learning days due to inclement weather and teacher workdays greatly decreased the amount of in person contact the student had with staff on a regular basis. Because of these conditions, the student was at school no more than two consecutive days at a time, and often only three total days per week. Also, the staff had little time to establish a relationship with the student prior to the study. This contributed to the lack of awareness of the function of his targeted behavior. Under normal conditions, staff may have had up to a month or more of additional access to the student prior to this study, which may have greatly impacted the study design.

Another issue faced was a lack of opportunities for the student to come into contact with his preferred items. This was partially due to the length of his inter-response time and the

inconsistency of his throwing behavior. The student had high rates of disruption in the classroom as shown in his behavior graph (Figure 1). However, the instances of throwing were typically grouped together with a large number of disruptions occurring at one time followed by observation of large gaps with no disruptions in-between. Because of this, along with the limited staff and time constraints, it was difficult to capture an accurate representation his throwing in baseline. Additionally, sessions followed the classroom schedule in order to keep a more naturalistic setting, which also limited the amount of contact with the student. It is possible that if more consistent opportunities were available, the student would have had more contact with the contingency, which could have changed the outcome of the study.

Finally, when the student was not engaging in challenging behavior staff observed Dwayne playing with toys functionally by himself as well as cooperatively playing with staff. The primary researcher and classroom staff hypothesized that Dwayne's challenging behavior was maintained by escape. This is due to staff observing Dwayne playing with and examining a toy before tossing it. Staff also observed Dwayne behaving in a similar manner at mealtimes. Staff observed Dwyane eating selected parts of his meal, then when he was done eating, he would throw the food that was left that he did not want to eat. The VM DRO was directed at Dwayne's throwing in play because that posed the most immediate danger to other students and staff. Other students and staff would often get hit by objects Dwyane threw when he no longer wanted the objects.

It is possible Dwayne would benefit from functional communication training. Using a training such as Picture Exchange Communication System (PECS) can help Dwayne communicate with staff when he is all done with an item. This would then allow staff to appropriately model what to do with an item when after it is no longer wanted. With more

intensive communication training Dwayne could be taught how to clean up his play area and to put an item away when he is all done. It is important to provide Dwayne with an appropriate functional skill to replace his behavior of throwing.

Future Research

There are many opportunities to expand future research with a VM DRO. While a VMDRO has been shown to be effective in certain instances of problem behavior that occurs at high rates (Toussaint et al., 2012), it would be useful to have more research on problem behavior that occurs at lower rates.

It would also be useful to have more information on the use of a VM DRO being effective in various settings. This would include the difference between a VM DRO working in a one-on-one session in a clinical setting as opposed to the results while working in a classroom setting with multiple children and staff present.

More research is needed to determine whether a VM DRO could be utilized for escape-maintained behavior. Results of this study were inconclusive but did not rule out the possibility that this type of intervention could be utilized. It is possible that a more highly preferred item would act as a reinforcer. It may also be necessary for the student to have more opportunities to contact the reinforcer. However, this has not been researched adequately, and would require further study.

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