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Using email reminders to increase virtual attendance for middle school students

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USING EMAIL REMINDERS TO INCREASE VIRTUAL ATTENDANCE FOR MIDDLE
SCHOOL STUDENTS

by

Lauren Cline

B.S., Illinois State University, 2013

A Thesis
Submitted in Partial Fulfillment of the Requirements for the
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Department of Psychology and Behavioral Sciences
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THESIS APPROVAL

USING EMAIL REMINDERS TO INCREASE VIRTUAL ATTENDANCE FOR MIDDLE
SCHOOL STUDENTS

by

Lauren Cline

A Thesis Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Science

in the field of Behavior Analysis and Therapy

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Graduate School
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Lauren Cline, for the Master of Science degree in Behavior Analysis and Therapy, presented on December 3, 2021, at Southern Illinois University Carbondale.

TITLE: USING EMAIL REMINDERS TO INCREASE VIRTUAL ATTENDANCE FOR MIDDLE SCHOOL STUDENTS

MAJOR PROFESSOR: Dr. Deija McLean, Ph.D., BCBA

As the COVID-19 pandemic progressed, professionals in the field of behavior analysis and education have continually asked how to help students access quality education while still keeping them safe and healthy. There have been multiple options presented that allow students to access their education, such as being fully in-person, fully virtual, and a hybrid option that includes both in-person and virtual learning. Due to different factors, families may choose a full virtual option for their children. But then the question becomes, "how do we make sure they log into their classes on time?" School attendance continues to be an issue across the country and adding in a virtual element to education is something that hasn't been dealt with in a large-scale effort before. The current study attempted to increase attendance for middle school students that were learning in a full virtual format by means of sending email reminders to the student and their parents, setting daily goals with the student, and providing positive reinforcement by delivering items to the student's home. Results indicated that this specific intervention package, as outlined, was not an effective method to help middle school students increase their virtual class attendance. Future studies should focus on other intervention packages that can help students learning in a full virtual format to attend their Zoom sessions and access the quality education they deserve.

ACKNOWLEDGMENTS

DEDICATION

I would like to dedicate this to my son, Lincoln, who was born during the Thesis process and who showed me what it means to push through obstacles that can get in your way. I hope that your first moments here in the world have taught you that life is wonderful and worth every hard moment that you may encounter.

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INTRODUCTION

COVID-19 and Education

In the wake of COVID-19, educational professionals changed aspects of the school day and the way students are educated. Changes may include restrictions on the number of individuals allowed in a school building or classroom at a time, the requirement to wear personal protective equipment, and social distancing (Centers for Disease Control and Prevention, 2020). For some students, changes include completing learning at home. As of November 2020, 29% of Illinois school districts are learning in-person, 43% are learning using a blended model consisting of some in-person learning and some remote learning, and 27% of are learning fully remote (Illinois State Board of Education, 2020). In addition to changes in procedures that educational professionals have put into place, school districts across the country have given families the option to choose a learning option.

Factors impacting a family's choice between in-person, hybrid, or full remote learning may include the age of the student, conflicting sibling learning and parent work schedules, school safety protocols, and familial exposure to COVID-19 (Musinski, 2020). In July 2020, a large, public school district in Texas sent a survey, via email, to primary caregivers of students to ask their anonymous opinion about their preferred mode of learning for their child during the 2020-2021 school year (Limbers, 2021). The school district noted that the purpose of sending out the survey was to help the school district with planning for the upcoming school year. The first question of the survey asked, "How would you prefer for your student to start the school year?" Answers for this question included, "On-campus/traditional," "On-campus and virtual hybrid schedule," and, "Fully virtual" (Limbers, 2021). The second question of the survey asked,

"Which of these factors are 'line in the sand' factors that absolutely affect your decision?" (Limbers, 2021). Options for the second question included "We do not have childcare options for hybrid schedules," "Available elective course offerings in virtual school," "Participation in extracurriculars," "School meals," "I don't want mandatory masks for children," "I do want mandatory masks for children," "I do not want mandatory social distancing requirements," "I do want mandatory social distancing requirements," and "Other" (Limbers, 2021). With these questions, the school district wanted to find out the caregivers' level of concern with their students potentially contracting COVID-19 and assess if there were any systematic differences between caregiver preferences based on what level of school the student was enrolled in (i.e. elementary, intermediate, middle, or high school). Results of the survey revealed that 52% of caregivers that responded preferred a traditional, face-to-face instruction for their student, 30% preferred a hybrid of on-campus/virtual instruction, and 18% preferred a full virtual format of instruction (Limbers, 2021). Results of a chi-square test also showed a statistically significant difference between elementary and middle school caregiver preferences for instructional format. Caregivers of middle school students were 33.6% more likely to express a preference for a hybrid on-campus/virtual option (Limbers, 2021). In addition, the same caregivers were 50.5% less likely to choose the traditional, face-to-face format compared to caregivers of elementary school students (Limbers, 2021). It was also noted that regardless of the school level of the student, the factor that affected caregiver preference for instructional format the most was concerns about the health and safety of their children (Limbers, 2021).

An unfortunate effect of the COVID-19 pandemic has been the way it has affected the mental state of some children and adolescents (Jones, 2021). Isolation and quarantine, along with loss of touch and physical interaction, have left our youth unable to cope from symptoms of

mental health disorders, such as depression and anxiety (Jones, 2021). Another effect of the

pandemic and how it relates to schools is in the way it has brought to light the existing inequities

in education (Jones, 2021). One inequity came out in the form of access to technology. When the

pandemic hit the United States, schools immediately switched to remote learning (Jones, 2021).

When that happened, schools had to come up with quick solutions for those families that did not

have access to the proper technology or internet access (Jones, 2021). School districts had to get

creative when solving these issues, so that all of their students could continue to access their

education (Jones, 2021).

Looking back on how the COVID-19 pandemic was handled, it is important to reflect on

what educators, learners, adults, and leaders did to support students during this time (Fisher et

al., 2022). In doing so, each of those four categories of supporters can learn what elements they

can have in their toolkit in order to continue to support students, should there be another

pandemic of this magnitude again. Educators consist of teachers and professors, and the tools

that were necessary to support students during the pandemic were time, technical knowledge,

flexibility, communication, and instructional skills (Fisher et al., 2022). Learners are the students

themselves, and can carry the tools of socioemotional supports and skills, resources, connections,

voice, and intrinsic ownership to help support one another (Fisher et al., 2022). Adults include

parents, guardians, or mentors, and their collaboration, support, technical knowledge, and

understanding of education were tools that were helpful in supporting students (Fisher et al.,

2022). Leaders make up the fourth group, and consist of educational leaders such as principals

and superintendents. Tools they should carry with them to support students include being

learning-centered, having foresight, including voices, and communicating effectively (Fisher et

al., 2022). All of these groups of people work together to support students, and it is important

that each of them reflect on their practices, in order to improve these skills for the sake of their students' learning.

Virtual Learning Modifications

Remote learning modifications may include delivery of work to student homes, the utilization of Zoom for class meetings, and the use of online learning management systems (e.g., Schoology, Seesaw, and Google Classroom; Moore & Hodges, 2020). Modifications are determined by basic student needs, instructor needs, individualized student needs, methods of collaboration, and access to additional resources (Moore & Hodges, 2020).

Through an explanatory case study, S. Erümit (2020) evaluated the distance education initiative implemented by K–12 schools in Turkey during the Covid-19 pandemic during the months of March–July 2020 from their students' point of view. Qualitative research methods were used through semi-structured interviews to obtain twelve students' evaluations of their experiences with Turkey's distance education model (Erümit, 2020). When asked about their perspectives on the mode in which instruction was being delivered, comments from students included that they were concerned with how much they would learn from the teachers' instruction and whether the teachers could motivate students to learn. Further, students identified that their education continued on mostly because of their individual efforts and that they had to accept more responsibility for their own learning (Erümit, 2020). When asked about overall opinions and suggestions about the distance education implemented, both positive and negative comments were presented (Erümit, 2020). For instance, students enjoyed distance learning because they could do it from the comfort of their own home and the ability to listen to lessons on their own time was preferred over six consecutive class periods each day (Erümit, 2020). Negative comments included a preference for face-to-face interactions with peers and teachers

and lack of motivation to complete schoolwork because learning was happening at home (Erümit, 2020).

Effects of Non-Attendance

Attendance is arguably the most important key to having an education. In the state of Illinois, student attendance is categorized as, "Satisfactory," if a student is absent for less than nine days per school year, "Warning Signs," if they are absent 10-17 days, and "Chronic Absence," if they are absent for 18 or more days, all presumed under an 180 day school year. (Illinois State Board of Education, 2019). Recent data indicate that 16.5% of Illinois students were chronically absent during the 2015-16 school year and 17% of students missed 10% or more of school days during the 2017-18 school year (Illinois State Board of Education, 2019). Furthermore, two groups that were identified to miss more school than their peers were children who come from homes below the poverty line and students with disabilities (Illinois State Board of Education, 2019). As a result of these data, the Illinois School Code mandated that chronically absent students need to be identified and supports need to be provided to address reasons for student absences (Illinois State Board of Education, 2019). Tiered intervention systems that are tailored to students' specific needs, such as the Illinois Multi-Tiered System of Supports (MTSS) were implemented in order to aide in removing barriers to learning, including the reasons for chronic absenteeism (Illinois State Board of Education, 2019). In a study conducted at a university, 423 undergraduate students that were enrolled in one of two sections of a general psychology course were studied to determine if their attendance had an effect on their quiz grades throughout one semester (Clump, Bauer, Whiteleather, 2003). Students were informed ahead of time that there would be three unannounced quizzes throughout the semester and data was collected on attendance on the days in which these unannounced quizzes occurred, as well as

on the days when six planned unit tests that were given throughout the semester (Clump, Bauer, Whiteleather, 2003). Methods of analytical procedures included a comparison of attendance of the two sections of the psychology class to determine if there was a significant difference on the number of students who took the three unannounced quizzes, comparison of attendance and student scores on unit tests that followed the unannounced quizzes, and comparison of overall test scores (Clump, Bauer, Whiteleather, 2003). Overall results indicated that attending class significantly increased the number of correct answers on a unit test and on overall test scores (Clump, Bauer, Whiteleather, 2003). This supports the point that attending class is very influential on a student's grade (Clump, Bauer, Whiteleather, 2003).

Indicators of Non-Attendance

Maynard and colleagues (2012) analyzed sample data from the National Survey on Drug Use and Health related to truant youth, aged 12-17, and examined the relationship between subgroups of truant youth and externalizing behaviors. The examined variables included school engagement, participation in school-based activities, grades, parental academic involvement, and the number of school days skipped during the previous 30-day period (Maynard et al., 2012). School Engagement was measured with a five-item questionnaire related to the participants' feelings toward school during the previous 12-month period (Maynard et al., 2012). Mean values of the questionnaire indicated that, on average, adolescents reported moderate levels of school engagement, with the mean values of younger adolescents (12-14 years) scoring slightly higher than older adolescents (15-17 years) (Maynard et al., 2012). Participation in school activities was measured by participants reporting on the number of school-based activities students were involved in during the previous 12 months (Maynard et al., 2012). Results of that measure indicated that students were involved in a mean of 1.51 school-based activities (Maynard et al.,

2012). For the indicator variable of grades, students reported their average grade for the previous semester or grading period (Maynard et al., 2012). The mean letter grade for adolescents was between a "B" and "C" average. In the area of parental academic involvement, participants reported on how often their parents provided them help with homework when it was needed (Maynard et al., 2012). Results were that, on average, parents inconsistently provided assistance with homework (Maynard et al., 2012). The final variable, number of school days skipped, required participants to report on the number of days they missed school because they skipped, "cut," or just did not want to be in school, for the previous 30-days (Maynard et al., 2012). Adolescents skipped an average of 2.65 days per month (Maynard et al., 2012). Overall, these results highlight the different areas that have an effect on truancy that can be improved upon.

Efforts to Improve Consistent Attendance

Some research has examined strategies to improve in-person general education attendance. Kremer and colleagues (2015) completed a systematic review and meta-analysis to examine the effects of after-school programs on school attendance and externalizing behavioral outcomes with at-risk students. Programs primarily targeted students in either middle school (41.7%) or a mixture of grade levels (37.5%; Kremer et al., 2015). 16 out of the 24 studies completed between 1990–2014 were synthesized to evaluate the effect of the intervention on students' attendance. Half of these studies measured total attendance in school, while the other half measured number of absences from school (Kremer et al., 2015). Nonetheless, the results of the synthesis indicated a very small, non-statistically significant treatment effect on attendance from participation in the after-school programs. The researchers hypothesized this finding due to the fact that very few of the studies identified specified increasing school attendance as a primary goal of the after-school program or developed a theory of change connecting the process of the

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after-school program to school attendance. The researchers recommended that if an increase of school attendance is a goal of after-school programs, then it is important for after-school programs to state that explicitly as a goal and develop programs to affect school attendance using a theory of change to drive program elements that would likely impact school attendance outcomes (Kremer et al., 2015).

Other strategies to improve attendance have included special education students. Licht, Gard and Guardino (1991) identified 20 high school students with "moderate or serious motivational problems" due to their failure to complete assignments, poor attendance, disruptive classroom behavior, or aggression towards peers (Licht, Gard & Guardino, 1991, p. 369). Participants were randomly assigned to a treatment or a control group. The treatment group was put on a point system, gaining points if they attended class and if they were on time Reinforcement was provided once per week to the treatment group in the form of social and tangible rewards for "good" attendance and for being on time (Licht, Gard & Guardino, 1991, p. 370). Students in the control group showed a significant decline across the time period of the intervention: however, the students in the treatment group showed no significant decline in attendance. Overall, the study demonstrated that an attendance intervention program can be implemented successfully for high school special education students (Licht, Gard & Guardino, 1991). An important takeaway for educators is that the inclusion of attendance contingencies may improve attendance and academic performance (Clump, Bauer, Whiteleather, 2003).

Attendance in Non-Academic Settings

Interventions to target attendance in non-school settings include reminders, working around families' schedules, and identification of potential barriers. In a study conducted in 2004, aimed to improve the viability at a psychological clinic, clients received telephone calls to

prompt clients to attend their appointments (Conduitt, Byrne, Court, Stefanovic, 2004). Out of the 512 original appointments that were made, 70% appointments were attended during the 20-week intervention, which was an increase from the 63% of appointments that were attended during baseline (Conduitt, Byrne, Court, Stefanovic, 2004). In this study, factors that affected non-attendance included when the client did not directly receive the telephone reminder and when the reminder was for first visits to the clinic (Conduitt, Byrne, Court, Stefanovic, 2004). Similarly, in child mental health clinics, families identified multiple factors or barriers that increased the likelihood that they will be "no-shows" for their appointments (Benway, Hamrin, McMahon, 2003). These significant barriers to attendance were due to inability to come at the time of an initial appointment as well as child-refusal. (Benway, Hamrin, McMahon, 2003). With these barriers in mind, a systematic review of procedures suggests that training practitioners to implement interventions virtually can be feasible and effective (Ferguson, Craig, Dounavi, 2019).

Reinforcement

Reinforcement is when a behavioral response is followed by a stimulus change that results in that response happening more often (Cooper et al., 2020). When this stimulus is being presented immediately following the response, it is described as positive reinforcement. The opposite is negative reinforcement, where the stimulus is withdrawn immediately following a response (Cooper et al., 2020). Reinforcement can be used in order to increase a number of behaviors, such as compliance (DeLeon et al., 2001), on-task behavior (Diaz de Villegas et al., 2020), and oral-reading fluency (Eckert et al., 2002).

In an attempt to increase compliance in a 10-year-old girl who has autism, DeLeon and colleagues (2001) tested whether reinforcement with edible reinforcers or reinforcement with a

break would be helpful in not only increasing compliance, but also decreasing escape-maintained problem behavior. In testing the two different types of reinforcement, the authors used the presentation of potato chips as the positive reinforcer and a 30-second break as the negative reinforcer (DeLeon et al., 2001). During the initial baseline condition, compliance averaged at about 3%. During the second intervention condition, the use of potato chips as positive reinforcement increased compliance to about 85% and the use of a 30-second break increased compliance to as high as 30% (DeLeon et al., 2001). Results indicate that positive reinforcement increased compliance at a higher level during two intervention conditions compared to negative reinforcement (DeLeon et al., 2001). In addition, during the final phase of the study, where the participant was able to choose which type of reinforcement she wanted, she consistently chose the positive reinforcement (DeLeon et al., 2001). The results of this study demonstrated that positive reinforcement can be effective in treating escape-maintained behavior.

Positive reinforcement can also be used to tackle on-task behaviors. On-task behavior, in this specific experiment, was defined as moving a marker steadily and approximately within the boundaries of the thick preprinted lines on a shape-tracing worksheet or turning over the worksheet page to access a new worksheet without pausing for more than two seconds (Diaz de Villegas et al., 2020). Eight typically developing children, aged two to five, were presented with synchronous reinforcement while completing the task (Diaz de Villegas et al., 2020). During the synchronous reinforcement sessions, the experimenter turned on a preferred song and provided attention in the form of conversation while the participant was completing the shape-tracing worksheet (Diaz de Villegas et al., 2020). When compared against sessions where accumulated reinforcement was used, using a multielement design, using synchronous reinforcement was "more effective at increasing on-task behavior for seven out of the eight participants" (Diaz de

Villegas et al., 2020). This study shows that using different variations of positive reinforcement, such as using synchronous reinforcement in the form of playing a favorite song and having a conversation, can help increase on-task behaviors in young children (Diaz de Villegas et al., 2020).

A third way that positive reinforcement can be helpful is to improve academic skills, such as oral reading fluency. A study was done with six elementary school students to examine if the effectiveness of an antecedent intervention could be enhanced by combining it with contingent reinforcement or performance feedback to in order to increase the number of words read correctly per minute (Eckert et al., 2002). In this experiment, the antecedent intervention was listening to passages and repeated readings. Contingent reinforcement came in the form of asking the participant to select an educationally relevant reinforcer from a selection of ten items. When the participant increased their oral reading rate by 5%, the participant was provided with their chosen item (Eckert et al., 2002). For the performance feedback element, the experimenter and participant developed two reading goals together. Following the oral reading of each passage, the experimenter presented the participant with feedback on the number of words read correctly per minute (Eckert et al., 2002). The experimental design used in the study was a multielement design. Two participants alternated the baseline and five different treatment conditions (antecedent intervention, antecedent intervention + contingent reinforcement, antecedent intervention + performance feedback + contingent reinforcement, and antecedent intervention + performance feedback) sequentially for two participants, while the other four participants received the conditions in a randomized order. Results showed that using the antecedent intervention with at least one additional component produced the greatest improvement in the number of words read correctly per minute. (Eckert et al., 2002).

Goal Setting

Setting goals in behavior analysis is an important step in determining if an intervention is socially valid. Specifying goals at the onset of an intervention also guide behavior analysts in deciding whether to continue a treatment or terminate (Cooper et al., 2020). Goal setting is of great value in the process of influencing behavior. Goals can be used to point out the past reinforcing consequences of behavior in a person's environment. Goals also identify a consequence specified in advance that will terminate the behavioral event in question. In the specific area of verbal behavior, goal statements are useful in order to predict and influence behavior (Ramnerö & Törneke, 2015). Goal setting can be used to improve skills such as using positive behavioral strategies (Cohrs et al., 2016), increasing physical activity (Miller et al., 2017), and repeated reading (Hammerschmidt-Snidarich et al., 2019).

Cohrs and colleagues conducted two experiments to evaluate if varying forms of antecedent specificity in goal statements would improve goal attainment. Completed with teaching staff in a public-school setting, there were four different ways in which goal statements were used to attempt to increase behavior-specific praise as a positive classroom management strategy (Cohrs et al., 2016). Each phase increase in specificity as the study went on. The first phase included the program supervisor approaching each participant in the same manner, only specifying the type and frequency of positive reinforcement strategy that the individual participant was to use. In the second phase, participants read aloud a statement that reminded them to praise a specific behavior more often. During the third phase, the participants read the same statement aloud as in phase two, with the addition of indicating the amount of times that praise should be used (Cohrs et al., 2016). After the first three phases were conducted, the data showed that behavior-specific praise was rarely used. Therefore, a fourth phase was added that

included the same components from the first three phases (specifying the type and frequency of positive praise, reading the card statement, and stating an amount of times praise would be used) with an addition of a ten-minute time frame in which the goal amount of praise was to be completed (Cohrs et al., 2016). Results showed that the addition of the ten-minute time frame resulted in goals that were more consistent, higher, and more successfully attained. Overall, this study shows that the use of specific antecedent strategies, such as reminders about behaviors and the conditions in which they should occur, along with a time frame in which the criteria needed to be met, resulted in improvements of behavior-specific praise (Cohrs et al., 2016).

Goal setting can also be used to increase physical activity of children. A study done with 18 elementary school students in order to evaluate an easy-to-implement, class-wide intervention using pedometers (Miller et al., 2018). These pedometers were given to the participants prior to their daily recess time, in order to count the number of steps they took. This study was done in two parts (Miller et al., 2018). During the first part of the study, feedback and self-monitoring were presented to the participants following recess. They were told that they were put on a team and that they were in competition to see which team could take the most steps during recess. Feedback on the previous session was presented prior to each session, during a circle time activity. During this feedback time, each team's average number of steps was shown to the group, along with the female and male from each team who took the number of steps during that previous session. These names were posted on a poster-sized dry-erase board, where they were on display for the school day. Additionally, a self-monitoring component was added to the first part of the study, during the second phase. The self-monitoring component involved the participants recording their number of steps on a data sheet before returning their pedometers at the end of each session (Miller et al., 2018). Results from part one indicated that feedback and

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self-monitoring did not increase all participants' steps during recess (Miller et al., 2018). Due to those results, goal-setting and rewards were added during the second part of the study. Goal setting included informing all participants of their goal number of steps to be completed while they were at recess. All participants received the same goal number. Rewards were presented contingent upon meeting or exceeding the goal number of steps in the form of a raffle ticket (Miller et al., 2018). Results showed that in the first part of the study, feedback and self-monitoring alone were not successful in increasing levels of physical activity. However, adding goal setting and rewards in the second part were successful in increasing levels of physical activity for the whole class. It is important to note, however, that the experimenters acknowledge that the components were not successful for every single participant and that perhaps a more individualized goal-setting procedure would be helpful in reaching goals of individuals (Miller et al., 2018).

A third skill that can be increased with the use of goal setting is repeated reading. Hammerschmidt-Snidarich and team added a goal setting component to a peer-mediated repeated reading intervention in an effort to increase oral reading fluency (ORF) of fourth and fifth grade students in an elementary school. Participants were presented with one-minute oral reading fluency passages and asked to read them aloud as best as they can. The number of words read correct per minute (WCPM) were scored, while also accounting for errors, skipped words, self-corrections, and no responses (Hammerschmidt-Snidarich et al., 2019). Baseline sessions involved partner reading sessions, where each participant read to another student in their class and the partner scored the number of WCPM. During the intervention sessions, a goal setting component was added using a concurrent multiple baseline design across students. The intervention sessions were introduced to students when baseline performance for students was

either insufficient (low gain in correct words per week) or WCPM data were variable with no consistent gains in performance (Hammerschmidt-Snidarich et al., 2019). When at least one member of the first pair of participants' data showed improvement in level, trend, or a decrease of variability with the intervention, the intervention was then introduced to the next pair of participants. The goal set for each participant was a 10% increase from the average of the previous three ORF scores (Hammerschmidt-Snidarich et al., 2019). Four out of the nine participants increased their WCPM with the addition of the goal setting intervention. Results demonstrate that goal setting was effective for those participants. Overall, this study shows that goal setting can be effective in increasing academic skills. However, it also shows that it may not effective for everyone, and individualization should be taken into account when considering if goal setting is an appropriate intervention for clients (Hammerschmidt-Snidarich et al., 2019).

Treatment Package

When a combination of behavior analytic strategies are used together in a systematic manner, it is considered to be a treatment package. Brodhead and team (2019) used a treatment package consisting of unstructured conversation, teaching, and novel conversation in order to teach social conversation via video-chat. Three seven-year-old males, diagnosed with Autism, were taught to have conversations using a non-concurrent multiple baseline design across participants (Brodhead et al., 2019). During the baseline condition, participants were presented with conversation guides that they were taught how to use prior to the study. During the unstructured conversation probe phase, the conversation guides were removed in order to measure behavior without them. During the teaching condition, activity schedules were used along with multiple-exemplar training of conversation guides. During the novel conversation partner condition, two different conversation partners were used to measure generalization of the

teaching condition. There was then a follow-up condition, completed two weeks later, where an unstructured conversation probe was presented again (Brodhead et al., 2019). Results indicated that the use of the teaching condition increased the accuracy of social conversations for all three participants. All three participants also maintained their accuracy and variability of conversation during the follow-up condition. This study shows that treatment packages involving unstructured conversation, teaching, novel conversation, and follow-up can be helpful in increasing social conversations of children with Autism (Brodhead et al., 2019).

Hansen and Wills (2014) evaluated the effects of an intervention package consisting of conditions such as instruction, goal setting, and contingent rewards. These intervention conditions were being evaluated in order to increase the number of words spelled correctly (WSC) and complete sentences (CS) written by a typically developing ten-year-old boy (Hansen & Wills, 2014). An reversal design (ABABCACB) was used to evaluate the effects of the interventions on the participant's WSC, CS, and errors in his writing. After baseline, one condition ("B" condition) involved goal-setting and contingent rewards. During this condition, prior to writing, the participant was asked to set a goal for WSC that was higher than his previous session's score. If he met that goal, then he was presented with a reward in the form of either small toys, pencils, positive calls home, or candy. Another condition ("C" condition) involved instruction, goal setting, and contingent rewards. During this condition, the participant was taught how to write complete sentences, practiced correcting his punctuation and capitalization of one of his own writing samples, set writing goals of writing more complete sentences than he had in the previous session, and receiving rewards contingent on if that goal was met (Hansen & Wills, 2014). Data showed that the participant was able to improve fluency

and accuracy of his written language. Results show that performance and skill-based interventions can interact as a package to increase academic skills (Hansen & Wills, 2014).

Internal Validity

When an experiment shows, without a doubt, that changes in the dependent variable are a function of the independent variable, it is said to have a high degree of internal validity (Cooper et al., 2020). A study that has questionable internal validity cannot have meaningful statements regarding functional relations. A major goal for researchers is to eliminate every possible source of uncontrolled variability, even if it seems impossible. When determining if a study has internal validity, it is important to look at multiple considerations. Those multiple considerations are definition and measurement of the dependent variable, graphic display, meaningfulness of baseline conditions, experimental design, and visual analysis and interpretation (Cooper et al., 2020). Factors other than the independent variable that could explain the results are threats to internal validity. Major threats to internal validity include history, maturation, instrumentation, testing, statistical regression, and diffusion of treatment (Kazdin, 2011).

For example, in a multiple-baseline design, when determining if a study demonstrates experimental control, researchers consider the extent to which alternative explanations could plausibly account for presented data patterns (Slocum et al., 2022). There are three primary threats to internal validity in a multiple baseline design. The first threat is maturation and can be controlled by requiring baseline phases of distinctly different temporal durations. The second threat is testing and session experience, which can be controlled by requiring baseline phases of substantially different amounts of sessions. The third threat to internal validity in a multiple-baseline design is coincidental events/history and it can be controlled by implementing phase changes on offset calendar dates (Slocum et al., 2022).

Purpose of the Present Study

There is limited literature related to improving school attendance for middle-school students who are learning in a remote setting. However, there continues to be a pressing need for these evidenced-based interventions during the time of COVID-19, especially when it comes to student attendance. The proposed study seeks to examine one evidenced-based, behavior analytical intervention package to increase middle school attendance in a remote learning setting. This will be done by implementing and analyzing an intervention package in the form of email reminders, goal setting, and reinforcement. The hypothesis is that the use of this intervention package will successfully increase virtual attendance. Additionally, successful implementation of this intervention may encourage the attempts of other behavior-analytic interventions within virtual school settings.

CHAPTER 2

METHODOLOGY

Participant

Inclusionary criteria of this study were participants who elected to be full virtual learners (as opposed to a hybrid option), who missed a significant amount of Zoom sessions during a seven-week observational period. There was one participant involved in this study. The participant, named Jason, was male, twelve years old, and Caucasian. Jason was a middle school student from a rural, public school district in Illinois participating in virtual learning. During the seven-week observational period, Jason missed 17 Zoom sessions, which equated to a mean of 18.4% of non-attendance, which was a significant amount compared to his middle school peers. Jason was a general education student and had the ability to log on for his Zoom sessions independently.

Settings and Materials

The participant's setting for his learning was at his home because he and his guardians elected to participate in virtual learning during the 2020-2021 school year. Required materials included a school-issued laptop computer with access to email, Zoom, and Schoology, a Learning Management System that this school was using in order for the participant and parents to access assignments and Zoom links. The participant was also provided with a schedule by his school which outlined all Zoom sessions throughout the week, including what time they started and which teacher taught each course.

Response Measurement and Interobserver Agreement

Following each Zoom session during the school day, teachers reported on participant attendance using an online attendance system. The participant was marked "present remote" if

they attended their Zoom sessions and "absent" if they did not attend their Zoom sessions. At the end of each school day, the author of the study accessed the online attendance record for the participant and calculated the percentage of attendance for the day. The target behavior was described as "attendance" which was operationally defined as logging into Zoom sessions with teachers during their scheduled time that was determined by the school.

Percentage of attendance was calculated by dividing the number of Zoom sessions that the participant was marked "present" by the total number of scheduled Zoom sessions for that day. That decimal number was then multiplied by 100. Data were graphed and analyzed with visual inspection on a daily and weekly basis to monitor progress. Interobserver agreement was measured using Exact Count-per-Interval IOA. This was calculated by dividing the number of intervals where two observers (the author and one additional IOA data reviewer) reached 100% IOA, dividing it by the total number of intervals and multiplying by 100.

Procedural Fidelity

Treatment integrity was assessed using a checklist (Appendix A) that required the researcher to evaluate the implementation of the intervention. Each day of the study, the author evaluated whether or not the intervention was implemented by marking a 'Y' if the component was completed, and a 'N' if the component was not completed. Social validity was assessed using a Google Survey (Appendix B), where the researcher asked the parents and teachers of the participant questions to evaluate the effectiveness, feasibility, and acceptability of the intervention components. On the Google Survey, stakeholders were asked four questions and they responded with either "Strongly Disagree," "Disagree," "Neither Agree nor Disagree," "Agree," or "Strongly Agree."

Procedures

Experimental Design

This intervention was implemented using an ABA design. This was implemented in order to show how the participant responded when the intervention was removed, after meeting the advancement criteria. This could be considered a withdrawal design, which involves a removal of the treatment and a return to baseline conditions (Barlow et al., 2009). However, it is noted that while the ABA design can still show some behavioral change, it is recommended to continue the pattern (i.e. ABABA), so that a more continuous pattern evolves and more consistent behavior change can be demonstrated (Barlow et al., 2009).

Experimental Conditions

Baseline condition. No intervention was implemented during the baseline phase. The participant was presented with their school Zoom schedule and attendance was tracked by each individual teacher that the participant worked with using the school attendance system. Once the participant achieved stable responding, with no increasing or decreasing trend of the data, for three consecutive days under baseline conditions, the intervention was applied.

Intervention condition (Email Reminders*).* During the intervention phase, the participant received an email from the author one day prior reminding him about his upcoming Zoom session for the following day. The email was sent to the participant's school-issued email address and his parent's email address. If the participant attended class, he was counted as "present remote," on the attendance system, which was documented by each teacher. During this condition, if the participant's percentage of attendance increased by at least 30% from the mean baseline percentage (also known as the "daily goal," which it will be referred to for the remainder of the paper), he received a tangible reinforcer that was delivered to his home at the

end of the school day by the author of the study. Upon meeting the "daily goal" for three consecutive days, a reversal to baseline was applied.

Preference Assessment

The informal preference assessment was completed as an interview with the parent of the participant, over the phone. Questions for the assessment included asking what types of items, sounds, smells, food, movement, attention, and general activities the participant enjoys. The parent was also asked to come up with 10 items that the student prefers, then was asked to put those items in order from most preferred to least preferred.

CHAPTER 3

RESULTS

Results of the intervention are displayed in Figure 1. The study lasted for 15 school days. During the initial baseline condition, the participant's average percentage of attendance per day was 60%. Therefore, in order for the participant to earn the reinforcer during the intervention condition, his "daily goal" percentage of attendance was 78%. The baseline condition lasted for four days. During the intervention condition, the participant did not reach the "daily goal" for the first five days, but then had three consecutive days of reaching the "daily goal," with one of those days where the participant had exceeded the "daily goal" with 100% of attendance. After moving into the second baseline condition, the participant continued to stay at 80% of attendance or above. The 2020-2021 school year came to a close on 5/27/21 and that is when data collection concluded.

When looking at Figure 1, the data shows a moderate-to-high level of behavior overall. During the initial baseline condition, the data mostly remained at the moderate level of around 60% of attendance. During the intervention condition, there was a mostly moderate level of behavior before increasing to higher levels of around 80%, where it mostly remained during the second baseline condition. Data was also on an overall increasing trend, as shown by the average percentage of attendance starting out at around 60%, decreasing to as low as 40%, then increasing drastically to remain between 80%-100%. There is a medium amount of variability in the data, as evidenced by how much the data varies between 40%-100% over the course of the 15 days of the study. Interobserver agreement was reached for 100% of intervals that were calculated.

Results of the preference assessment indicated that the participant enjoys activities such as playing video games and being active outside with his siblings. The participant's parent also discussed that he likes a variety of chips and candy as his favorite snacks. When asked to name 10 items that the participant prefers, the parent named different snacks, games, and forms of money such as cash and gift cards. The preferred item that the parent ranked as being something that the participant would most prefer was school spirit items. The parent rationalized this choice by saying that the participant does feel a disconnect from his school due to virtual learning and enjoyed earning school spirit items when he was learning in person. Therefore, the tangible reinforcer that the participant earned for meeting his "daily goal," were different school spirit items such as a water bottle, pop socket, and drawstring bag, all with the school district logo on the items.

The treatment integrity checklist shows that all components of the intervention were implemented 100% of the time, as evidenced by lack of 'N's' recorded for each step on the checklist. There were approximately 15 'N/A's' recorded throughout the process, which reflects that the component was not intended to be implemented on that day, due to which condition that day fell on (i.e. baseline conditions vs. intervention condition). Overall, this shows that on the days when the study ran, the intervention was implemented as outlined.

The social validity survey was sent to the participant's parent and all five of his teachers. The parent and two of the teachers responded to the four-question survey. 100% of the respondents strongly agreed that the intervention was clear and easy to understand. When asked if using email reminders was an acceptable way to increase attendance during virtual learning, approximately 66.7% of respondents agreed, while 33.3% of respondents neither agreed nor disagreed. Additionally, 100% of respondents agreed that the intervention was effective for

increasing the participant's attendance and that the behavior change demonstrated by the participant was valuable. The results of the social validity survey demonstrate that the intervention was effective, feasible, and acceptable to stakeholders involved with the participant and his learning.

In summary, the results of the graph show an overall increase in attendance throughout the course of the study. However, it cannot be said with certainty that the intervention was effective for increasing virtual attendance. Also, the treatment integrity checklist reveals that the intervention was implemented as it was outlined for each day. Finally, the social validity survey results indicate to multiple stakeholders that the intervention was an appropriate way to increase attendance.

CHAPTER 4

DISCUSSION

The results of the study indicate that the use of treatment packages that include email reminders, goal setting, and reinforcement, sent to both students and their parents, did not prove to be effective in increase virtual attendance for middle school students. There are multiple reasons why this treatment package was not an effective intervention. When performing a visual inspection of the graph, the data stay at a similar level as during the intervention phase. Because this is a reversal design, if the intervention had been successful, the data would have immediately returned to original baseline levels. The data, as presented, may actually show us that behavior change may have been more likely due to the reinforcement that was presented when the participant reached his goal attendance. In addition to the issue with data, there are potential issues with internal validity in this study. A number of variables could have been responsible for behavior change, other than the intervention package. For example, the participant had multiple teachers during his Zoom sessions. Each teacher has a different style of teaching in a virtual format, which could include reinforcement components for attending their Zoom sessions. Depending on the teaching style, or content being discussed that day, it could have had an effect on if the participant decided to log into his Zoom sessions. Another variable is the fact that it was the end of the school year, and there could have been fun activities unrelated to classroom content going on for those days. These variables show that there were issues with internal validity in this study, and is another reason why this intervention was ineffective for increasing virtual attendance. However, the results did reveal that email reminders can be a socially valid way to intervene on this behavior, according to the stakeholders that filled out the social validity survey.

These results can have an impact on clinical and applied practice in the field of behavior analysis, even though the study was unsuccessful. Firstly, components of this study can add to the small amount of literature that exists when behavior analysts are searching for interventions related to virtual learning, more specifically at the middle school level. Secondly, while schools continue to return to an in-person learning model for the coming school years, there are still students across the country that will require the need for virtual learning, such as those that are medically fragile and will not be able to return to in-person learning with the mass population of students. Parts of this intervention can be helpful for those students that cannot participate in in-person learning yet and may need assistance with attendance. Thirdly, this study could potentially open the door for future behavior analysts to explore the realm of creating interventions for virtual learning in school settings.

There were a number of limitations during this study that are worth nothing. First, this intervention could only be implemented with students that were participating in virtual learning during the 2020-2021 school year. As the school year progressed, there became less students that participated in virtual learning because they transitioned back to in-person learning. This was due to a number of factors, such as parent preference and constant changing state and school district COVID-19 restrictions. As the school year went on, this also limited the types of students that were able to participate in the study, such as those in special education, because they were among the first students to be able to return to in-person learning.

A second limitation during this study was that the study was run with one school, in a rural area of Illinois. This means that any participants that were recruited were from that one school only, because there is only one middle school in that particular school district. This also means that the study was limited in how many classes the participant attended each day and how

many days per week he was expected to attend his virtual classes, due to COVID-19 restrictions. For this particular school, students attended academic classes four days per week, which was a change from the typical five days per week in prior school years. Also, on the days that students attended classes, they were responsible for attending five classes each day, which was also a change from prior school years as they typically would attend seven classes each day.

A third limitation was the way in which changing COVID-19 restrictions altered the course of this study. When this study was first created, it was originally meant to address virtual non-attendance for middle school students in special education, at this particular school. At that time, there were multiple students in special education who were struggling with virtual attendance and required some sort of intervention. However, that problem was addressed when this school district allowed all students in special education to return to in-person learning, and there were no longer issues with virtual attendance with these students. This then meant turning to the general education population, where there was still a need for an intervention for lack of virtual attendance. However, as the second semester of the 2020-2021 school year continued, this school continued to offer virtual students who were having a hard time with virtual learning to come back to learn in-person. This was the right move for these students at the time. But unfortunately meant that there became less options for participants for this study as time went on.

Fourthly, there was a lack of response from potential participants and their parents/guardians when they were contacted. Four general education students were identified as struggling with virtual attendance and were contacted to participate in the study. When those four families were contacted, one of them had revealed their family was moving out of the district and two of them did not respond after multiple requests. One participant and their parent

responded and agreed to be part of the study. Therefore, a multiple baseline design could not be implemented as originally planned, because only one participant was able to complete the study.

Also, there was no confirmation that the participant, or his parent, received the email reminders each day. There was no response requirement from the participant, or his parent, to indicate that they received the email reminders. Because of this, the email reminders can definitively be ruled out as being responsible for any behavior change, since there was no way to confirm if the participant or his parent viewed the emails. A way to change this could have been to require a confirmation response from the participant. Another way to change this for future studies could be including a mailbot system attached to the emails, so that there is a confirmation indicator when someone receives an email.

Finally, due to the multiple factors outlined above, such as the changing COVID-19 restrictions and lack of response from identified participants, there was a small window of time for the intervention to be implemented. Originally, the intervention was outlined to have three baseline conditions and two intervention conditions. At the onset of the study, there were 15 days of the school year remaining. In following the procedures as written, the participant required a few more days in each condition. Therefore, at the conclusion of the study, the intervention ended with two baseline conditions and one intervention condition. With that being said, the participant was able to meet his attendance goal for the three consecutive days during the intervention condition.

Relating the current study back to previous research, this intervention can add to the different aspects that may not have been thought of before or take research further in the field of behavior analysis. On the topic of COVID-19 and education, an intervention such as this could help with providing assistance to families whose children will not be able to return to in-person

learning right away with other students for future school years. Since there are already multiple

factors that can cause a family to want to choose virtual learning for their child (Musinski, 2020),

as behavior analysts, we can help with building an intervention process not only for attendance,

but for other issues that may come up. In the area of virtual learning modifications, intervention

packages can be another tool in the toolbox along with other modifications outlined, depending

on basic student needs, instructor needs, individualized student needs, methods of collaboration,

and access to resources (Moore & Hodges, 2020).

The use of positive reinforcement versus negative reinforcement have both been

implemented in order to increase target behaviors (DeLeon et al., 2001). In this study, the mode

in which the reinforcement was delivered is different than typical delivery modes of

reinforcement. Future studies can examine different ways that reinforcement can be presented,

such as delivering to the participant's home. Goal setting has been used to improve skills such as

using positive behavioral strategies (Cohrs et al., 2016), increasing physical activity (Miller et

al., 2017), and repeated reading (Hammerschmidt-Snidarich et al., 2019). Virtual attendance can

be an additional behavior that goal setting can target.

Treatment packages can be systematically implemented for academic (Hansen & Wills,

2014) and social (Brodhead et al., 2019) behaviors. There are plenty of treatment packages that

are used in a in-person format. This study opens up the possibility of treatment packages for use

in a virtual format. Internal validity must continue to be taken into account when studying

treatment packages, so that researchers can be certain that the independent variable, and no other

extraneous variables, were responsible for behavior change (Cooper et al., 2020). Future studies

can focus on completing component analyses as part of the study. This could help to determine

which parts of a treatment package, used in a virtual format, were responsible for the behavior change, and help rule out threats to internal validity.

The effects of non-attendance will continue to be a barrier that schools across the country need to problem-solve. In the state of Illinois, the use of the tiered intervention systems, such as MTSS (Illinois State Board of Education, 2019), can include interventions such as email reminders and treatment packages in order to help with those barriers to learning that can still exist. In the efforts to continue to improve attendance specifically, other interventions for in-person learning have been identified, such as putting students on a point system and providing reinforcement when they hit a specific amount of points (Licht, Gard & Guardino, 1991). This current study can, again, help with expanding the literature by providing a starting point for other interventions targeting attendance, whether that is virtual or in-person. Regardless, it is recognized that the inclusion of attendance contingencies can improve attendance and, by extension, academic performance (Clump, Bauer, Whiteleather, 2003).
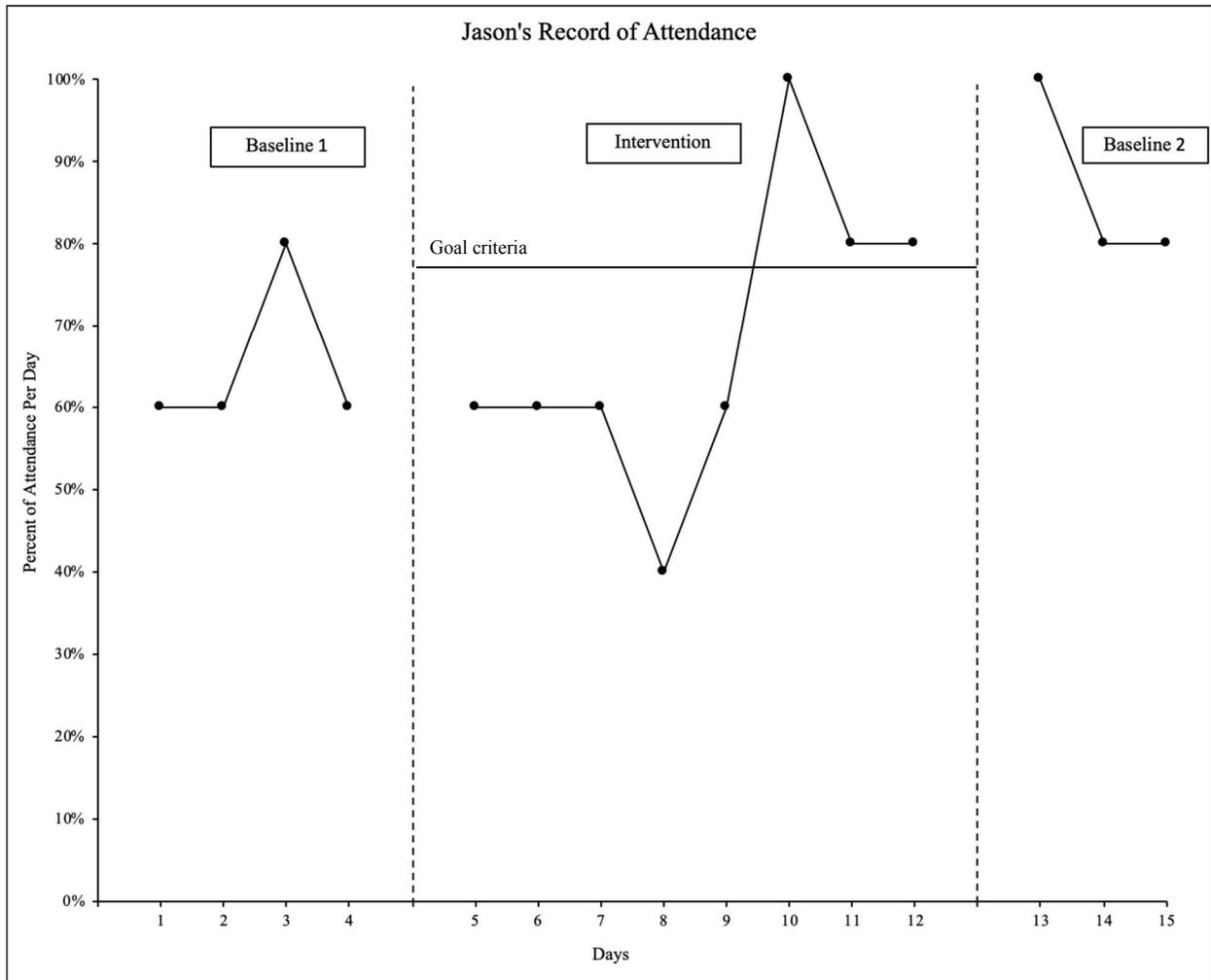
CHAPTER 5

SUMMARY, CONCLUSION, RECOMMENDATIONS

Intervention packages continue to be a useful way to change behavior in a proactive manner. Rather than waiting for a behavior to occur and responding in a way that can change that behavior, treatment packages are a structured, systematic process that address the behaviors of interest. In this study, the systematic process of using email reminders, goal setting, and positive reinforcement was set up as a treatment package in order to increase a middle school student's virtual attendance. The data reveal that this specific intervention package was unsuccessful at increasing the target behavior. However, intervention packages should continue to be considered in applied settings, including schools.

Now that the need is presented for targeting attendance in virtual learning scenarios, different interventions can be attempted to keep extending the research in the area of attendance. Also, when it comes to virtual learning, behavior analysis can extend their research by targeting other aspects of this mode of learning that students may find difficult. These aspects can include skills such as work completion and executive functioning. In general, behavior analysts have a lot of areas that need further exploration, even just within the category of education. This intervention shows that there is always room for creativity, even in a category of behavior analysis that may be well-established. There is always room for us to grow.

Figure 1

Graph

Figure depicting a line graph titled "Jason's Record of Attendance" with the y-axis labeled "Percent of Attendance Per Day" (0% to 100%) and x-axis labeled "Days" (1 to 15), divided into three conditions: Baseline 1, Intervention, and Baseline 2.

Graph depicting the percentage of virtual attendance per day for Jason over the course of two baseline conditions and one intervention condition.

Figure 2

Social Validity Results
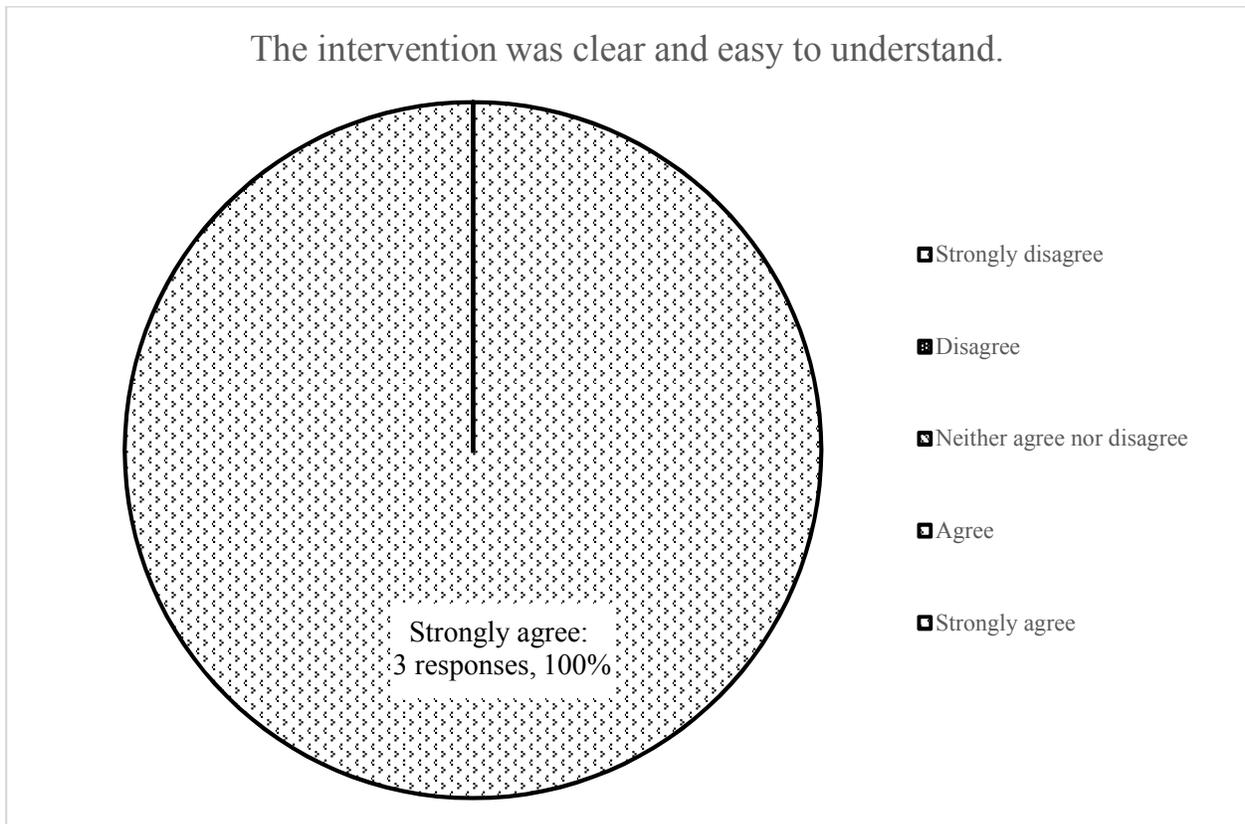
The intervention was clear and easy to understand.

Strongly agree:
3 responses, 100%

Legend:
- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Results of the Social Validity question of whether the intervention was clear and easy to understand.

Figure 3

Social Validity Results

Using email reminders was an acceptable way to increase a participant's attendance rate during virtual learning.

Neither agree nor disagree: 1 response, 33.3%

Agree: 2 responses, 66.6%

□ Strongly disagree

□ Disagree

▣ Neither agree nor disagree

□ Agree

□ Strongly agree
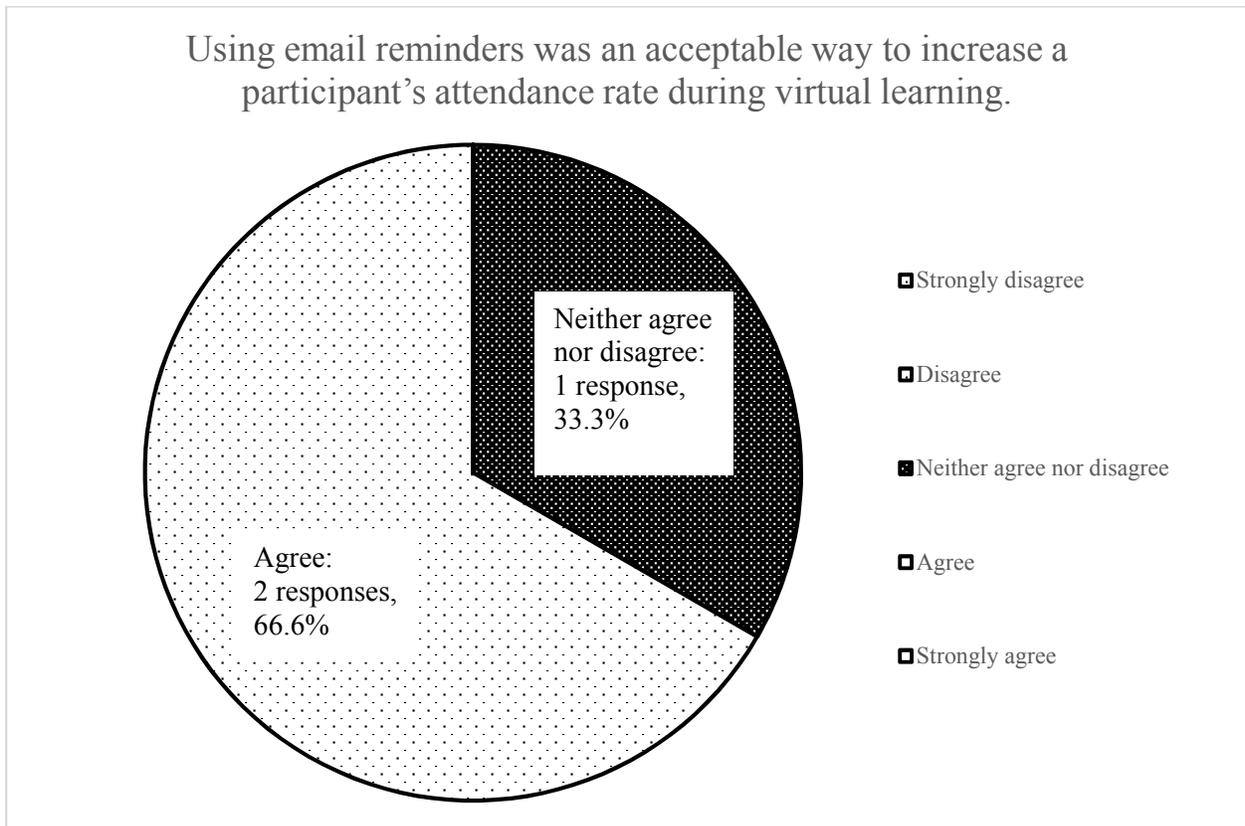
Results of the Social Validity question of if email reminders were acceptable as a way to increase virtual attendance.

Figure 4

Social Validity Results

The intervention proposed was effective for increasing the participant's attendance.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Agree:
3 responses,
100%
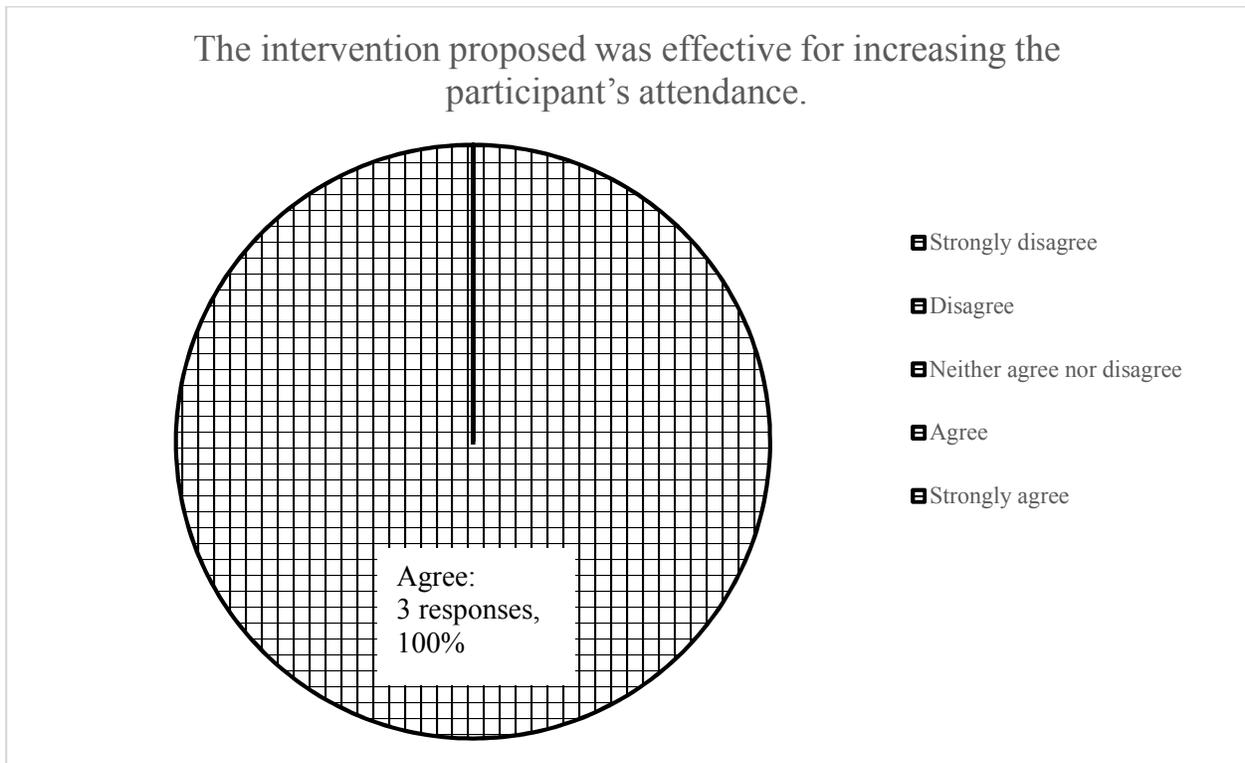
Results of the Social Validity question of whether the intervention was effective.

Figure 5

Social Validity Results

The behavior change demonstrated by the participant was valuable.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Agree:
3 responses,
100%
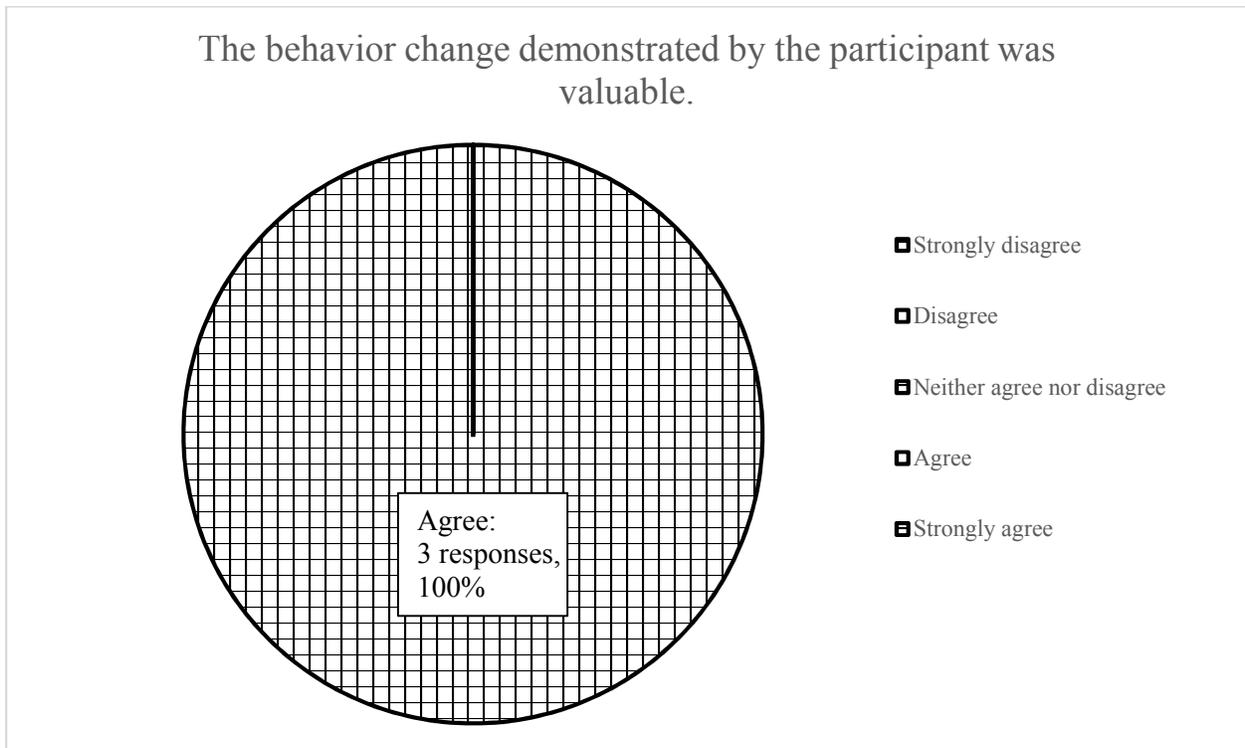
Results of the Social Validity question of if the behavioral change demonstrated by Jason was valuable.

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TREATMENT INTEGRITY FORM

Student Name: ___Jason_____

Directions: Complete this form for each day of intervention implementation. Record "Y" if the intervention component was implemented and record "N" if the intervention component was not implemented.

Intervention Components	Dates																
	5/3	5/4	5/5	5/6	5/7	5/11	5/12	5/13	5/14	5/18	5/19	5/20	5/21	5/25	5/26	5/27	
1. Email reminder sent to participant's school issued email address	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N/A	
2. Email reminder sent to parent's email address	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N/A	
3. Attendance tracked by all of participant's teachers	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
4. Delivery of preferred reinforcer when goal was met	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	Y	Y	N/A	N/A	N/A	

Treatment integrity form displaying the intervention components and whether they were followed each day the study was conducted.

APPENDIX B

SOCIAL VALIDITY QUESTIONNAIRE

Student:_____ Parent or Teacher: _____

This questionnaire consists of 4 items. For each item, you need to indicate the extent to which you agree or disagree with each statement. Please indicate your response by circling one of the options listed.

Question	Responses				
1. The intervention was clear and easy to understand.	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
2. Using email reminders was an acceptable way to increase a participant's attendance rate during virtual learning.	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
3. The intervention proposed was effective for increasing the participant's attendance.	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
4. The behavior change demonstrated by the participant was valuable.	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

Social validity questionnaire sent to Jason's parent and teachers to evaluate the effectiveness, feasibility, and appropriateness of the intervention.

VITA

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Bachelor of Science, Special Education, December 2013

Thesis Paper Title:
　　　Using Email Reminders to Increase Virtual Attendance for Middle School Students

Major Professor: Dr. Deija McLean, Ph.D., BCBA