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EVALUATING THE EFFECTS OF MEDITATION ON STUDENTS' WITH DISABILITIES ON-TASK PERFORMANCE

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EVALUATING THE EFFECTS OF MEDITATION ON STUDENTS' WITH DISABILITIES ON-TASK PERFORMANCE

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Applied Behavior Analysis in the
College of Education
at the University of Kentucky

By

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2020

ABSTRACT OF THESIS

EVALUATING THE EFFECTS OF MEDITATION ON STUDENTS' WITH DISABILITIES ON-TASK PERFORMANCE

This document will address the following prompts: (a) compare and contrast A-B-A-B designs and multiple probe designs for their applications to research questions, respective strengths and weaknesses, and threats to internal validity, (b) evaluate Wilson and Dixon (2010) for rigor, risk of bias, and quality based on What Works Clearinghouse's measures, and (c) provide a rationale for the use of meditation with students with disabilities and outline procedures a practitioner could follow to implement meditation with a student with behavioral challenges.

KEYWORDS: Single-case design, Withdrawal Design, Multiple Probe Design, What Works Clearinghouse, Meditation

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TABLE OF CONTENTS

Overview of Alternative Thesis Project

During the Spring 2020 semester, students within the applied behavior analysis program were conducting applied thesis projects within typical contexts as part of their fulfillment of the requirements of a master's degree program. Due to the coronavirus disease 2019 (COVID-19), public schools and related facilities closed with no plans to reopen within the time frame to allow for graduation for students in the last semester of their graduate program. Students were allowed to complete an alternative thesis assignment in the form of responding to writing prompts followed by an oral defense of the written products, along with questions related to their field of study. The following outline and written prompts were assigned as an alternative to an applied thesis project:

Alternate Thesis Project

Spring 2020

The deadline for submitting responses is April 6. Responses should be emailed to all members of your committee. You will complete an oral defense on the date that you have already scheduled, and you will answer questions about your written questions, as well as answer questions from any content that you have learned during your Master's program.

1. You will write a paper comparing and contrasting (a) a multiple-probe design and (b) an ABAB design. This should include, but not limited to the types of research questions that can be used with the designs, how internal validity is established and strength of the internal validity, threats to internal validity, advantages and limitations of each, and external validity.

2. Given the article [Wilson, A. N., & Dixon, M. R. (2010). A mindfulness approach to improving classroom attention. *Journal of Behavioral Health and Medicine*, *1*(2), 137–142.], use the form attached (i.e., Rating Studies and Notes to Consider) to analyze the rigor, quality, and potential bias of the article and write a summary of what you found.
3. You will write an article, *designed for a practitioner*, about the independent variable (i.e., meditation) you chose for your original thesis including a rationale for why this IV is important, how to implement the IV, an application vignette or scenario, and supporting references.

Each response must be 4 double-spaced pages and adhere to APA 6th edition guidelines and include references (this section ***does not*** *count toward page requirements). When reviewing and editing your work, make sure your responses are analytical, technical, and your own original ideas/work (plagiarism is not worth failing; https://apastyle.apa.org/style-grammar-guidelines/citations/plagiarism).*

CHAPTER 1. *QUESTION 1*

Single case design is a research methodology that focuses on evaluating or comparing the impact of an independent variable on a single participant or group of participants. Single case design is rooted in baseline logic, meaning that an individual participant serves as their own baseline (Ledford & Gast, 2018). Single case research is used by researchers who study populations that are difficult to capture in group design, such as those with disabilities and subcategories who may represent a smaller proportion of the population (Kratochwill et al., 2010). Features of single case design research include the following: (a) at least three demonstrations of effect to establish experimental control, (b) adequate reliability of dependent measures, (c) adequate procedural fidelity of independent variables, and (d) sufficient data to demonstrate outcomes of baseline and intervention conditions (Kratochwill et al., 2010).

Single case design typically asks a question rather than testing a certain hypothesis (e.g., is the intervention or set of interventions more effective in changing the dependent variable than baseline or "business as usual" conditions; Kratochwill et al., 2010). Across all single case designs, experimental control is established once results demonstrate a functional relation between the independent variable and change in the dependent variable– showing that change is directly tied to the independent variable and not to other factors (Ledford & Gast, 2018). Features are visually analyzed using level, trend, variability, immediacy of effect, overlap, and consistency of data patterns across similar and adjacent conditions to determine an intervention's impact (Kratochwill et al., 2010). In this paper, A-B-A-B designs and multiple probe designs will compared. More specifically, characteristics of each design, what questions these designs can address,

strengths and weaknesses specific to each design, and threats to internal validity to consider with each design.

ABAB designs, also known as withdrawal or reversal designs, involve the systematic addition and removal of an intervention to evaluate that intervention's impact on behavior compared to baseline. It involves intra-participant replication, or replication of experimental effects across the same participant (Ledford & Gast, 2018). The primary feature of ABAB designs is the A-B paradigm (i.e., baseline condition, then intervention condition) that is repeated to allow for three demonstrations of effect across one target (Ledford & Gast, 2018). Multiple probe design is a time-lagged design in which baseline (i.e., A) and intervention (i.e., B) conditions are implemented at three points in time across multiple participants, contexts, or target behaviors (Ledford & Gast, 2018). Baseline is collected concurrently, meaning that data is collected under baseline conditions across all tiers while the independent variable is introduced sequentially in successive tiers based on a data pattern's level, trend, and/or stability (Ledford & Gast, 2018). Multiple probe allows for intermittent data to be collected in pre-intervention conditions for all behaviors, participants, or contexts prior to introducing the independent variable (Ledford & Gast, 2018).

ABAB designs can be used to answer demonstration questions (i.e., demonstrate the effectiveness of an intervention on a certain behavior with a certain population) for reversible behaviors, or behaviors whose change is contingent to environmental arrangements being in place (e.g., evaluating a visual schedules impact on challenging behavior; Ledford & Gast, 2018). Multiple probe designs can be used to answer demonstration questions across both reversible and non-reversible behaviors (e.g.,

number and letter identification; Ledford & Gast, 2018). Multiple probe designs have high utilization in applied settings, such as clinics and schools (Ledford & Gast, 2018).

When selecting a design to present their results, researchers should compare the strengths offered by each design (e.g., flexibility with data collection, effectiveness of the design to demonstrate a functional relation). A-B-A-B designs are easy for those who don't have a background in single case to visually analyze, making this design more public and practitioner-friendly. A-B-A-B designs allow for three demonstrations of effect using one target behavior and one participant (Ledford & Gast, 2018). This minimizes planning the researcher would have to perform prior to initiating the study. Lastly, this design allows for flexibility for the researcher to extend the design to compare multiple interventions (i.e., multi-treatment design; A-B-C-B-C; Ledford & Gast, 2018). This is beneficial if the intervention is ineffective and the researcher chooses to change independent variables within the study.

Multiple probe designs are suitable to answer questions for both reversible and non-reversible behaviors, meaning this design can be used to answer more questions when compared to A-B-A-B designs. Multiple probe designs end in intervention (i.e., A-B) across each participant, context, or behavior rather than requiring researchers to remove the intervention, as is the case for A-B-A-B designs (Ledford & Gast, 2018). This is beneficial if the intervention is effective is reducing a challenging behavior that it would be non-preferred or potentially harmful to increase under baseline conditions (e.g., self-injurous behavior, aggressive behavior). Because of this, multiple probe designs have high utilization in applied settings (e.g., clinics, schools, Ledford & Gast, 2018). Furthermore, multiple probe designs allow for intermittent data collection during baseline

conditions, requiring less effort and planning from the researcher prior to intervention conditions (Ledford & Gast, 2018).

Researchers should also consider the limitations associated with each design. A-B-A-B designs are applicable to behavior that is reversible, limiting its use across various targets (Ledford & Gast, 2018). This design is also susceptible to cyclical variation (i.e., data patterns caused by an unplanned factor not related to the intervention; Ledford & Gast, 2018). Though this design ends in intervention, researchers should consider the ethical complications that come as a result of withdrawing a possibly effective intervention. As discussed before, this becomes especially imperative in cases where the study focuses on decreasing dangerous behavior.

Although intermittent data collection requires less effort from the researcher, it limits the researcher's ability to identify threats to experimental control (Ledford & Gast, 2018). More specifically, multiple probe designs are at risk for the following threats: maturation, history, testing, and attrition (Ledford & Gast, 2018). Researchers should also weigh the limitations in selecting whether to measure across behaviors, participants, or contexts. For instance, multiple probe across participants is designed to stagnate which participant receives treatment, leaving the participant in the final tier without treatment for an extended period of time (Ledford & Gast, 2018). However, multiple probe across behaviors could be at risk for behavioral covariation if the behaviors selected to study are not independent and functionally similar (Ledford & Gast, 2018).

Single case designs are vulnerable to threats to internal validity that weaken experimental control. Replication and randomization in single case design help address threats to internal validity (Kratochwill et al., 2010). Ledford and Gast (2018) outlined

the following threats to experimental control detrimental to both designs: maturation (i.e., changes in behavior that occur due to time), instrumentation (i.e., challenges with measurement system), procedural infidelity (i.e., "lack of adherence to condition protocols" (p. 21), attrition (i.e., loss of participants), history effects (i.e., events that occur throughout the study that were not related to procedures), and multi-treatment interference (i.e., outcomes are altered by multiple interventions). A-B-A-B designs are also vulnerable to testing effects (i.e., repeated testing measures result in the participant learning the desired skill).

CHAPTER 2. *QUESTION 2*

When evaluating research, readers should extend their interest not only to the outcomes of a study but also efforts to increase rigor and ensure results of a study are a result of the intervention being analyzed rather than unplanned factors (Ledford & Gast, 2018). Risk of bias (i.e., could methodological decisions lead to potential overestimation of the outcome), rigor (i.e., did researchers plan for and implement procedures in ways to decrease potential biases and increase confidence in the study's outcomes), and quality (i.e., did the study include components that add to its generality to the setting the research is intended for) are such factors to be considered when analyzing a study to ensure procedures have been implemented to reduce threats to internal validity (Ledford & Gast, 2018). What Works Clearinghouse (WWC) provides a list of questions that are designed to assist the reader in determining if a study meets standards, meets standards with reservations, or does not meet standards (Kratochwill et al., 2010).

Wilson and Dixon (2010) evaluated the impact of mindfulness exercises on attending behavior for second and third grade students. Authors used an ABA design to evaluate if attending behaviors would increase across 12 participants (i.e., mean age 8-years-old) under conditions in which mindfulness exercises were provided (e.g., silent game, breathing exercises, noticing self, and mindful eating). The authors defined attending as when students were "engaged in what was occurring at that particular moment in the classroom" (Wilson & Dixon, 2020, p. 138) and offered the following examples: students directed their attention toward the teacher or a student when they are talking, and engaging in classroom activities (e.g., looking at or completing a worksheet), and following instructions.

Authors collected data on attending behaviors across all conditions (i.e., baseline and intervention). Under baseline conditions, no intervention or modification was made to the students' environments. Data collectors were present during the participants' instructional time for 30 min across 2 weeks. Data were collected using a momentary time sampling method that rotated between participants every 10 sec (i.e., participant one was observed for 10 sec, then participant 2, etc.). Participants were observed in the same order: females were observed first, followed by male participants. During intervention conditions, various mindfulness practices were implemented for 15 min prior to observation. These practices included: (a) Silent Game (i.e., students follow rules that include mindful behaviors such as sitting still and having eyes closed; students were awarded Hershey kisses for following rules), breathing exercises (i.e., students told to focus on their breathing), (b) Silent Game 2 (i.e., rules from Silent Game were embedded into breathing exercises), (c) Noticing Self exercise (i.e., students were asked to explore body sensations through statements such as "see if you can notice your body as you sit in your chair"; p. 140), and (d) Mindful Eating (i.e., students as a group ate a mandarin and discussed the textures, smells, and tastes that accompanied the experience). Following these exercises, students were observed for 30 min in the same arrangement as discussed before. Authors allowed for 15 min between the end of the mindfulness exercises and the beginning of the observation period to reduce reactivity among students.

Rigor is determined by factors such as whether the independent variable was systematically implemented and whether measures were collected for inter-observer agreement and procedural fidelity. Authors, based on descriptions provided in the article, did systematically manipulate the independent variable (i.e., mindfulness activities)

across condition changes. Authors also collected data on inter-observer agreement for 50% of sessions, with an average of 94% agreement between observers. However, authors did not collect data on procedural fidelity to ensure procedures were implemented as they were designed to be. Authors also did not allow for three to five data points in each condition (i.e., only two data points in the final baseline condition). Authors also did not provide sufficient demonstrations of effect. An ABA design does not allow readers to determine if a functional relation is present and does not determine if threats to internal validity are not present (Ledford & Gast, 2018). Based on criterion provided by WWC, Wilson and Dixon (2010) did not meet WWC standards of rigor due to failure to meet criteria for procedural fidelity, insufficient data collection across conditions, and insufficient demonstrations of effect.

In evaluating for bias and quality, readers are also directed to look at a study's randomization and whether it is appropriate for the study. Wilson and Dixon (2010) did not explicitly randomize procedures when appropriate (e.g., randomizing the start time for intervention, randomizing the days of the week in which data were collected). Authors, when observing participant behaviors, also did not randomize the order in which participant's behaviors were observed and collected. By beginning and ending with the same student each time, readers are unsure if cyclical variability (i.e., repeated and predictable patterns in data) or sequencing effects have some impact on participant's outcomes, weakening the findings at the end of the article. Authors also did not explicitly provide any form of blind assessors or data collectors in this study. These characteristics rate authors to have high risk of bias for both randomization and blinding.

When looking at quality measures, readers are to look for characteristics that indicate applicability of procedures (e.g., generalizing procedures to new environments, measuring social validity; Ledford & Gast, 2018). When looking for ecological validity, readers should determine if the study was set in an environment that is relevant to the typical context (Ledford & Gast, 2018). The Wilson and Dixon (2010) study took place in an elementary school general education classroom with students who were enrolled in that classroom. Students were observed during their typical routine during various school subjects (e.g., reading, math, science and social studies). Procedures, however, were implemented by the researcher rather than the classroom teacher, decreasing this study's ecological validity. Authors also did not provide social validity measures from relevant stakeholders to determine if the study's goals, procedures, or outcomes held approval from participants or teachers involved in the study. This information would be helpful for readers of this study to understand whether teachers felt these procedures would be beneficial or if students felt interested in continuing mindfulness practices. Authors did not extend their data collection to assess for maintenance. However, it would not be appropriate nor necessary to assess for maintenance in this study. Mindfulness exercise benefit from continuous application and practice. Therefore, if the mindfulness exercises were to be removed, it could be likely that authors would notice a decrease in attending behavior across students. Data were collected on attending behaviors across multiple areas (e.g., reading, math, science and social studies) across multiple times of the school day, allowing for a form of generalization. However, results across those individual settings and times were not provided; therefore, no measures of generalization data were provided. Authors should have provided this information as well as determined whether

outcomes are influenced by different implementors (e.g., a substitute teacher or classroom aide). Finally, participants included in this study were selected due to demonstrations of inappropriate behavior across the class, making them an appropriate choice for this study. However, no information was provided on inclusionary or exclusionary information, therefore, we are unsure of what those behaviors were as well as any details regarding what goals students had in the classroom or what supports were in place for students.

Wilson and Dixon (2010) presented an article that adds to the limited evidence base on mindfulness exercises and their utilization in addressing behavior challenges. The outcomes of this study were positive (i.e., 18% increase in attending behaviors when students practiced mindfulness exercises). However, based on WWC criterion, this study does not meet standards due to its limitations in rigor, potential bias, and lack of quality measures. Though this study does not meet standards, it provides additional literature to an area of research with little evidence: embedding mindfulness practices in classrooms of at-risk students. Future researchers should assess mindfulness' generality across a variety of settings (e.g., home, school, clinical, and vocational environments) with various implementers (e.g., parents, teachers) to add to literature on mindfulness and its implications with those with disabilities. Future research should also strive to create vigorous research that is cognizant of factors that decrease bias and increase rigor.

CHAPTER 3. *QUESTION 3*

Students with behavior challenges in the classroom (e.g., autism spectrum disorder [ASD], attention deficit hyperactivity disorder [ADHD], and other developmental disabilities) are susceptible to diminished outcomes regarding academic and social achievement (DeMartini-Scully, Bray, & Kehle, 2000). Researchers have found that challenging behavior, including noncompliant behaviors, can serve as a response to potentially stressful environments that require complex skills (e.g., attending to teacher and peer instruction, transitioning between activities, social reciprocity) to navigate (Bitsika & Sharpley, 2016). Increased stress with no explicit way to cope increases the chance in which individuals may engage in challenging behaviors in environments where those stressors are present, such as the classroom (Hwang, Kearney, Klieve, Lang, & Roberts, 2015).

Many strategies (e.g., token economies, functional communication training) are employed in classrooms to decrease instances of challenging or noncompliant behavior. Though these methods are typically effective, they require a lot of time and effort from teachers and staff to implement as well as a great deal of training and ongoing support from other professionals (Wilson & Dixon, 2010). When a student's challenging behavior disrupts classroom instruction, the student may be reprimanded, removed from general education settings and denied their least-restrictive educational experience (Kern, Hetrick, Custer, & Commisso, 2019). Based on these considerations, a clear need exists within classrooms for strategies that are easily embedded in the student's day, effective at reducing problem behavior, non-stigmatizing for other students to observe, and feasible for the teacher to deliver.

Meditation has been researched in general education settings and with typically-developing children and adolescents and has yielded positive results, such as decreases in negative affect and challenging behaviors and increases in attentiveness, social skills, and compliance with academic tasks (Bostic et al., 2015; Burke, 2010; Valosek, Nidich, Wendt, Grant, & Nidich, 2019; Waters, Barsky, Ridd, & Allen, 2015; Beauchemin, Hutchins, & Patternson, 2008). However, little research exists of meditation's impact on students with behavior challenges and disabilities, especially within classroom settings. Singh et al. (2018) studied the impact of a guided meditation with fifth grade students with ADHD on active engagement (i.e., student's active participation in instructions provided by lead teacher) in math instruction. Results indicated statistically significant improvements in active engagement and correct math work from participants who participated in group meditation when compared to control.

For teachers hoping to implement meditation in their classroom, I will provide procedures through the following simulation: *Blanche is a 10-year-old female receiving special education services who demonstrates vocal outbursts (e.g., threatening harm to others, cursing) and other disruptive behaviors (e.g., getting out of her seat and walking around/ out of the classroom). Mrs. Arthur, the special education teacher, reports that these behaviors occur most often in during English activities, when students are directed to engage in independent seatwork or asked to work in groups. Mrs. Arthur reported that Blanche is typically removed from the classroom activity and sat at an isolated table where she receives no further instruction.*

First, identify your target behavior or behaviors (e.g., threatening) and provide operational definitions of these behaviors. For example, Blanche's behavior of

threatening could be defined as “Any instance in which Blanche responds to others with statements that indicate harm to others. Examples could include, “I’m going to throw this at you” or “I’ll hit you if you don’t leave me alone”. A data collection method is chosen after defining the target behavior. A continuous data collection method, such as rate (see Appendix 1), will provide a more accurate representation of results, but data collection methods should be determined by what is feasible for professionals (e.g., teacher, paraprofessionals) in the classroom.

Second, choose a guided meditation that is appropriate for the student and provides directions the student can attend to. This can be a guided meditation video/audio (e.g., https://www.youtube.com/watch?v=d1cbGCHuUe0&t=38s; Jason Stephenson–Sleep Meditation Music, n.d.) or a script someone reads to the student. To determine if a guided meditation is appropriate, read the directions provided aloud and ask the target student to listen and perform the actions described. Teachers should also determine what is an appropriate length of time for their student to participate in meditation based on what is feasible within the student’s schedule as well as how long the student could attend to directions. For Blanche, Mrs. Arthur selects a 10 min video because this allows Blanche enough time to practice deep breathing without disrupting her typical routine. Consider what supports should be added to increase the student’s success with this procedure (e.g., adding headphones to decrease intrusive noise, placing the student in a dimly lit, isolated room to help foster attending to the meditation, seating the student in a way to reduce distraction).

Third, embed meditation into the student’s schedule. Meditation should be scheduled into the student’s day within close proximity to the beginning of the non-

preferred task. Provide an explanation of what meditation is and what is expected of the student. For example, “We are going to play a meditation video. Meditation is something that people can do to help them relax. I want you to listen to what the video tells you to do and do it. When you are done, we will move on to English.” Take time to model novel or difficult behaviors (e.g., demonstrate a deep breath). Blanche’s teacher introduces meditation into her routine 20-minutes prior to the classroom’s English activity to introduce meditation, ensure that enough time is given for Blanche to complete the 10-minute video, and allow Blanche time to transition to her English activity.

Following the guided meditation, data should be collected on the student’s target behavior. This will determine the effectiveness of these procedures and if modifications are appropriate. If data shows a therapeutic trend (see Appendix 2), no modifications should be made. If data shows a contra-therapeutic (see Appendix 3) or stable trend, implementors could make the following modifications: increasing the amount of time the student spends meditating, adding supports, or selecting a new meditation.

Meditation is designed to be a daily exercise and benefits from everyday application. Therefore, teachers should not fade the time allotted to engage in meditation. However, teachers should fade themselves as implementer by teaching the student to use a video or app and access it prior to challenging situations in their life. They should extend these procedures to new environments (e.g., different classes, at home, in the student’s workplace). Teaching students to self-implement meditative practices through a phone or tablet increases this intervention’s age appropriateness by reducing adult intervention and utilizing tools that are available to every student.

Students who demonstrate challenging behavior in the classroom need effective interventions that reduce challenging behavior, foster their access to academic achievement, and help develop social and emotional relationships with their peers. Teachers, due to limited resources, need interventions that are non-invasive and do not require continuous monitoring and application. Meditation could offer a solution to both of these problems. However, more research needs to be established to determine meditation's impact on challenging behavior.

APPENDIX 1. EXAMPLE DATA SHEET FOR MEASURING RATE

Name: _____ Data Collector: _____

Date of Observation: _____

Operational Definitions of Challenging Behavior(s):

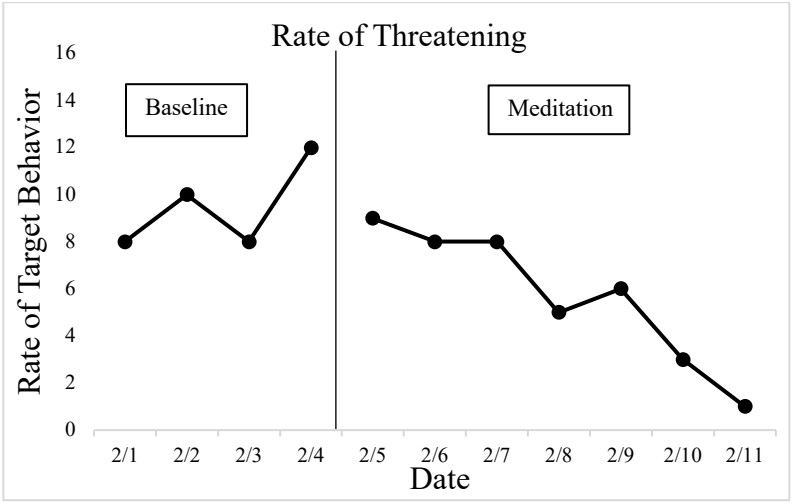
Example: *Threatening*	*Any instance in which Blanche responds to others with statements that indicate harm to others.* *Examples could include, "I'm going to throw this at you" or "I'll hit you if you don't leave me alone".*

Trial Number	Time	Total Time (minutes)	Activity	Frequency	Total Frequency	Rate
Ex:	***8:00-9:00***	***60 m***	***Reading independently***	𝍸 |	***8***	***0.13***
1						
2						
3						
4						
5						
Average all rates in the last column together by adding the total and dividing by the number of trials data were collected for (e.g., 5).						

For finding rate:

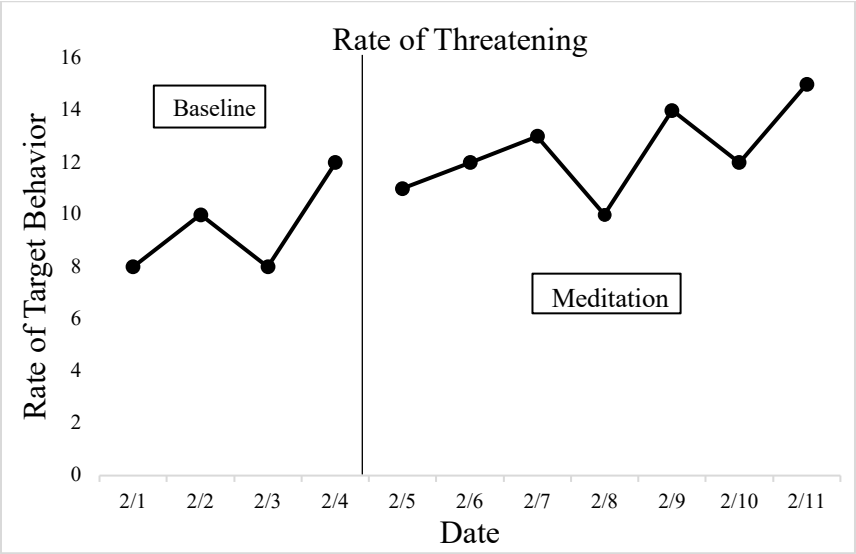
Total frequency / Total Time

APPENDIX 2. VISUAL ANALYSIS FOR THERAPEUTIC TREND



Data paths that show improvement in your target behavior would represent a therapeutic trend in data (Ledford & Gast, 2018). If the target behavior is challenging behavior (e.g., threatening others), you would hope to see the rate of that behavior decrease during intervention conditions (see graph presented above for visual representation). If your data path is therapeutic, you do not need to make modifications to the treatment and continue providing it as long as you continue to see therapeutic results.

APPENDIX 3. VISUAL ANALYSIS FOR CONTRA-THERAPEUTIC TREND



Data paths that demonstrate worsening in your target behavior would represent a contra-therapeutic trend in data (Ledford & Gast, 2018). If the target behavior is challenging behavior (e.g., threatening others), an increasing data path would be considered a worsening and contra-therapeutic outcome (see graph presented above for visual representation). After consistent contra-therapeutic results (i.e., at least 3 data points of increasing or steady data), implementors should consider making modifications to the independent variable that could support results (e.g., providing the student a quiet space, adding noise-cancelling headphones) or selecting a new intervention.

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EMPLOYMENT

University of Kentucky College of Education

Teaching Assistant

September 2018-May 2020

Bluegrass ADD

CLS Provider

June 2018- December 2019

Blue Sprig INC.

Formerly, Verbal Behavior Consulting INC.

Registered Behavior Technician

July 2017-June 2018