THE EFFECT OF ALTERNATIVE SEATING AND CHOICE-MAKING OPTIONS ON TASK ENGAGEMENT AND PROBLEM BEHAVIOR

by

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(Under the Direction of Kevin Ayres)

ABSTRACT

Sensory Integration Therapy (SIT) is commonly used to target sensory issues associated with Autism Spectrum Disorder (ASD), even though it is not empirically supported. Alternative seating options are one type of SIT used in classrooms that attempt to try to improve academic scores and task engagement. Schilling and Schwartz (2004) researched the effect of therapy balls on task engagement. Results demonstrated significant increases in engagement, but the study had methodological flaws. The present study examined effects of alternative seating on task engagement and problem behavior with three participants with ASD in a classroom setting. For two participants, results suggest little to no differentiation in task engagement and problem behavior between conditions. Results from one participant indicate a significant decrease in task engagement and an increase in problem behavior during the alternative seating condition. Future research should further examine the effects of alternative seating options before they are used in classrooms.

INDEX WORDS: environmental arrangement, alternative seating, task engagement, autism

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CHAPTER 1

Introduction

The American Psychiatric Association's Diagnostic and Statistical Manual, Fifth Edition (DSM-5) includes hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment in the diagnostic criteria for Autism Spectrum Disorder (ASD) (American Psychological Association, 2013). Traditional behavior interventions for ASD focus on the function of the behavior rather than sensory issues. Some researchers argue that typical interventions for ASD ignore sensory issues and that this can lead to poor attending (Ayres, 1972). Ayres (1972), hypothesized that an intervention focused on enhancing sensory integration would improve academic scores. Ayres (1972) developed an intervention called sensory integration therapy (SIT) that was meant to treat sensory issues. SIT varies for each child but consists of motor movements that researchers hypothesize stimulate and help the brain integrate senses (Ayres, 1972). Ayres (1972) found a statistically significant difference between the academic scores of the experimental and control groups, with the group receiving SIT making greater academic gains.

More recent studies have examined different types of SIT and used other outcome measures. Schaaf et al. (2014), researched an intervention for sensory difficulties in children with ASD that included motor activities such as swings, large balls, and a climbing wall. The researchers found an increase in the rating scale scores for goal attainment and functional skills within the experimental group receiving the sensory intervention when compared to the control

group. Schaaf et al. (2014), suggests future research should focus on direct observable outcome measures and not rely solely on rating scales.

Ashburner et al. (2014), responded to Schaaf et al. (2014) by pointing out some limitations and recommendations for future research. Ashburner et al. (2014) mentioned that the parents were not blind to the intervention which could have biased the rating scale. Another issue that the researchers mention was that the control group in the Schaaf et al. (2014) study was not the same for all participants. The control group received "treatment as usual," which consisted of ABA and speech language therapy, but not all participants received the same interventions. Ashburner et al. (2014) suggest that a comparison intervention is needed in order to attribute the outcome to the sensory intervention rather than any intensive therapy.

There have been multiple systematic reviews of SIT that have had mixed results. Researchers of one systematic review examined 25 studies and concluded that there were no consistent positive effects when using SIT (Lang et al., 2012). The researchers of this systematic review suggested that there was insufficient evidence to support the use of SIT as an intervention for children with ASD (Lang et al., 2012). These researchers conclude that professionals should not use SIT because of the lack of scientific evidence and current laws mandating the use of evidence-based interventions (Lang et al., 2012). In a more recent systematic review of SIT, researchers only found three studies using SIT that met their requirements (Schoen et al. 2019). The requirements for inclusion in the systematic review focused on the participants having sensory deficits and the sensory intervention itself rather than focusing on high quality research methodology. The researchers concluded that SIT should be considered an evidence-based practice and recommend the use of SIT for children with ASD between the ages of 4-12 (Schoen et al., 2019). However, the researchers chose the study by Schaaf et al. (2014) and two other

studies that had methodological flaws. All three studies used rating scales as outcome measures and either had no fidelity measure or did not collect sufficient data on fidelity.

A specific type of SIT used in classrooms is alternative seating, typically in the form of therapy balls or cushions. There are a few studies where researchers changed the classroom environment by adding therapy balls or cushions and examined the effects on behavior (Seifert & Metz, 2017) (Schilling & Schwartz, 2004) (Sadr et al., 2015). Seifert and Metz (2017), examined the effect of inflated cushions on engagement in a preschool classroom with typically developing children. The researchers used a rating scale to measure engagement and found statistically significant improvements in two of the five subscales. The findings also showed no negative effects on the other three subscales. The researchers suggest these results support use of the intervention in preschool classrooms. The study did have some limitations, including missing data because of technical difficulties with cameras. Another limitation is that researchers conducted the study during an optional instructional time, which could have affected the sample of participants.

Researchers have also examined alternative seating in special education classrooms. Schilling and Schwartz (2004), examined the effects of alternative seating on classroom behavior of young children with ASD. The researchers used a preschool classroom consisting of four males with ASD from 3 to 4 years old. Researchers had the participants sit on a commonly used seating device (chair, bench, or floor) during the control condition and on therapy balls during the intervention phases. The researchers focused on in-seat behavior and engagement in appropriate classroom activities using direct observable outcome measures instead of rating scales (Schilling & Schwartz, 2004). The researchers found improvement for in-seat behavior and engagement across all four participants. The researchers also collected social validity data by

giving a questionnaire for teacher preferences about using alternative seating, but the researchers did not collect data on student preference. Schilling and Schwartz (2004), hypothesized the therapy balls could have addressed some sensory deficits of the participants, which led to improvements in engagement. The results suggest that the intervention was effective, but the study had methodological flaws because the researchers did not collect sufficient inter-observer agreement (IOA) (Schilling & Schwartz, 2004). A study by Sadr et al. (2015), examined the effect of seat cushions and ball chairs on in-seat and on-task behavior of students with ASD. The researchers found increases in on-task behavior for all participants and found increases for both variables for four participants. The researchers conclude that the dynamic seating options increased on task behavior for almost all students with ASD (Sadr et al., 2015). However, the experimental design (A-B-A-C) did not allow the researchers to make this conclusion because it does not have enough replications to determine a functional relationship. Another limitation of this study is that the researchers did not collect sufficient IOA data.

Most of the previously mentioned research focuses on the effects of alternative seating on task engagement. One evidence-based practice for increasing task engagement is choice-making opportunities. Watanabe and Sturmey (2003), evaluated the effect of choice-making opportunities on task engagement of adults with ASD. The researchers examined task engagement during baseline with a fixed schedule of tasks and the intervention condition that allowed a choice of tasks. In the choice condition task engagement improved for all participants and was maintained over time (Watanabe & Sturmey, 2003). In another study, Dyer, Dunlap, and Winterling (1990) examined the effect of choice-making on problem behavior for three students with ASD. The researchers used a single case reversal design (A-B-A-B) and participants engaged in their chosen educational task or an educational task chosen by the experimenters. The

results suggested there was a reduction in problem behavior when experimenters gave participants a choice in educational tasks (Dyer et al., 1990). These two studies add to previous research and evidence that choice-making opportunities may be beneficial for increasing task engagement and reducing problem behavior. There is little research on choice-making opportunities when it comes to environmental arrangement, but one study added in a choice-making component to research on alternative seating to evaluate if having a choice on seating options would improve task engagement. Umenda and Deitz (2011), evaluated the effect of therapy cushions on in-seat and on-task behavior for children with ASD. The researchers also took data on seating preferences to examine student choice. One participant primarily chose the standard chair and one participant primarily chose the therapy cushion. Although the seating preferences were different the researchers did not find substantial changes on in-seat or on-task behavior between conditions with standard chairs and therapy cushions (Umenda & Deitz, 2011). Although the researchers collected IOA and procedural fidelity, they did not report what percentage of sessions IOA and procedural fidelity was collected. The researchers hypothesize that the therapy cushions used in the study did not provide enough sensory input. The researchers suggest using different alternative seating devices that can provide intense sensory input (Umenda & Deitz, 2011).

Most of the research on alternative seating used therapy cushions or balls. A similar alternative seating option is a wobble chair, a plastic stool that allows children to constantly move and stay active, which may provide more intense sensory input. Wobble chairs are sold without research supporting the claim that they improve focus by providing an outlet to move around (“Kore Kids Wobble Chair,” n.d.). Wobble chairs have appeared in the news, which

claimed wobble chairs improve students' attention, but the article does not provide a research study to support its claims (Light, 2016).

A survey of parents of children with ASD found the third most commonly used treatment for ASD was SIT (Green et al., 2004). The results of Green et al. (2004), suggest that professionals still use SIT even without scientific validation. The lack of experimental rigor and methodological flaws in most SIT and alternative seating research provides a need for high quality studies on alternative seating. The results of Watanabe and Sturmey (2003) and Dyer et al. (1990) add another research component with regards to choice-making opportunities. The purpose of this study is to examine the effect of wobble chairs on task engagement and problem behavior. The second purpose of this study was to examine the effect of student choice on task engagement and problem behavior.

CHAPTER 2

Method

Participants

Three, 6 years old students participated in this study. All participants were African-American males and diagnosed with ASD and a speech or language impairment. All participants were recruited from the same self-contained special education classroom and had previous experience with sitting in both traditional chairs and wobble chairs prior to the start of the study.

Spence had a minimally functional vocal repertoire that usually consisted of one or two words but would communicate with four-word sentences when given a model prompt. Spence engaged in aggression, disruption, elopement, and dangerous acts (DA) in the classroom. A differential reinforcement of alternative behavior (DRA) procedure was in place at certain times throughout the school day but was not in place during any sessions of this study. Spence's classroom goals included receptively identifying pictures of objects since he had mastered matching pictures of objects.

Dan engaged in minimal vocalizations and communicated through Picture Exchange Communication Systems (PECS). Dan engaged in aggression, disruption, elopement, and DA in the classroom. Dan's classroom goals included matching pictures of objects.

Nate engaged in minimal vocalizations and communicated through a device using a Language Acquisition through Motor Planning (LAMP) system. Nate engaged in aggression, disruption, elopement, and DA in the classroom. Nate's classroom goals included matching pictures of objects.

Setting and Materials

Setting. Sessions took place in the student's self-contained special education classroom in a public school. The classroom contained eight students and five staff members consisting of two certified teachers along with masters and doctoral students completing their practicum requirement. The room approximately measured 7.3 m by 5.4 m and contained six tables with traditional chairs. All sessions took place at the center of the classroom at a kidney shaped table. The student's chair was placed at the curved indent of the table and the experimenter was seated in a traditional chair to the left of the participant. The same experimenter conducted all sessions and a camera on the chair on the other side of the table recorded all sessions. Each session was conducted at the same time each day during the participant's Individualized Education Program (IEP) time, which consisted of working on each student's particular goals and targets.

Materials. The traditional chair approximately measured 45.72 cm x 44.45 cm x 60.96 cm. The wobble chair measured 34.29 cm x 34.29 cm x 30.48 cm. The experimenter used 30 laminated notecards with pictures of various community signs measured 7.62 cm by 12.7 cm for the work tasks. Participants had access to their regularly used communication device and their personalized token board during the study.

Dependent Variable and Measurement

The dependent variables were task engagement and rate of problem behavior. To capture task engagement, researchers measured the duration per session completing five discrete trials of identifying or matching community signs. The start of a trial was contingent on the participant meeting the definition of on-task behavior, which was defined as participant gaze oriented in the direction of the instructional materials. Problem behavior was measured by rate using the Countee application for iPhone (Peic & Hernández, 2016). The types of problem behavior

measured were aggression, disruption, elopement, and dangerous acts (DA). Researchers took a count of each instance of individual problem behaviors per session and divided the frequency by session duration to calculate rate. Researchers defined aggression as a participant's hand (open or closed fist) or foot comes into contact with another person from a distance of 6 inches or more (each hand or foot is one instance). Researchers defined disruption as a participant holding an item in one or both hands and releasing the item through the air a distance of 6 inches or greater (each item is one instance). Disruption was also defined as participant's hand, arm, foot comes into contact with surface from at least 6 inches away and makes an audible sound on the recording. Researchers defined elopement as participant moving more than an arm's reach from his seat (counted if student moves out of video frame). Elopement was also defined as participant's body going from standing or seated position to the floor. DA was defined as participant stands or climbs on furniture (chair or table).

Reliability. Researchers collected interobserver agreement for 40% of sessions across all conditions for all participants. The primary researcher trained masters student and doctoral students in special education as data collectors. The primary experimenter calculated interobserver agreement for the duration of each session by dividing the smaller duration by the larger duration multiplied by 100. The percent agreement for duration ranged from 92.5% to 100% and the mean was 98.5%. Interobserver agreement for problem behavior was calculated by dividing the smaller rate by the larger rate multiplied by 100. The percent agreement for problem behavior ranged from 92.3% to 100% and the mean was 99.5%.

Procedures

Procedures for each treatment condition were identical except for the change in seating arrangement. Researchers only conducted one session per day with each participant. Once the

participant was seated, the experimenter placed three community sign cards in an array on the table and stated, “Work time is starting in 3, 2, 1.” The countdown cued data collection to start. The experimenter began the session by verbally prompting the participant by saying, “look.” The experimenter would continue to verbally prompt the participant to look every 10 seconds if the participant did not meet the definition for on-task behavior. Once the participant engaged in the definition of on-task behavior, the experimenter placed the demand “match ____” or “touch ____.” The experimenter used a three-step prompting strategy for discrete trials throughout all condition (Tarbox, Wallace, Penrod, & Tarbox, J. (2007). The experimenter first gave a model prompt after 5-seconds if the participant did not respond or made an incorrect response matching or touching the correct community sign. The experimenter then physically prompted the participant if there was another incorrect response or no response. The experimenter only implemented three-step prompting for instructional trials and participants were not prompted back to their seat. Once a participant engaged in a correct response, the experimenter provided verbal praise and said “good job” or “nice work” while preparing for the next trial. The experimenter could only place one demand every 15 seconds in order to ensure the speed of demands was the same across conditions. Spence and Nate received one token per two correct responses and Dan received one token per correct response across all treatment conditions. Participants used this token economy system across activities in their classroom and received tokens on their usual classroom fixed ratio schedule during sessions for correct responses on verbal and model prompts. Participants could exchange tokens for reinforcers such as edibles (chips or candy) or a minute with an iPad. The duration of the session excluded any time with reinforcers.

Traditional Chair. Each session began with the experimenter placing a traditional chair at the kidney table and then bringing the participant to the table to sit down.

Wobble Chair. Each session began with the experimenter placing a wobble chair at the kidney table and then bringing the participant to the table to sit down.

Student Choice. Each session began with the experimenter bringing the participant to the table. The experimenter held a traditional chair in one hand and a wobble chair in another hand. The experimenter said, "Which do you want to sit on?" Once the participant walked to either the traditional or wobble chair the experimenter would say "nice choice." The experimenter then placed the selected chair at the table. If a participant did not make a decision or touched both chairs the experimenter would remove both chairs for five seconds, then represent the options to the participant until a selection was made.

Experimental Design

The experimenter chose an alternating treatments design to compare the traditional chair, wobble chair, and student seating choice. Although only one participant was needed for experimental control, three participants were used to improve external validity. The experimenter randomized the order of the three conditions with no condition repeating until all were conducted. Each participant had five sessions conducted for every condition.

Procedural Fidelity. The researchers measured procedural fidelity for 40% of sessions per condition for each participant. Researchers used checklists to collect fidelity data on the implementation of the condition procedures. Checklist items included using the correct chair for each condition and the experimenter waiting for task engagement before placing a demand. Procedural fidelity was 100% for all measured sessions throughout the study in each condition for each participant.

CHAPTER 3

Results

Task Engagement

The results for Spence in Figure 1 display the traditional chair condition as the lowest session duration and the wobble chair and student choice conditions with slightly higher levels. Although there is some differentiation in duration between conditions for Spence, there is no functional relation demonstrated because the differentiation between conditions is minimal. The results for Nate in Figure 2 indicate no differentiation between the conditions. There is a decelerating trend in all conditions. The results for Dan in Figure 3 suggest a functional relation between type of seating and task engagement. The traditional chair condition had consistently shorter durations with longer durations observed during both the wobble chair and student choice conditions.

Problem Behavior

The results for Spence in Figure 4 demonstrate a stable trend with zero instances of problem behavior in the traditional chair condition. The data from the wobble chair and student choice conditions suggest some variability, but the level is still low for all conditions. The results for Nate in Figure 5 show high variability and no differentiation among conditions. There were moderate levels of problem behavior for every condition and a functional relation between conditions was not demonstrated. The results for Dan in Figure 6 show clear differentiation and a functional relation between type of seating and problem behavior. There were stable levels of

zero instances of problem behavior during the traditional chair condition and low to moderate levels of problem behavior in the wobble chair and student choice conditions.

Student Choice

Spence and Dan chose the wobble chair 100% of the time during student choice condition. Nate initially chose the wobble chair during the student choice condition, but then switched to choosing the traditional chair. Overall, Nate chose the wobble chair for 40% of the student choice sessions and chose the traditional chair for the 60%.

CHAPTER 4

Discussion

Interventions targeted for sensory deficits for children with ASD are frequently used as an intervention even without quality evidence-based research supporting it. Much of the literature regarding sensory interventions have methodological flaws and lack experimental rigor. The researchers in the present study used an experimental design that could determine functional relations and collected sufficient IOA and procedural fidelity data in order to have strong internal validity.

The main findings of this study show that for these participants there was no improvement in task engagement or problem behavior. For Spence and Nate there was little to no difference in task engagement and problem behavior between conditions. It should be noted that, although anecdotal evidence, Nate rarely used either chair regardless of condition. Nate's problem behavior solely consisted of elopement and when tasked with matching community signs he would generally be standing instead of sitting. The results also show that for Dan there were adverse effects from using the wobble chair, which included longer session duration and increased rate of problem behavior. These results suggest alternative seating options could actually hinder academic performance and exacerbate problem behavior among children with ASD.

The secondary purpose of this study was to evaluate the effect of student-choice on task engagement and problem behavior. Spence chose the wobble chair for every choice session and showed little to no change in task engagement and problem behavior. Nate chose the wobble

chair for two sessions, then chose the traditional chair the last three sessions, and had little to no change in task engagement and problem behavior. Dan chose the wobble chair for all student choice sessions which led to a decrease in task engagement and an increase in problem behavior. These results suggest student choice in seating may not improve task engagement or problem behavior and may even have adverse effects.

These findings contradict previous published research that indicated that alternative seating improved task engagement and other behaviors (Seifert & Metz, 2017) (Schilling & Schwartz, 2004) (Sadr et al., 2015). Positive publishing bias, the phenomenon that studies with positive results are more likely to be published than those with no significant or negative results, could be one explanation for the positive results among SIT research (Song et al., 2010). Another explanation could be methodological flaws or the use of indirect measures in some of the previous research on alternative seating.

The results of this study also add to previous research on choice-making and suggests that not all choice-making opportunities will increase task engagement. It is interesting to note that Dan consistently chose the wobble chair even though his performance was better with the traditional chair. These results suggest that performance will not increase solely because the student gets to choose the preferred seating method and could actually hinder performance. This has implications for future research to further examine different kinds of choice-making options and the effect on task engagement.

The results of this study provide skepticism for using alternative seating in classrooms. Studies with no significant or negative results should still be published to counter positive publishing bias. Overall, more research supporting alternative seating with high methodological

rigor is needed before considering to use alternative seating options in classrooms for children with ASD.

Limitations

There were a few limitations to this study including that the experimenter and data collectors were not masked to each condition's purpose. Procedural fidelity measures were used to limit this threat to internal validity. Another limitation was a potential testing threat where participants got accustomed to how the sessions were conducted which could have lowered session duration throughout the study. The alternating treatment design does not completely limit this threat but the effect would be seen in all conditions. A potential testing threat is seen in Figure 2 because each condition seems to have a decelerating trend as more sessions are conducted.

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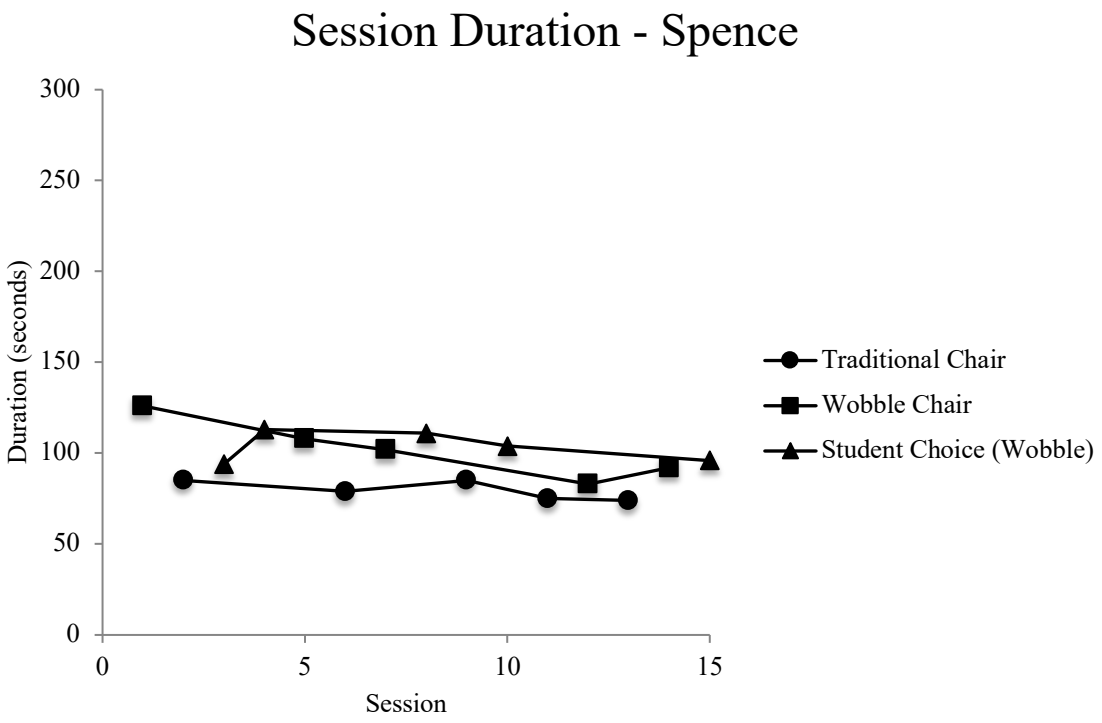

Figure 1. Duration (seconds) and session number for Spence across traditional chair, wobble chair, and student choice conditions.

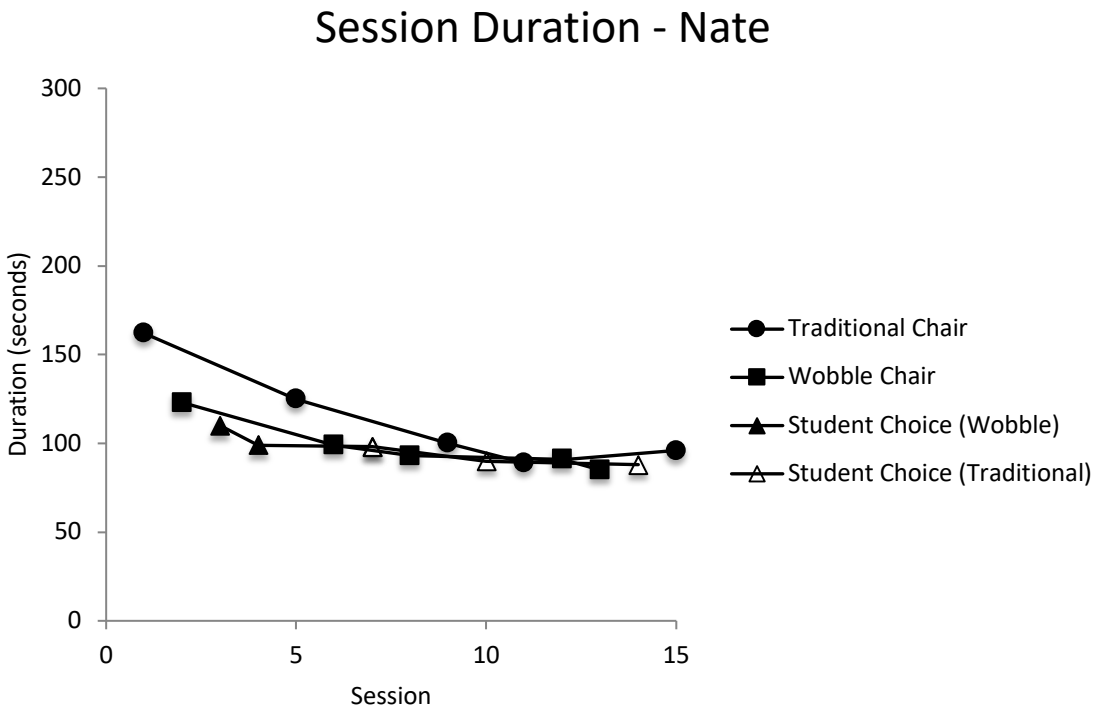

Figure 2. Duration (seconds) and session number for Nate across traditional chair, wobble chair, and student choice conditions.

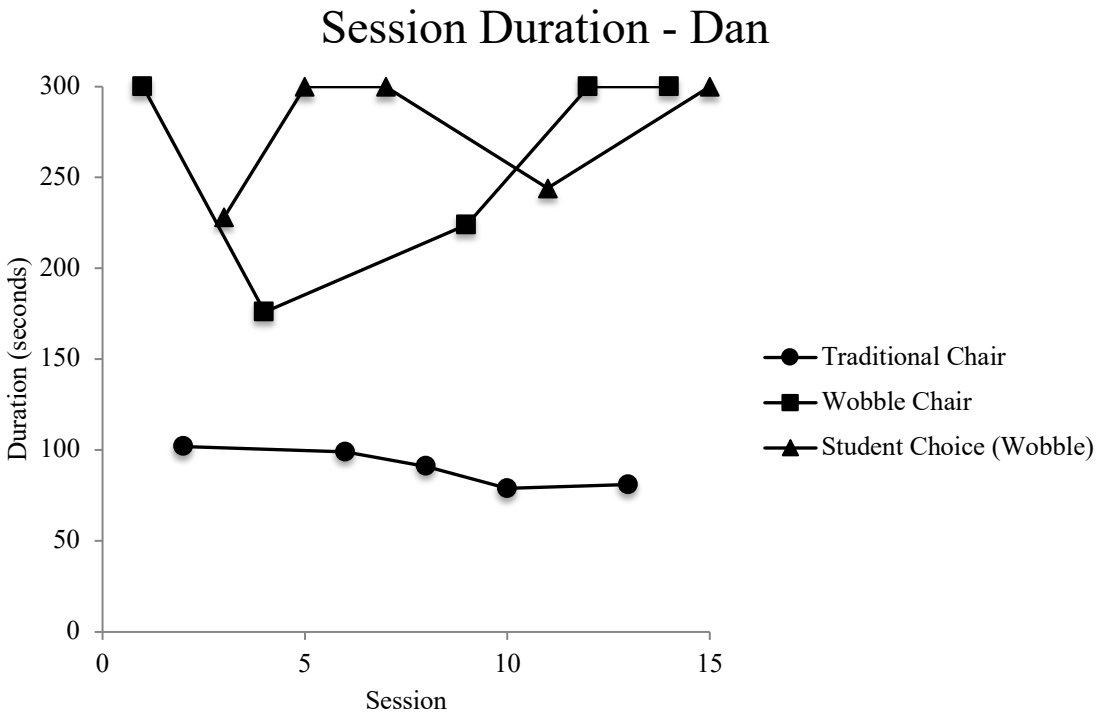

Figure 3. Duration (seconds) and session number for Dan across traditional chair, wobble chair, and student choice conditions.

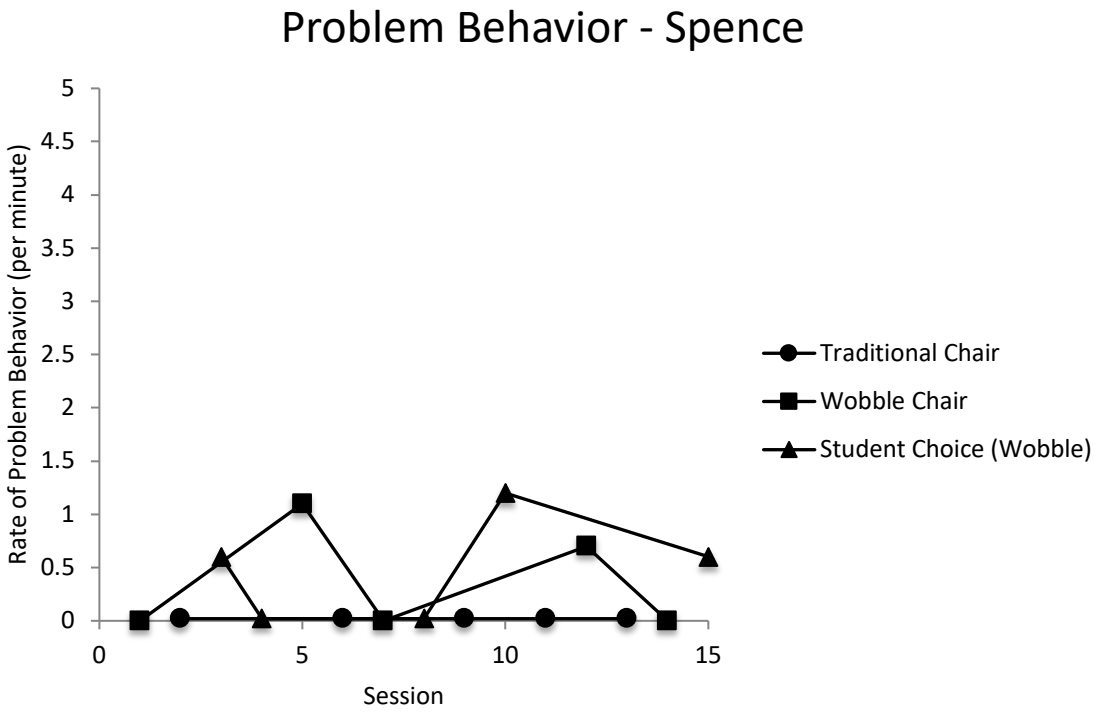

Figure 4. Rate of problem behavior and session number for Spence across traditional chair, wobble chair, and student choice conditions.

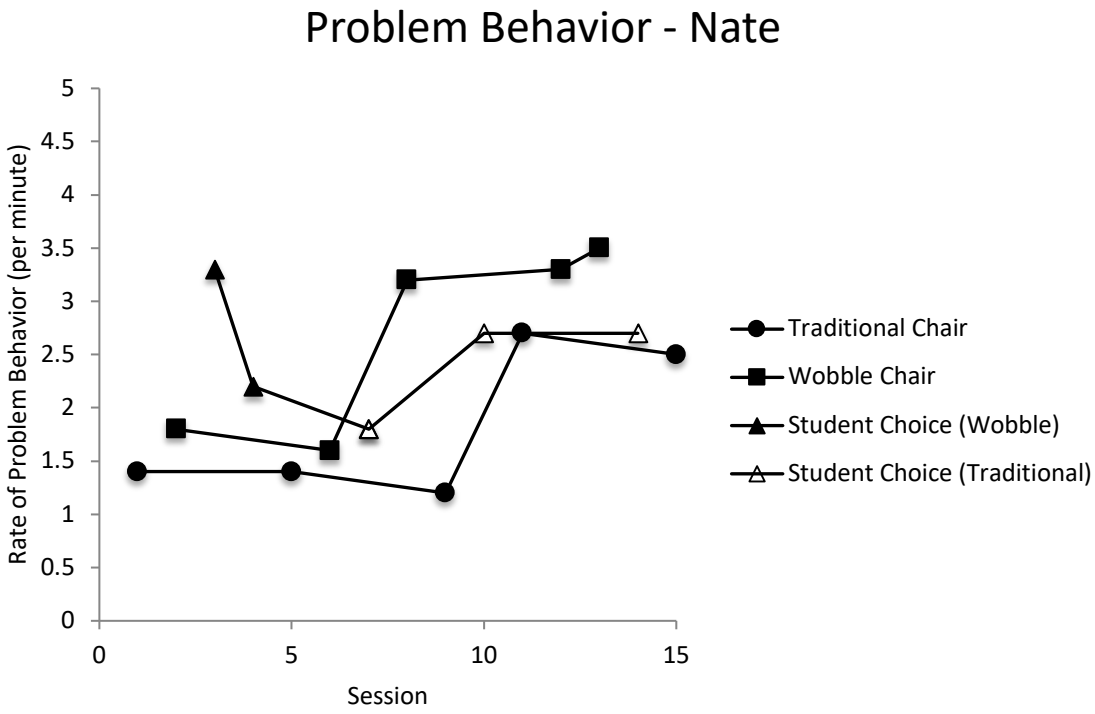

Figure 5. Rate of problem behavior and session number for Nate across traditional chair, wobble chair, and student choice conditions.

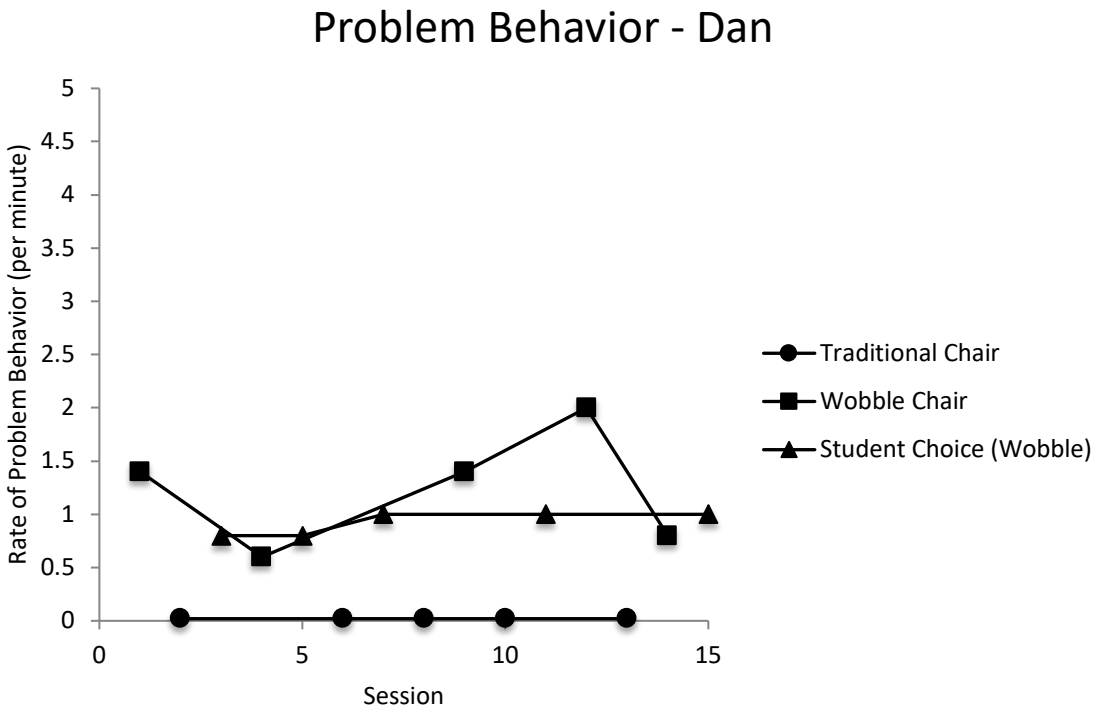

Figure 6. Rate of problem behavior and session number for Dan across traditional chair, wobble chair, and student choice conditions.