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Program Evaluation of the Impact of Sensory Room Interventions on Student Readiness in

Muskegon County

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Abstract

Aim: This study is a program evaluation of four different sensory rooms in the schools within Muskegon County Northern Service Unit (NSU) to uncover the benefits of sensory interventions on students' school readiness.

Methods: Grand Valley State University occupational therapy students analyzed data from the school occupational therapists to promote evidence based practice of this program.

Results: Within this program, sensory interventions increased students' school readiness.

Conclusion: Outcomes indicate that the primary means of increasing students' school readiness include transitioning to an active activity following sensory interventions and participating in multiple stations. Results are not generalizable to other programs.

Introduction

Currently in Muskegon County, MI, 3,807 students are receiving special education services, which represents 12.8% of the entire special education count in the state of Michigan (Michigan Department of Education, 2017). In order to establish a normalized response to sensory information for these students, sensory rooms can be utilized in school districts by occupational therapists. There is currently a lack of research on protocols for sensory rooms, including which types of activities and interventions work best to facilitate readiness during the school day.

According to the Individuals with Disabilities Education Act (IDEA), in order for a student to qualify for special education services they must meet one of the following eligibility requirements: Autism Spectrum Disorder (ASD), Cognitively Impaired (CI), Deaf Blindness (DB), Early Childhood Developmental Delay (ECDD), Emotionally Impaired (EI), Hearing Impaired (HI), Other Health Impairment (OHI), Physical Impairment (PI), Severe Multiple Impairments (SXI), Specific Learning Disabilities (SLD), Speech and Language Impairment (SLI), Traumatic Brain Injury (TBI), and Visual Impairment (VI) (Michigan Department of Education, 2015). Any student with a diagnosis of one of the aforementioned eligibilities may benefit from sensory room interventions at his or her school to facilitate adapted responses related to sensory needs. It is projected that within the general population, about 5-10 percent of students may have sensory integration dysfunction (Roley, Bissell, & Clark, 2009).

Sensory integration dysfunction is also called Sensory Processing Disorder (SPD), and is defined as the inability to use information received through the senses in order to function efficiently in daily life (Kranowitz, 1998). For these students, it means there is a need for them to utilize a separate environment to engage in activities that will regulate their sensory processing during the school day and allow them to successfully access education through school activities. To address sensory processing issues in the school environment, occupational therapists evaluate and plan interventions to impact students' performance in school tasks and daily routines.

Literature Review

Sensory Processing

Although sensory interventions were first explained by A. Jean Ayres through the Sensory Integration Model in the 1960s, the use of sensory approaches has been further developed by Winnie Dunn. Dunn's Model of Sensory Processing was based on the hypothesis that there is a relationship between a person's nervous system operations and self regulation strategies (Dunn, 2007). This interaction led Dunn to identify four different categories of

sensory processing challenges to allow practitioners to have a greater understanding of the impact of sensory processing problems on participation and performance in everyday activities (Schell, Gillen, & Scaffa, 2014; Dunn, 2007). Based on the work of Ayres, Dunn, and other theorists, a sensory processing nosology was derived to create diagnostic categories of sensory processing disorder (SPD) (Schell, Gillen, & Scaffa, 2014). For the purposes of this project, the term sensory intervention will be used when describing the use of the sensory rooms.

The Person-Environment-Occupation Model

Occupational performance is a result of the dynamic relationship among people, the environments in which they live and work, and their occupations and roles (Law et al., 1996). The Person-Environment-Occupation Model (PEO) is based on the perceptions from the Occupational Therapy Guidelines for Client Centered Practice, and from environment behavior theories (Law et al., 1996). The occupational performance of students who utilize sensory rooms was observed through a PEO lens throughout this research study. The PEO model is appropriate to apply to the use of sensory interventions in the school context in order to contemplate the relationship between the student with his or her unique abilities, the school environment, and school occupations (Delpont & Hasselbusch, 2011).

Person. Students have many expectations to meet throughout their school day, including having sustained attention, demonstrating emotional regulation, maintaining an appropriate energy level, and having an understanding of where their body is in relation to others and their environment. Students with a sensory processing disorder display different person factors depending on their sensory pattern, which can prevent them from producing an adaptive response to sensory stimuli and affect their occupational engagement. The different patterns of sensory processing disorder include sensory modulation disorder (pattern of over-responsivity, under-responsivity, or sensory craving), sensory discrimination, and sensory based motor disorder.

Students who have sensory processing disorder may present themselves in ways that are misperceived by others. For example, a student who is over-responsive to sensory input and experiences responses that are higher in intensity and prolonged, may act more cautious and fearful, or more destructive and defiant than their peers (Ben-Sasson et al., 2009; Kranowitz, 1998). Additionally, when students are under-responsive, they may lack a response to stimuli in social situations throughout their school day, which can interfere with their self-esteem, learning, and participation, as well as alter others' perceptions of them (Baranek et al., 2006). According to Wuang et al., students who show an impairment in sensory discrimination may discern themselves as apathetic, less motivated, and disoriented (2008). Lastly, students with postural disorder, a subtype of sensory-based motor disorder, may have difficulties with planning, organizing and carrying out movements. This can cause students to become lonely if they are anxious or unable to partake in school day activities and lead to weakened emotional well-being (Kranowitz, 1998; Koenig & Rudney, 2010; Poulsen, Ziviani, Cuskelly, & Smith, 2007). A student who presents with any one of these sensory processing difficulties may benefit from the implementation of a sensory intervention protocol by a trained practitioner in a sensory room.

Education and Support Team. The education and support team in the school setting impact the way that students learn and participate during their school day. This team consists of teachers, substitute teachers, paraprofessionals, occupational therapists, physical therapists, social workers, and more. All of the aforementioned professionals must consult with each other to ensure that students with sensory processing needs are getting support in all environments during their school day to increase the student's participation in school day activities (Bodison &

Parham, 2018). Additionally, these professionals need to consult one another to discuss any possible factors that may be limiting the students school performance and participation. It is the role of occupational therapists to consult with parents and teachers to recommend ways that sensory experiences can be incorporated into daily routines.

Environment. Students have less control over their surrounding environment in the schools, which makes it more difficult for them to learn (Ben-Sasson et al., 2009). Typical school-day environments include the classroom, playground, lunch room, and bus, which encompass different social and physical components in areas of occupation such as education, social participation, self-care, and play.

Classroom setting. Students with SPD are known as learners with disabilities in regard to responding effectively to the demands made by a learning environment (Tsung-Yen & Ming-Shiou, 2016). Modern-day classrooms are frequently constructed with an overabundance of visual clutter and students are often seated in groups, which exposes them to unpredictable tactile input (Ashburner, Ziviani, and Rodger, 2008). In addition, excessive noise in modern-day classrooms can hinder academic performance for students who have difficulty processing information in noisy environments, increasing prevalence of the student underachieving academically (Anderson, 2001; Ashburner, Ziviani, & Rodger, 2008).

Playground setting. The playground is a critical environment for students' social participation. Playground activities can lead to the development of a student's physical, cognitive, and social skills, and observing students' play at recess can reflect their level of development with these skills (Pellegrini & Smith, 1993). Research shows that students with suspected SPD were less sought out by their peers on the playground and more likely to have conflict, less likely to pick up on the social cues from others, and engaged in more immature play than their peers (Cosbey, Johnston, Dunn, & Bauman, 2012).

Sensory environments. Sensory rooms have become more prevalent throughout the last ten years as they provide students with sensory processing difficulties a place to go throughout the school day. These rooms are defined and labeled differently amongst different schools, but all create a therapeutic place for students who need sensory interventions. Schools refer to them as "motor rooms," "sensory rooms," or "multisensory rooms." While there is no universal definition for what a motor room is, a program called "Ready Bodies, Learning Minds" describes a typical motor room as "aiming to enhance learning readiness through engagement in certain movement activities that develop the reflex and sensory systems" ("What is the RBLM Motor Lab?," n.d.). The terms 'multisensory room' and 'sensory room' are often used interchangeably, both involving the use of visual, auditory, and kinesthetic modalities together in a calming environment where each student feels safe and can explore the space regardless of his or her limitations (Obaid, 2013; Says, 2013). These sensory environments are designed to stimulate and soothe emotions through the student's senses and can utilize a variety of different equipment to match the student's unique needs (Stephenson, & Carter, 2011).

According to Lucy Jane Miller, sensory rooms can have a significant impact on how a student's brain functions. Miller states that students who participate in sensory room activities have increased opportunities to extend attention because the task is fun and not work (Sensory Rooms Help Students Learn, 2011). Sensory rooms in schools provide students with a place to go when they are feeling overwhelmed with their school day routine and provide a safe place to help regulate restrictive or repetitive behaviors.

SAFE. Sensory environments can provide students the opportunities to engage in self-stimulating activities that help to regulate their nervous system (Smith, Press, Koenig, &

Kinnealey, 2005). Kranowitz (2006) states that all activities that are led within a sensory space must follow a SAFE protocol. SAFE means that all activities should be *Sensory-motor* to target the relationship between sensation and movement, *Appropriate* for the student's age and needs, *Fun* and student-directed, and *Easy* enough for the student to work towards success.

Occupation. Throughout the literature, themes transpired showing that sensory processing difficulties impact the students' occupations of education, social participation, and play participation. Typical school day occupations of a student include, but are not limited to, playing with friends, asking and answering questions in the classroom, writing at his or her desk, following the rules of the classroom, and listening to his or her peers. These typical occupations can be affected when other person and environmental factors impact occupational performance during the school day.

Academic work. Learning is dependent upon the ability to process sensation from movement and the environment and use it to organize behavior (Bundy & Murray, 2002). Difficulties in processing sensory information for students within a classroom setting directly correlates with the quality of their occupational performance, specifically regarding learning and behavior. Students with difficulties in processing sensory information are at an increased risk for learning disabilities and exhibit lower participation in school-related activities, as well as decreases in academic achievements (Koenig & Rudney, 2010). Students with sensory processing difficulties perform below average in spelling, reading, and writing tasks (Koenig & Rudney, 2010). Sensory interventions are able to effectively address and minimize the performance deficits supported by the literature in both academic and non-academic occupations and overall school function (Koenig & Rudney, 2010).

Non-academic work. Work outside of the classroom is just as beneficial and important for students as academic work in the classroom. Play is an important school-day occupation because it encourages learning and social participation among peers. Non-academic work includes recess, lunch, art, gym, and sensory room breaks, and requires that a typical student be able to focus and attend to the task at hand. Sensory interventions encompass activities such as play-doh, yoga, and crafting, which can be more challenging for students experiencing SPD. A systematic review on the performance challenges of children with SPD suggests that students who have trouble processing and integrating sensory input show diminished play skills and social participation (Koenig & Rudney, 2010). Play is crucial for all students, as it allows them to work towards healthy brain development and requires them to use creativity while developing their imagination, dexterity, and physical, cognitive, and emotional strength.

The literature proposes that students with motor disorders are at a high risk for significantly lower social participation rates. Poulsen, Ziviani, Cuskelly, and Smith (2007) found that boys with developmental coordination disorder (DCD) had lower participation in structured and unstructured physical play activities than boys without DCD. A study examining children's responses to sensory stimuli showed that students exhibiting the poorest social performance during play activities were those who had sensory over-responsivity (Hilton, Graver, & LaVesser, 2007). Conclusively, the literature shows that sensory processing difficulties can significantly obstruct student's school occupations of education, play, and social participation.

Research Question

The gap in research on sensory room use combined with the need for a specific protocol led the Muskegon County NSU occupational therapists and Grand Valley State University (GVSU) student researchers to develop the following research question: "Does the use of

sensory room interventions increase readiness for participation in school environments among k-12 students with sensory processing disorders?”

Methods

A mixed methods approach was taken to conduct a program evaluation of four sensory rooms in Muskegon County NSU. By combining qualitative and quantitative approaches, a greater and deeper degree of understanding is provided than if a single approach was taken (Almalki, 2016; McKim, 2017). The combination of approaches allows researchers to target information from multiple perspectives to facilitate understanding about multifaceted phenomena such as health, illness, and occupation (Mortenson & Oliffe, 2009). By using a mixed methods approach to determine the effect of Muskegon County NSU’s sensory rooms on student school readiness, the students’ occupations were analyzed with numerical and categorical data to fully understand the results and patterns that emerged. A concurrent nested design was used, meaning that qualitative and quantitative data was collected simultaneously (Creswell et al, 2003).

Procedures

An initial need for a program evaluation of sensory room interventions within the Muskegon County NSU was established by the three occupational therapists from the district. The occupational therapists reached out to graduate students at GVSU to facilitate the research process, and a review of literature was conducted to determine the current gap in the research. A first meeting between the occupational therapists, student researchers, and research mentor took place in Muskegon to establish documents and the procedure for data collection. The timeline of 6-12 weeks was agreed upon and the sensory rooms being used for the research within the NSU were discussed.

The three occupational therapists from the NSU recruited 1-2 students from each of their caseloads to participate in the program evaluation. Throughout the 6-12 week timeline, adult employees of Muskegon County NSU used the Data Collection Sheet (DCS) (See Appendix A) to document the students’ engagement in school activities before and after the sensory intervention, time spent in the sensory room, how many activities were completed, and any additional comments to be noted. Guidelines given to the adult employees involved in documenting the sensory room interventions is provided in Appendix C. Completed documentation was securely returned to the NSU occupational therapists who then de-identified all of the data and securely sent it to the student researchers at GVSU. Following this 6-12 week period of data collection, the survey created by the student researchers, found in Appendix B, was administered online through SurveyMonkey to all adult employees involved in monitoring the students in the sensory rooms.

Informed consent. The occupational therapists within the Muskegon County NSU and adult employees working with the students in the sensory rooms were the only individuals to have contact with the students. GVSU occupational therapy student researchers received all of the de-identified DCS with no confidential information pertaining to the students. Prior to participating in the survey, the adult employees provided their consent by agreeing to the terms on the consent form (See Appendix B).

Participants

A sample population of six students within the Muskegon County NSU receiving special education services were recruited for participation in this program evaluation. The students’

eligibilities for services included: Autism Spectrum Disorder (ASD), Emotional Impairment (EI), Early Childhood Development Delay, and Other Health Impairment (OHI) of Attention Deficit Hyperactivity Disorder (ADHD). The students' grade level ranged from kindergarten to third grade during the time of data collection, and all students used the sensory rooms for a client-centered therapeutic intervention determined by the occupational therapist. These interventions included the implementation of a movement break or self-regulation activities for each individual student.

Inclusion Criteria.

1. The student had a current IEP within the school district.
2. The student had to be currently participating in sensory interventions in the chosen sensory rooms.
3. An adult employee agreed to complete required data collection forms to collect research.

Exclusion Criteria.

1. The student did not have a current IEP within the school district.
2. There was no documentation of a student's sensory processing issue.

Instrumentation

Data Collection Sheet. Throughout the data collection process, two tools were used. First, during the 6-12 week data collection period, the adult employees implementing the sensory room interventions completed the Data Collection Sheet (DCS). The DCS allowed the adult employees to document what the student was participating in before the sensory room intervention, as well as rate his or her level of engagement in that activity on a Likert scale (1=not at all engaged, 5= fully engaged). The same steps were taken after the sensory intervention when the student returned to his or her school day activities. During the sensory intervention, the adult employees recorded the start and end time of the intervention, as well as how many stations the student completed during that time. The DCS also provided additional space for any comments. Reliability and validity for this tool have not yet been established due to the fact that it was created by the occupational therapists at Muskegon County NSU and is not generalizable to other programs.

Survey. An electronic survey was created by the GVSU student researchers using the SurveyMonkey program. After the 6-12 week data collection period, the adult employees who implemented the sensory room interventions received an email with a survey consisting of qualitative and quantitative questions. The questions included in this survey were developed through collaboration between the student researchers and their mentor, as well as the GVSU Statistical Consulting Center (SCC). A reminder email to complete the survey was sent directly from student researchers to the adult employees two weeks after the initial survey was received. A second reminder email came from the occupational therapists at the NSU four weeks from when the initial survey was delivered.

Data Analysis

GVSU student researchers collaborated with the GVSU SCC to analyze the quantitative data. The Statistical Package for the Social Sciences (SPSS) software package was used to analyze the data using Generalized Estimating Equations (GEE). The GEE demonstrated the impact of each dependent variable on the student's school readiness, and provided a depiction of how time, pre/post activity, and number of stations completed all led to a change in school readiness after sensory room participation.

Student researchers analyzed the qualitative data through individual coding and group theming the data collected in the comments section of the DCS. While the survey intended to collect additional qualitative data was distributed to adult employees who completed the DCS for student participants, only one survey was completed, so the data was not used.

Results

Quantitative Results

The goal of quantitative research is to provide data that will inform a certain phenomenon, statistic, or correlation between two groups (Taylor, 2017). This type of research is relevant for the current program evaluation as it shows the differences in school readiness among the participants based on both the level of engagement and the number of activity stations they participated in during sensory interventions. Specifically, the differences between the post and pre-engagement scores are illustrated in a bell-shaped curve and demonstrate that on average, students were more engaged in classroom activities following sensory room interventions (Figure 1).

Analysis of GEE Parameter Estimates (Figure 2), demonstrates that each variable was tested individually while all other variables remained controlled. All data was shown to be a significant factor on students' engagement, except for the time that the student was in the sensory room. Before analyzing data, activities that students were participating in both prior to and after the sensory break were categorized into both stationary and active activity subtypes (i.e. reading [S] & recess [A]). As shown in the output, a student was likely to be .56 more engaged (on a 1-5 scale) if they participated in an active task after completing the sensory room break. For every additional station completed in the sensory room, the student was likely to be .062 more engaged (on a 1-5 scale). Analysis also demonstrated that students were more engaged after participating in the sensory room break by an average of .67 (on a 1-5 scale).

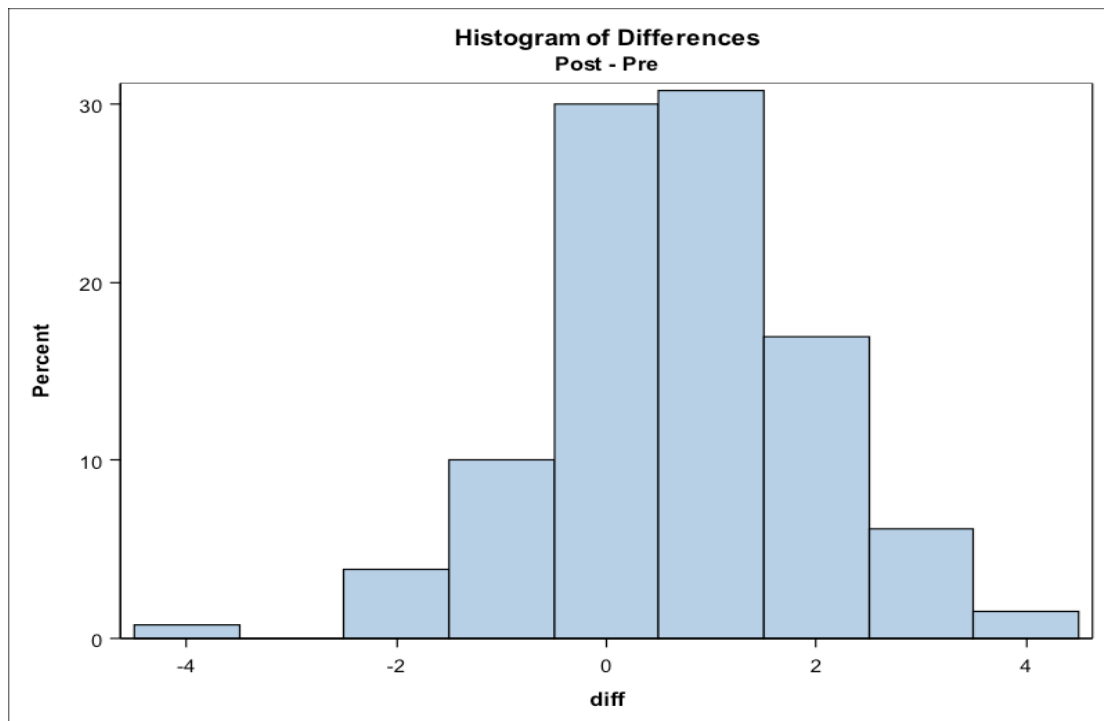


Figure 1. *Histogram of Differences.*

Analysis Of GEE Parameter Estimates						
Empirical Standard Error Estimates						
Parameter	Estimate	Standard Error	95% Confidence Limits		Z	Pr > Z
Intercept	2.3700	0.4682	1.4524	3.2876	5.06	<.0001
Active Activity Following Break	0.5600	0.1827	0.2018	0.9181	3.06	0.0022
Stationary Activity Following Break	0.0000	0.0000	0.0000	0.0000	.	.
Post Sensory Room Break	0.6756	0.1175	0.4454	0.9059	5.75	<.0001
Pre Sensory Room Break	0.0000	0.0000	0.0000	0.0000	.	.
Time spent in room	0.0276	0.0247	-0.0209	0.0761	1.11	0.2650
# of Stations Completed	0.0620	0.0299	0.0033	0.1206	2.07	0.0383

Figure 2. Analysis of GEE Parameter Estimates.

Qualitative Results

Qualitative research aims to discover meanings, beliefs, and values of the participants as well as different perspectives of people, groups, and organizations in various social settings and cultures (Taylor, 2017). The goal of qualitative research is to bring out the everyday lived experience of the participants to gain a better understanding of different viewpoints (Taylor, 2017). This type of research is relevant for the current program evaluation to add to the quantitative data and create a mixed methods approach to enrich the data collection process. The qualitative data used in this study was collected from the comments section on the DCS pertaining to the experiences each student had in the sensory room. All comments were recorded and themed by the student researchers and three main themes emerged. Themes include: “sensory room non-use,” “positive impact on occupational performance,” and “negative impact on occupational performance” (see Figure 3).

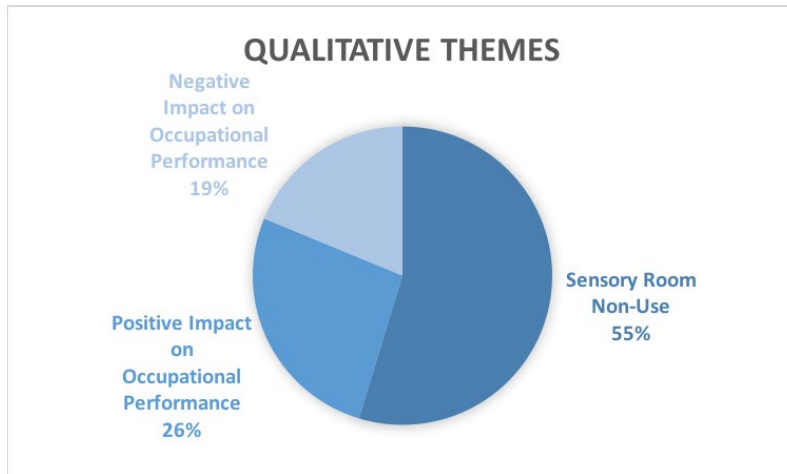


Figure 3. Themes of Data Collection Sheet Comments.

Theme:	Sensory room non-use		
Subtheme:	<i>Absent</i>	<i>Chose not to attend</i>	<i>Alternative activity</i>
Comments:	“Absent from school” “No motor room today”	“Chose not to go, not feeling well” “Would not go to motor room - didn’t want to do anything today”	“No motor room today, did play doh though” “Worked through break time”

Figure 4. Example Comments from the “Sensory-Room Non-Use” Theme.

The “sensory room non-use” theme was further broken into three subthemes: absent, chose not to attend, and alternative activity (Figure 4). This theme emerged as a result of multiple comments indicating that the student was absent from the sensory room on that particular day due to various reasons represented by the subthemes.

Theme:	Positive impact on occupational performance	
Subtheme:	<i>Preferred activity</i>	<i>Positive benefits of participation</i>
Comments:	“Loves yoga, totally participated” “Loved motor room today”	“Great time, more focus afterward” “Continued at a 5 following recess as well”

Figure 5. Example Comments from the “Positive Impact on Occupational Performance” Theme.

The “positive impact on occupational performance” theme was further broken into two subthemes: preferred activity and positive benefits of participation (Figure 5). This theme was chosen each time a comment was made that described a positive impact on occupational performance due to various factors represented by the subthemes.

Theme:	Negative impact on occupational performance			
Subtheme:	<i>Mood</i>	<i>Attention</i>	<i>Schedule</i>	<i>Teacher</i>
Comments:	“Having an off day” “Wasn’t feeling well”	“Hard time redirecting today - better after lunch” “Hard time getting back”	“First day back from break, focus was difficult”	“Sub teacher class was all off today” “2nd day with sub teacher, hard to focus”

Figure 6. Example Comments from the “Negative Impact on Occupational Performance” Theme.

The “negative impact on occupational performance” theme was further broken into four subthemes: mood, attention, schedule, and teacher (Figure 6). This theme was chosen each time a comment was made that described a negative impact on occupational performance due to various factors represented by the subthemes.

Discussion

The main purpose of the current program evaluation was to determine if the use of sensory room activities/protocols increase readiness for participation in school environments among K-12 students with sensory processing needs. Results suggest that sensory room interventions have a positive impact on students’ level of engagement in the school environment, and that there are a variety of internal and external factors that impact students’ desire to participate in sensory room interventions. Results also suggested that when students transition to an active activity after the sensory room break they, on average, present with a higher level of school engagement. Lastly, a greater number of stations completed in the sensory room had a positive correlation with an increase in school engagement.

Positive Impact on Occupational Performance

Results suggest that there are many factors that contribute to a positive occupational engagement in the sensory room and the school environment after a sensory intervention. These factors consisted of engaging in preferred activities in the sensory room, transitioning to an active school activity after the break, and an overall positive mood. As shown in Figure 1, students who participated in an active activity following their sensory intervention remained more engaged. Many of the activities classified as active were non-academic specials within the school such as music, library time, recess, etc. Due to these being special activities, these could have been preferred activities of the students, therefore increasing their engagement levels. Previous studies agree with these results. A study by Obaid (2013) revealed the importance of having materials relatable to each student’s learning preference in order to achieve the best sensory intervention outcomes for students involved in sensory room activities.

Research also shows that the most positive outcomes in a student’s ability to learn are when concepts in the classroom are presented in a variety of ways, allowing the student to gain understanding and experience throughout the learning process (Obaid, 2013). This relates back to the findings of the present program evaluation that demonstrated the positive impact on level of engagement of participating in more sensory room stations during the students break. Lucy Jane Miller states that students who attend and participate in sensory room activities have increased

opportunities to extend their attention due to the tasks required being fun and not considered work (Sensory Rooms Help Students Learn, 2011). This could have been a factor of the increased level in engagement when the students returned to their classroom from sensory interventions. The results of this research also lead back to the SAFE protocol suggested by Kranowitz (2006) of having activities that are sensory-motor, appropriate for the students age, fun, student-directed, and easy enough for the student to reach success. When a student enjoyed a sensory room activity, as reported within the comments on the DCS, that positive response to the activity may have led to the student staying more engaged after the sensory intervention.

Negative Impact on Occupational Performance

Findings in the present study also revealed that there were a variety of negative impacts on a student that may have led to a decrease in their school engagement after sensory room breaks. Students who weren't feeling well, had a change in their schedule, or were in an overall bad mood did not show improvements in school engagement after sensory interventions. Additionally, when students transitioned to stationary activities after their sensory room break, such as math or reading in class, they were not as engaged as the students who transitioned to the active activities. Past research shows that if the activities within sensory rooms do not reach the threshold of awareness a student needs to process the sensory information, they will appear uninterested or lethargic, as it is not meeting his or her needs (Schoen, Miller, Brett-Green, & Nielsen, 2009). Additionally, physiological stress impedes daily participation of students with sensory needs, which may stem from students having less control of their physical environment as it becomes more stimulating at school (Bodison & Parham, 2018; Ben-Sasson et al., 2009). Students who had a substitute teacher, a change in their schedule, or other external factors causing them to have an off day may have shown a decrease in engagement due to these environmental stressors.

Application to Occupational Therapy Practice/Administration/Education/Theory

The results of this program evaluation emphasize many important considerations for occupational therapy practitioners and school districts. This program evaluation can serve as a model for other occupational therapists to gather data and analyze the impact of sensory room use on classroom readiness. Due to the limited amount of current research in the field of occupational therapy on sensory rooms in schools, this research will contribute to the current body of knowledge. Conducting similar program evaluations can assist school-based occupational therapists with using evidence-based practice within their sensory rooms. Although the process of this program evaluation can be carried over to other school districts, the results cannot be generalized due to the fact that each school's program will be different, and every student with sensory needs differs as well.

Limitations

One limitation of this program evaluation is that the DCS utilized to gather information was created by the Muskegon County NSU occupational therapists and is not a standardized tool to measure the effect of sensory room activities on students' school readiness. The adult employees who utilized the DCS to gather information were trained by three different occupational therapists, which may have led to discrepancy in understanding concepts of the data collection tool. The tool's format was also a limitation of this program evaluation. While training was provided, the DCS did not provide any guidance for the comment section, and there was

no standardization to the adult employees' rankings of the students' post-engagement level after the sensory room intervention. Having the teacher complete the post-engagement section of the DCS after a specific time period may have provided more accurate data.

Additionally, the survey that was distributed to the adult employees was only returned by one individual who provided data that was unusable in the current evaluation. Distributing the surveys at the end of the school year may have been a limitation due to the adult employees preparing for summer break. If more surveys were returned, researchers would have been able to gather more information about the DCS and the impact of sensory interventions.

The sample of students included in this study is also a limitation. All of the students were males and in grades Kindergarten- third grade. The data set is not an inclusive representation of female students and students grades 4-12. There are also many variables that cannot be controlled with students who have various sensory needs, which limits the ability of the results to be generalized to other populations of students.

Suggestions for Further Research/Modifications

Researchers may decide to also evaluate the effectiveness of specific equipment used in a sensory room. Future research that studies the effect of sensory room equipment will produce more generalizable data, as well as provide more guidance on what activities and equipment to utilize in the sensory room to meet students' specific sensory needs. The effectiveness of sensory room equipment on student readiness could be studied by using the same pieces of equipment across different age groups, or with students who have the same diagnoses, and documenting the impact on school readiness. Various sensory room equipment can also be tested to target specific sensory needs of students, and results can be documented. Future research may use the current format of this program evaluation, but with a larger or more diverse group of participants. Collecting data on a greater number of students would further add to the body of research and indicate whether or not the program evaluation is useful. Lastly, providing training to staff prior to collecting data may be beneficial in receiving more relevant and useful qualitative data from the comment section on the DCS. It may also be helpful to alter the DCS to provide more guidance and structure for the individuals completing the form.

Conclusion

Overall, the significant results that were found in this study show that the sensory room protocols in place within the Muskegon County NSU increased students level of engagement after their sensory room interventions. While these results are not generalizable, this program evaluation can act as an example for occupational therapists who want to develop protocols for effective sensory room use in the school setting in order to increase students' school readiness. Further studies are needed using greater numbers of students, greater age ranges, and more rigorous methodology to test the effectiveness of specific protocols and sensory room equipment.

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Appendix A

Data Collection Sheet

Data Collection Sheet for Sensory Room Breaks

Building:

Student #:

Date	Classroom Activity Prior to Break	Break	Classroom Activity Following Break	Comments:
	Activity:	Start time: End time:	Activity:	
	Level of Engagement 1 2 3 4 5 (not at all) (fully)	Stations Completed: 1 2 3 4 5 6 7 8	Level of Engagement 1 2 3 4 5 (not at all) (fully)	

Date	Classroom Activity Prior to Break	Break	Classroom Activity Following Break	Comments:
	Activity:	Start time: End time:	Activity:	
	Level of Engagement 1 2 3 4 5 (not at all) (fully)	Stations Completed: 1 2 3 4 5 6 7 8	Level of Engagement 1 2 3 4 5 (not at all) (fully)	

Date	Classroom Activity Prior to Break	Break	Classroom Activity Following Break	Comments:
	Activity:	Start time: End time:	Activity:	
	Level of Engagement 1 2 3 4 5 (not at all) (fully)	Stations Completed: 1 2 3 4 5 6 7 8	Level of Engagement 1 2 3 4 5 (not at all) (fully)	

Appendix B

Survey for Adult Employees

Consent Form

The purpose of this research study is to determine the effect of sensory interventions used in four Muskegon County Northern Service Unit (NSU) sensory rooms on the student's level of school readiness. This is a research project being conducted by Grand Valley State University (GVSU) Occupational Therapy students in accordance with Muskegon County NSU occupational therapists. You are invited to participate in this research project because you are an adult employee within the Muskegon NSU who has been selected to administer and observe sensory interventions with the students involved in the study.

Your participation in taking this survey is voluntary, and you may choose not to participate. If you do decide to participate in this survey, you may withdraw from participating at any time and your responses will not be used.

The procedure involves filling out an online survey that will take approximately 15 minutes. All responses given will be confidential, and data will be stored in a password protected folder. The responses of this survey will be used for scholarly purposes only and may be shared with the GVSU Statistical Consulting Center the student researchers mentor.

If you have any questions about the research study, please contact Olivia DeWeerd (holwerdo@mail.gvsu.edu), Erica Roll (rolle@mail.gvsu.edu), or Emilie Sickles (sicklese@mail.gvsu.edu). This research has been reviewed according to Grand Valley State University IRB procedures for research involving human subjects.

By selecting the agree button below you indicate that:

- You have read the above information
- You voluntarily agree to participate
- You are at least 18 years of age and are an adult employee in the Muskegon County NSU

If you do not wish to participate in the survey, please decline participation by selecting the disagree button.

- Agree
- Disagree

Survey Questions

1. What is your job title?

2. How many years have you been working with children with sensory needs (Select one)?

0 1 2 3 4 5 6 7 8 9 10

3. How many students with sensory needs do you currently work with on a weekly basis? 0

1 2 3 4 5 6 7 8 9 10 more than 10

4. Describe a situation where the child had a non-optimal experience in the classroom following the sensory room intervention.

5. Describe a successful observation experience in the sensory room. Provide the child's eligibility criteria, and include what sensory stations were completed.

6. Were you given any specific training from the occupational therapists before implementing sensory room interventions?

7. If you received training, do you think it helped you complete your job duties?

8. How did you know when students were in need of a sensory room intervention?

9. To what extent did the Data Collection Sheet provided for you help you accurately document your observations? (0=not at all, 9= very helpful)

0 1 2 3 4 5 6 7 8 9

Appendix C

Sensory Motor Room Training

Purpose: Equipment and activities in the sensory/motor room are designed to help students regulate their nervous system to be ready to learn. Adult guidance and structure is necessary for this to occur.

Rules

1. Adult supervision is required at all times
2. If a student is not following directions and/or not being safe with the equipment, he/she needs to exit the room.
3. Typically breaks should last 10-15 minutes (refer to each student's individual plan.) This room is meant to help students organize sensory input in order to learn, not to avoid academic tasks.
4. Please reset each station so it is ready for the next person. (It is helpful to have the student reset the station themselves before moving on to the next; helps provide a pause between activities.)
5. For students requesting non-scheduled breaks during and academic activity, it's important for the student to return to the same academic activity briefly in order to prevent specific task avoidance.

Basic Procedure Information

1. Activities will change periodically, however some items will remain the same.
2. There will be directions and rules provided for each activity. Please review these before beginning an activity. Safety precautions will be listed as necessary. (i.e. Rock wall: no lanyards, jewelry, flip flops or boots. Feet must remain below the red line. No jumping down from wall.)
3. Athletic shoes are required when using the rock wall.
4. Student should spend approximately 2-3 minutes at each chosen station (This is a general guideline, and may vary depending on the activity.)

How To Effectively Complete a Sensory Break

1. Have students choose a variety of activities, unless otherwise directed by the occupational therapist.
2. If you observe the student's energy increasing, alternate between proprioceptive activities (heavy work, deep pressure) and movement activities.
3. When using the swing please note that rotational swinging can have a very STRONG impact on the nervous system, and can be cumulative. While many students enjoy swinging in

circles, encourage them to do linear, back and forth swinging instead, which is more organizing to the brain.

4. If students do complete rotational swinging, please ensure that they complete the same number of rotations in the opposite direction to help balance their vestibular system.
Please refer to the attached information on signs of sensory overload and strategies to offset.
5. End the break with at least one calming activity to ensure the student is ready to learn upon leaving the room. This could include deep breathing, yoga poses, steamroller, or activities from the “I Can Calm Myself” poster.

Sensory Overload

Signs of Sensory Overload

- Yawning
- Changes in skin color
- Headache
- Changes in heart rate or respiration
- Pupil dilation
- Prolonged dizziness
- Nausea

Offsetting Sensory Overload

- Override excessive vestibular stimulation with immediate vigorous, intensive, self-generated proprioceptive input
- Utilize intense physical activity as outlines below even if the student expresses a desire to lie down

Specific Strategies to Offset Sensory Overload

- Run, crawl, or jump vigorously around the room
- Place hands on head and press down while jumping in place and sucking vigorously with sealed lips (picture 1 below)
- Place ice cubes into the student’s hands, at the base of the skull, and on the temples
- Have student press into the crash pad or mat with entire body as hard as possible (picture 2 below)

Picture 1



Picture 2



Sensory Motor Room Data Collection Training

- Please use data collection sheet given by your therapist.
- Collect data for each break during the 8 week data collection period.
- Fill in the date and the start and stop times of the break.
- Fill in or circle which stations were completed during the break.
- Fill in the activity prior to and after the break.
- Use the likert scale to indicate the student's level of engagement in the activity within 15 minutes before leaving for the break and after returning from the break.
- A small space is provided for comments. Please use this area to describe noteworthy events, circumstances or difficulties like schedule changes, illness, etc..
- Return completed data sheets to student's Occupational Therapist.