University of Louisville
ThinkIR: The University of Louisville's Institutional Repository

Doctor of Nursing Practice Papers | School of Nursing

7-2021

# Implementation of sensory modulation for de-escalation on an adolescent, female psychiatric inpatient unit.

Heather Scott

Follow this and additional works at: https://ir.library.louisville.edu/dnp

 Part of the Nursing Commons

## Recommended Citation

Scott, Heather, "Implementation of sensory modulation for de-escalation on an adolescent, female psychiatric inpatient unit." (2021). *Doctor of Nursing Practice Papers.* Paper 118.
Retrieved from https://ir.library.louisville.edu/dnp/118

This Doctoral Paper is brought to you for free and open access by the School of Nursing at ThinkIR: The University of Louisville's Institutional Repository. It has been accepted for inclusion in Doctor of Nursing Practice Papers by an authorized administrator of ThinkIR: The University of Louisville's Institutional Repository. This title appears here courtesy of the author, who has retained all other copyrights. For more information, please contact thinkir@louisville.edu.

# Implementation of Sensory Modulation for De-escalation on an Adolescent, Female Psychiatric Inpatient Unit

by

Heather D. Scott

Paper submitted in partial fulfillment of
the requirements for the degree of

Doctor of Nursing Practice

School of Nursing, University of Louisville

July 28, 2021

Mary-Beth Coty Digitally signed by Mary-Beth Coty
Date: 2021.07.28 17:56:22 -04'00'

Signature DNP Project Chair Date

Sarah R Schirmer Digitally signed by Sarah Schirmer
Date: 2021.07.29 08:32

Signature DNP Project Committee Member Date

Signature DNP Program Director 8/12/2021
Date

Signature Associate Dean for Academic Affairs 8-12-2021
Date

**Acknowledgments**

I would like to recognize my committee chair, Dr. Mary-Beth Coty, and committee member, Dr. Sara Schirmer. Both graciously dedicated their time and knowledge, guiding me through the completion of this DNP project. I appreciate their support and encouragement.

I would also like to acknowledge the facility where I completed this project. Many of the key leaders were champions of this project from its beginning stages through its completion. A special thank you goes to the staff on the female adolescent unit. Their dedication to improving the lives of these female adolescents made this project a success.

Finally, I would like to thank my husband, Shane, and sons, Hayden and Andrew. Their love and support sustained me throughout this educational journey.

**Abstract**

**Background:** Epidemiological data suggested high rates of aggressive incidents involving adolescent patients occurred on inpatient psychiatric mental health units. To mitigate these incidents, mental health staff utilized de-escalation techniques to help alleviate distress, yet the data suggested many occurrences resulted in a seclusion or restraint event. Consequently, national healthcare entities and mental health organizations have advocated for eliminating seclusion and restraint practices due to their potential for re-traumatization, injury, or death.

**Purpose:** This evidence-based project aimed to increase nurses' self-efficacy when utilizing sensory modulation as a de-escalation technique for aggressive behavior to reduce the seclusion/restraint rate.

**Methods:** Mental health staff on a female adolescent inpatient psychiatric unit participated in an education session that reviewed the benefits of sensory modulation, the policy and procedure for the sensory room/cart, and the appropriate use of the sensory room/cart. A pre-test/post-test design evaluated the impact of the education session upon mental health staff's beliefs regarding sensory modulation and their self-efficacy in de-escalating agitated patients. After using a sensory cart for one month, the participants completed a second evaluation measuring the impact of the intervention on practice change.

**Results:** A convenience sample of mental health staff (N=22), mental health technicians, nurses, and therapists, participated in the education session and utilization of the sensory cart. A paired samples t-test evaluated the impact of the education session on participants' scores concerning their beliefs about sensory modulation and their self-efficacy related to de-escalation. The results showed the educational session had a statistically significant impact on staff's beliefs about sensory modulation and de-escalation self-efficacy, as evidenced by the increase in the mean scores on both the sensory beliefs survey and the Clinician Confidence in Coping with Aggression Instrument (CCPAI). Conversely, the follow-up evaluation showed a statistically significant decline in sensory modulation beliefs after one

month of using the intervention. Seclusion/restraint rates declined in the two months following implementation.

**Discussion:** The staff readily adopted the intervention and utilized the sensory cart for de-escalation on average once per day. The results highlighted the importance of providing a thorough education session regarding the benefits of sensory modulation and how to use the sensory cart to increase the self-efficacy of staff in using this de-escalation technique. Continued refinement of future educational sessions is needed to address staff concerns about the appropriateness of when to use the sensory cart. Additionally, it is uncertain of the long-term impact on seclusion/restraint rates from one month of data. A more extended evaluation period is needed to fully understand the effect of the intervention on seclusion/restraint rates.

***Keywords:*** sensory modulation, sensory room, sensory cart, comfort room, de-escalation, seclusion, restraint, inpatient psychiatric unit, adolescent female, self-regulation

**Table of Contents**

# Implementation of Sensory Modulation for De-escalation on an Adolescent, Female Psychiatric Inpatient Unit

## Background

Mental health professionals strive to maintain a safe and therapeutic milieu for their patients and colleagues. Nonetheless, aggression and violence still occurred at alarming rates, particularly in adolescent inpatient psychiatric units, with epidemiological studies suggesting adolescent aggression rates ranged from 23% to 33% (Baeza et al., 2013; Dean et al., 2008; Ryan et al., 2004). These acts of aggression included incidents where patients verbally and/or physically harmed staff, verbally and/or physically harmed peers, physically harmed themselves, and/or destroyed property (Panagiotou et al., 2019).

To provide a safe milieu, the Agency for Healthcare Research and Quality (AHRQ, 2016) suggested multiple strategies to de-escalate distressed patients. These techniques included supportive communication, one-on-one time with staff, self-time-out, or administration of pharmacological medications. The goal was to use the least restrictive approach possible, focusing on trauma-informed care and recovery-oriented care. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) defined trauma-informed care as:

> A program, organization, or system that is trauma-informed realizes the widespread impact of trauma and understands potential paths for recovery; recognizes the signs and symptoms of trauma in clients, families, staff, and others involved with the system; and responds by fully integrating knowledge about trauma into policies, procedures, and practices, and seeks to actively resist re-traumatization (p. 9).

Still, some acts of aggression required mental health staff to use seclusion/restraints (SR) to ensure the safety of all involved. The Centers for Medicare and Medicaid Services (CMS) defined restraint use as "any manual method, physical or mechanical device, material or equipment that

immobilizes or reduces the ability of a patient to move his or her arms, legs, body or head freely" (Condition of Participation: Patient's Rights, 2010, p. 10). The same code of federal regulations defined seclusion as "the involuntary confinement of a patient alone in a room or area from which the patient is physically prevented from leaving. Seclusion may only be used for the management of violent or self-destructive behavior" (Condition of Participation: Patient's Rights, 2010, p. 10).

## Significance

A systematic review examined the prevalence data of SR use among adolescents in psychiatric settings and found seclusion used for 26% and restraints used for 29% of the population (De Hert et al., 2011). Historically, staff and patients thought SR led to safer environments for all involved; however, research does not support this premise. Psychological harm, physical injuries, and death occurred in both staff and patients when utilizing SR techniques (Larue et al., 2013; Sailas & Fenton, 2000).

A Pulitzer Prize-winning exposé published in 1988 in the *Hartford Courant* underscored the dangers in the United States when using SR and was the impetus for federal legislation passed in 2000 restricting its use in federally funded psychiatric facilities (Weiss, 1998). As part of this seminal report, the news organization commissioned a statistical investigation from the Harvard Center for Risk Analysis and found between 50 to 150 deaths occurred annually following SR use in psychiatric facilities, with more than 26% of those deaths occurring in children and adolescents (Weiss, 1998).

More recent epidemiological findings from a systematic review indicated injuries continued to happen in 0.8% to 4% of physical restraint incidents (Kersting et al., 2019). While death is undoubtedly the most tragic outcome, a secondary effect involved patients who have experienced significant trauma in their lives who may be traumatized anew and experience further psychological distress associated with the use of SR measures (Bryson et al., 2017; Wong et al., 2020). According to SAMHSA (2010b), staff members are also affected negatively by SR use: lost time accidents from work, poor morale, and employee turnover frequently occurred in environments utilizing SR.

In 2003, SAMHSA and the National Association of State Mental Health Program Directors (NASMHPD) convened a national summit to discuss eliminating the use of SR (SAMHSA, 2010a). Proceedings from the conference led to the first time a federal agency called for the end of SR use. It is, likewise, the position of The Joint Commission (TJC) and CMS to reduce and ultimately eliminate the use of SR (CMS, 2006; TJC, 2019). However, despite federal regulations and calls for action from national mental health organizations, a systematic review of epidemiological findings indicated negative physical consequences from physical restraint continued to occur with a frequency ranging from 1 in 100 up to 1 in 25 for psychiatric patients (Kersting et al., 2019).

An emerging movement for behavior de-escalation is the use of sensory modulation. Sensory modulation is defined as a twofold process. "It originates in the central nervous system as the neurological ability to regulate and process sensory stimuli; this subsequently offers the individual an opportunity to respond behaviorally to the stimulus" (Brown et al., 2019, p. 521). Multiple sensory-based approaches have been utilized and include a sensory room, sensory cart, and sensory integration programs (Ma et al., 2021). Hulsegge and Verheul introduced the first sensory room at the Hartenburg Institute in the Netherlands in 1975 for people with profound physical and mental disabilities (Champagne & Stromberg, 2004). Since that time, occupational therapists have adapted the concept for psychiatric facilities allowing patients to have a space to explore the environment in terms of light, sound, touch, proprioception, taste, and aroma. The movement for incorporation of sensory approaches has grown so prominent that in 2006 the Massachusetts State Department of Mental Health included sensory approaches into the state's code of regulations as part of its licensure requirements for mental health facilities (Champagne, 2006).

Sensory rooms provide a dedicated space filled with multiple stimuli to help calm, center, and/or alert an individual to be more self-organized. Sensory room items include bubble tubes, image projectors, rocking chairs, bean bags, stress balls, weighted blankets/vests, music, tranquil lighting,

chewing gum, aromatherapy lotions and oils, and fidget tools (Seckman et al., 2017; Sivak, 2012). The intent of the room is to provide a therapeutic environment for patients to practice and learn how to become more self-regulating to reduce anxiety, aggression, and/or anger (Champagne, 2006).

Because of limitations of the physical environment and/or financial constraints, facilities have developed sensory carts allowing for more flexibility to utilize sensory modulation. A sensory cart is a mobile storage unit that contains many of the sensory items commonly found in a sensory room, such as tactile fidgets, calming music, aromatherapy items, weighted lap blankets, etc. Since mental health nurses and staff strive to promote a safe, therapeutic milieu free of trauma-inducing practices, sensory modulation, whether in the form of a sensory room or cart, provides an additional option for de-escalation for mental health staff.

## Literature Review

A literature search of the following databases, Cumulative Index for Nursing and Allied Health (CINAHL) with full text, PsycINFO, and Pubmed, was performed on July 5, 2021. Search terms used were: "sensory room" OR "comfort room" OR "sensory modulation interventions" OR "sensory cart" AND "mental health" AND "psychiat*." The search was further refined by limiting results to peer-reviewed and English language. Date time limits were set from 2000 to the current time frame to capture all relevant information to the topic. CINAHL returned 109 results, PsycINFO 91 results, and PubMed 97 results for a combined 297 references.

Next, the article titles and abstracts of the search results were reviewed for eligibility utilizing the following inclusion and exclusion criteria. Eligibility criteria included 1) inpatient psychiatric population and sensory modulation used as the intervention, and 2) all studies were level II or higher on the Johns Hopkins Nursing Evidence-Based Practice Levels of Evidence Scale (Johns Hopkins Nursing, n. d.). Exclusion criteria included articles related to 1) populations with cognitive disabilities, dementia, and autism spectrum disorders, 2) community health and school settings, 3) group sensory interventions,

and 4) Johns Hopkins Level III and IV evidence because these types of studies did not directly address questions of efficacy and effectiveness.

Once articles that had no relevance to the research topic and the duplicates were removed, 17 remained. These 17 studies described the implementation of sensory modulation and its statistical impact on reducing patient distress and SR rates. All studies were published within the past ten years, with the majority published in the past five, highlighting the topic's relevancy.

**Sensory Modulation Reduces Distress Levels**

Most of the sensory modulation research has occurred in adult populations utilizing sensory rooms. Only three studies evaluated the efficacy of sensory rooms in reducing distress levels, specifically in the adolescent population (Bobier et al., 2015; Seckman et al., 2017; West et al., 2017). These three studies demonstrated significant reductions in distress levels following sensory modulation. The researchers operationalized distress as those unpleasant feelings leading to aggression and disruptive behaviors. Because the instrument used to evaluate distress varied, direct comparisons were challenging. Two of the three studies measured distress in adolescents using a 0-10 visual analog scale, which was based upon the Subjective Units of Distress Scale (SUDS) along with pictorial adaptations to help characterize the level of emotion (Seckman et al., 2017; West et al., 2017). Seckman et al. (2017) reviewed adolescent sensory room sessions ($N$ = 65) and recorded entry and exit distress levels from a patient perspective and the staff perspective. The results showed a significant reduction in distress from pre-to-post sensory room usage from the patient perspective with a mean paired difference of 3.61 ($p \leq$ .05). Likewise, for the staff evaluation, the mean paired difference was 3.11 ($p \leq .05$).

West et al. (2017) reached the same conclusion using the same assessment instrument but refined the distress assessment process by utilizing an experimental group ($n$=56) and a control group ($n$=56). To control for staffing and milieu conditions, non-sensory room users were selected randomly by a computer-based program on the same day as sensory room users to create the matched control and

experimental groups. The random effects regression analyses showed significant reductions in distress from both the patient and clinician perspective for those in the sensory room group and had a large effect size (Cohen's *d* = 1.3). Furthermore, the researchers found that patients with a history of aggression showed greater levels of distress reduction, on average 4 points, following a sensory room session compared to users with no history of aggression, average 2.2 points. Thus, sensory rooms appear to be most beneficial for those with histories of aggression.

A third study focusing on the adolescent population used a different instrument to monitor distress levels from the clinician's perspective only (Bobier et al., 2015). Researchers used the validated Freemantle Arousal Scale, which measures arousal on a scale from 0, corresponding to sleeping, to 5, corresponding to highly aroused or violent (Bobier et al., 2015). Clinicians scored patients with a mean arousal level of 2.79 before sensory room use and a mean of 1.54 following sensory room use, corresponding to a significant decrease in distress level ($p$ = .000).

With limited data available for the adolescent population, studies in adult psychiatric inpatients also confirmed the benefits of sensory modulation for reducing distress. Two studies used a 10-point Likert scale rather than a visual analog scale to measure distress levels (Wiglesworth & Farnsworth, 2016; Novak et al., 2012). Wiglesworth and Farnworth (2016) recorded sensory room sessions ($n$=50) for a female-only forensic mental health unit. They found the most frequent stress reduction total was two points when comparing pre-sensory and post-sensory room utilization. Novak et al. (2012) reported similar results in reducing distress levels. When comparing pre-sensory and post-sensory room sessions ($n$=75) on an inner-city acute psychiatric unit comprised of adult men and women, the average reduction in distress was a statistically significant 2.3 points ($p$ < .001).

Knight et al. (2010) rated distress pre-sensory and post-sensory room usage using the Brief Psychiatric Rating Scale (BPRS). The researchers improved inter-rater reliability by offering training sessions on the usage of the BPRS until all staff was able to score within one point of one another on

training vignettes. Furthermore, the study included a control group that used traditional de-escalation techniques, which involved quiet time, one-on-one staff time, pacing, and increased supervision, compared to the experimental group, which utilized a sensory room. The results showed both the control group (*N*=36) and the sensory room group (*N*=24) had statistically significant improvements in pre-BPRS and post-BPRS scores ($p$ = .000). The authors indicated while sensory rooms did not show any superiority over traditional techniques in self-regulation, the benefit of sensory rooms was the development of personal empowerment to use sensory stimulation to self-soothe. Similarly, Smith and Jones (2014) conducted a mixed-method study after implementing a sensory room where patients in an adult male psychiatric unit (n=4) shared positive experiences regarding sensory room usage. Patients reported being able to relax, relieve stress, reflect, and meditate.

While the bulk of sensory modulation research has been conducted using sensory rooms, the literature endorsed the use of sensory carts if the facility cannot physically or financially support a sensory room. For example, Adams-Leask et al. (2018) utilized a sensory cart for adults (n=74) in the emergency mental health setting. The researchers found a statistically significant reduction in distress, measured on a scale from 0 to 10, with 10 being "extreme distress." Thus, the data suggested sensory modulation, whether offered as a sensory room or cart, was beneficial for psychiatric patients providing a non-pharmacologic option to become self-sufficient in regulating their emotions and subsequent behavior.

**Sensory Room Impacts on Seclusion/Restraint Rates**

While sensory rooms showed a statistically significant improvement in distress across all studies that measured the variable, the results for reducing SR rates were mixed, with some showing improvement and others deterioration. In examining the findings from the adolescent studies, two of the three studies showed an improvement in SR rates. Bobier et al. (2015) reviewed seclusion rates over twelve months and found that seclusion rates decreased from 3.2 per 100 treatment days to 1.8 per 100

treatment days when comparing the six months before and after implementing a sensory room. Seckman et al. (2017) calculated the rates as the number of SR incidents per 1,000 patient days, leading to a 26.5% reduction in restraints incidents and a 32.8% reduction in seclusion incidents when comparing the six months pre- and post-sensory room implementation.

West et al. (2017) noted an increase in seclusion incidents following sensory room implementation. For the twelve months before the sensory room, 50 adolescents were secluded compared to 65 following the creation of the sensory room. The researchers felt comparing univariate data associated with seclusion rates was a crude measure of the effectiveness of a sensory room and were less concerned with the increase because of the many confounding factors such as patient self-selection and the use of PRN psychotropic medications. The study did not provide restraint data.

Adult sensory room usage also showed variable effectiveness in reducing SR rates. Three studies showed the sensory room having an impact on SR rates. Lloyd et al. (2014) compared seclusion rates for two equivalent adult units with dedicated staff where one unit could utilize a sensory room, and the other unit used traditional methods of de-escalation. A statistically significant change occurred for the experimental unit, decreasing from 157 seclusion episodes in the six months before using a sensory room to 53 episodes after introducing the sensory room. The control unit reported 46 episodes of seclusion in the first six months and an increase to 81 episodes in the second half. Likewise, Andersen et al. (2017) found similar results when comparing a control unit with no sensory room (n=224 admissions) and an experimental unit (n=218 admissions) with a sensory room. In addition, the use of restraint belts decreased 38% compared to the control group. The authors examined restraint data for an entire year following the implementation of the intervention. Finally, Sivak (2012) reported no seclusion and restraint use in the four months following the implementation of a sensory room compared to the four months prior. The study also showed the client-to-client assault rate declined 23.4%, and the client-to-staff assault rate declined 48.1%.

Conversely, an equal number of studies showed increased numbers of seclusion and restraint incidents. Smith and Jones (2014) measured seclusion rates three months before introducing a sensory room on a male-only psychiatric intensive care unit and three months following. In the three months prior, 27 incidents of seclusion occurred compared to 37 following the implementation of the sensory room. Novak et al. (2012) also evaluated seclusion rates but used a more extended evaluation period, twelve months pre- and post-sensory room. Furthermore, the study utilized a higher level of statistical analysis compared to Smith and Jones (2014). A paired t-test evaluated mean seclusion rates before and after sensory room implementation and showed no statistical significance. The same was true for aggression incidents for this facility. West et al. (2017) also conducted a paired t-test and found the mean difference in seclusion rates 12 months before and after sensory room introduction was not significant ($t$ (22) = 0.71, $p$ = .49). Cummings et al. (2010) reported a one-way ANOVA comparing nine months of SR data for an experimental unit with a sensory room and a control unit without a sensory room, indicating no significant changes in SR use.

Several investigators identified 'few patients serving as outliers' as a possible explanation for the increase in SR rates (Cummings et al., 2010; Seckman et al., 2017; Smith & Jones, 2014). Cummings et al. (2010) conducted a chart review and found a pattern of a minimal number of outliers, 2% of admissions, that accounted for 15% of seclusion and restraint episodes. Smith and Jones (2014) indicated one patient was secluded 12 times which was 32.4% of the total seclusion incidents. Seckman et al. (2017) found that two patients accounted for 66% of one month's SR incidents. The data suggested that some individuals may have little ability to self-regulate and required more frequent SR intervention, thus affecting the studies' results when examining SR data.

**Limitations of the Evidence**

Several limitations existed that influenced the quality of the evidence. First, no large-scale randomized control studies have been conducted. The lack of randomization in many studies and small

sample sizes limited the ability to deduce a cause-effect relationship between using a sensory room/cart and reductions in distress levels and SR rates. Furthermore, the most prolonged time frame examined in the reviewed Level II studies was twelve months. It would be beneficial to see if short-term gains in reduced patient distress levels and SR rates are sustainable over a longer time frame than one year. Second, it is possible the additional attention from management and staff training sessions was a confounding variable that influenced SR rate reduction. Because of the heightened awareness, staff may have been less likely to intervene with a restrictive measure and more likely to utilize other de-escalation techniques, including using the sensory room/cart to manage aggressive behaviors. Similarly, response bias may have influenced patient and staff perceptions of decreased distress levels because they expected the sensory room/cart to have a positive effect.

**Implications for Practice**

Whether as a sensory room or cart, implementing sensory modulation seems a practical addition to the tools available to mental health staff for de-escalation of distressed patients. All the studies showed significant reductions in distress levels on pre-test and post-test assessments from both the patient and the clinician perspective. The evidence strongly supported the sensory room as a modality that promotes self-regulation. As Björkdahl et al. (2016) indicated, this aligns with recovery-oriented mental health that supports individual choice, responsibility, and control over their symptom management. Because it is a non-pharmacological intervention, adequately trained staff members would be qualified to offer this intervention without a physician's order on an as-needed basis. While the evidence showed mixed results in reducing SR rates, the sensory room/cart seemed to be a valuable resource to aid in SR reduction after excluding the "outliers."

## Theoretical Framework

**Plan-Do-Study-Act Cycle**

The Institute for Healthcare Improvement (IHI) provided a framework, known as the Plan-Do-Study-Act (PDSA) cycle, to guide the implementation of this evidence-based practice (EBP) project to reduce SR rates (IHI, n.d.). The first step, *plan*, involved developing a proposal to test a particular intervention and predict its potential outcomes. For this project, the *plan* was to create a sensory cart that staff members would feel confident providing to adolescent patients as a de-escalation tool for agitated behavior. It was predicted that sensory cart usage would increase as staff members developed a greater level of self-efficacy in offering it as a de-escalation technique. As sensory cart usage increased, it was hypothesized that SR rates would decrease.

The *do* step involved planning and constructing the sensory cart and developing the policy and procedure regarding its use. Champagne (2006) provided an implementation guide for sensory rooms that suggested the type of items included in the sensory room depend upon the rules and regulations of the setting. Sensory tool selection must consider ligature risk, infection control, the potential for self-harm, and fire codes. Publications outlining suggested items for a sensory room offered a starting point for selecting what to include in the cart (Champagne, 2006; McDaniel, 2009). The DNP student developed a policy and procedure regarding the proper usage of both a sensory room and a sensory cart which the Executive Medical Committee adopted. Unit personnel attended a staff development program provided by the DNP student that shared information on the benefits of sensory modulation as a means for behavior change in aggressive adolescent patients. The session highlighted proper procedures for using the sensory cart and how to evaluate when appropriate and inappropriate to offer the sensory cart as a de-escalation technique.

The next phase of the PDSA cycle, *study*, involved analyzing outcomes related to the use of the sensory cart. SR rates were compared for the two months before the education session/cart and the two months following implementation. Finally, *act,* evaluated the barriers identified by staff that arose

using the sensory cart and helped shape the modifications to the next PDSA cycle. Participants completed an evaluation questionnaire that assessed the barriers and facilitators of the project and how involvement in the project changed clinical practice related to SR use.

**Bandura's Self-Efficacy Theory**

A key component to the successful implementation of this project included the nursing staff's perception of providing successful de-escalation. Bandura's Self-Efficacy Theory guided the staff development portion of this project to increase self-efficacy. Self-efficacy can be defined as "an individual's judgment of his or her capabilities to organize and execute courses of action" (Resnick, 2017, p. 79). In his theory, Bandura (1977) made a clear distinction between self-efficacy and outcome expectations. Intuitively an individual may understand an action will produce the desired outcome. Still, if they harbor doubts about their ability to perform the activity, there is no appreciable change in behavior to produce the outcome expectations.

Bandura described four concepts that serve as sources of information that influence one's judgment about personal self-efficacy, mastery experience, vicarious experience, verbal persuasion, and physiological feedback (Bandura, 1999). As the most influential concept, mastery experience stems from successfully performing a skill and seeing the expected outcome. Mastery experiences were provided in the training sessions using role-play to reinforce self-efficacy in de-escalation skills. The second concept, vicarious experience, involved seeing other staff members successfully perform de-escalation skills. Observing a mentor or more seasoned staff member de-escalate a patient successfully can increase one's beliefs that the potential lies within oneself to do the same. The training session allowed for active reflection among the staff members to discuss what works well when de-escalating a patient. The third concept, verbal persuasion, involved key stakeholders encouraging staff members, reminding them they have what it takes to succeed. Finally, physiological feedback, such as stress reactions and tension, provides feedback regarding their performance.

Other researchers studying de-escalation of aggressive patients have utilized this theory as a framework to guide their investigations. For example, Ferrara et al. (2017) studied the effects of a de-escalation training program on medical-surgical nurses to assess their confidence in managing aggressive patients. Results showed a mean increase of 23 points comparing pre-test and post-test scores on the Confidence in Coping with Patient Aggression Instrument (CCPAI), scored from 0 to 110 with a higher number corresponding to more confidence. Similarly, Hostetler (2020) conducted a 90-minute de-escalation training program for nursing students working in a psychiatric unit and found a 21.8 point increase in the CCPAI. Both studies found statistical significance for a paired two-tailed *t*-test with $p < .001$.

## Methods

The DNP student investigator guided a plan-do-study-act cycle that evaluated the evidence-based practice aspects of a newly implemented sensory cart. The project team consisted of the unit manager and the DNP student investigator. Additionally, key stakeholders, consisting of the Chief Nursing Officer, Director of Quality Improvement, and the Director of Risk Management, were updated monthly about the project progression at seclusion/restraint committee meetings.

### Purpose

The purpose of this EBP project was to provide an additional de-escalation tool in the form of a sensory cart that staff could utilize to help adolescents self-regulate when feeling distressed. The project's primary aim was to increase the self-efficacy of the mental health staff to use sensory modulation as a de-escalation tool. A secondary aim was to reduce the seclusion/restraint rates by intervening early in the escalation cycle and empowering the adolescent patients to alter their behavior. Finally, the purpose aligned with the facility's quality improvement goals, which was to eliminate the practice of seclusion and reduce the number and duration of physical restraints.

**Setting and Target Population**

The setting for this project was a 140-bed inpatient psychiatric hospital located in the southeastern United States. The pilot project occurred on a 30-bed unit providing psychiatric care to pre-adolescent and adolescent females, ages nine to seventeen, who experienced sexual trauma. Admission criteria for this unit included a psychiatric diagnosis of post-traumatic stress disorder (PTSD), reactive attachment disorder (RAD), and/or major depressive disorder (MDD), IQ greater than or equal to seventy, and recent behavioral issues or self-harm behaviors related to past trauma. Lengths of stay for these adolescents ranged from three to six months.

This project's target population consisted of the mental health staff working on this residential adolescent unit. The staff members included registered nurses (RNs), licensed practical nurses (LPNs), mental health technicians, and social workers. Any floating or per-diem personnel were excluded from the EBP project.

A facilitating factor aiding the implementation of this EBP project was the support of the leadership team. For example, the adolescent unit manager had previous experience using sensory modulation in another facility and was invested in making a similar practice change on the pilot unit. Likewise, the Chief Nursing Officer (CNO) endorsed this project because he valued supporting his staff in pursuing advanced nursing education. Conversely, a barrier to this project involved staff turnover in the CNO position. Although both the outgoing and incoming CNO were supportive of the project, the timing of the turnover impacted the project implementation timeline.

**Intervention**

The EBP project involved three phases: developing a sensory modulation plan, training personnel on the use of sensory modulation, and evaluating its efficacy following a one-month pilot period. Phase one of this scholarly project included developing a sensory room on an adolescent inpatient psychiatric unit as the means for sensory modulation. The host facility identified the physical

space for the sensory room, a former storage closet, 6 X 14 feet in size, with video monitoring capability. However, corporate guidelines deemed the area unsafe for patient occupancy due to a lack of proper ventilation and a ligature risk associated with the drop ceilings. Because of the prolonged construction timeline to correct these issues, the intervention pivoted from a sensory room to a sensory cart. Adams-Leask et al. (2018) indicated sensory carts were a viable option for facilities facing budgetary or physical constraints.

The DNP student investigator repurposed an existing cart and added plastic totes to store the sensory tools. Many of the same sensory items planned for the sensory room were incorporated into the sensory cart. The Director of Risk Management and the Infection Control Nurse reviewed all the sensory tools to ensure the items met safety guidelines for low potential of self-harm and allowed for thorough cleaning. The items included: a wipeable weighted lap blanket, a cloth lap blanket with a machine-washable outer shell, flexible stress balls, sensory brushes, sensory bubble poppers, a sensory tile, mixing sensory tubes, gel timers, sensory snappers, and a tablet for calming music and visual scenery. Additionally, the literature suggested selecting low-cost sensory items so that upon discharge from the facility, the patients could purchase many of the same tools for use at home.

The DNP student investigator wrote a policy and procedure and received approval for its adoption by the Executive Medical Committee. The policy and procedure outlined items from the sensory cart could be used by patients for 20 minutes in the patient observation room, the quiet room, or alone in the dayroom. Both patients or staff members could initiate sensory sessions, but the cart was unavailable during group programming such as psychotherapy or activity group times. The sensory cart was not a means of punishment or reward. The staff documented the patient's name, date, time in/out for each sensory session and verified the items were cleaned and inspected for safety and integrity. Patients completed an assessment before and after the session known as the Fast Assessment of Children's Emotions (FACE) (Kennedy et al., 2015). The student investigator contacted the lead author

via email and received permission to use the assessment (H. Kennedy, personal communication, September 2, 2020). See Appendix A. The evaluation provided data on whether progress was being made by the patient using sensory modulation as a de-escalation technique. The measurement assessed six feelings: angry, confused, sad, energetic, anxious, and tired. The patients rated each emotion as "not at all," "a little," or "a lot." Scoring was zero points for "not at all," one point for "a little," and 2 points for "a lot" for all feelings except for energetic. Energetic was reverse scored with 2 points for "not at all," 1 point for "a little," and 0 points for "a lot." The total score ranged from 0 to a max of 12 points, with lower scores showing improvement in emotions.

The second phase of the intervention involved conducting a 45-minute training session for the staff working on the adolescent unit about the benefits of sensory modulation, proper use of the sensory cart, and addressed when it is appropriate to use the intervention. The first twenty minutes of the education session focused on defining sensory modulation and how it works to help adolescents self-regulate and noted the sensory cart's tools that provide the sensory experience. A three-minute video clip shared during this time highlighted the benefits of sensory modulation and how it is an empowering tool for self-regulation (Lloyds of London, 2020). Then staff engaged with the sensory items, listened to meditation music with the lights low, and reflected on how they felt before and after the experience. Next, the educational session transitioned to the policy and procedure, which described how to use sensory modulation with patients at the facility. That portion of the training lasted ten minutes. The group spent the remaining fifteen minutes of the educational session reviewing vignettes and discussing whether it was appropriate to offer the sensory room as a de-escalation technique based upon the provided scenario. Finally, the participants completed assessments before and after the educational session.

After a one-month pilot period, the staff completed a follow-up assessment that measured the impact of the project on practice change and the sustainability of the sensory cart as a de-escalation technique. Additionally, the project evaluated SR rates before and after implementation.

**Ethics**

The sensory room project proposal was submitted to the IRB for approval before implementation. It was approved as a quality improvement, not human subjects research, per the University of Louisville Human Subject Protection Program. Once it became apparent a sensory room was no longer feasible due to time constraints, an amendment was submitted to the IRB describing the pivot to a sensory cart. The IRB approved the amendment. The local agency also reviewed and approved the pilot project as indicated in the letter of support from the Chief Nursing Officer found in Appendix B.

**Project Design**

The project utilized a pre-test/post-test design evaluating the staff's knowledge and beliefs about sensory rooms/carts and their confidence in de-escalating aggressive patients following a staff development module regarding sensory modulation as a de-escalation technique.

**Sample**

A convenience sample comprised of registered nurses, licensed practical nurses, mental health technicians, and social workers assigned to the adolescent unit was the target population. Human Resources provided a list of staff. Any floating and per diem staff were excluded from the sample. The unit's core staff received notifications of the training program through the internal communication system, ShiftHound, inviting them to attend a 45-minute training session which transpired concurrently with monthly staff meetings. In addition, flyers were posted on the unit advertising the training. The training occurred on four separate occasions to allow all shifts an opportunity to attend. Participation was voluntary. Of the total 25 core staff members, 22 completed the pre-test/post-test surveys associated with the staff development module, and 13 completed the one-month follow-up survey.

**Measures**

The staff development sessions aimed to introduce sensory modulation via a sensory room/cart as an additional tool to de-escalate agitated patients. Two instruments evaluated the effectiveness of the staff development module. The first evaluation, the sensory modulation beliefs survey, measured how well participants understood sensory modulation and their beliefs about sensory rooms. Modeled after an ad hoc instrument used by the Office of Mental Health in New York, the survey contained two open-ended questions, 1) How would you describe the concept of a sensory room to someone who has never heard of it before? 2) What kind of changes do you anticipate seeing as a result of using a sensory room? (McDaniel, 2009). The remainder of the instrument contained six 5-point Likert questions ranging from 1 "not at all" to 5 "very much" that assessed the beliefs of how a sensory room impacted practice. Total scores ranged from 5 to 30, with a higher score indicating more positive views. As an ad hoc measurement, no validity and reliability data were available. The researchers developed this survey as an informational tool for a one-time use without any plan for repetition, eliminating the need for psychometric properties. The instrument was available in the public domain and did not require permission for use. See Appendix C.

The second instrument, the Confidence in Coping with Patient Aggression Instrument (CCPAI), measured the staff's self-efficacy in de-escalating aggressive patients (Thackrey, 1987). The tool contained ten questions and used an eleven-point Likert scale ranging from 1, low confidence, to 11, high confidence. Scores on the instrument ranged from 10 to 110, with higher numbers indicating higher levels of confidence. A sample of the questions includes: How good is your present level of training for handling psychological aggression? How able are you to meet the needs of an aggressive patient? How self-assured do you feel in the presence of an aggressive patient? A pilot study of the instrument in a psychiatric prison and a psychiatric unit at the Veteran's Administration found high internal consistency

(Cronbach's $\alpha$ = .92) among professional and paraprofessional mental health personnel. It, too, was in the public domain and did not require permission for use. See Appendix D.

The survey also collected demographic data from the participants. Demographic data included: age, professional role, education level, length of time working at the facility, length of time working in mental health, length of time working as a nurse, and what shift worked. Notably, all participants were female because facility policy only allows females to work on the female adolescent unit.

**Data Collection**

Before the staff development session began, all participants were assigned a participant ID number. Each participant received a similarly numbered packet containing the demographic datasheet and two copies each of the sensory modulation beliefs survey and the CCPAI instrument labeled "A" and "B." The participants completed all sheets labeled with the letter "A" before the education session, including the demographic datasheet, the sensory modulation beliefs survey, and the CCPAI survey. These surveys provided baseline levels of beliefs regarding sensory modulation and self-efficacy of de-escalating aggressive patients. Immediately following the educational session, the participants completed the surveys labeled with a "B." There was no identifying information associated with the responses. The sensory modulation beliefs survey and CCPAI were administered a third time following a one-month implementation period of using the sensory cart. The surveys were distributed using the same participant ID number generated from the initial education session to facilitate a paired statistical analysis.

The facility stored the survey responses along with the list of participant identifiers in a locked cabinet in the nursing office. The student investigator kept an electronic copy of the information on an encrypted laptop computer with secure biometric access. All HIPAA policies and procedures were followed.

### Data Analysis

Data analysis was performed using IBM SPSS Statistics v27. Descriptive statistics summarized the demographic profile of the participants. Paired t-tests examined the impact of the education module on the means from the sensory modulation beliefs survey and the CCPAI. A second paired t-test analyzed the effect a one-month implementation period had on the sensory modulation beliefs survey and the CCPAI scores. The analysis compared the means on the sensory modulation beliefs survey and CCPAI following the education session compared to the means on the same surveys obtained one month after implementation. Bivariate Pearson correlation examined the relationship among the dependent variables and demographic characteristics. In addition to the quantitative data, the two open-ended questions on the post-education survey and the three open-ended questions on the one-month follow-up survey were analyzed using content analysis for emerging themes.

## Results

### Descriptive Statistics of the Sample

Descriptive statistics showed the sample (*N*=22) was comprised only of women as this was a facility requirement for employment on this unit. The staff consisted primarily of mental health technicians (*n*= 13, 59%), followed by nurses, both LPN and RN (*n*= 5, 22.7%), and finally therapists (*n*=4, 18.2%). Most of the sample (68.2%) had completed some level of higher education ranging from an associate degree to a graduate degree. The average age for the sample was 33.45 years, with a minimum age of 21 and a maximum age of 51. Twenty participants had less than five years of experience working at the facility, with the average time being 2.9 years. Similarly, the average time working in mental health was 4.9 years, with 16 participants with less than five years' experience. The one-month follow-up sample had an attrition rate of 41%, with 13 participants completing the final survey. See Table 1 for demographic characteristics.

**Table 1**

*Demographic Characteristics of Participants at Baseline*

| Characteristic | *n* Baseline | % |
|---|---|---|
| Gender | | |
| Female | 22 | 100 |
| Male | 0 | 0 |
| Professional Role | | |
| Mental health technician | 13 | 59.1 |
| LPN | 1 | 4.5 |
| RN | 4 | 18.2 |
| Therapists | 4 | 18.2 |
| Education Level | | |
| High school graduate | 1 | 4.5 |
| Some college | 6 | 27.3 |
| Associate degree | 6 | 27.3 |
| Bachelor's degree | 6 | 27.3 |
| Graduate degree | 4 | 13.6 |
| | *M* | *SD* |
| Age | 33.45 | 9.18 |
| Years working at facility | 2.90 | 3.95 |
| Years working in mental health | 4.90 | 5.90 |
| Years working as a nurse | 13.82 | 8.90 |

**Paired Samples t-test**

A paired samples t-test evaluated the impact of the education session on participants' scores concerning their beliefs about sensory modulation. An alpha level of .05 was used for statistical significance for all statistical tests. The null hypothesis, $H_0$, indicated that the mean score for pre-test sensory beliefs would be the same as the mean score for post-test sensory beliefs following the

education session. The null hypothesis was rejected. The results showed an increase in the mean from the pre-test (*M* = 21.68, *SD* = 7.49) compared to the post-test (*M* = 25.14, *SD* = 4.42) with a statistically significant improvement in core beliefs about sensory modulation, with a mean difference of -3.45, *t*(42) = -2.40, *p* = .026 (two-tailed). The 95% confidence interval ranged from -6.44 to -0.46. The Cohen's *d* of -.512 indicated a medium effect size.

Likewise, a paired samples t-test evaluated the impact of the education session on mental health staff's self-efficacy in de-escalating aggressive patients using the CCPAI instrument. The null hypothesis, $H_0$, indicated that the mean score for the pre-test CCPAI would be the same as the mean score for the post-test CCPAI following the education session. The null hypothesis was rejected. The results showed an increase in the mean from the pre-test (*M* = 81.00, *SD* = 17.39) compared to the post-test (*M* = 84.91, *SD* = 16.62) with a statistically significant improvement in de-escalation self-efficacy, with a mean difference of -3.91, *t*(42) = -2.84, *p* = .010 (two-tailed). The 95% confidence interval ranged from -6.77 to -1.04. The Cohen's *d* of -.605 indicated a medium effect size.

Following a one-month trial period using the sensory cart, the participants completed the same surveys again to determine if implementation impacted core beliefs about sensory modulation and the staff's self-efficacy in de-escalating aggressive patients. The null hypothesis, $H_0$, indicated that the mean score from the post-test sensory modulation belief survey would be the same as the mean score for the sensory modulation beliefs survey following a one-month implementation period. The null hypothesis was rejected. The results showed a decrease in the mean on the sensory modulation beliefs post-test (*M* = 24.38, *SD* = 4.86) compared to the one month follow-up score (*M* = 20.69, *SD* = 3.75) with a statistically significant deterioration in core beliefs about sensory modulation, with a mean difference of -3.69, *t*(24) = -3.41, *p* = .005 (two-tailed). The 95% confidence interval ranged from -1.59 to -0.28. The Cohen's *d* of -.946 indicated a large effect size.

Similarly, a paired t-test analyzed the means of the CCPAI after the education session compared to the CCPAI mean at the one-month follow-up period. The null hypothesis, $H_0$, indicated that the mean score from the post-test CCPAI survey would be the same as the mean score from the one-month follow CCPAI survey. The analysis failed to reject the null hypothesis as there was no statistically significant change. See Table 2 for results.

**Table 2**

*Results of Paired t-test Analysis*

| | Pre-Education Session Mean (*SD*) | Post-Education Session Mean (*SD*) | *t*(42) | Sig. (2-tailed) | Cohen's D |
|---|---|---|---|---|---|
| Sensory Beliefs | 21.68 (7.49) | 25.14 (4.42) | -2.40 | .026* | -.512 |
| CCPAI | 81.00 (17.39) | 84.91 (16.62) | -2.84 | .010* | -.605 |

| | Post-Education Session Mean (*SD*) | One-month Follow-Up Mean (*SD*) | *t*(42) | Sig. (2-tailed) | Cohen's D |
|---|---|---|---|---|---|
| Sensory Beliefs | 24.38 (4.86) | 20.69 (3.75) | -3.41 | .005* | -.946 |
| CCPAI | 86.92 (11.72) | 84.85 (8.21) | -.695 | .500 | -.193 |

*****Alpha confidence level for significance $p < .05$

**Bivariate Pearson Correlation**

The variables age, educational level, professional role, years working at the facility, years in mental health, years working as a nurse were all analyzed to see if there was a correlation to the total score on the sensory beliefs survey and the final score on the CCPAI. The analysis showed a statistically significant negative correlation between age and the final score on the CCPAI survey, $r(20) = -.53$, $p < .011$.

**Seclusion/Restraint Rates Pre- and Post-Implementation**

For the two months before the education session and implementation of the sensory cart, the restraint rates for the unit were 4.99 and 5.43 episodes per 1000 patient hours, respectively. Following implementation, the restraint rate declined to 4.44 episodes per 1000 patient hours in the first month and only one hold episode occurred in the second month. Both months had zero seclusion episodes. Notably, the facility does not use mechanical restraints of any kind. All restraint incidents involved using physical intervention procedures as outlined by the Handle With Care® behavior management system.

**Content Analysis of Sensory Beliefs**

***Pre-implementation Beliefs***

The sensory modulation beliefs survey contained two open-ended questions. Content analysis was completed on the responses. For the first question, "How would you describe the concept of a sensory room to someone who has never heard of it before (i.e., explain the purpose of the room, what it would look like, how it is used)?", twenty-two participants responded. Three themes emerged. The primary theme described the sensory room as an environment dedicated to de-escalation where patients could use their five senses to regain control. A second theme focused solely on de-escalation without providing any details of how the patient achieved becoming calmer. A third theme focused on sensory rooms as a coping skill to manage stress. Two respondents replied they were unfamiliar with the concept of sensory rooms.

The second question, "What kind of changes do you anticipate seeing as a result of the use of a sensory room?" received 22 responses. Two positive themes emerged and encapsulated much of the feedback. The first theme revolved around improved behaviors. For example, many felt incidents of aggression would decrease. The second theme involved less use of SR. Only three respondents wrote about potential negative changes, which included increased stress for staff to facilitate the usage of the sensory room and concern about it being a place to "play" rather than focus on skill development.

### *Post-implementation Beliefs*

The one-month follow-up survey contained three open-ended questions. Content analysis was completed on the responses. For the first question, "What barriers/concerns did you encounter using the sensory cart?" three themes emerged. The most prominent theme revolved around the misuse and abuse of the sensory cart. Staff shared "patients made self-harm threats to try to use specific sensory items." A second theme involved multiple people wanting to use the sensory cart at the same time. For the third theme, staff shared they had difficulty discerning when appropriate or inappropriate to use the sensory cart. The second question, "What types of benefits did you see from patients using the sensory cart?" concentrated on one theme. The respondents felt the sensory cart was successful in decreasing stress, anxiety, and agitation. For the third question, "How did having a sensory cart change your practice regarding de-escalation?" the staff reported that having a sensory cart added another tool to their de-escalation toolbox.

## Discussion

### Considerations for Developing a Sensory Room/Cart

While much of the literature focused on items to include in a sensory room and discussed the physical environment regarding safety, little is mentioned of building code associated with mental health facilities. The original intent of this scholarly project was to implement a sensory room in the

adolescent unit. While identifying a space proved relatively straightforward, the DNP student investigator had not considered the regulatory requirements for bringing the area up to code for direct patient care. The newly designated sensory room was previously a storage closet. The space was deemed unsafe for patient occupancy due to a lack of proper ventilation and a ligature risk associated with the drop ceilings. The construction timeline to rectify these deficits made a sensory room unfeasible for this PDSA cycle and required pivoting to a sensory cart. For those considering a sensory room, federal, state, and corporate regulations for the physical environment must be researched thoroughly and factored into the decision between a room or a cart. In this PDSA cycle, the sensory cart provided an economical and timely intervention for evaluation.

**Facilitating Factors for Sensory Modulation Use**

Following the implementation of the sensory cart, adoption of the intervention occurred quickly. Within the first week of utilization, staff used the sensory cart a total of ten times. The quick uptake in using the intervention can best be explained by the positive beliefs and optimism expressed by the staff following the introductory education session, as evidenced by the statistically significant improvement in the mean on the sensory beliefs survey. Comparably, Wright et al. (2020) reported a similar finding in their qualitative study evaluating factors that influenced the implementation of sensory modulation on inpatient mental health units. When staff expressed the belief that the intervention would lead to less agitation and aggressiveness, they were more likely to initiate sensory modulation.

For this scholarly project, the mental health staff continued to express optimism despite a statistically significant decrease in the mean on the sensory modulation beliefs survey following a one-month implementation period. One participant shared, "it gives you more options to choose from to help a patient de-escalate." Overwhelmingly, staff reported decreased anxiety and less agitation among patients following the use of the sensory cart. These findings were consistent with the literature, which

reported statistically significant decreases in distress in adolescents that used a sensory room (Bobier et al., 2015; Seckman et al., 2017; West et al., 2017).

Another facilitating factor for this project included the high participation of participants in the staff development module designed to increase self-efficacy. Much of the literature noted that providing a thorough educational session before implementation aided in bolstering the confidence of staff to use sensory modulation (Blackburn et al., 2016; Seckman et al., 2017; Wright et al., 2020). The staff development module incorporated multiple modes of learning to reinforce self-efficacy. The statistically significant increase in the mean on the CCPAI survey indicated an increase in self-efficacy in de-escalating aggressive patients, highlighting the education session's impact. Similarly, Seckman et al. (2020) noted a 30% increase in staff's confidence using sensory tools following the researchers' training session.

Furthermore, these results from the CCPAI paired t-test are consistent with findings in the literature. For example, other researchers reported mean increases of over twenty points in the CCPAI score following de-escalation training sessions, highlighting the value of training sessions (Ferrara et al., 2017; Hostetler, 2020). However, the mean increase of 3.91 points in the CCPAI total score for this project was modest compared to those reported in the literature. Notably, staff recently completed semi-annual de-escalation and Handle With Care© training required by the facility. Thus, multiple training sessions may have contributed as a confounding factor to the increased de-escalation self-efficacy.

**Barriers to Sensory Modulation Use**

Following an initial surge in the use of the sensory cart, staff became more hesitant to use the cart because of issues that arose. That hesitancy is reflected in the mean on the sensory modulation beliefs survey at follow-up, which showed a statistically significant decline in the mean. First, staff felt many were "abusing" the intent of the sensory cart. For example, on multiple instances, patients shared

that if they did not have access to a particular sensory item, they would not cope and might resort to self-harm. Staff also felt that some patients were feigning distress because they wanted an opportunity to "play" with the sensory items. Difficulties also arose because multiple patients wanted to use the cart simultaneously, and it became difficult to manage the expectations of those waiting for their turn. Likewise, Seckman et al. (2017) expressed similar issues when introducing a sensory room on an adolescent unit. The researchers recommended more staff training to develop guidelines for appropriate and inappropriate use of the sensory room. They also suggested that staff be appropriately trained to make a clinical assessment of who is in more need of sensory modulation to reduce distress and offer other coping skills to the remaining patients who may be better able to self-regulate.

To alleviate misuse, the student investigator consulted with the unit manager and developed a hierarchy of interventions leading up to the use of the sensory cart to guide staff and empower them to use the de-escalation technique correctly. Before the adolescents could use the sensory cart, they were advised to use a skill in their coping skills box and write a response on a one-page handout describing the trigger and what they were doing to alleviate the distress. If ineffective, staff initiated the use of the sensory cart at their discretion. However, if the staff member identified acute distress and felt that going immediately to the sensory cart would be beneficial, the staff member could forgo the writing assignment and initiate a sensory session.

**Impact on Seclusion/Restraint Rates**

The introduction of a sensory cart demonstrated positive results. Seclusion and restraint rates declined in the two months following the education session and implementation of the sensory cart. While encouraging, uncertainty remains whether this is sustainable over a longer period. Many confounding variables should be noted. First, during this time frame, a patient discharged who had multiple physical restraint incidents. Similar results were reported in the literature where a select few high acuity patients required repeat S/R episodes (Cummings et al., 2010; Seckman et al., 2017; Smith &

Jones, 2014). Second, an organization wide emphasis from management regarding de-escalation skills occurred concurrently with this project. This included bi-annual de-escalation and Handle With Care training. While difficult to ascertain the true source of the decline in S/R rates, it was still beneficial to offer an additional non-pharmacological de-escalation technique.

## Limitations

There were several limitations associated with this scholarly project. First, the small sample size (*N*=22) and attrition were issues, with 41% not completing the one-month follow-up measure. Additionally, the ad hoc survey used to measure sensory modulation beliefs lacked psychometric properties and may not have adequately assessed core beliefs. Second, as both surveys were self-report measurements, social desirability bias may have influenced the results skewing the data. Third, the education session provided to the staff focused on a sensory room rather than a sensory cart. While the essence of sensory modulation is the same for both a room and a cart, assessing whether it is appropriate to use a sensory cart compared to a sensory room may have contributed to some of the difficulties for the staff in determining the appropriateness of when to use the sensory cart. Finally, the two-month data collection time frame was short and needed to encompass a more extended period to assess the intervention's impact on SR rates fully.

## Conclusion

The sensory cart provided mental health staff an alternative, non-pharmacological tool to de-escalate distressed patients. Staff readily acknowledged improvements in patients' mood and behavior following a sensory cart session. For this reason, the sensory cart was a beneficial intervention empowering these patients to learn to self-regulate. Future efforts regarding sensory modulation should focus on continuing staff education. The intervention is only as effective as the staff's willingness to embrace it and offer it to the patients in their time of distress. Increasing their self-efficacy in de-escalating agitated patients using sensory modulation directly relates to the sustainability of this

intervention. Potentially, if the pilot project started on this unit continues in a favorable direction, it would be possible to introduce sensory carts on other units in the psychiatric hospital as it is a low-cost, flexible intervention that empowers patients.

Future PDSA cycles evaluating sensory modulation on this unit will include the introduction of the sensory room. The facility has dedicated funding for the sensory room renovations, with an anticipated completion date of August 2021. The goal would be to evaluate the intervention for a more extended period and reduce seclusion and restraint rates.

**References**

Adams-Leask, K., Varona, L., Dua, C., Baldock, M., Gerace, A., & Muir-Cochrane, E. (2018). The benefits of sensory modulation on levels of distress for consumers in a mental health emergency setting. *Australasian Psychiatry*, *26*(5), 514–519. https://doi.org/10.1177/1039856217751988

Agency for Healthcare Research & Quality. (2016). *Comparative effectiveness review number 180: Strategies to de-escalate aggressive behavior in psychiatric patients*. https://www.ncbi.nlm.nih.gov/books/NBK379399/pdf/Bookshelf_NBK379399.pdf

Andersen, C., Kolmos, A., Andersen, K., Sippel, V., & Stenager, E. (2017). Applying sensory modulation to mental health inpatient care to reduce seclusion and restraint: A case control study. *Nordic Journal of Psychiatry*, *71*(7), 525–528. https://doi.org/10.1080/08039488.2017.1346142

Baeza, I., Correll, C. U., Saito, E., Amanbekova, D., Ramani, M., Kapoor, S., Chekuri, R., De Hert, M., & Carbon, M. (2013). Frequency, characteristics, and management of adolescent inpatient aggression. *Journal of Child and Adolescent Psychopharmacology*, *23*(4), 271–281. https://doi.org/10.1089/cap.2012.0116

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295x.84.2.191

Bandura, A. (1999). A social cognitive theory of personality. In L. Pervin & O. John (Ed.), *Handbook of personality* (2nd ed., pp. 154-196). Guilford Publications.

Björkdahl, A., Perseius, K.-I., Samuelsson, M., & Lindberg, M. H. (2016). Sensory rooms in psychiatric inpatient care: Staff experiences. *International Journal of Mental Health Nursing*, *25*(5), 472–479. https://doi.org/10.1111/inm.12205

Blackburn, J., McKenna, B., Jackson, B., Hitch, D., Benitez, J., McLennan, C., & Furness, T. (2016). Educating mental health clinicians about sensory modulation to enhance clinical practice in a

youth acute inpatient mental health unit: A feasibility study. *Issues in Mental Health Nursing*, *37*(7), 517–525. https://doi.org/10.1080/01612840.2016.1184361

Bobier, C., Boon, T., Downward, M., Loomes, B., Mountford, H., & Swadi, H. (2015). Pilot investigation of the use and usefulness of a sensory modulation room in a child and adolescent psychiatric inpatient unit. *Occupational Therapy in Mental Health*, *31*(4), 385–401. https://doi.org/10.1080/0164212x.2015.1076367

Brown, A., Tse, T., & Fortune, T. (2018). Defining sensory modulation: A review of the concept and a contemporary definition for application by occupational therapists. *Scandinavian Journal of Occupational Therapy*, *26*(7), 515–523. https://doi.org/10.1080/11038128.2018.1509370

Bryson, S. A., Gauvin, E., Jamieson, A., Rathgeber, M., Faulkner-Gibson, L., Bell, S., Davidson, J., Russel, J., & Burke, S. (2017). What are effective strategies for implementing trauma-informed care in youth inpatient psychiatric and residential treatment settings? A realist systematic review. *International Journal of Mental Health Systems*, *11*(1). https://doi.org/10.1186/s13033-017-0137-3

Centers for Medicare & Medicaid Services. (2006, December 8). *CMS publishes final patients' rights rule on use of restraints and seclusion*. Cms.gov. https://www.cms.gov/newsroom/press-releases/cms-publishes-final-patients-rights-rule-use-restraints-and-seclusion

Champagne, T. (2006). Creating sensory rooms: Environmental enhancements for acute inpatient mental health settings. *Mental Health Special Interest Quarterly*, *29*(4), 1–4.

Champagne, T., & Stromberg, N. (2004). Sensory approaches in inpatient psychiatric settings: Innovative alternatives to seclusion and restraint. *Journal of Psychosocial Nursing and Mental Health Services*, *42*(9), 34–44. https://doi.org/

Condition of Participation: Patient's Rights, 42 CFR § 482.13 (2010). https://www.govinfo.gov/content/pkg/CFR-2010-title42-vol5/pdf/CFR-2010-title42-vol5-sec482-13.pdf

Cummings, K. S., Grandfield, S. A., & Coldwell, C. M. (2010). Caring with comfort rooms: Reducing seclusion and restraint use in psychiatric facilities. *Journal of Psychosocial Nursing and Mental Health Services*, *48*(6), 26–30. https://doi.org/10.3928/02793695-20100303-02

Dean, A. J., Duke, S. G., Scott, J., Bor, W., George, M., & McDermott, B. M. (2008). Physical aggression during admission to a child and adolescent inpatient unit: Predictors and impact on clinical outcomes. *Australian & New Zealand Journal of Psychiatry*, *42*(6), 536–543. https://doi.org/10.1080/00048670802050587

De Hert, M., Dirix, N., Demunter, H., & Correll, C. U. (2011). Prevalence and correlates of seclusion and restraint use in children and adolescents: A systematic review. *European Child & Adolescent Psychiatry*, *20*(5), 221–230. https://doi.org/10.1007/s00787-011-0160-x

Ferrara, K. L., Davis-Ajami, M. L., Warren, J. I., & Murphy, L. S. (2017). De-Escalation training to medical–surgical nurses in the acute care setting. *Issues in Mental Health Nursing*, *38*(9), 742–749. https://doi.org/10.1080/01612840.2017.1335363

Hostetler, T. (2020). The comparative change of self-efficacy in nursing students after verbal de-escalation education. *International Journal of Studies in Nursing*, *5*(1), 103. https://doi.org/10.20849/ijsn.v5i1.730

Institute for Healthcare Improvement. (n.d.). *Science of improvement: Testing changes*. http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx

Johns Hopkins Nursing. (n.d.). *Johns Hopkins Nursing evidence-based practice: Appendix C evidence level and quality guide*. https://www.hopkinsmedicine.org/evidence-based-practice/_docs/appendix_c_evidence_level_quality_guide.pdf

Kennedy, H., Unnithan, R., & Wamboldt, M. Z. (2015). Assessing brief changes in adolescents' mood: Development, validation, and utility of the Fast Assessment of Children's Emotions (FACE). *Journal of Pediatric Health Care*, *29*(4), 335–342. https://doi.org/10.1016/j.pedhc.2015.01.004

Kersting, X. A. K., Hirsch, S., & Steinert, T. (2019). Physical harm and death in the context of coercive measures in psychiatric patients: A systematic review. *Frontiers in Psychiatry*, *10*. https://doi.org/10.3389/fpsyt.2019.00400

Knight, M., Adkison, L., & Kovach, J. S. (2010). A comparison of multisensory and traditional interventions on inpatient psychiatry and geriatric neuropsychiatry units. *Journal of Psychosocial Nursing and Mental Health Services*, *48*(1), 24–31. https://doi.org/10.3928/02793695-20091204-03

Larue, C., Dumais, A., Boyer, R., Goulet, M.-H., Bonin, J.-P., & Baba, N. (2013). The experience of seclusion and restraint in psychiatric settings: Perspectives of patients. *Issues in Mental Health Nursing*, *34*(5), 317–324. https://doi.org/10.3109/01612840.2012.753558

Lloyd, C., King, R., & Machingura, T. (2014). An investigation into the effectiveness of sensory modulation in reducing seclusion within an acute mental health unit. *Advances in Mental Health*, *12*(2), 93–100. https://doi.org/10.1080/18374905.2014.11081887

Lloyds of London. (2020). *What is sensory modulation?* Www.youtube.com. https://www.youtube.com/watch?v=NPKUEBhW284

Ma, D., Su, J., Wang, H., Zhao, Y., Li, H., Li, Y., Zhang, X., Qi, Y., & Sun, J. (2021). Sensory-based approaches in psychiatric care: A systematic mixed-methods review. *Journal of Advanced Nursing*. https://doi.org/10.1111/jan.14884

McDaniel, M. (2009). *Comfort rooms: A preventative tool used to reduce the use of restraint and seclusion in facilities that serve individuals with mental illness*. https://omh.ny.gov/omhweb/resources/publications/comfort_room/comfort_rooms.pdf

Novak, T., Scanlan, J., McCaul, D., MacDonald, N., & Clarke, T. (2012). Pilot study of a sensory room in an acute inpatient psychiatric unit. *Australasian Psychiatry*, *20*(5), 401–406. https://doi.org/10.1177/1039856212459585

Panagiotou, A., Mafreda, C., Moustikiadis, A., & Prezerakos, P. (2019). Modifiable factors affecting inpatient violence in an acute child and adolescent psychiatric unit: A 16-year retrospective study. *International Journal of Mental Health Nursing*, *28*(5), 1081–1092. https://doi.org/10.1111/inm.12619

Resnick, B. (2017). Self-Efficacy. In S. J. Peterson & T. S. Bredow (Eds.), *Middle range theories: Application to nursing research and practice* (4th ed., pp. 79–92). Wolters Kluwer.

Ryan, E. P., Hart, V. S., Messick, D. L., Aaron, J., & Burnette, M. (2004). A prospective study of assault against staff by youths in a state psychiatric hospital. *Psychiatric Services*, *55*(6), 665–670. https://doi.org/10.1176/appi.ps.55.6.665

Sailas, E., & Fenton, M. (2000). Seclusion and restraint for people with serious mental illnesses. *Cochrane Database of Systematic Reviews*. https://doi.org/https://doi.org/10.1002%2F14651858.CD001163

Seckman, A., Paun, O., Heipp, B., Van Stee, M., Keels-Lowe, V., Beel, F., Spoon, C., Fogg, L., & Delaney, K. R. (2017). Evaluation of the use of a sensory room on an adolescent inpatient unit and its impact on restraint and seclusion prevention. *Journal of Child and Adolescent Psychiatric Nursing*, *30*(2), 90–97. https://doi.org/10.1111/jcap.12174

Sivak, K. (2012). Implementation of comfort rooms to reduce seclusion, restraint use, and acting-out behaviors. *Journal of Psychosocial Nursing and Mental Health Services*, *50*(2), 24–34. https://doi.org/10.3928/02793695-20110112-01

Smith, S., & Jones, J. (2013). Use of a sensory room on an intensive care unit. *Journal of Psychosocial Nursing and Mental Health Services*, *52*(5), 22–30. https://doi.org/10.3928/02793695-20131126-06

Thackrey, M. (1987). Clinician confidence in coping with patient aggression: Assessment and enhancement. *Professional Psychology: Research and Practice*, *18*(1), 57–60. https://doi.org/10.1037/0735-7028.18.1.57

The Joint Commission. (2019). *Quick safety issue 47: De-escalation in healthcare*. Jointcommission.org. https://www.jointcommission.org/en/resources/news-and-multimedia/newsletters/newsletters/quick-safety/quick-safety-47-deescalation-in-health-care/

The Substance Abuse and Mental Health Administration (SAMHSA). (2010). Issue brief #1 promoting alternatives to the use of seclusion and restraint: A national strategy to prevent seclusion and restraint in behavioral health services. https://www.samhsa.gov/sites/default/files/topics/trauma_and_violence/seclusion-restraints-1.pdf

The Substance Abuse and Mental Health Services Administration. (2010). *Issue brief #4 promoting alternatives to the use of seclusion and restraint: Making the business case*. https://www.samhsa.gov/sites/default/files/topics/trauma_and_violence/seclusion-restraints-4.pdf

The Substance Abuse and Mental Health Services Administration. (2014). SAMHSA's concept of trauma and guidance for a trauma-informed approach. https://ncsacw.samhsa.gov/userfiles/files/SAMHSA_Trauma.pdf

Weiss, E. M. (1998, October 11). Hundreds of the nation's most vulnerable have been killed by the system intended to care for them. *Hartford Courant.* https://www.courant.com/news/connecticut/hc-xpm-1998-10-11-9810090779-story.html

West, M., Melvin, G., McNamara, F., & Gordon, M. (2017). An evaluation of the use and efficacy of a sensory room within an adolescent psychiatric inpatient unit. *Australian Occupational Therapy Journal*, *64*(3), 253–263. https://doi.org/10.1111/1440-1630.12358

Wiglesworth, S., & Farnworth, L. (2016). An exploration of the use of a sensory room in a forensic mental health setting: Staff and patient perspectives. *Occupational Therapy International*, *23*(3), 255–264. https://doi.org/10.1002/oti.1428

Wong, A. H., Ray, J. M., Rosenberg, A., Crispino, L., Parker, J., McVaney, C., Iennaco, J. D., Bernstein, S. L., & Pavlo, A. J. (2020). Experiences of individuals who were physically restrained in the emergency department. *JAMA Network Open*, *3*(1), e1919381–e1919381. https://doi.org/10.1001/jamanetworkopen.2019.19381

Wright, L., Bennett, S., & Meredith, P. (2020). "Why didn't you just give them PRN?": A qualitative study investigating the factors influencing implementation of sensory modulation approaches in inpatient mental health units. *International Journal of Mental Health Nursing*, *29*, 608–621. https://doi.org/10.1111/inm.12693

**Appendix A: Personal Communication**

## Re: Permission to use FACE instrument

Kennedy, Heather <HEATHER.KENNEDY@CUANSCHUTZ.EDU>
Wed 9/2/2020 3:34 PM
To:

- Scott,Heather Denise <heather.hall@louisville.edu>

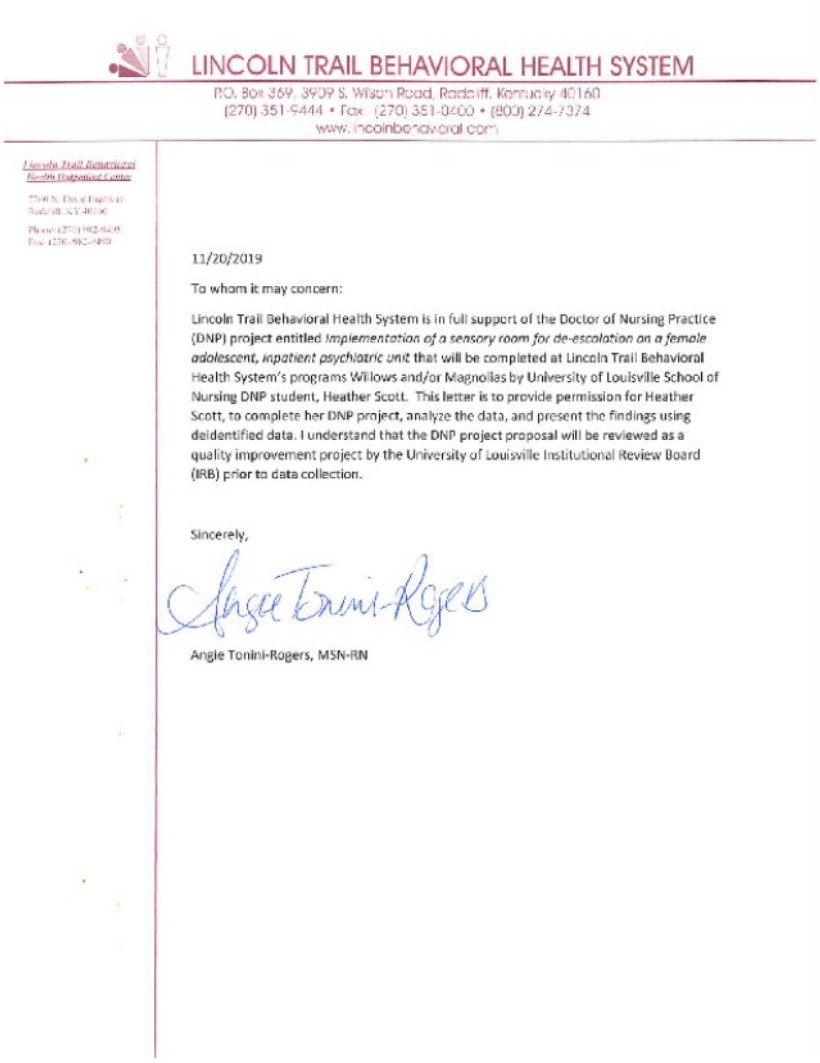
Hello Heather

It is a pleasure to be connected to you. The FACE measure is in the public domain and we do not collect royalties or anything from it's use. I've attached the copy I have, although I think it is also available on psychTests. You may want to check with a statistician about the appropriateness of t-tests. Since you are comparing subjects or assessing change within subjects, it may work. We used the measure to compare the effectiveness of particular interventions of music or art for differing groups of patients. I remember having to use the LogOdds and an odds ratio. The items are scored 0-,1,2. The "energy" item was reversed scored, "0=2" "1-1" and 2=0. Higher scores on the measure mean higher levels of associated moods. I've attached the article that we published with the measure.

I hope this answers all of your questions, but if not, do not hesitate to reach out again.

Heather Kennedy, MPH, PhD (She, her, hers)
Program Manager
UpRISE, Colorado's social justice youth tobacco control movement
Rural, arts-based youth-led social action for mental health
Center for Public Health Practice
Colorado School of Public Health

## Appendix B: Letter of Support from Chief Nursing Officer



LINCOLN TRAIL BEHAVIORAL HEALTH SYSTEM

P.O. Box 369, 3909 S. Wilson Road, Radcliff, Kentucky 40160
(270) 351-5444 • Fax (270) 351-0400 • (800) 274-7374
www.lincolnbehavioral.com

11/20/2019

To whom it may concern:

Lincoln Trail Behavioral Health System is in full support of the Doctor of Nursing Practice (DNP) project entitled *Implementation of a sensory room for de-escalation on a female adolescent, inpatient psychiatric unit* that will be completed at Lincoln Trail Behavioral Health System's programs Willows and/or Magnolias by University of Louisville School of Nursing DNP student, Heather Scott. This letter is to provide permission for Heather Scott, to complete her DNP project, analyze the data, and present the findings using deidentified data. I understand that the DNP project proposal will be reviewed as a quality improvement project by the University of Louisville Institutional Review Board (IRB) prior to data collection.

Sincerely,

Angie Tonini-Rogers

Angie Tonini-Rogers, MSN-RN

**Appendix C: Sensory Modulations Beliefs Survey**

The following is a brief survey to gauge your knowledge and perception about sensory rooms following a training session for sensory modulation and use of a sensory room. Please answer questions to the best of your knowledge. If you do not know the answer to a question, simply respond N/A.

**1. Do you believe that use of a sensory room will help to decrease the use of restraint and seclusion in your facility?**

5 4 3 2 1 N/A
Very much Somewhat Not at all

**2. Do you believe that use of a sensory room in your facility will help to improve staff/patient relationships**?

5 4 3 2 1 N/A
Very much Somewhat Not at all

**3. Do you believe that use of a sensory room in your facility will help to improve staff morale?**

5 4 3 2 1 N/A
Very much Somewhat Not at all

**4. Do you believe that use of a sensory room will help to decrease stress levels for individuals who are recipients of care in your facility?**

5 4 3 2 1 N/A
Very much Somewhat Not at all

**5. Do you believe that use of a sensory room will help to decrease stress levels for individuals who are employed by your facility?**

5 4 3 2 1 N/A
Very much Somewhat Not at all

**6. Do you believe that use of a sensory room will be an effective tool for helping to teach individuals the skills necessary to control aggressive behavior?**

**5** 4 3 2 1 N/A
Very much Somewhat Not at all

**7. How would you describe the concept of a sensory room to someone who has never heard of it before (i.e. explain the purpose of the room, what it would look like, how it is used)?**

_____
_____

**8. What kind of changes do you anticipate seeing as a result of use of a sensory room?**

_____
_____

## Appendix D: Clinician Confidence in Coping with Patient Aggression Instrument

This questionnaire is a series of questions about your personal levels of confidence with incidents of aggression and use of de-escalation techniques following a training session using sensory modulation/sensory rooms. Please be truthful about your answers for what your confidence really is, not what you would like for it to be.

**1. How comfortable are you working with an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Uncomfortable Very Comfortable

**2. How good is your present level of training for handling psychological aggression?**

1 2 3 4 5 6 7 8 9 10 11

Very Poor Very Good

**3. How able are you to intervene physically with an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Unable Very Able

**4. How self-assured do you feel in the presence of an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Not Very Self-assured Very Self-assured

**5. How able are you to intervene psychologically with an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Unable Very Able

**6. How good is your present level of training for handling physical aggression?**

1 2 3 4 5 6 7 8 9 10 11

Very Poor Very Good

**7. How safe do you feel around an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Unsafe Very Safe

**8. How effective are the techniques that you know for dealing with aggression?**

1 2 3 4 5 6 7 8 9 10 11

Very Ineffective Very Effective

**9. How able are you to meet the needs of an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Unable Very Able

**10. How able are you to protect yourself physically from an aggressive patient?**

1 2 3 4 5 6 7 8 9 10 11

Very Unable Very Able