The Autism-Friendly Sensory Pods: An Overview

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Abstract- Sensory integration plays a key role in child development because he/she explores the environment through their senses (i.e., smell or hearing). While typically developed children gain sensory development automatically, children with Autism Spectrum Disorder (ASD) have difficulty with receiving and responding to sensory information, affecting their behavior and social skills. Sensory processing therapy has been widely used to intervene in the sensory stimuli appropriately for children with ASD. To provide an inclusive and accessible environment for autistic individuals, sensory pods have been introduced as an autism-friendly closed space to help them escape from the overstimulating environment and manage their moods to adapt to the atmosphere. Currently, research is needed to examine the empirical evidence of the best practices with the use of sensory pods.

Keywords- Autism Spectrum Disorder, Sensory Pods, autism-friendly closed space.

1. Introduction

Sensory Integration (SI) refers to the process that a human receives information from the body's sensory systems, then our brain organizes the information in order to respond appropriately (i.e., safe or not, pleasurable or painful, or to engage or to avoid) (Guardado & Sergent, 2022). As a child grows, they develop skills from their sensory demands to engage their senses to learn about the world and to interact with the environment (Ramirez, 1998). An example of sensory integration of a typically developed child, he/she would hold the egg delicately to avoid crushing it. Some children have difficulty integrating sensory information to process and respond, which is called "sensory processing disorder" or "sensory integration dysfunction" (Weitlauf et al., 2017). The sensory processing disorder can impact a child's development in motor, emotional, cognitive, physiological, and regulatory functions, thereby negatively affecting their social relationships and participation in their daily activities (Ikonen, 2001).

Children with autism spectrum disorder (ASD) are individuals who have a developmental disorder that affects their communication and social skills. ASD is a spectrum disorder, which means that it can range from mild to severe and can manifest in a variety of ways in different individuals. Children with ASD may have difficulty with social interactions and communication, such as making eye contact, initiating or maintaining conversations, or understanding social cues and body language. They may also have repetitive behaviors or limited interests, and may be sensitive to certain stimuli, such as certain noises or textures. They may also have difficulty with sensory processing, meaning that they may be oversensitive to certain stimuli or under-sensitive to others. It is important to note that every child with ASD is unique and may experience the symptoms of the disorder differently (Lahiri et al., 2020).

2. Sensory processing difficulties and children with ASD

Research shows that approximately 90% to 95% of children with ASD have sensory processing disorder, which impacts their behaviors and social skills negatively (Camarata et al., 2020). The typical signs of a sensory processing disorder from autistic include (a) being overly sensitive or under-responsive to touch, movement, sights, or sounds, (b) having a typical high or low activity level, (c) being easily distracted, (d) delays in motor, speech, or academic skills, (d) poor body awareness, (e) difficulty with unfamiliar location, toys, or new tasks, and (f) difficulty in coping with self-regulation, such as calming themselves (Ikonen, 2001). For example, a child with ASD may present severe discomfort when he/she is at a noisy shopping mall.

Sensory Integration treatment is the intervention to help children with sensory processing disorders by stimulating their sensory process. Typical sensory integration treatments used for children with ASD not only calm their anxiety but also for them to tolerate a sensory-rich environment, thereby improving their challenging behaviors or social functions and skills. Some examples of devices for sensory integration therapy are deep pressure, sensory brusher, and weighted vests. Also, therapy sessions provide activities for vestibular, proprioceptive, auditory, and tactile stimuli by utilizing play-oriented materials, such as trampolines, balls, swings or slides. Sensory integration therapy is applied in various environments such as homes, communities, schools, and clinics.

Although sensory integration treatment in ASD has been widely used as a behavioral intervention framework in schools and clinical settings, there is limited and emerging evidence on the effectiveness and efficacy of sensory integration therapy [1]. While (Schoen et al., 2019) address that an increasing number of studies have provided positive results of sensory integrating interventions, (Weitlauf et al., 2017) pointed out the empirical limitations of sensory integration therapy as the conditions of the target population, interventions, and outcomes varied. However, the literature suggests that large-scale clinical trials are needed for clearer and more consistent outcomes (Camarata et al., 2020).

3. Closed Space for Children with ASD

Children with ASD frequently receive and interpret sounds or sights differently. Many of them demonstrate a different reaction to bright-colored, large open space, constant noise, or crowds which triggers high levels of anxiety and becoming overwhelmed (Guardado & Sergent, 2022). In recent years, sensory deprivation pods have been used to help individuals with sensory processing disorders, most commonly autistic individuals, feel more relaxed and calmer. When a child with autism spectrum disorder (ASD) needs to escape the overstimulating environment, the sensory pod provides that child with a personal safe space, providing various features such as a sliding door, soft blankets, multicolored lights, and speakers. (see Figure 1).

Figure 1. An example of a Sensory pod in a classroom

For instance, Dublin City University (DCU) in Ireland launched the Autism-friendly university initiatives and research project focused on better understanding the challenges and difficulties of their students with ASD to settle in and adapt to university life. The autism-friendly university design guide revealed the sensory stressors to prevent effective accessibility for autistic students in the university environment (Mostafa, 2021). Some examples of sensory stressors include smells from the cafeteria, red walls, projector sounds, or cluttered furniture. In order to help autistic students manage their overwhelmed feelings and destress from the campus environments, three sensory pods were placed in libraries across the university's three campuses to offer them a designated quiet and closed space (see Figure 2). From the efforts of the Autism-friendly university initiatives, the university revealed that students with ASD handle their college life better by accessing the sensory pods to reduce sensory overloads (Ryan, 2019).

Also, the Sensory Pod was provided at Mada Center as part of the sponsorship agreement between Mada and SensoryPod to provide a full inclusive localized experience in the region as part of the Mada Innovation Program (Thani et al., 2019).

Figure 2. Sensory Pod in Dublin City University

To request Sana Taleb to take a professional photo of Sensory Pod at Mada Center

Figure 3. Sensory Pod at Mada Center

4. Integration of virtual reality in closed spaces

One of the key elements of sensory pods is the integration of VR technology. VR headsets and other VR hardware are used to create a fully immersive visual experience for the user (Othman & Mohsin, 2017). This can be combined with other sensory elements, such as sound and touch, to create a truly multisensory experience. There are several ways that VR is being used in sensory pods. For example, some pods are being used to provide relaxation and stress relief through guided meditation and visualization exercises. These exercises can be enhanced with VR technology, allowing users to visualize themselves in a peaceful, calming environment such as a beach or a forest. Other sensory pods are being used for entertainment purposes, such as virtual reality games or movies. These pods can provide an immersive gaming or movie-watching experience that takes the user out of the real world and into a virtual one. Therapy is another area where VR is being used in sensory pods. For example, VR can be used to help people with phobias or other anxiety disorders to confront their fears in a controlled, virtual environment. It can also be used to help people with physical disabilities to regain movement or strength through virtual rehabilitation exercises.

There are a number of benefits to using VR in sensory pods. One of the main benefits is the ability to create a fully immersive experience that can be customized to the needs of the user. This allows for a highly personalized experience that can be tailored to the specific goals of the user, whether it be relaxation, entertainment, or therapy. Another benefit is the ability to create virtual environments that might be difficult or impossible to experience in the real world. This can include things like simulated space travel or exploring exotic locations.

Overall, the integration of VR in sensory pods is a promising development that is helping to enhance the sensory experience in a variety of settings. From relaxation and stress relief to entertainment and therapy, VR is being used to create immersive and personalized sensory experiences that can have a positive impact on people's lives.

5. PECS in sensory pods

Integrating pictograms, such as those used in the Picture Exchange Communication System (PECS), into sensory pods can be a helpful way to enhance the user experience for individuals with communication difficulties, such as those with autism spectrum disorder (ASD) (Othman & Al-Sinani, 2021). PECS is a communication system that uses visual symbols or pictures to help individuals express their needs and wants. By incorporating PECS into sensory pods, individuals with ASD or other communication challenges can more easily interact with and control their sensory environment. For example, a sensory pod could have a display with a series of pictograms representing different sensory experiences, such as music, lights, or smells, and the user could select the desired sensory experience by pointing to the corresponding pictogram. This can help make the sensory experience more interactive and engaging and can also provide a useful tool for individuals with ASD to communicate their preferences and needs.

6. Conclusion

Most autistic children have some kind of sensory processing issues. The architectural designs (i.e., the color of walls) and environments (i.e., noisy crowds) can be barriers for them to be

fully included in the school or community. However, it is not an easy solution to modify or redesign the existing buildings and the environment. Instead, the sensory pod can be an alternative option, which is an affordable, calming and safe space to be easily installed in a place such as schools, universities, hospitals, libraries, and airports. Yet, there is currently no empirical evidence of the effectiveness of the sensory pod as a sensory therapeutic solution. In order to develop best practices with the use of sensory pods, experimental studies are needed to evaluate the effects for children with ASD and sensory integration intervention in various settings.

One potential future direction for research on sensory pods could be to focus on improving the overall user experience by enhancing the realism and immersion of the sensory stimuli provided by the pods. This could involve using more advanced technologies, such as virtual reality or haptic feedback, to create a more convincing and lifelike sensory environment for the user. Another area of research could be to explore the therapeutic potential of sensory pods, by studying the effects of different sensory stimuli on various mental health conditions such as anxiety, stress, and depression. Additionally, research could focus on developing sensory pods that are more portable and accessible, potentially using mobile or wearable technology, to allow for more convenient and widespread use in various settings.

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