Interdisciplinary Collaboration between Occupational Therapy and Dentistry for Autistic Patients and Sensory Processing Differences

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Interdisciplinary Collaboration between Occupational Therapy and Dentistry for Autistic Patients and Sensory Processing Differences

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Doctoral Capstone Experience
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Abstract

Dental care is the most frequently cited unmet healthcare need for children with special needs (Cermak et al., 2015). Given the increased research linking oral health to overall health, it is important to ensure that dental care is accessible to all individuals. Oral hygiene and health management are both occupations included in the Occupational Therapy Practice Framework (4th ed). Combined with the unique training of an occupational therapist in sensory processing and environmental adaptations, the profession of occupational therapy has an important role in addressing the availability of dental care for those with disabilities.

The aim of my doctoral capstone experience was to explore the benefits of interdisciplinary collaboration between occupational therapy and dentistry to improve dental care for autistic patients and those with sensory processing differences. This included a literature review to explore current evidence-based approaches, meeting with experts on the topic, developing trainings for different audiences, creating visuals, implementing sensory and emotional regulation strategies, providing parent consultations, and exploring reimbursement. The DCE resulted in improved dental provider confidence and increased advocacy for oral health care for autistic individuals. The details of the doctoral capstone experience will be further outlined in this manuscript.
Introduction to Capstone Project

There is an increasing push from the neurodivergent community for acceptance of neurodiversity, changes in autism research and practices, and increased accessibility for all. An article from Leadbitter and colleagues (2021) states the neurodiversity movement incorporates the premise that “the disability is not simply a defect in the individual but arises from the interaction between a non-standard individual and an unaccommodating environment”. There is a need to accommodate for neurodiversity in schools, workplaces, and, for the focus of this capstone, medical environments. Occupational therapists have specialized training to modify environments based on unique client factors. Therefore, it is imperative that the profession of occupational therapy fills its role in supporting this movement. Dental appointments are notorious for being a challenging sensory experience for the autistic community, creating a barrier to accessing dental care. In addition, dental practitioners report challenges in providing quality care to autistic patients, describing a lack of training and a lack of cooperation from autistic patients. My capstone project focused on program development to ease this experience for autistic patients, caregivers, and dental practitioners.

In order to address this issue, I spent 14 weeks at a pediatric dentist office in Grand Rapids, MI. The owner of the practice is passionate about providing quality care to children with special healthcare needs. Therefore, they see many autistic children as well as children with other disabilities such as down syndrome and cerebral palsy. My site mentor was the director of operations, who was able to assist with arranging trainings, adding materials to the website, working within the electronic medical record system, and coordinating other logistics needed to implement my capstone. My second site mentor was the lead hygienist at the office. She was able to provide the information I needed to create visuals and develop trainings that address the
specific problem areas at the office. Although the dentist who owned the practice was not technically one of my site mentors, she was the person I worked most closely with throughout the experience and served as a point person for approval and feedback on my ideas. While most of my time was spent with this specific office, I also met with a variety of other experts in the field and provided trainings for other pediatric dental offices, dental students, and therapy centers.

**Literature Review**

**Introduction**

Despite the importance of proper oral care, dental care is the most frequently cited unmet healthcare need for children with special needs (Cermak et al., 2015). With the consistent rise of individuals being diagnosed with autism, it is likely that an increasing number of dental practitioners will encounter autistic patients in their practice (Como et al., 2021). However, 60-80% of dentists state they are unwilling to treat patients with developmental disabilities because of their resistive behaviors (Stein et al., 2014). Of all the reasons someone may require dental care in the hospital under general anesthesia, resistive behaviors had the strongest correlation to treatment in the hospital (Stein et al., 2014). Occupational therapists have specialized training in sensory and environmental adaptations. Therefore, they can provide a unique opportunity for interdisciplinary collaboration between occupational therapy and dentistry to decrease anxiety, reduce the use of general anesthesia and restraints, and improve overall oral health for autistic patients. However, very few dental offices in the country currently collaborate with occupational therapy. The purpose of this literature review is to first explore the reasons for difficulties with oral care for autistic individuals and then to address occupational therapy’s role in improving access to oral care in the home and at the dentist. The literature review used ProQuest, Google
Scholar, Google Search, and CINHAL with search terms such as “autism spectrum disorder”, “oral hygiene”, “dental care”, and “environmental modifications”.

**Autism**

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, to be diagnosed with autism spectrum disorder (ASD) a person must have difficulties with social communication and have restricted, repetitive, and/or sensory behaviors or interests (American Psychiatric Association, 2013). Autism self-advocacy and the neurodiversity movement have gained attention in recent literature and in the media, which necessitates respecting others’ traits and behaviors as natural to their neurological makeup (Dallman et al., 2022). Autistic self-advocates often describe how these differences contribute to a sense of identity in being autistic, while simultaneously acknowledging that being autistic in a neurotypical society can lead to struggles with sensory overload (Dallman et al., 2022), with up to 95% of autistic individuals having some form of sensory processing difficulty (Cermak et al., 2015).

**Sensory Processing**

Autistic individuals have a unique style of neurological processing that “leads to phenomenological differences in sensing and operating in their environment” (Dallman et al., 2022). This causes over- or under-responsivity to stimulation, leading autistic individuals to often respond differently to visual, auditory, tactile, or gustatory stimuli (Stein et al., 2011). An over-responsive nervous system has a low-threshold to excite the nervous system, causing an exaggerated and sometimes aversive response to stimuli and often leading to fight or flight reactions (Stein Duker, 2019). Many autistic individuals participate in “stimming”, which can be defined as repetitive, usually rhythmic behaviors expressed through body movements or
vocalizations (Kapp et al., 2019). In a qualitative study of 31 autistic adults, they suggested that stimming creates a rhythmic movement that allows them to self-regulate when experiencing overwhelming environments, sensory overload, noisy thoughts, and uncontainable emotion. It has been shown that stimming increases during dental visits (Stein et al., 2012), which is likely due to the overwhelming nature of the environment.

**Communication and Emotional Regulation**

Autistic individuals often have differences in verbal and non-verbal communication. An autistic person may have difficulties understanding body language, gestures, facial expressions, sarcasm, and inflection in tone (Brown & Elder, 2014). They also display atypical communication styles such as echolalia (where something that was said is repeated), contact gestures (such as grabbing an adult’s hand and placing it on something they want), pronoun reversals (such as referring to themselves as “you”), and neologisms (where meaning is assigned to a word or phrase that is not the socially accepted meaning) (Brown & Elder, 2014). These difficulties in communication may make it challenging to understand what is going on in the world around them. Autistic individuals may benefit from visuals, as their visual processing is usually more effective than their auditory or verbal processing (Smutkeere et al., 2020).

Impairments in communication often make it difficult for autistic children to express their needs and discomfort (Como et al., 2014). Often, behavioral outbursts in autistic children are attributed to frustration due to the inability to communicate with others (Brown & Elder, 2014). It is reported that autistic individuals often show pain in atypical ways, such as through self-injurious behavior, aggression, irritability, reduced participation in activities, changes in sleep, or crying (Fitzpatrick et al., 2020). Due to the differences in communication, pain is often unidentified and ineffectively managed among autistic individuals (Fitzpatrick et al., 2020).
**Oral Health and Hygiene**

Due to difficulty tolerating home and professional oral care, sensory processing differences, and communication challenges, many autistic individuals have poor oral health (Como et al., 2020). In a study looking at oral care at home, it was found that 17% of 142 autistic children did not brush their teeth at all and 36% brush their teeth less than once per day. For children with sensory over-responsivity, the taste or texture of toothpaste, the toothbrush bristles, the echoey nature, and fluorescent lights in the bathroom may all hinder toothbrushing in the home (Stein Duker, 2019). It is reported that fine and gross motor impairments, the side effects of medications, and the need for caregiver involvement also contribute to difficulties with daily toothbrushing (Smutkeereee et al., 2020).

In a survey completed by parents of autistic (n=196) and typically developing (n=202) children, they found that 60% of autistic children have moderate to extreme difficulty having the dentist or hygienist clean their teeth, compared to only 14% of typically developing children (Stein et al., 2012). One contributor to difficulties participating in a dental cleaning is a lack of education, as 58% of parental survey respondents reported that the dentist stated that he/she did not have adequate dental training to treat their autistic child (Stein et al., 2012). Another factor is sensory over-responsivity, which has been shown to be related to uncooperative behaviors in the dental office (Stein et al., 2014). As the mouth and face are extremely sensitive, tactile sensitivities are exacerbated when the dental practitioner touches around and inside the patient’s mouth and may be perceived as noxious stimuli (Stein Duker, 2019). Gustatory and olfactory sensitivities may also be aggravated, as they are exposed to different textures, tastes, and smells of dental products, medical gloves, and even perfumes of staff (Stein Duker, 2019). The overhead fluorescent lights are bright and may make a humming or buzzing noise, intensifying
visual and auditory sensitivities (Stein Duker, 2019). The vestibular movement of the chair reclining backward may also be aversive for children with gravitational insecurity (Stein Duker, 2019).

All of these sensory sensitivities are likely to lead to fight or flight reactions that may result in uncooperative behaviors. One study looked at physiological stress and anxiety in autistic children during routine oral care and found that they exhibited significantly greater behavioral distress than typically developing children (Stein et al., 2014). They also found increased activation of their sympathetic nervous system (Stein et al., 2014). The study also suggests that typically developing children experience physiological stress but use coping strategies, such as cognitive self-talk skills, to calm themselves (Stein et al., 2014), whereas autistic children likely have difficulty accessing cognitive strategies.

**Occupational Therapy and Dentistry**

One of the main focuses of occupational therapy is activities of daily living, which includes oral care (Como et al., 2021). OTs are skilled in identifying strengths and challenges while adapting and modifying activities to facilitate participation (Como et al., 2021). Therefore, a collaboration between OT and dentistry can provide dental practitioners with an understanding of autistic traits, as well as possible strategies to improve oral care for these patients (Como et al., 2021). In order to support this neurodiversity-affirming movement, it is essential that appropriate adaptations and education are provided to embrace the embodied autistic experience (Dallman et al., 2022). It is important to keep in mind that these uncooperative behaviors are the child’s way of communicating fear and discomfort.

**Environmental Modifications**
At the University of Southern California, the OT department collaborated with USC’s school of dentistry to create a sensory-adapted dental environment (Como et al., 2021). The environment consisted of the following modifications:

Visual: Blackout curtains, overhead fluorescent lights and dental lamps turned off, the dentist wore a headlamp to direct light directly into the client’s mouth and minimize light in the child’s eyes, and slow-moving visual color effects shone on the ceiling in the child’s visual field (Cermak et al., 2015b).

Auditory: Calming, rhythmic music was played throughout the visit (Cermak et al., 2015b)

Tactile: deep pressure was provided by a butterfly-type wrap, weighted with a regular pediatric X-ray vest. The wings wrapped around the child from shoulders to toes and provided a deep hugging pressure to produce a calming effect (Cermak et al., 2015b).

With these environmental modifications, they found a decrease in physiological distress when compared to a regular dental environment for both typically developing children and autistic children. It is also likely that a greater number of dentists would be willing to treat autistic children when using these environmental adaptations, as distress behaviors were the greatest barrier to their willingness to treat autistic patients (Cermak et al., 2015a). In addition to these modifications, offering sunglasses, private rooms, unflavored toothpaste, noise-canceling headphones, and instructing the child to get into the chair after it is already reclined may also prevent sensory overload (Stein Duker, 2019).

Parent Training

When surveying a sample group of parents of autistic children, 73.3% reported were unable to help their child complete toothbrushing correctly (Smutkeereee et al., 2020). In a study
of 31 children with mild or moderate ASD, they introduced a visual pedagogy that outlined the steps of brushing teeth, as autistic individuals often benefit from visual teaching compared to auditory or verbal teaching (Smutkeereee et al., 2020). Parents were advised on how to use it and encouraged to do so during brushing times. They found statistically significant improvements in toothbrushing ability, toothbrushing cooperation, and plaque index after 6 months of using the visual pedagogy when compared to baseline.

Another strategy for those with visual and auditory sensitivities is to change the location of toothbrushing at home, due to the aversive nature of the bathroom lights and the echoey environment (Stein Duker, 2019). For tactile sensitivities, deep pressure has been linked to desensitization (Stein Duker, 2019). To prepare for brushing, parents can try to start with an oral massage or vibration to the face/mouth area, wipe teeth with a washcloth, and try a toothbrush with very soft bristles (Stein Duker, 2019). It may also be beneficial to try to identify the least noxious toothpaste for their child, such as mild flavors like bubble gum and strawberry as opposed to mint (Stein Duker, 2019).

Dental Staff Training

It is reported that the more prepared dentists felt to work with autistic children, the more likely they were to provide care (Como et al., 2021). Therefore, it is essential that dental practitioners get the necessary training to provide care for this population. A common strategy recommended by the American Academy of Pediatric Dentistry teaches practitioners to use is tell-show-do, where they explain what will happen, show them how it happens, and then do it (Como et al., 2021). However, it has been shown that those with greater over-responsivity to sensory stimuli exhibit decreased expressive and receptive language skills (Stein Duker, 2019). Therefore, this is likely an ineffective method for those with sensory over-responsivities given
the difficulties with verbal processing (Stein Duker, 2019). Instead, it may be beneficial to provide visual supports. Visual schedules break down a task such as a dental cleaning into discrete step-by-step tasks to be checked off when complete, and can make oral care more predictable and provide a firm ending time (Stein Duker, 2019). Another type of visual support, called a social story, can be used to provide important information to decrease anxiety about the upcoming dental visit, such as what to expect, what sensory stimuli they will encounter, and what types of tools they will use (Stein Duker, 2019).

It is also important to educate dental staff on the importance of sensory breaks and stimming. Stimming creates a calming feedback loop and has been reported to be a useful behavior for self-regulation to soothe overwhelming sensations and emotions (Kapp et al., 2019). At the dentist, children are expected to lay still in the dental chair. However, it is important to understand the benefits of allowing a child to stim and educate dental practitioners on the need for stimming to promote self-regulation.

**Protective Stabilization Use in Dentistry**

The American Academy of Pediatric Dentistry (AAPD) defines protective stabilization as “the physical limitation of a patient’s movement by a person or restrictive equipment, materials or devices for a finite period of time in order to safely provide examination, diagnosis, and/or treatment” (AAPD, 2020). The term protective stabilization utilized in dentistry was formerly referred to as physical restraint and medical immobilization (AAPD, 2020). A common form of protective stabilization is called a papoose board, which is a rigid board with straps for the hands, arms, and legs (Figure 1). Currently, there is only one state that requires advanced training to utilize protective stabilization (AAPD, 2020). However, a predoctoral dental survey
demonstrated that only two percent of dental students actually used an immobilization device (such as the papoose board) on a patient during school (AAPD, 2020).

**Figure 1**

*Papoose Board*

*Note.* The papoose board is a type of protective stabilization frequently used when patients resist or oppose medical procedures.

A qualitative study by Malik and colleagues (2022) completed semi-structured interviews with parents to understand their perceptions regarding papoose boards and other restraint methods. Two of the parents described overall positive experiences with the papoose board, describing a calming effect for their child (Malik et al., 2022). They also reported preferring this option as opposed to general anesthesia (Malik et al., 2022). Other parents report traumatic experiences for both the parent and the child. One parent stated “I feel that by constraining someone that is having a hard time, you are betraying the trust” (Malik et al., 2022). Another parent described how her daughter screamed the entire time, which is traumatic for everyone involved (Malik et al., 2022).

Many parents felt rushed by the dentist and wish they had been given more time to decide or prepare their child (Malik et al., 2022). The parents who had negative experiences
retrospectively wished the treatment had been delayed or other approaches had been explored (Malik et al., 2022). Given the mixed attitudes toward this type of protective stabilization, it is important to consider the ethical issues associated with papoose boards. In addition, it is essential to provide the proper amount of time and information to the parent for them to provide true informed consent prior to implementing protective stabilization.

**Sedation**

General anesthesia is frequently needed for patients who are resistant to care and have extensive treatment needs, and while typically safe, general anesthesia has associated risks and is costly for the patient (Rada, 2013). A study by Rada (2013) looked at the treatment needs of 50 autistic patients who underwent general anesthesia. Of the 50 participants, 60% required periodontal treatment (to treat periodontal disease). Each patient had an average of 4 teeth extracted and a mean of 3.5 fillings needed (Rara, 2013). Two adults required all of their remaining teeth to be removed, one adult required 21 teeth to be extracted, and one 9-year old required 10 teeth to be extracted (Rada, 2013).

**Reimbursement for Patients with Special Healthcare Needs**

The AAPD states that “many dentists are unwilling to treat individuals with special healthcare needs (SHCN) due to lack of familiarity with medical conditions, inadequate training to treat SHCN, poor reimbursement, and lack of knowledge about available resources” (AAPD, 2022). Patients with SHCN also often require increased time and personnel for an appointment to treat the patient in a safe, effective, and high-quality manner (AAPD, 2022). In addition, there are barriers to third-party payers and their willingness to compensate for the additional time required to provide dental care for individuals with SHCN. (AAPD, 2022). A study by Byrappagari and colleagues (2018) surveyed general dentists in Michigan regarding their
willingness to treat patients with developmental disabilities. Of 241 dentists, 54.8% reported that better reimbursement was a leading factor in improving their ability to treat patients with developmental disabilities.

The combination of inadequate training, increased time for appointments, and lack of proper reimbursement poses a challenge for autistic patients to access dental care. Given the described challenges with oral hygiene noted above, there is a significant need for a financial incentive for dentists to treat these patients in order to reduce the high number of emergency room visits and frequent need for general anesthesia dental services that become necessary as a result of delayed or unmet dental care (Byrapagari et al., 2018).

**Conclusion**

An interdisciplinary approach between occupational therapy and dentistry would provide many benefits for autistic patients, caregivers, and dental practitioners. Occupational therapists have the training and knowledge to implement environmental modifications, educate parents, and collaborate with dental staff on strategies to promote success for oral care. By providing the necessary education and modifications, dentists will likely be more willing to treat autistic patients (Cermak et al., 2015a). In addition, training parents will provide opportunities for those autistic children to improve their overall oral health. When healthcare practitioners are educated on autism, they will be able to accommodate for the unique characteristics of autistic individuals and therefore support them in embracing their lived autistic experience.
Needs Assessment

In order to explore the problems specific to this office in particular, a needs assessment was completed. The information was gathered through interviewing the dentists, hygienists, dental assistants, and office staff, in addition to observation of multiple different patients during appointments. The dental team was also provided with a survey to rate their confidence in working with autistic patients, sensory processing differences, and anxiety. Described below are the strengths, weaknesses, opportunities, and threats determined through the needs assessment process prior to any interventions provided throughout the DCE.

Strengths

The team strives to create positive experiences for their patients. The team is very willing to learn and passionate about providing quality care to patients with special healthcare needs. They are intentional to only push as far as the patient and caregiver are comfortable to promote successful visits. The pediatric dentists at the office have received training on behavior management strategies during their residency. In addition, the office has received training from behavior analysts to learn about managing challenging behaviors and breaking down tasks for autistic patients. They also encourage behavior therapists to come with their clients to dental appointments.

The hygienists modify appointments as needed for autistic patients. The office has a system where they rate a child’s behavior on each appointment, as well as list any sensory needs and what was successful during the last visit. They may dim the lights, provide sunglasses, recline the chair before the patient got in, use a manual toothbrush as opposed to the prophylaxis brush, or use flavorless toothpaste and fluoride varnishes. They frequently use the strategy called “tell, show, do”. They make an effort to collaborate with parents to set up the child for success.
The office has 4 chairs in an open bay where most patients are seen for hygiene visits. Each chair has a TV mounted to the ceiling for the patient to watch a movie, which serves as a great distractor. The office also has two “quiet rooms” that offer a private space for patients with special needs, sensory differences, or anxiety. This is a big strength of the office, as the space is typically much calmer than the open bays. In addition, if a child is having a difficult time, they have a private space to de-compress and try to re-regulate.

When a patient consistently has very difficult visits to the dentist, they may offer to provide de-sensitization visits. The goal of these visits is to decrease anxiety and work toward getting the necessary x-rays and exams to prevent a child from needing protective stabilization or sedation. The patient will typically schedule 6-8 appointments to work toward tolerating a dental cleaning and improving oral hygiene in the home environment.

**Weaknesses**

From the results of the initial survey distributed to the dental team, fifty percent of the respondents stated they feel nervous working with autistic patients. After talking further with the team, they described difficulties managing challenging behavior, accommodating for stimming and “the wiggles”, and communicating with autistic patients. While the team has received training from behavior management techniques, they had not received training on sensory processing and accommodations for sensory sensitivities. When asking team members about their knowledge of sensory processing, most reported awareness of over-responsiveness to touch, lights, and sounds. However, the staff did not have much knowledge on under-responsivity and sensory seeking.

One of the main sensory challenges of a cleaning is getting x-rays. Films of the teeth are essential for a comprehensive exam and determining treatment routes. However, this is typically
one of the most sensory-aversive aspects of a cleaning. When a child cannot participate in getting x-rays taken, it often increases the need for protective stabilization or sedation. Sometimes the provider will try to use nitrous oxide to help calm a patient for challenging aspects such as films or treatment. However, the nose piece the child is required to keep on their face to get the benefits is often sensory-aversive as well.

Parent burnout is also a weakness in promoting oral health for autistic individuals. Consistency and routine are essential for good oral hygiene habits. Given the sensations encountered with toothbrushing, it can often be extremely challenging for autistic individuals and parents trying to help. Many parents at the office have reported times when they have given up trying to fight it. One patient in the office had not brushed his teeth in over 3 years.

Another major weakness is the increased time, decreased reimbursement, and extra staff needed for autistic patients. When a child goes in for a cleaning, the office bills for the dental exam, the x-rays, polishing, scaling, and fluoride. However, an autistic child may only be ready to participate in certain portions at a dental visit. From observation, the majority of autistic patients at the office were only able to tolerate an exam from the dentist. Therefore, the office can only bill for the portion of the cleaning the patient was able to participate in, resulting in decreased reimbursement for autistic patients’ appointments. In addition, many appointments for autistic patients are booked for sixty-minutes, as opposed to the normal forty-minute appointments. This is done to allow the child extra time to adjust to the environment and to give breaks when needed. Often a dental assistant is required in addition to the hygienist to assist with taking films and for protective stabilization when needed. Due to these accommodations needed for many autistic patients, the office receives significantly less reimbursement and requires significantly more resources from the office. The owner of Growing Smiles is passionate about
providing care for these individuals and is willing to see autistic patients despite these problems. However, other offices may have a cap on how many special needs patients they see or may decline to see them all together, claiming they don’t have the training to treat these individuals.

**Opportunities**

The identified strengths and weaknesses highlighted many opportunities for my DCE. First was a need for staff training regarding autism, sensory processing, and environmental modifications to improve the staff’s ability to accommodate a variety of different needs.

Another opportunity was to provide visuals and resources for the dental team to assist with communication during dental visits. There was also an opportunity to resources to parents to provide more information on how to set patients up for successful visits. Many parents are very anxious about bringing their child in for a dental visit, particularly when they are anticipating their child to have difficult behavior during the appointment.

There was also a need to assist the hygienists in what they call “de-sensitization visits”. The hygienists provide the de-sensitization visits, which is beneficial as they are able to use the specialized tools for a cleaning and work on taking x-rays during these appointments. However, hygienists do not have the training to implement sensory-based de-sensitization strategies or to therapeutically grade a task up or down based on the patient’s needs. In the past, the team has received training from behavior therapists, where they educated the hygienists on task analysis. The de-sensitization visits focused on working through each step of a cleaning, starting with getting in the chair, tolerating the chair reclining, and so on. This gave the hygienists a great starting point, however, it was important to increase the success of these visits by providing sensory-based modifications for aspects of the cleaning as well as in the environment. There was also an opportunity to provide input on grading the task to increase the overall effectiveness of
these visits. The patient will typically come once a week for six to eight weeks. There is an out-of-pocket cost of forty dollars per visit. The opportunity to explore alternative funding options will be further outlined in the objectives achieved section.

**Threats**

After interviewing the staff, they reported difficulties completing their work when a patient engages in stimming or has a hard time sitting still in the chair. Even with accommodations, some children are too fearful to participate in any aspect of an appointment. When this happens, the hygienists often change gears away from doing a full cleaning. They may have the child brush their own teeth, have a parent brush, or the hygienist will try to brush with a manual toothbrush while waiting for the dentist to come in to attempt an exam. If a child is in pain or if a parent has concerns of decay, the dentist may need to push to do an exam to determine a treatment plan. This frequently requires protective stabilization, either from the papoose board or assistants stabilizing the head and arms. If the child has multiple areas of treatment needs, the dentist will recommend general anesthesia. However, if it is something that can be done quickly and within one visit, they will often plan to use the papoose board and/or give the child an oral sedative. When there is not an immediate concern, the office may offer desensitization visits to increase a child’s ability to tolerate a dental appointment. If a child has success with these visits, he or she may be able to complete treatment without the need for protective stabilization or sedation. This is an area where OT can be impactful to prevent medical trauma and decrease the number of children requiring anesthesia, which is costly and risky.

**Objectives Achieved**

The information gathered from the literature review and needs assessment was used to guide my goals and objectives for the DCE. The overarching goal of my DCE is as follows:
By the end of the 14-week DCE, the student will improve autistic patients’ participation in dental visits, increase staff’s confidence working with autistic patients, and improve oral hygiene routines at home for autistic patients.

Specific objectives were created to guide my DCE to meet this goal. Below is a summary of the tasks completed guided by my objectives to address the aforementioned goal.

The first week of my capstone was spent observing autistic patients during hygiene and treatment appointments, gathering information from the dental staff regarding their experiences with autistic patients, and talking with caregivers of autistic children about the challenges of dental visits and home oral hygiene.

**Visuals**

Many autistic individuals process visual communication better than auditory information, particularly when they are in a state of stress. During my DCE, I created a variety of visuals to enhance communication and provide predictability. In order to support a successful visit, I created a social story to outline what will happen during their upcoming visit (see Appendix A). The social story was uploaded to the website with instructions for parents. A copy was also placed in the waiting room for patients to look at before their appointment. In addition, I created visual schedules with pictures of each step of the dental cleaning to provide predictability and a clear endpoint to the appointment (Appendix B). The pictures were laminated and secured with Velcro. This allowed the hygienists to easily modify the order or remove certain steps depending on the patient’s needs. At the bottom of the schedule is the “prize” picture, which has been very reinforcing for some patients. When using it during the
visit, the patients are encouraged to rip off each step as they progress. The visual schedule was placed in both of the quiet rooms. At first, I introduced the schedule to the hygienists and modeled using it with the patients. As my DCE progressed, the hygienists took over the role of using the visual schedule.

An unexpected outcome I noticed with the visual schedule was the increased participation of caregivers. The caregivers know the best ways to communicate with their children. Therefore, when caregivers were made aware of the steps of the appointment, it allowed them to take a more active role in communicating with their child.

**Parent Handouts**

The hygienists make specific recommendations to the patient and caregiver to improve their overall oral health, such as improving toothbrushing and flossing techniques and modifying their diet. However, hygienists do not have specific training to accommodate sensory processing differences. To bridge this gap, I created a handout called “Tips for Improving Toothbrushing at Home for Sensory Sensitive Kids” (Appendix C). This handout outlines specific modifications to try based on a child’s unique sensory processing. The handout was posted to the website for parents to access as well as given to parents in person when they expressed difficulties with toothbrushing at home.

For good oral hygiene, establishing a consistent routine for toothbrushing at a young age is imperative. To assist caregivers and patients with this, I created a “Toothbrushing Tracker” (Appendix D). This handout was printed off and stickers were attached to each page. The patients had the option to take home the handout to track their toothbrushing in between hygiene visits. The hygienists encouraged the patients to bring the toothbrushing tracker back
to their next visit to show off how well they have been taking care of their teeth. Additional copies of the handout were posted to the website for parents to print off at home as well.

Lastly, I created a handout for parents explaining oral seeking (Appendix E). During my first few weeks of observing, I noticed a trend in parents expressing concerns about their child’s mouthing behaviors. Most patients who were mouthing items past the age of three also had some sensory processing differences described by their parents. To provide parent education, I created a handout explaining the sensory components of oral seeking. It highlighted the potential benefits of oral sensory input and ways to give a child this input in a functional way. The goal of the handout was to encourage parents and dental staff to consider the sensory needs oral seeking is meeting for the child prior to attempting to extinguish the behavior. The handout was given to parents in the office as well as posted to the website. Providing the handout to a parent often led to parent education regarding their child’s overall sensory processing and its impact on self-regulation, attention, and learning. Parents were able to gain a greater understanding of their child’s sensory processing as it relates to toothbrushing and dental visits, as well as their overall daily functioning.

**Trainings**

The literature review indicated a clear need to increase education for dental provider regarding patients with special healthcare needs. For my DCE, my education focused on sensory processing and autism. At my site, I had two all-staff trainings during their monthly meeting times. The training was provided to both the office staff and the clinical team. The first training was thirty minutes long and covered autism, the nervous system, emotional regulation, sensory processing, and dentistry-specific adaptations (Appendix F). In my second training, I covered the neurodiversity movement, identity-affirming language, autism
communication techniques, communication with parents, and sensory-adapted environments (Appendix G).

After implementing the first training, it became clear that there is a need to take this information to dental providers outside of just my site. The trainings I created were modified to comprehensively cover all of the information in one presentation. I went to a pediatric dental office in the area to share this information. The staff asked a multitude of questions regarding sensory processing, and it was clear that this information had implications for their daily practice.

From the literature and from talking with dentists in the field, dentists and dental hygienists do not receive adequate training in providing care for those with special healthcare needs. I met with the director of the Pediatric Dentistry Residency Program at the University of Michigan regarding the training of their general and pediatric dentists. The director described their curriculum as containing behavioral management techniques and general information regarding autism. However, the program does not specifically cover sensory processing. He found my expertise beneficial and set up a time for me to present to the pediatric dental resident. The pediatric residents were receptive to the training and asked thoughtful follow-up questions regarding the functional impact of sensory processing differences in dental care.

Another gap I identified in care for oral health is the lack of therapies targeting dental care. When a patient receives therapy services, the dental team typically encourages parents to advocate for toothbrushing and dental care goals in their therapy. Dental providers try the best they can to promote oral hygiene at home, however, they do not have the training in therapeutic techniques or the time to commit to addressing oral hygiene routines at home. In my experience in OT and in ABA, preparing for dental visits and practicing toothbrushing are
infrequently targeted during therapy sessions. In addition, ABA therapists do not typically have an in-depth understanding of sensory processing to set autistic patients up for toothbrushing. To target this gap, I provided training to a behavior therapy center to educate the staff on sensory processing as it relates to toothbrushing and visiting the dentist.

**Sensory Modifications**

To decrease sensory overload at a visit, an important aspect of my project was to provide sensory strategies to implement during visits. Presenting information to the staff was beneficial to provide the staff with a general understanding of the science behind the processes I implemented in the office. However, I found presenting the information in combination with modeling the strategies was the most successful way to create change.

Time constraints were a frequent barrier in implementing strategies to promote regulation during a dental visit. Therefore, the strategies I recommended had to be easily implementable and quick. A simple but effective strategy for promoting regulation was providing patients with lots of water. When a patient takes a sip of water, they are required to gain control of their breathing. Also, when the water is cold, it may provide enough sensory input to shock the nervous system and bring them back to regulation. In addition to using water to regulate breathing, I also trained the office on using bubbles. In order to blow bubbles, a person again must coordinate their breath. Bubbles are also very reinforcing. When an autistic patient receives ABA services, they are used to getting frequent reinforcement when participating in challenging tasks. The hygienists were trained to use bubbles to increase the frequency in which the patients contacted reinforcement in order to improve cooperation during visits.
An additional strategy I introduced to the office was the use of fidgets for regulation. The office already had fidgets available for patients. However, not all fidgets have the same sensory features. For example, the office has fidget balls that many patients love. I educated the team on encouraging the patients to “try to squeeze the ball so hard you pop it” in order to increase proprioceptive input into the arms. In addition, if a patient is continuing the bring their hands to their face, the hygienist can re-direct the patient to tell them about the sensory features of the fidget in their hands.

At the beginning of my DCE, I encouraged the office to purchase a Z-vibe oral motor tool. Many of the autistic patients at the office have had OT and speech therapy in the past, where they may have encountered the Z-vibe. When a child is having a difficult visit, the Z-vibe may be used as opposed to introducing dental tools the child is unfamiliar with. Even if a child has never seen the Z-vibe before, it is visually more kid-friendly and it offers vibration that can be de-sensitizing to the mouth and regulating to the nervous system for some kids. The hygienists have stated they have found great benefits in having this tool available. Throughout my experience here, I have seen many autistic patients feel the Z-vibe and willingly put it in their mouth and their cheeks, wanting more of the favorable sensation. One patient put the Z-vibe with the toothbrush head in his mouth after not allowing any toothbrushing for over 3 years. Another patient with Down syndrome grinds her teeth all throughout the day, and the caregiver and hygienist noticed a pause in grinding when the patient was holding the Z-vibe.

**Sensory Intake**

In order to assist the dental team in knowing what type of sensory modifications to make, I created a sensory processing questionnaire (Appendix H). The form categorized the patients in under-and over-responsive categories to help the staff best plan for a successful visit.
In collaboration with the operations manager at the office and the EMR support team, I created an electronic form that was able to be added to the software. It was able to be included in the patient forms sent electronically prior to the appointment and available to fill out upon arrival to the office on iPads. The form was optional and caregivers were prompted to only fill it out if the child has sensory processing differences. After filling it out, it is automatically added to the patient’s chart for the dental staff to access. The staff was provided with a sheet outlining simple sensory-based modifications they can make based on the responses to the sensory processing questionnaire. The ability for the form to be added to the electronic medical record software was crucial for successful implementation.

**Sensory-Adapted Dental Environments**

One of my objectives was to implement environmental modifications to accommodate sensory needs. Given the focus of my DCE is a non-traditional area of OT, I found myself frequently seeking out advice from other experts in the field. From what I have gathered, the community of professionals working toward addressing the accessibility of dental care for patients with special healthcare needs is small. However, they collaborate frequently to work toward improving quality care for this population.

Dr. Leah Stein is a leading researcher at the University of Southern California. She has published many studies regarding the feasibility and effectiveness of a sensory-adapted dental environment. She was willing to meet with me to discuss my DCE and provided valuable input from an OT perspective. I have consulted with many different professionals throughout my project, but Dr. Stein was the only occupational therapist I was able to collaborate with who is targeting oral care for autistic individuals. She was able to provide feedback on projects I had been working on at the office and bring me back to an occupation-focused lens in my DCE.
When searching for other resources to support my DCE, I came across a company called Sensory Health. The company provides training for medical providers on sensory processing. In addition, the team designs and implements sensory-friendly environments for medical and dental offices. I met with the co-founder and CEO of the company to discuss his experience in the field and to hear about the benefits of sensory modifications in a dental environment. He was able to speak on the logistics of implementation and offices' perceptions toward making these changes. The CEO also connected me with an office the company served to modify the environment and provide training. I had the opportunity to go see the sensory-adapted environment, where they had created two sensory-adapted treatment rooms and a separate sensory room in the front of the office. At the visit, I spoke with the lead dentist about using these environments in practice, time management related to the rooms, and the overall benefits of the additions.

After exploring sensory modifications other offices implemented, I worked with the owner of Growing Smiles to create a plan to develop a sensory-adapted dental environment in both of the quiet rooms at the office.

**De-Sensitization Visits**

Training for desensitization visits was incorporated in the all-staff trainings as well as provided through modeling through opportunities for me to be hands-on during these visits. The visual schedule has been a successful strategy for de-sensitization visits as well. If the child is motivated toward working toward a goal, the child is able to play an active role in establishing goals with the hygienist. They have the opportunity to create the visual schedule themselves, choosing the steps they want to work on that visit and the order in which they wish to target the goals. They are also provided with a goal checklist to bring with them to each visit.
to keep track of their own progress and for the hygienist to comment on the appointment (See Appendix J).

Exploring Reimbursement

Due to the decreased reimbursement the office receives for most autistic patient appointments, I explored the literature and available resources to compensate for these visits. I found a training regarding the payer systems role in special health care dentistry, which led me to get in contact with the executive director of the dental foundation. She has successfully advocated for increased funding for patients with special needs who have a commercial Delta Dental plan in Michigan. These added benefits are standard across all plans and provide additional reimbursement of ninety-two dollars for each visit the child has. In addition, it covers unlimited de-sensitization visits with the same reimbursement rate, eliminating the need for parents to pay out of pocket for these visits. It also grants the child four dental cleanings a year to compensate for decreased oral hygiene. These benefits serve as a great incentive for dental offices and make up for the lost reimbursement that typically occurs at these visits. However, these benefits are exclusive to Delta Dental commercial plans, and have not yet been established with any other dental insurance or Medicaid plans. Growing Smiles had not yet been aware of these benefits. I worked with the billing specialist to set up a system to screen for eligible patients and bill these codes for their visits. This was a big win for the company, my capstone project, and most importantly the patients with special healthcare needs.

Implications of Capstone

Overall, my capstone project increased the dental staff’s confidence in treating autistic patients and those with sensory processing differences. Parents also expressed decreased anxiety in bringing their child to the dentist with the modifications in place and with an OT there to
assist. However, as my DCE progressed, the aim of my capstone took a broader focus on advocacy and education. I was able to provide education to dental offices, dental students, and therapists who see autistic patients with the goal of increasing understanding and providing strategies to target this issue. In addition, I had an opportunity to participate in an interview with a local news station alongside the executive director of Delta Dental to advocate for oral health services for autistic individuals and share about my capstone project.

A common theme I encountered during my meetings with other advocates for special healthcare dentistry was the desire to have occupational therapy on board. When meeting with the executive director of the Delta Dental Foundation, she spoke on the need for occupational therapists to join in on advocacy and assist in the development of educational resources. In addition, the dental staff at Growing Smiles stated they felt much more confident treating autistic patients; parents at the office were overwhelmed with gratitude to have a person who understands their child assist with a dental visit. The owner of Growing Smiles continually stressed the need to pursue this project further after graduation. She was a member of the board for American Association of Pediatric Dentistry, and assisted in arranging presentations for their annual conferences. She was adamant that training from an occupational therapist would be a sell-out presentation, and that I should pursue guest speaking opportunities at dental conferences.

The co-founder of Sensory Health expressed that they are looking for an occupational therapist to join their team, as they felt they were lacking a skilled provider who specializes in sensory processing and environmental modifications. The co-founder is a former CPA, with no formal training in autism or sensory processing. However, he saw such a need for accommodations in medical communities that he took it upon himself to figure out a way to bridge the gap.
The role of an occupational therapist is to address the interaction between the person, occupation, and environment. When considering occupational justice, there must be an increase in occupational therapists working to bridge these gaps in healthcare accessibility.

The overwhelming amount of encouragement I received throughout my DCE demonstrated a necessity for the profession of OT to work to fill these gaps in accessing healthcare. While my project focused on dentistry, parents I spoke with throughout the project expressed that accessing primary care services and receiving any other needed medical services was just as much of a challenge. In support of the neurodiversity movement, the autistic community would greatly benefit from occupational therapists further addressing healthcare accessibility.

**Conclusion**

Overall, my DCE provided strategies, tools, and environmental modifications to a pediatric dental office in Grand Rapids, which are outlined in the appendices below. The dental staff learned alongside me and demonstrated confidence in the continuation of these approaches prior to the end of my DCE. I will continue to collaborate with the office after the DCE as they work toward creating sensory-friendly dental environments in two of their operatories. I will also continue to advocate for the provision of oral healthcare services throughout my career as an occupational therapist.

The overwhelming amount of encouragement I received from practitioners and advocates in the field demonstrated a clear need for occupational therapists to collaborate with dental professionals and medical professionals alike. I hope that my DCE can serve as a guide for other occupational therapists when addressing barriers to accessing healthcare services for vulnerable populations. When beginning this capstone project, I was doubtful that other dental professionals
would be open to making modifications to their treatment approaches and environments. However, the majority of professionals I encountered throughout my DCE were eager for any assistance and opportunities available to them. It became clear that this is a larger problem than even I realized prior to taking this on. With improved interdisciplinary collaboration between occupational therapy and other medical professionals, the autistic community will have better access to services and increased overall health throughout their lifespan.
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Appendix A

Social Story

Going to the dentist to get my teeth cleaned!

When I go to the dentist we park the car and walk into the building.

We tell the front desk we are here and then I wait in the waiting room until it is my turn.

The hygienist will come get me and take me to measure how many muscles I have and see how tall I have grown!

Then I will go sit in the special chair. When I sit in the chair I will put my hands on my tummy and my feet out straight.

Sometimes they will take pictures of my teeth using a special camera.
The hygienist will give me sunglasses and lay my chair back so I can watch the movie on the ceiling!

The hygienist will use her special toothbrush and toothpaste to brush my teeth. The toothbrush will vibrate and might feel a little ticklish. This one is a zebra!

Then they will floss in between all of my teeth! The hygienist will also ask about how I am brushing my teeth at home and what types of food I eat!

The dentist will come to count my teeth with her special tooth counter and mirror to make sure they are all healthy.

The hygienist or doctor has a special paint brush she will use to put vitamins on my teeth to make them grow big and strong!

When I am all done, I get to pick a prize for being such a great helper!
Appendix B

Visual Schedule

Getting my Teeth Cleaned

Pictures
Brush Teeth
Floss
Paint Teeth
Count Teeth
Prize
Appendix C

Tips to Improve Toothbrushing at Home for Sensory Sensitive Kids

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**Exposure, exposure, exposure!**

The best way to get your child to feel comfortable with toothbrushing is to provide as much exposure as possible. Play videos of toothbrushing around the house in different areas. The more exposure they get, the better they will be at it! The toothbrush should be soft, and the use of a sensory toothbrush is vital. Toothbrushing should be done as often as possible, and it is important to involve family members in the process. The idea is to make toothbrushing an enjoyable experience for the child.

**Touch Processing**

The information we receive through the receptors in our skin.

**Responds Too Much**

- TRY:
  - A toothbrush with soft or silicone bristles
  - Let them brush this will provide a sense of control and help them to better prepare for the sensory input they are about to experience
  - Try brushing after a meal or playing a game prior to brushing to provide input into their mouth that can desensitize the oral cavity
  - When helping brush, make sure to use firm deep pressure for all toothpastes

**Responds Too Little or Seeking**

If your child:
- Doesn’t notice food on their face or through their hands
- Has no signs of toothbrushing
- Finds normal sensations to be unpleasant
- Frequently picks non-edible objects in their mouth
- Prefers crunchy or very chewy foods or overpowers their mouth with food
- Touches everything within reach or has difficulty with personal space
- Prefers very hot or very cold foods

**Try**:
- Brushing the teeth outside of the bathroom
- Use bright or colorful toothbrushes
- Give them a flavour of toothpaste they like

**Visual Processing**

The way the brain receives and interprets visual information in the environment.

**Responds Too Much**

If your child:
- Gets overstimulated by bright lights
- Enjoys wearing sunglasses or hats
- Gets overstimulated or distressed in a busy or cluttered environment

**Try**:
- Brushing their teeth outside of the bathroom
- Use bright or colorful toothbrushes
- Give them a variety of choices to brush their teeth

** Responds Too Little or Seeking**

If your child:
- Enjoys watching items spin or twirl
- Likes to have things around them
- Enjoys bright colors

**Try**:
- Brushing while watching a video
- Leave the water on, put bubbles in the sink for the child to watch or use their favorite light up toy
- Provide toothbrushing with any visual input that is reinforcing to them

**movement**

A person’s understanding of their body and relationship of their body with the space around them is arguably the most important sensory input.

**Responds Too Much**

If your child:
- Is very fearful of trying new experiences
- Avoids movement such as playing on playground equipment or being around where there are loud noises
- Gets startled with movements in the car

**Try**:
- Brushing sitting in their favorite chair
- Avoid using a mirror at the bathroom sink
- Lightly touch the child on the back of their hand
- Provide movement while brushing: dancing to their favorite song, walking around the house, sitting in a swing, etc.

**Responds Too Little or Seeking**

If your child:
- Breaks things by accident
- Is slow or bouncy into things frequently
- Has a hard time sitting still or falls out of their chair often
- Is always moving
- Is considered a “bored” child
- Falls on purpose
- Craves fast or spinning movement
- Requests deep pressure or weighted blankets

**Try**:
- Provide movement while brushing: dancing to their favorite song, walking around the house, sitting in a swing, etc.
- A child who is constantly seeking movement
- Use light pressure so that they will be comfortable
- Movement allows their body to feel calm and ready to handle other sensations such as a toothbrush and toothpaste.

**Hearing**

The way the brain receives and interprets sounds and language in the environment.

**Responds Too Much**

If your child:
- Identifies all unexpected sounds or is easily distracted by sounds you may not notice
- Avoids noisy or echoey spaces such as the classroom or playground
- Has difficulty in or slow to follow directions due to competing stimuli in the environment

**Try**:
- Avoiding an electric toothbrush as the sound of the vibration may be bothersome
- Brushing outside of the bathroom or even in the bathroom
- Noise canceling headphones

**Responds Too Little or Seeking**

If your child:
- Enjoys placing speakers close to ears or playing music
- Uses to make repetitive noises or tapping tunes, enjoy singing or humming
- Doesn’t reply to names being called
- Can be difficult to engage or seems in “their own world”

**Try**:
- Having toothbrushing with their favorite song or video
- A toothbrush that plays music
- Singing or counting during toothbrushing
- It may be helpful to use the same song every time to provide predictability

**Taste & Smell**

The way the brain receives and interprets different flavors and scents.

**Responds Too Much**

If your child:
- Is a picky eater or prefers bland food
- Has strong reactions to smells
- Uses all foods to look the same

**Try**:
- Way around textures of toothpaste (some may feel more gritty and some may feel more slimy)
- Help flavor of toothpaste (they may even make flavorless toothpaste)
- Try painting with no toothpaste or less toothpaste and gradually work up
- Don’t try to hide the toothpaste in the brushes. It is important to establish trust

**Responds Too Little or Seeking**

If your child:
- Has little preferences over foods
- Prefers strong flavors, spicy, or sour foods
- Enjoy swallowing sweet and non-scented foods

**Try**:
- Strong tasting toothpaste
- Providing opportunities to smell and taste toothpaste before putting on the toothbrush
- A fluoride toothpaste is recommended

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**References**

Appendix D

Toothbrushing Tracker

★ It is important to brush your teeth 2 times a day for 2 minutes to keep your teeth strong and healthy!
★ Put a sticker on the chart each time you brush your teeth!

Bring this with you to your next visit at the dentist to show off how great you have done brushing your teeth!
Appendix E
Oral Seeking Handout

WHAT IS ORAL SEEKING

Oral seeking is when a child continues to place non-edible objects in their mouth for much longer than other kids do.

Why do children mouth items?

Seeking out input into the mouth serves a purpose! It is one of the first ways an infant learns to self-calm.

Infants also use their mouth to explore and learn about the world. The mouth is a very sensitive area of the body and gives the brain very specific information about the properties of objects. Mouthing up to 18-24 months helps their sensory motor development! Mouthing typically subsides after the age of 2. When it persists, there is likely a reason! Unless the dentist has concerns about it impacting their oral health, it is not always a problem.

Oral seeking can also look like overstuffing their mouth with food, making excessive noises with their mouth, or frequent drooling.

Sensory Benefits

Oral sensory input taps into 3 different sensory systems:

- Tactile: different textures
- Deep pressure: The jaw is one of the strongest set of muscles in the body! Chewing can give a similar sensation to the mouth as a weighted blanket does to the body.
- Taste

All of this sensory information can be incredibly calming to the child's body. Pay attention to the times of day your child is mouthing and if it is related to stressors throughout the day.

How to Help

"Flood the system"

Provide as much access to a variety of oral sensory experiences as possible throughout the day. This can help decrease their need to seek it out themselves in ways that might not be safe or healthy.

Try out a vibrating toothbrush, sensory chew necklaces or pencil toppers, z-vibe tool, blowing bubbles, or even imitating making silly faces.

Provide more sensory input during mealtimes:

- Incorporate spicy or sour foods
- Give your child a thick smoothie, applesauce, or yogurt and have them drink it through a small or spiral straw
- Camelback water bottle (requires bite and suck)
- Textured spoons
- Different temperatures: soups, popsicles, ice water, etc.
Appendix F

Growing Smiles Pediatric Dentistry Staff Training #1

**AUTISM, SENSORY PROCESSING, AND EMOTIONAL REGULATION**

**ASD AND ACCESS TO DENTAL CARE**

- **SENSORY SENSITIVITIES**
  - 93% of autistic individuals having some form of sensory processing difficulty (Cermak et al. 2015)

- **DENTAL STAFF EDUCATION**
  - 58% of parents stated that the dental staff did not have adequate training to treat their child with ASD (Stein et al. 2012)

- **POOR ORAL HEALTH**
  - Dental care is the most frequently cited unmet health care need for children with special needs (Cermak et al. 2015)

**ORAL HYGIENE & ASD**

- **1 OUT OF 5**
  - Approximately 1/5 autistic children did not brush their teeth at all at home (Stein Baker 2019)

- **3 OUT OF 8**
  - Approximately 3/8 autistic children brush their teeth less than once a day at home (Stein Baker 2019)

**EMOTIONAL REGULATION**

WHAT IS REGULATION

Regulation is the ability to flexibly move between states of arousal in response to stressors and changes in the environment.

All of us are regulating our emotions and our body throughout a day.

**NERVOUS SYSTEM ON A NORMAL DAY**
NERVOUS SYSTEM AT THE DENTIST

HOW TO ACHIEVE THIS

Sensory experiences can either promote regulation or facilitate dysregulation.

When the thinking brain goes off, go through the body.

IDEAL NERVOUS SYSTEM AT THE DENTIST

PROACTIVE

Prevention is key!
- Provide clear communication
- Implement sensory-based strategies
- Calm your own nervous system

REACTIVE

- Breathe!!!
- Short simple sentences
- Bubbles, water, squeeze toy, tapping, hum a song, animal noises
- Let parent co-regulate

What Is Sensory Overload?

Sensory overload occurs when sensory input is overwhelming, leading to a state of distress.

REGULATION & SENSORY PROCESSING

(Sensory Health, [Link])
INTERDISCIPLINARY COLLABORATION BETWEEN OT AND DENTISTRY

**STIMMING AND REGULATION**

- Stimming: repetitive, usually rhythmic body movements or vocalization
- Rhythmic movement promotes self-regulation to soothe overwhelming sensations and emotions
- Stimming increases during dental visits, likely due to the overwhelming nature of the environment

(Kapp et al., 2019; Stein et al., 2012)

**WHAT IS SENSORY PROCESSING?**

Registration and interpretation of sensory input in the environment. Everyone's brain processes this information differently.

Sensory processing disorder is when the way their brain processes sensory input hinders participation in everyday life.

**SUBTYPES OF SENSORY PROCESSING DISORDERS**

**SENSORY OVER-RESPONSIVE**
- Responds too much, too soon, or for too long to sensory stimuli
- Most people find tolerable

**SENSORY UNDER-RESPONSIVE**
- Seem unaware of sensory stimuli, delayed responses, responds with less intensity or not at all

**SENSORY SEEKING**
- Intense craving for sensory experiences that they actively seek out. Usually helpful to the body

(Miller et al.,

**THE EIGHT SENSES**

1. Visual
2. Tactile
3. Olfactory
4. Taste
5. Auditory
6. Proprioception
7. Vestibular
8. Interoception

**VESTIBULAR**

**Under-responsive or Seeking Input**
- Can spin without getting dizzy
- Is always moving, bumping into walls, falling out of chair, considered a “dare devil”
- Wiggles, head turning

**Modifications:**
- Provide breaks to get out of the chair, go for a walk, bounce on a ball, jump up and down, or sit

**Over-responsive:**
- Difficulty with feet off the ground or hesitant to get in chair
- Startles with moving the chair back or avoids reclining with the chair

**Modifications:**
- Recline the chair and then have the child climb in
- Could be sensitive to knee to knee board
**Proprioception**

Awareness of where our body is in space:
- Proprioceptors located in our muscles and joints
- Stimulate with heavy input such as deep squeezes, weighted blankets, jumping on the trampoline.

This input is the best ‘modulator’ or ‘changer’ to the nervous system. It provides calming, organizing, and regulating input into the body.

Modifications:
- Squeeze ball
- Wet wash cloth for deep pressure into gums
- Weighted blanket

**Interoception**

Perception of internal body states:
- Pain
- Bladder/bowel
- Temperature
- Sick
- Hungry/thirsty

Often altered for people with sensory processing differences and autistic people.
* *Remember when asking if they have had tooth pain

**Auditory**

Over-responsive:
- Startles at unexpected sounds or is easily distracted by sounds
- Putting their hands over their ears
- Difficulty or slow to follow directions due to competing stimuli in the environment

Modifications:
- Talk less! Make sure there is only one voice talking in the room at a time
- Avoid singing songs, clapping, and cheering, and excessive praise
- If counting, try to lower the pitch of your voice and have only one person count
- Provide extra time for them to process verbal instructions
- Noise canceling headphones/quickshifts

Under-responsive or Seeking Input:
- Doesn’t reply to name being called
- Appears withdrawn or difficult to engage
- Placing speakers close to ears, makes repetitive noises or tapping of items, enjoys singing or humming, prefers loud music

Modifications:
- Incorporate all the singing and counting, fluctuate your pitch of voice
- Any rhythmic input is beneficial to promote calm and regulation within the body

**Touch**

Over-responsive:
- Is very particular about the type of clothes they wear, tags in clothes, seams, etc. Has difficulties with cutting nails or hair
- Picky eater, likes all food to look the same, has a strong preference for soft or hard foods, or certain textures
- Complains of pain with tooth brushing, difficulty with films, tenses body

Modifications:
- Always provide **firm deep touch** as opposed to light touch (this tugs into the proprioceptive system)
- Let them touch everything before. Describe how it is going to feel

Under-responsive or Seeking:
- Not liking food on their face or that their hands are dirty
- High pain tolerance
- Frequently putting non-edible objects in their mouth
- Prefers crunchy or very chewy foods
- Oversuffs their mouth with food
- Touching everything within reach or difficulty with personal space

Modifications:
- Provide deep touch
- Tactile sensory toy to re-direct seeking
- Vibrating toothbrush
INTERDISCIPLINARY COLLABORATION BETWEEN OT AND DENTISTRY

**VISUAL**

Over-responsive:
- Dreads bright lights, covering eyes, gets overwhelmed in a cluttered environment, likes wearing hats or sunglasses
- Difficultly with eye contact
- Easily distracted by stimuli in room (windows, motion, decorations, etc)

Under-responsive:
- Not noticing motion or important details around them

Sensory seeking:
- Likes watching objects that spin, light up, bright colors

**TASTE & SMELL**

Over-responsive:
- Very picky eater
- Cags on certain tastes or smells

Modifications:
- Avoid minty flavors
- Can recommend flavorless toothpaste
- Be aware that a child might have preference over color of toothpaste

Under-responsive:
- Little preference over foods
- Foods tasting miki/bland
- Preference for strong flavors
- Sensory seeking
- Seeks out intense flavors such as spicy or sour foods

Modifications:
- Offer toothpaste choices
- Smell and taste toothpaste before using it
- Strong flavored toothpaste

**EXPANDING YOUR TOOLBOX**

**QUICKSHIFTS**

Brain based music
Different frequency through the right and left ear
“Regulation” track provides rhythmic music to calm the body
Best used as a preventative measure
Downloaded on iPADs and can connect to headphones

**Z-VIBE**

Vibration can be very effective in the normalizing sensations
Can use as a desensitizing tool or as a toothbrush
Common tool used in therapy—they might be familiar with this tool or have one at home
Child may tolerate better than other tools

[ARK Therapeutic Products, 2021]
DESENSITIZATION

Brush own teeth right when they arrive
Z-vibe to provide input into the gums
Deep pressure with wash cloth
Sugar-free gum

VISUAL SCHEDULE

Children benefit from clear end point
Autism and numbers: Counting down the number of steps

BUBBLES

My favorite tool.
The child has to stop, breathe in, and then breathe out
 Automatically reinforcing

WATER

Need to stop, coordinate breathe
Colder the better, shock the nervous system and help re-regulate
Better from a cup

FIDGETS

Squeezing a resistive ball gives deep pressure into the muscles to calm the body
Encourage them to squeeze it hard!
"Replacement behavior" to redirect hands away from their face

WEIGHTED BLANKET

Proactive strategy: Provides deep pressure to calm body
Best for the wiggly kids- they are often craving that input
Promotes closed body posture
Questions?

REFERENCES


Appendix G
Growing Smiles Pediatric Dentistry Staff Training #2

**Neurodiversity Movement**
- Autistic person vs person with autism
- Moving away from the deficit model
- A disabling diagnosis vs a disabling environment
- Universal design

**Training Part 2**

- "The dentist was like well I can't work on him I was like, yeah me neither!"
- "He built up like a cheetah then he leaves and has sensory overload!"
- "A dental hygienist told my daughter that she really needs to brush her teeth more. I'm like do you remember those special needs children? So I kind of wanted to punch her, but I didn't."
- "They take an individualized approach, almost like an individualized AIP for the dental office."

**Autism Appointments**
- Parents go everywhere with the assumption others don’t understand
- Is there anything we can do to set things up for success?
- Maintaining dignity
- Encourage parents to talk about the appointment as much as possible

**Autism Appointments**
- Therapeutic use of self
- Nonverbal cues more important than language
- "Low arousal approach"
AUTISTIC STIMS & IMITATION

Stims tell you about a person's sensory processing

- Initiation vocal stims
- Increased eye contact and social connectedness

WHEN A CHILD HAS ABA SERVICES

- Very frequent breaks with small rewards
- Very rigid
- Edibles as rewards
- Doesn't work for all autistic people

SENSORY ADAPTED DENTAL ENVIRONMENT

- Autistic and neurotypical children have a lower need for supervision and psychological and behavioral effects in SBC compared to SBC
- 1-on-1 interaction
- May be from increased throughput of clinical treatment, amount of staff, need for a successful appointment
- Without any training, can positively change the environment for better experiences
De-sensitization Visits

- Simulate oral hygiene at home
- Working up to the chair
- Getting small successes
- Prompting functional communication when possible

Delta Dental Commercial Expanded Benefits

- Unlimited exams (D0110, D0140, D0150, D0160, D0180, D0200)
- Additional visits to learn about and adapt during an exam
- Desensitization and introductory visits can be helpful for people with sensory sensitivities or cognitive disabilities.
- Up to four hygiene visits per calendar year (D0110, D0120, D0150, D0160)
- Dental care management—patients with special healthcare needs (D0997)
- Anesthesia—(D0222, D0223, D0238, D0245)

Additional sensory and behavioral strategy tools, including additional time, should be dental staff need them to help identify needs up front rather than at the time services are rendered.

Oral Seeking

- Beneficial for learning, attention, and sensory processing
- Understand the function/pros & cons
- Seeking deep pressure or tactile
- Very crunchy or chewy foods, vibration, gum, chewies (put in freezer or add sour spray)

Z-Vibe

- Gives brain other input to process
- Using for exams
- 1:2:3 approach

All Smiles Shine App

- Communication Device
  - I am feeling...
  - Breathe in and out

QUESTIONS/COMMENTS
# Appendix H

## Sensory Processing Questionnaire

### Visual

<table>
<thead>
<tr>
<th>Question</th>
<th>Over-responsive</th>
<th>Under-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seem bothered by bright lights? (blinks, squints, cries, closes eyes, etc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoy watching objects spin or move or enjoys looking at moving objects out of the corner of his or her eye?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Auditory

<table>
<thead>
<tr>
<th>Question</th>
<th>Over-responsive</th>
<th>Under-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seem bothered by ordinary household sounds, such as the vacuum cleaner, hair dryer, or toilet flushing?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respond negatively to loud noises by running away, crying, or holding hands over ears?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like to cause certain sounds to happen over and over again?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appear not to hear certain sounds?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Taste

<table>
<thead>
<tr>
<th>Question</th>
<th>Over-responsive</th>
<th>Under-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gag at the thought of unappealing food or show distress at smells that other children do not notice?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like to taste or smell nonfood items, such as glue or paint?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Touch

<table>
<thead>
<tr>
<th>Question</th>
<th>Over-responsive</th>
<th>Under-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull away from being touched lightly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Become distressed by the feel of new clothes, or having their fingernails or toes cut?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dislike teeth brushing more than most kids his or her age?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seem to enjoy sensations that should be painful, such as crushing onto the floor or hitting his or her own body?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seem to lack normal awareness of being touched?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Movement

<table>
<thead>
<tr>
<th>Question</th>
<th>Over-responsive</th>
<th>Under-responsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seem afraid of riding in elevators or escalators?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fearful of movement such as swings, slides, or other playgrounds?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seem driven to seek activities such as pushing, pulling, dragging, lifting, and jumping?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chew on toys, clothes, or other objects more than other children?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spin and whirl his or her body more than other children?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seem to not get dizzy when other people do?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Questions adapted from the Sensory Processing Measure-2
## Appendix I

Sensory-Friendly Adaptations

### Visual

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<th>IF:</th>
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</thead>
<tbody>
<tr>
<td>Over-responsive</td>
<td></td>
</tr>
</tbody>
</table>
|  | * Florescent lights off  
|  | * Ask if they want projector lights  
|  | * Window closed |
| Under-responsive |  |
|  | * Projector lights  
|  | * Bubbles  
|  | * Might want to visually stim (place objects or fingers in light, look out of corner of eye, give breaks for visual stim) |

### Auditory

<table>
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<td></td>
</tr>
</tbody>
</table>
|  | * Only 1 person talking or counting at a time  
|  | * Short simple phrases  
|  | * Lower TV volume  
|  | * Avoid songs or excessive praise  
|  | * Headphones/Quickshifts at low volume  
|  | * Extra time to process verbal instructions (use visual instruction when able) |
| Under-responsive |  |
|  | * Incorporate singing, counting, and fluctuate tone of voice  
|  | * Headphones/Quickshifts  
|  | * Repeat vocal stim back to them |

### Taste

<table>
<thead>
<tr>
<th>IF:</th>
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<tbody>
<tr>
<td>Over-responsive</td>
<td></td>
</tr>
</tbody>
</table>
|  | * Avoid minty flavors  
|  | * Flavorless toothpaste  
|  | * Child might have preference over color |
| Under-responsive |  |
|  | * Strong flavors (mint)  
|  | * Smell and taste before using it |

### Touch

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Over-responsive</td>
<td></td>
</tr>
</tbody>
</table>
|  | * Firm touch over light touch always!  
|  | * Describe how things are going to feel  
|  | * I-vibe for desensitization  
|  | * Finger to apply fluoride instead of brush |
| Under-responsive |  |
|  | * Firm touch  
|  | * Tactile sensory toy to re-direct seeking  
|  | * Vibrating toothbrush  
|  | * I-vibe either to mouth or anywhere else on body to "flood the system" |

### Movement

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Over-responsive</td>
<td></td>
</tr>
</tbody>
</table>
|  | * Recline chair prior to getting in  
|  | * Weighted blanket to help them understand where their body is in space |
| Under-responsive |  |
|  | * Weighted blanket  
|  | * Squeeze ball  
|  | * "flood the system": marching, jumping, spinning, etc and then have them get in the chair to reduce the wiggles  
|  | * Breaks for stim/movement (even better, allow stimming in chair when safe) |
De-Sensitization Goals

<table>
<thead>
<tr>
<th>Goals</th>
<th>I did it!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lay in Chair</td>
<td></td>
</tr>
<tr>
<td>Brush Teeth</td>
<td></td>
</tr>
<tr>
<td>Count Teeth</td>
<td></td>
</tr>
<tr>
<td>Floss</td>
<td></td>
</tr>
<tr>
<td>Pictures</td>
<td></td>
</tr>
</tbody>
</table>

What went well this week:

Goal for next week: