

HOPE CONNECTION 2.0: EVALUATING THE EFFICACY
OF SENSORY INTERVENTIONS TO IMPROVE
SENSORY PROCESSING IN
ADOPTED CHILDREN

by

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Abstract

In October and November of 2022, TCU's Karyn Purvis Institute of Child Development hosted the Hope Connection 2.0 camp which is a trauma-informed, therapeutic intervention for adoptive families. Children in adoptive families often have histories of trauma which impacts many aspects of their lives. Sensory processing is the mechanism in the brain that manages incoming sensory information and is known to be affected by early experiences with trauma. The Hope Connection 2.0 camp is designed to address many of the effects of trauma, including sensory processing. This study evaluated the efficacy of the Hope Connection 2.0 camp at reducing sensory processing deficits and improving children's ability to process sensory input. Ten families participated in the camp which took place over two weekends. Parents completed surveys providing information on their children's capacity for sensory processing prior to attending camp and after attending the final session in November. The findings of this study show that some sensory processing categories showed improvements four weeks after the intervention, but some categories did not show improvements. The information collected supports prior research which has shown that sensory processing interventions show improvements several months after the camp intervention rather than four weeks after.

Keywords: sensory processing, adoption, trauma, short sensory profile, therapeutic family camp, Trust-Based Relational Intervention

Introduction

Sensory Processing Overview

Children rely on sensory information to navigate the world. Nurturing caregivers naturally provide sensory-rich environments for children through affectionately touching, holding, or speaking to the child (Purvis et al., 2013b). Early experiences with trauma may disrupt a child's capacity for sensory processing (Cermak & Daunhauer, 1997; Purvis et al., 2013b). Children who are deprived of these nurturing experiences, like many children who have been adopted, do not have as many or as consistent opportunities for their brains to connect the various sensory systems compared to other children (Cermak & Daunhauer, 1997; Purvis et al., 2013b).

Each child's pathway to adoption is different and might include periods of institutionalization, foster care, multiple caregivers, abuse, or neglect (Brodzinsky et al., 2022). Individual experiences with adoption all vary, but experiencing early trauma is highly common among children who are adopted (Brodzinsky et al., 2022). Children who experience adoption often do not have consistent, reliable caregivers providing nurturing care early in their lives (Cermak & Daunhauer, 1997). Part of nurturing care involves providing the sensory stimulation necessary for healthy brain development (Cermak & Daunhauer, 1997). Without frequent sensory input, children are unable to practice integrating sensory input in infancy (Cermak & Daunhauer, 1997). If these early sensory processing experiences are not made possible by the caregivers in a child's life, they struggle to process sensory input as they age since they have not had opportunities to practice integrating sensory information (Cermak & Daunhauer, 1997). Additionally, a child who does not experience the regular sensory input which accompanies nurturing caregiving also misses opportunities to build meaningful relationships with their

caregivers (Purvis et al., 2013b). Early opportunities for children to receive sensory input are vital because the absence of these sensory experiences can impact a child's future ability for sensory integration and might affect their future relationship with their caregivers.

If a child does not practice receiving sensory input and learning to process the information, the child's behavior might be impacted. Sensory experiences occur many times a day for all people. The brain and the body work in union to comprehend the various sensory experiences and to make sense of them ("Understanding Sensory Processing Disorder", n.d.). The brain and the body receive sensory information and construct a person's understanding of their environment ("Understanding Sensory Processing Disorder, n.d.). The way the brain and body perceive sensory information determines the way a person feels and can impact their behavior ("Understanding Sensory Processing Disorder", n.d.). Without regular sensory input from caregivers, this connection between the brain and the body might be inefficient at making sense of sensory experiences (Purvis et al., 2013b). Difficulties with sensory processing negatively impact a child's ability to integrate sensory information and to respond appropriately to sensory input with their behavior (Purvis et al., 2013b). Children who have experienced trauma might not have had enough early practice with sensory processing, so some sensory information may elicit unexpected behavioral or motor responses in this population (Cermak & Daunhauer, 1997; Purvis et al., 2013b). The five external senses – sight, touch, taste, smell, and hearing – as well as the three internal senses – proprioceptive, tactile, and vestibular – may all be affected by trauma. Preliminary research has shown evidence that different types of maltreatment may result in different sensory processing deficits (Howard et al., 2020). For example, children with histories of abuse were more likely to exhibit hyperreactivity to touch and to have gustatory and olfactory sensitivities (Howard et al., 2020). Comparatively, children who had experienced

neglect were more likely to be under-responsive to sensory stimuli, to seek more stimulation, and to have differences in auditory filtering (Howard et al., 2020).

Sensory defensiveness is when a child reacts negatively to sensory input which may result from deficits in sensory processing (Purvis et al., 2013a). Sensory defensive behaviors may create additional challenges for a child who struggles with sensory experiences (Purvis et al., 2013a). Tactile defensiveness, oral defensiveness, visual defensiveness, and auditory defensiveness describe aversions to specific types of sensory input (Stagnitti et al., 2002). Tactile defensiveness might include a child's strong dislike of being touched, of being hugged, or touching certain textures (Stagnitti et al., 2002). Also, grooming tasks such as showering, haircuts, and trimming nails might be displeasing to children with tactile defensiveness (Stagnitti et al., 2002). A child with oral defensiveness might strongly dislike certain types of foods or struggle with brushing their teeth (Stagnitti et al., 2002). Visual defensiveness might make a child avoid eye contact or be overly sensitive to light (Stagnitti et al., 2002). Auditory defensiveness might make a child overly sensitive to certain sounds (Stagnitti et al., 2002). Loud noises, even from a non-threatening source, might make a child fearful (Stagnitti et al., 2002). These behaviors might be difficult for caregivers to understand and might be misinterpreted as willful disobedience and can strain relationships between children and their caregivers (Howard et al., 2020).

Relationship between Sensory Processing, Attachment, and Behavior

Prior research indicates there may be a relationship between sensory processing, attachment, and behavior (Purvis et al., 2013b). John Bowlby described attachment as the connection between a child and their caregiver (Bowlby, 1973 & 1988). Psychological research evaluates certain behaviors as indicators of the attachment relationship between children and caregivers. Some attachment behaviors which might be initiated by the child and indicate a positive attachment relationship include the child cuddling, physical closeness, physical affection, and verbal affection with the caregiver (Purvis et al., 2013b). Sensory processing, attachment behaviors, and a child's general behavior are hypothesized to be related to one another. After a therapeutic camp intervention for nineteen children ages 3-14 from backgrounds of complex trauma, results showed an inverse relationship between sensory deficits and positive attachment behaviors (Purvis et al., 2013b). Therefore, children displayed fewer difficulties with sensory processing and more positive attachment with caregivers after attending the camp (Purvis et al., 2013b). A positive relationship was also found between sensory deficits and negative attachment behaviors, so the more sensory deficits parents reported correlated to more negative attachment behaviors (Purvis et al., 2013b).

The data from camp also showed that children who entered camp with the greatest deficiencies in sensory processing displayed the greatest growth in positive attachment behaviors and exhibited fewer negative attachment behaviors after the camp intervention (Purvis et al., 2013b). These results indicate that the children who experienced the most gains in positive attachment behaviors were the ones who experienced the greatest struggles with sensory processing at the start of camp. In addition to displaying more positive attachment behaviors, they also saw a reduction in negative attachment behaviors such as avoiding the caregiver

(Purvis et al., 2013b). This data may indicate that sensory deficits may have acted as barriers to prevent children from exhibiting positive attachment behaviors (Purvis et al., 2013b). The same study also found a specific, positive correlation between vestibular system deficiencies and negative attachment behaviors (Purvis et al., 2013b). An infant's vestibular system develops naturally as they are picked up and held by caregivers (Purvis et al., 2013b). Being picked up and held by caregivers moves the fluid in the ear canal and results in vestibular input (Purvis et al., 2013b). Picking up an infant affectionately means that caregivers often make eye contact, close physical contact, and speak to the child. Pairing these warm sensory experiences with the activation of the vestibular system is important for promoting healthy relationships between children and their caregivers (Purvis et al., 2013b). Infants who lack nurturing caregivers may miss opportunities for this vestibular stimulation. Purvis et al. also showed that the vestibular input a child receives from their attachment figure might predict the child's vestibular functioning and attachment behaviors (2013 b).

Trust-Based Relational Intervention (TBRI)

TBRI is therapeutic model developed for caregivers to provide effective care for children who have experienced complex developmental trauma (Purvis et al., 2013a). TBRI has been used with children in many settings and has proven successful in promoting healthy relationships with children who have experienced trauma (Purvis et al., 2013a). TBRI utilizes three Principles – Connecting, Correcting, and Empowering. The Connecting Principles tend to the child's attachment needs through mindfulness and engagement. The Correcting Principles focus on a child's behavioral needs by using proactive and reactive strategies to manage behavior. The Empowering Principles attend to a child's physical needs including their physiological state and environment. Part of maintaining a healthy environment includes meeting the sensory needs of

the child. Prior research has demonstrated regularly scheduled sensory input into a child's daily life can be effective in reducing sensory processing difficulties (Fazlioglu & Baran, 2008). Hope Connection 2.0 utilizes the principles of TBRI to meet the needs of children and infuses sensory enrichment into many aspects of camp.

The Hope Connection 2.0

The Hope Connection camp was founded to serve the needs of children who experienced early deprivation primarily through adoption (Purvis et al., 2007). The camp was built to address three main facets of a child's life – attachment, behavior, and sensory processing (Purvis et al., 2007). TBRI is the caregiving model used at the Hope Connection 2.0 camp to develop healthy relationships between children and their caregivers. The earliest version of camp began as a three-week long intervention for children and families and has evolved into a two-weekend camp known as Hope Connection 2.0 (Hunsley et al., 2022; Purvis et al., 2007). The goals of Hope Connection 2.0 are consistent with the camp's original objectives – to aid children and their adoptive families in building healthy family relationships by healing the emotional and behavioral deficits resulting from early experiences with trauma (Hunsley et al., 2022). Camp focuses on three main areas of psychological development – attachment, pro-social behavior, and sensory processing (Purvis et al., 2007). A child's early experiences with insufficient caregiving may negatively impact each of these areas (Purvis et al., 2007). Furthermore, attachment, pro-social behavior, and sensory processing are all interconnected, so difficulties in one may result in difficulties in another (Purvis et al., 2007).

To address the sensory needs of children, camp provides a sensory-rich environment for children (Purvis et al., 2007). The camp model specifically focuses on the internal senses – vestibular, proprioceptive, and tactile as well as the external senses – taste, touch, sight, hearing,

and smell (Purvis et al., 2007). One way to ensure sensory needs are met is to incorporate many opportunities for various forms of sensory stimulation, otherwise known as a “sensory diet.” A “sensory diet” describes consistently scheduled programming throughout the day which meets various sensory needs (Purvis et al., 2013a). Allowing children frequent access to sensory tools such as fidgets or to sensory rooms has been known to aid children with emotional regulation (Purvis et al., 2013a).

Frequent exercise of the internal and external sense is thought to reduce undesirable behaviors. To measure changes in behavior before and after the camp intervention, the original Hope Connection camp used the Child Behavior Checklist and found decreases in all four subscales comparing pretest and posttest data (Purvis et al., 2007). Children displayed decreases in thought problems, attention problems, aggressive behavior, and other problems (Purvis et al., 2007). The use of the Short Sensory Profile 2 at Hope Connection 2.0 demonstrated significant decreases in sensory seeking and sensory avoiding behaviors in children who attended camp (Hunsley et al., 2022).

Cultivating a Sensory Rich Environment at Camp

The current study included ten families with children ages 5-12 years old who participated in the Hope Connection 2.0 camp activities. The data collected focused on only one child from each family, but all children in the family participated in the camp intervention. Every Hope Connection 2.0 camp incorporates sensory stimulation throughout the daily camp schedule to provide many opportunities to practice healthy sensory integration. Each day begins with a ‘Crash-n-Bump’ course created by occupational therapists to target the tactile, proprioceptive, and vestibular senses (Purvis et al., 2007). The activity contains fourteen stations where campers moved in approximately 1-minute-long rotations (see Appendix A). First, a trained facilitator

leads the campers in assessing their bodies to determine whether they are in a low or high arousal state. Depending on how the children respond, the leader guides them through various strategies to either heighten or lower their arousal states. Then, the campers proceed through the various activities of the course. Some stations involved tossing bean bags, balancing on wobbly boards, and jumping on miniature trampolines. Each activity specifically targets one or more of the internal senses. In addition to the Crash-n-Bump course, there were several other opportunities for physical activity scheduled for the campers.

After Crash-n-Bump, campers proceed to other group sessions throughout the day. They complete each group with similar-aged peer groups. There is a younger group, ages 5-8 years old, and an older group, ages 9-12 years old. One group which also specifically seeks to meet sensory needs is 'Movement Group' (See appendix B). Movement Group may be conducted outdoors or indoors and is an opportunity for sensory input utilizing gross motor skills. Movement Group activities use a trained facilitator to lead organized activities or games involving dancing, coordinated drumming, yoga poses, or other types of games involving physical activity.

For both Crash-n-Bump and Movement Group, children participate in dysregulating activities which engage many of their different sensory systems. Then, they are led in regulation techniques to calm their bodies. This pattern of dysregulation and subsequent regulation helps the children practice self-regulation techniques in a safe, playful environment. Participating in Movement Group equips them with the tools to eventually self-regulate when they encounter various external stimuli that change their states of arousal.

After the group sessions in the morning are complete, campers break for lunch and then are offered the opportunity to play outside. The children engage in free play and choose their

own activities. This time of camp is specifically designated for unstructured play, where children select their own activities to engage in, because this form of play has proven effective at teaching children socioemotional regulation skills (Rhea, 2022). Campers can choose to engage in high intensity activities such as soccer or football, or they can choose low intensity activities such as drawing with chalk or blowing bubbles. Furthermore, the opportunity to be outside provides a necessary break to release the parts of the brain that have been concentrating during the other structured, indoor activities (Rhea, 2022). Going outside frees the brain to recuperate from any tiredness that follows activities which demand focus (Rhea, 2022). During this free play time, campers remain with an individual buddy, an undergraduate or graduate student, who monitors the camper's arousal state. When campers choose highly active games such as soccer, the buddy might suggest they follow up with an activity like blowing bubbles to reset their energy levels back to baseline. The buddies can suggest the coupling of high energy activities with lower energy activities to build upon the pattern of dysregulation and subsequent regulation that camp instills in its other, structured groups. The buddies are mindful that campers who are in a high arousal state may benefit from some regulating exercises such as deep breathing. Alternatively, a camper who is in a sluggish or low arousal state may benefit from a more intense activity such as hopscotch. Each camper has an individual buddy who can help them choose activities which appropriately match their arousal state. While the children have freedom in choosing how they play, the camp facilitators ensure dysregulating activities are followed by regulating exercises so campers can successfully participate in their afternoon activities later.

The younger group of campers also participates in guided sensory activities during the Sensory Group each day of camp. A facilitator leads the campers in activities targeting tactile, proprioceptive, and vestibular senses. Activities include balancing on large exercise balls, using

weighted objects, exploring objects with various textures, and more (See Appendix C). In the afternoon, the older group of campers have the freedom to rotate through various stations and engage in self-guided activities. They may choose to participate in the activities used by the Sensory Group, or they may explore the sensory objects freely.

Aside from organized activities for building sensory processing skills at Hope Connection 2.0, there are also opportunities for sensory input woven into the experience. For example, there is always bubblegum or peppermints available for campers throughout the day. Chewing bubblegum provides proprioceptive input and allows children to be more focused and attentive (Yu et al., 2013). Similarly, the taste and smell of peppermints can be alerting to children and aids in attention. Other tools such as kinetic sand, squishy balls, or slinkies are also available for campers to use as needed throughout the day. These objects or ‘fidgets’ provide various types of sensory experiences such as tactile or proprioceptive stimulation. Items such as weighted stuffed animals or weighted blankets are also used at camp to provide deep pressure and rich sensory stimulation.

Current Study

The current study evaluates the effectiveness of the Hope Connection 2.0 therapeutic camp intervention at reducing sensory processing challenges in children who have been adopted. Sensory processing deficits can disrupt a person’s daily life, so continued research in this area is important. Children who have experienced trauma and adoption are at-risk for greater challenges, so exploring interventions to reduce sensory processing challenges for this population is particularly critical. The hypothesis of this study is that participants will display reduced sensory processing challenges after attending camp.

Method

Participants

To recruit families, TCU's KPICD contacted a list of TBRI Practitioners who are experts in TBRI. These practitioners have extensively studied and practiced TBRI with clients. TCU contacts practitioners with information about the Hope Connection 2.0 because they may have had clients who qualify for the study. TCU's KPICD also posted information on social media to recruit participants. Any interested families, whether recruited via social media or TBRI through practitioners, completed an online application.

Participants in this study included 10 families who attended the Hope Connection 2.0 camp. Criteria for families required that each family had at least one adopted child between 5 and 12 years of age by the start of camp. The adopted child must have been legally adopted into the family for at least one year by the time they applied for camp. Families were excluded from camp if they had a child with severe emotional or behavioral challenges that might pose a threat to themselves or others. Families were also excluded from the study if they were living in a two-parent household where the parents had a contentious marriage relationship. If there were one or more family members unable or unwilling to participate in any research protocols were also excluded from the study. Any families serving as an active foster home were also excluded from the study.

Families with multiple children selected a single target child who the camp intervention was aimed to help, but all siblings were a part of the experience. Parents filled out applications containing information providing a profile of their child's experiences prior to adoption and any risk factors they might have experienced. Parent-report surveys were used to gather demographic information regarding race. Two children were reported by their parent as Black. Four were

reported as Asian. One was reported as Eurasian. One was reported as Hispanic. One was reported as White. One was reported as both Black and Latino. The average age of participant was 10 years old at the start of camp. The average amount of time each target child had been in their current home was 5.45 years. Previous placements include foster care, orphanages, biological parents, and kinship placements. Three target children experienced difficult pregnancies in-utero. Three target children experienced difficult births. Eight target children experienced neglect. Two target children experienced physical abuse. Nine target children experienced the loss of a primary caregiver. Nine parents reported that their target child had behavioral difficulties. All ten parents reported that their target child had emotional difficulties. Eight parents report that their child had educational difficulties. Eight parents reported that their child had sensory difficulties. Seven parents reported that their child had social difficulties.

Procedure

The university's Institutional Review Board approved this study. Interested families completed an application via a survey with the inclusion and exclusion criteria for the study. Any family who did not meet all the inclusion criteria or met any exclusion criteria were unable to submit the survey. After completing the application, families who met all the eligibility criteria and none of the exclusion criteria were contacted to complete consent forms and background check forms. Families were also briefed on the expectations for participating in this study and were given the option to withdraw. Once families completed the screening process, the KPICD selected families to participate by evaluating several factors including the risk for potential harm, parents' goals for camp, and the size of families. To participate, families had to pay \$495 which was the cost per family and included all camp materials, meals and snacks during camp, online parent training, and TBRI materials.

Families completed baseline assessments (T1) in August 2022 via an online survey sent to parents. One parent completed this T1 assessment for the family which included several questionnaires about their target child. The same parent completed the same assessments at T2 in December 2022, four weeks after camp.

In September 2022, four weeks prior to camp, parents completed online pre-training which involved watching three videos from the KPICD. Parents also completed study guide questions about the videos via online surveys. This pre-training took approximately 8-10 hours to complete during a six-week open-access time.

The camp occurred on two weekends, October 7-9, 2022, and November 11-13, 2022. The camp consisted of approximately 34 hours of intervention across both weekends. After the first weekend and before the second weekend, the KPICD provided parents a “PLAY box” which contained materials for parents to implement TBRI activities into their family’s daily lives. While at camp, all children participated in camp activities enriched by Connecting, Correcting, and Empowering Principles of TBRI. Each camper had a designated buddy who is a current or former student of the TCU KPICD child development or developmental trauma programs and has been trained on implementing TBRI with children. While children participated in camp activities, parents were led by TBRI Practitioners on effectively implementing TBRI with their children. These practitioners were selected by the KPICD for their extensive knowledge of TBRI and for their experience in mentoring parents in implementing TBRI.

Measures

Several questionnaires were completed by parents through the T1 and T2 data collection surveys. The Short Sensory Profile 2 (SSP2) is the assessment this study is focused on. The SSP2 is a 34-item assessment for children ages 3 years to 14 years and 11 months to evaluate a child’s

typical patterns for sensory processing (Dunn, 2014). The SSP 2 asks questions specifically relating to the sensory experiences a child is likely to encounter in the events of their daily lives (Dunn, 2014). The SSP 2 provides Sensory System scores, Behavioral scores, and Sensory Pattern scores (Dunn, 2014). Sensory System scores provide information on the child's senses in the following subcategories: General, Auditory, Touch, Movement, Body Position, and Oral (Dunn, 2014). Behavioral scores include subcategories of Behavioral, Conduct, Social Emotional, and Attentional (Dunn, 2014). Sensory Pattern scores provide information regarding the child on the following subcategories: Seeking/Seeker, Avoiding/Avoider, Sensitivity/Sensory, Registration/Bystander (Dunn, 2014). These subcategories can be used to classify children as performing "Just Like the Majority of Others", "Less than Others", "Much Less than Others", "More than Others", or "Much More than Others" as compared to the normal curve (Dunn, 2014). Just Like the Majority of Others indicates a standard deviation from the mean as less than ± 1 . Less than Others or More than Others indicates a standard deviation as ± 1 . Much Less than Others or Much More than Others indicates a standard deviation of ± 2 .

The Sensory Pattern scores are derived from two scales – neurological threshold which ranges from high to low, and self-regulation which ranges from passive to active (Dunn, 2014). According to Dunn, a child's neurological threshold refers to their behavioral interests and tendencies as indicated by their persistence at a task (2014). At each extreme of the neurological threshold continuum, a child might exhibit undesirable behaviors. A child whose neurological threshold is considered high might be overly committed to performing certain routines, so this rigidity might interfere with other aspects of life (Dunn, 2014). Alternatively, a child whose neurological threshold is low might be too disinterested in their surroundings that they might miss critical experiences of daily life (Dunn, 2014). Dunn defines the other continuum, self-

regulation, as a person's manner for meeting their personal needs (2014). A child with active self-regulation might engage in ways to add sensory inputs into their experiences by making noise, touching objects frequently, and moving often (Dunn, 2014). A child using passive self-regulation techniques might choose to reduce sensory input by avoiding or complaining about sensory stimulation (Dunn, 2014). Together, these two continua, provide an understanding of a child's behavioral response to sensory stimulation which can ultimately classify them according to one of Dunn's four sensory processing patterns: seeker, avoider, sensor, and bystander (Dunn, 2014).

A child classified as a bystander displays high neurological thresholds and passive self-regulation (Dunn, 2014). These children tend to be tolerant and unbothered by their surroundings (Dunn, 2014). Sensory seekers display high neurological thresholds and active self-regulation strategies (Dunn, 2014). Sensory seekers often choose to engage in extra sensory stimulation and remain alert (Dunn, 2014). Comparatively, children classified as sensors display low neurological thresholds and passive self-regulation strategies (Dunn, 2014). These children tend to be very perceptive of their surroundings and might identify patterns or mistakes easily (Dunn, 2014). Children who are sensory avoiders have low neurological thresholds and active self-regulation strategies (Dunn, 2014). These children thrive with routines and dislike unexpected or unfamiliar sensory input (Dunn, 2014).

Results

Data analysis evaluated nine of the ten target children. The excluded target child did not have a parent report their T1 SSP2, so they were excluded from the analysis. The subscales evaluated with the SSP2 included seeking, avoiding, sensitivity, registration, auditory, touch, movement, body position, oral, conduct, social emotional, and attentional. The average scores for

all children at T1 and T2 were calculated to evaluate changes in sensory processing overtime from T1 to T2 (See Figure 1). Results indicated that average participant scores for sensory seeking, avoiding, auditory, oral, conduct, social emotional, and attentional decreased from T1 to T2. Meanwhile, average scores for registration, touch, movement, and body position increased from T1 to T2. An increased score indicates an increase in behaviors associated with sensory processing deficits while a decreased score indicates a decrease in these behaviors.

Figure 1

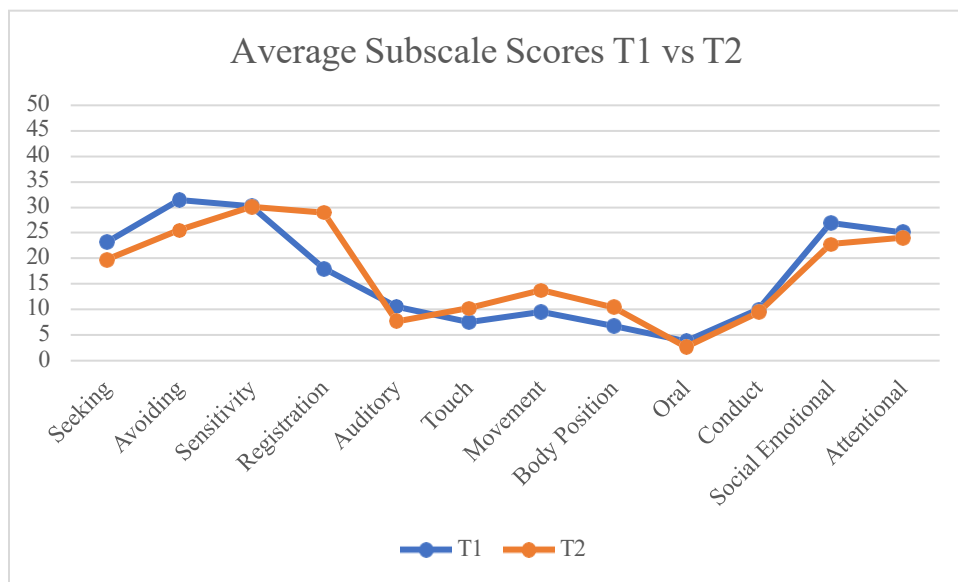


Figure 2

Comparison of SSP subcategories of children, T1 and T2		
	T1	T2
Total SSP	103 (\pm 32)	104 (\pm 29)
Seeking	23 (\pm 9)	20 (\pm 42)
Avoiding	31 (\pm 6)	26 (\pm 7)
Sensitivity	30 (\pm 9)	30 (\pm 8)
Registration	18 (\pm 9)	29 (\pm 8)
Auditory	11 (\pm 2)	8 (\pm 3)
Touch	8 (\pm 4)	10 (\pm 2)
Movement	10 (\pm 5)	14 (\pm 4)
Body Position	7 (\pm 5)	10 (\pm 94)
Oral	4 (\pm 1)	3 (\pm 2)
Conduct	10 (\pm 3)	9 (\pm 4)
Social Emotional	27 (\pm 8)	23 (\pm 7)
Attentional	25 (\pm 8)	24 (\pm 8)
a. Mean (\pm SD).		

The SSP2 was also used to compare the target children to the standard scores of other children ages 5-12 which provided whether they scored “Less Than Others”, “Much Less Than Others”, “Much More Than Others”, or “Just Like the Majority of Others” on the seeking, avoiding, sensing, and registration subcategories. These subcategories provide information on the standard deviation of a child’s score compared to the average child. Among all ten children in this study only one child was categorized as “Less Than Others” for sensory seeking and registration meaning that this child differed from the normal curve by a standard deviation of -1. At T1, all other children scored “Just Like the Majority of Others” on all subscales. At T2, the same child scored “Just Like the Majority of Others” for all subcategories, including seeking and registration. The other participants also remained “Just Like the Majority of Others” for all subcategories.

Discussion

This study evaluated the efficacy of the Hope Connection 2.0 camp at reducing sensory processing difficulties in children who have been adopted. Results show that four weeks after camp there are no clear trends in sensory processing changes. Seven subscales showed small improvements while others did not. These findings are consistent with a recent paper which indicates that four weeks after the Hope Connection 2.0 camp, there are not many improvements in sensory processing (Hunsley et al., 2022). Six months after camp, however, showed improvements in sensory processing (Hunsley et al., 2022).

One explanation for not seeing an improvement in sensory processing four weeks post-camp may be that the families attending were already familiar with sensory processing through their TBRI training. All camp families were working with a TBRI Practitioner who was trained to help families identify their child's sensory challenges and meet those needs, as well as refer them to an occupational therapist. Some families may have been seeing an occupational therapist, as well. This prior knowledge of TBRI and sensory processing might dampen the post-camp results.

Another explanation for the increases in the sensory processing subtypes of registration, touch, movement, and body position may be due to the parent's increased understanding of sensory processing challenges gained through training provided during camp. Parents may initially come to camp with basic knowledge of sensory processing challenges and then improve upon their understanding during the camp weekends. Learning about sensory processing at a deeper level might equip parents to recognize sensory processing-related behaviors after camp that they would not have noticed before. This effect might have caused the parent-reports of increased sensory processing challenges after the camp intervention.

This study also had several limitations that impacted the results. One factor which limited extensive data analysis was the small sample size. Ten families participated in the intervention, and only nine participants' data could be used to compare the results over time. Including more participants would provide more insight into the efficacy of the camp intervention. These preliminary results showed that the children in this sample varied greatly in their outcomes, so including more participants would allow for a more thorough data analysis. Another limitation was the use of parent-report surveys which can introduce bias into the reports. There would likely be differences in scores depending on which parent completed the survey. A single parent's perspective of their child's sensory processing behaviors might not be objective. Having the SSP2 completed by both parents might help mitigate bias in the reports. Also, having the report completed by a third party would help reduce biased reports. Finally, the study was also limited by the short timeframe of collecting T2 data only four weeks after camp. Increasing T2 to several months post-camp might illustrate the changes overtime more completely. Reassessing the child's SSP2 multiple times after participating in the camp intervention would provide a greater understanding of the changes taking place.

Despite these limitations, the study has provided some information that can be used for future research. Another study might choose to assess parents' understanding of sensory processing prior to T1 and again after T2 to see if there are significant gains in their knowledge of sensory processing. This information might help confirm or deny the idea that parents' increased understanding of sensory processing after camp is associated with recognizing more challenging behaviors at T2. Another direction for a future study would be to have the SSP2 completed for the children by an occupational therapist or a teacher. Having a third-party perspective on the child might provide more insight and mitigate some bias. Finally, future

research should continue to follow up with participants beyond four weeks to gain a more comprehensive understanding of the changes over time.

Knowledge of sensory processing in children and the effects of a therapeutic camp intervention are highly applicable. This study and similar research can be used to develop new interventions or improve existing ones. The current study builds on future research and is a reminder that sensory processing improvements occur over extensive periods of time. Interventions seeking to treat children with sensory processing challenges should be long-term as changes in sensory processing patterns take time.

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Appendix A

CRASH-N-BUMP

Materials:

- Print the slide for each station (to be posted as directions).
- Bean bags
- Rocker board
- Exercise ball
- Therabands
- Scooter board
- Fidgets (5)
- Balance Beam (or tape on the floor)
- Mat (for rolling; picnic blanket will probably work)
- Zoom Ball
- Mini trampoline

Caution: As with any activity, watch closely for flipped lids, lacking physical and cognitive skills, and adjust quickly and easily if necessary (always have a back-up plan in mind for the hardest activities).

Activities:

1. Crawl like a crab to the next station (other alternatives: cow, cat, or bear)
2. Toss the bean bag 5x back and forth with a buddy.

Challenge: walk backward while tossing the bean bag

3. Bear crawl to the next station (Begin on hands and toes; keep back end high; alternate stepping forward from hand to foot)

4. Balance on rocker board with socks for 1 minutes (alternatives: wear shoes or bare feet)
5. Leap frog to the next station.
6. Roll back and forth on yoga ball 5x while on stomach with the help of a buddy.
7. Have a three-legged race with a buddy, use Theraband to tie your legs together.
8. While sitting on scooter board race your buddy to the line, use plungers to help with balance.
9. Walk toe to heel going forward, backward and side to aide on the balance beam.
Challenge: toss ball with a buddy while walking.
10. Wheelbarrow with a buddy (alternative: do 10 bear crawls)
11. Roll like a log to the end of the mat and back.
12. Play Zoom Ball with a buddy 10x
13. Jump 20-30x on the trampoline.
14. Do wall pushes for 1-2 minutes.

Appendix B

MOVEMENT GROUP

Weekend 1 Saturday

Materials

- Speaker and several kids-songs
- Bubbles

Warm-up

- Buddies will blow bubbles and the campers will pop them

Activities

- Play music (Speaker) and have kids act out different animals
 - Have kids pretend they are lions and roar and stomp around
 - At the end of the movement group, have kids pretend they are a sloth
 - Start with most intense animals then move to more calm animals
 - Monkey- “I wanna be like you”: 3:50 (practice mirroring)
 - For half of the song, the buddy can dance and pretend like they are monkeys and the camper will imitate, then switch.
 - Bear- “The Bear Necessities”: 2:12
 - Lion- “I Just Can’t Wait to be King”: 3:41
 - Lobster/Sea Creatures- “Under the Sea”: 3:26
 - Cricket/calm down- “When you Wish Upon a Star”: 3:23
- Teach kids the movements to Lean on Me
 - Lean on me, when you're not strong
 - And I'll be your friend

- I'll help you carry on
- For it won't be long
- 'Til I'm gonna need
- Somebody to lean on

Closing

- Lean on me (run through the whole thing once)

Weekend 1 Sunday

Materials:

- Scarves/bandanas/ribbons
- Speaker and kid-friendly playlist
- Drumsticks and drums

Warm-up

- Scarf/handkerchief/ribbon dance
 - Follow the Leader style with leader in the front- Start dancing to Moana and then at the end, the leader will have the kids go sit back down in front of the rhythm sticks which will be set out in a circle
 - “How Far I’ll Go”- Moana 2:35 and speaker

Activity

- Rhythm sticks to 3 songs (Slow song, medium song, and fast song)- Songs they are familiar with : “We will Rock you”/ Can’t stop the feeling/Hakuna Matata/Supercalifragilistic

Closing

- Lean on me dance

Weekend 2 Saturday**Materials:**

- Speaker and kid-friendly playlist

Warm-up

- Boss Says- Elbow to Elbow, hand to hand, etc.

Activity

- Red Light, Green Light
- Mirrors game: Take turns (buddy and camper) leading and mirroring
 - Have buddies stand facing one another. Instruct one buddy to 'be the mirror' for the other buddy. When one buddy moves, the mirror follows, cooperating and doing exactly what the other person does. Go slow so the mirror has time to follow. Take turns being the mirror.

Closing

- Lean on me

Weekend 2 Sunday**Materials:**

- Speaker and pre-selected GoNoodle video (can just play audio)
- Playlist with line dances

Warm-up

- Yoga poses (GoNoodle- Energizing and mindfulness)

Activity

- Cha-cha slide
- Cupid Shuffle

- Hokey Pokey
- Cotton-eyed Joe
- End with Up Goes the Castle (Sesame Street)

Closing

- Lean on me

**Appendix C:
Sensory Rotation
Weekend 1: Stick Together Challenges**

Materials:

- Balance Board, Pinwheel and/or weighted neck/lap pillow/animal (Could be done with 1-2 of the items.)
- Small 3-minute sand timer

Activity: *Stick Together* Challenges (Balance Board, Pinwheel and SuperHero with a Heavy Hug)

- The kid/buddy team will try to make three minutes at each challenge station, helping each other as needed.
- 1st station – Balance Board
Stay on the balance board without falling off for 3 minutes. Take a trial run and take off shoes and socks if desired. Buddies can support each other verbally and physically. Trade and let the other partner try as well.
- 2nd station – Superman
Hold a superman pose (feet apart, shoulders back, hands on hips, and chin slightly tilted up) with the heavy hug pillow around neck for 3 minutes. Ditch the pillow if necessary (it will be helpful for some).
- 3rd station- Pinwheel
Keep a pinwheel moving slowly by working together to blow the pinwheel for 3 minutes. Try to maintain slow pinwheel movement constantly for the entire time. (Keep aware of partner's sensitivities to personal space. Value eye contact. You can visually connect with partner to get a rhythm going)

Weekend 2: Slime and Sensory Path

Materials:

- White school glue (1 cup per child)
- Baking soda (1 teaspoon per child)
- Contact solution (2-3 tablespoons per child)
- Food coloring
- Containers or bags for slime
- Sensory path materials – water beads, sensory rug (Marti), walking cans, sensory tiles, etc.

Activity:

- Teach regulating strategies – Breathing Ball and Pinwheel
- Make slime using glue, baking soda, contact solution, food coloring.
- After the time is up, we check engines and do regulating strategies.
- Take a walk down the sensory path. Pay attention to what you like and don't like.