

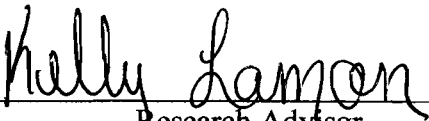
A COMPARISON OF INTERVENTIONS  
FOR CHILDREN WITH TACTILE  
DEFENSIVENESS

by

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ABSTRACT

Difficulties with sensory integration can greatly affect a child's development, behavior and performance in the classroom. Children who are struggling with this problem may display behaviors such as inattention, disruption, and avoidance of certain activities. Historically, occupational therapists primarily implemented sensory integration techniques. However, educators are beginning to recognize this problem in the school setting and are requesting information about interventions that can be implemented in the classroom. Unfortunately, researchers do not agree on the effectiveness of sensory integration interventions. As a result, this research paper will review the literature regarding the efficacy of sensory integration interventions. In addition, a method will be proposed for carrying out research that addresses the efficacy of several different interventions implemented in the school setting with a child who displays difficulty with tactile defensiveness.

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## Chapter One: Introduction

Sensory integration is a concept that has been in existence in the field of occupational therapy since the 1960's but has only recently pervaded the educational setting. Dr. Jane Ayres was the first to coin the term sensory integration, and called it "the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment" (1972, p.11). Through her research, Ayres discovered that there are several systems involved in sensory integration including visual (sight), auditory (hearing), olfactory (smell), gustatory (taste), vestibular (movement and balance), proprioception (joints and muscles), and tactile (touch). These sensory systems allow us to interpret incoming stimuli from the environment and use it to react and plan behavior (Kranowitz, 1998). This research will focus on the tactile system.

The tactile system is related to the nerves under the surface of the skin and the information they send to the brain. This information can come from touch, pain, temperature, and pressure (Hatch-Rasmussen, 2005). A child may be considered tactilely defensive when he or she displays "the tendency to react negatively and emotionally to touch sensations" (Ayres, 1972; Sears, 1981). Current philosophies behind sensory integration suggest that tactile defensiveness is due to "failure of higher central nervous system structures to modulate incoming tactile stimuli" (Royeen & Lane, 1991). Generally speaking, this means that children with tactile defensiveness are overly sensitive to light touch. Behaviors that are associated with tactile defensiveness include withdrawal when being touched, refusal to eat certain foods, refusal to wear certain types of clothing, avoidance of getting hands dirty, complaining when having face washed, and using only fingertips instead of the whole hand to manipulate objects (Hatch-

Rasmussen, 2005). In addition, children who are sensitive to light touch also seek out and crave deep touch such as “bear hugs” and back rubs (Kranowitz, 1998).

### *Rationale/Problem*

There are several reasons that research needs to be conducted in the area of sensory integration and tactile defensiveness: First, behaviors that are associated with tactile defensiveness are often problematic in the classroom and may impede in the learning process. It is important to find interventions that will help children who are struggling with these behaviors function in the school setting. Further, there is little conclusive evidence regarding the effectiveness of sensory integration procedures. Although occupational therapists and educators report they notice changes in behavior, researchers are unable to state why these interventions seem successful. Finally, a wealth of research has been conducted regarding interventions within a clinical setting, but little research has been conducted in the educational setting. It is important to know whether sensory integration interventions can be effective in the classroom.

Behaviors associated with tactile defensiveness are often problematic while the child is developing. For example, if the child is only eating particular foods, he or she may not be getting an adequate amount of vitamins and minerals. Also, many activities within a school setting require students to get their hands dirty such as art projects or playground activities. It may be difficult for teachers to make exceptions for these children. Furthermore, because children with tactile defensiveness crave deep touch, they can often be very disruptive in the school setting as they seek out ways to obtain that type of stimulation. These children may give “bear hugs” at inappropriate times, push, or lay on top of others, all of which can be disturbing for children in the classroom. Consequently, it is important to find ways to help children deal with sensory difficulties in order to help them function in the classroom.

Occupational therapists aim to design interventions which slowly introduce different textures and types of touch into the daily lives of those children with tactile defensiveness. However, there is much controversy surrounding the effectiveness of these interventions. Early reports on sensory integration were based on poorly controlled studies (Mulcahy, 1994). Today sensory integration is still criticized because research has been unable to show why it works. Further, there is little conclusive evidence that proves that one sensory integration technique is superior to others. Therefore, further research needs to be conducted in order to discover whether sensory integration techniques are effective. In addition, sensory integration techniques need to be compared in order to find the most effective methods of intervention.

Finally, it is important to study the effectiveness of sensory integration techniques within the educational setting. Currently, sensory integration techniques are applied most frequently within the clinical setting where problematic behaviors may or may not occur. As a result, it is necessary to study the effectiveness of the techniques within the natural classroom setting. It is unknown whether teachers are applying sensory integration techniques in a systematic or haphazard manner. It is also unknown whether teachers are receiving adequate instruction regarding the timing and intensity of these techniques. Therefore, more research needs to be conducted in the educational setting.

### *Purpose*

The purpose of this study is to examine sensory integration and tactile defensiveness in the school setting. Further, a methodology of this study will be discussed which could be used to compare several techniques related to interventions for tactile defensiveness. In a future study, this methodology will be used to find the most effective methods of treatment in a school setting. The following questions will guide this research paper:

1. What are sensory integration and tactile defensiveness?
2. What interventions are used to treat tactile defensiveness?
3. Are sensory integration interventions effective in the school setting?
4. What methodology of study can be used to determine which interventions work best in a school setting?

### *Definition of Terms*

*Modulation* - the brain's regulation of its own activity and activity level.

*Occupational Therapy* - The use of productive or creative activity in the treatment or rehabilitation of people with physical, emotional, or cognitive disabilities.

*Sensory Defensiveness* - "...a constellation of symptoms related to aversive or defensive reactions to non-noxious stimuli across one or more sensory systems." (Wilbarger & Wilbarger, 1991).

*Sensory Diet* -the therapeutic use of sensation incorporated into daily activities (Wilbarger & Wilbarger, 2002).

*Sensory Integration* - "...the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment" (Ayres, 1972, p.11).

*Sensory Integration Dysfunction (SID)* - The inability to process sensory information and use it in a meaningful, organized manner.

*Tactile Defensiveness (TD)* - "...the tendency to react negatively and emotionally to touch sensations" (Ayres, 1972; Sears, 1981).



### *Limitations of the Research*

This paper will propose a methodology which could be used to determine the most effective interventions for tactile defensiveness. The proposed methodology is a single-subject design, and there are some limitations. First, the results may not be easily generalized to the larger population because there is only one subject in the study. A particular intervention might work well for the selected subject, but it may not work well for another child. In addition, only three interventions will be investigated in this study. There are several sensory integration techniques that are frequently used in the educational setting but this research study was not able to address more than three specific methods of intervention. Furthermore, although the chosen design (alternating treatments) is the most appropriate for this study, it may be difficult to differentiate the effects of each individual intervention. Finally, it may be helpful to use more than one instrument in the identification of tactile defensiveness. The suggested tool, the Sensory Profile (Dunn, Saiter, & Rinner, 2002), is a very sound instrument, but it would be interesting to see if other instruments yield the same results.

## Chapter II: Literature Review

Everyday, human beings receive information through their senses from their environment and from within their bodies. Information is received via several sensing systems including visual (sight), auditory (hearing), olfactory (smell), gustatory (taste), vestibular (movement and balance), proprioception (joints and muscles), and tactile (touch). These systems are complex and allow us to experience and interpret incoming stimuli. However, these systems do not work efficiently for every person, often times resulting in “sensory integration dysfunction” or SID. SID is the inability to process sensory information and use it in a meaningful, organized manner (Kranowitz, 1998). All people occasionally experience difficulty processing sensory information. Illness, fatigue, and stress can interfere with smooth sensory integration. However, it is only considered a problem when the difficulty starts to affect several aspects of a person’s life. Specifically, children with learning disabilities, attention deficit hyperactivity disorder (ADHD), fetal alcohol syndrome (FAS), severe cognitive disabilities, autism and pervasive developmental disorders have been thought to frequently have problems with sensory processing (Kranowitz, 1998). When sensory integration processes are working efficiently, attention can be given to the task at hand, and movements are coordinated in a useful and efficient manner (Bakley, 2001). Conversely, a person with sensory integration dysfunction may act confused, distracted, and disorganized. Coping with everyday tasks can be frustrating and difficult.

There have been several hypothesized causes of sensory integration dysfunction, but researchers do not have any conclusive evidence. Some proposed causes include a genetic predisposition, prenatal issues including chemical use, prematurity, trauma during birth, environmental pollutants, and excessive or insufficient sensory stimulation after birth (Kranowitz, 1998). Many people struggle everyday to process sensory information, and

consequently have problems with everyday life tasks. Because sensory processing issues can affect normal human functioning, there became a need for knowledge in the area of sensory processing and integration.

### *Sensory Integration Theory*

Throughout her career, occupational therapist Dr. A. Jean Ayres sought to describe atypical social, emotional, motor, and functional patterns of behavior that were related to poor processing of sensory stimuli (Miller, Cermak, Lane, Anzalone, & Koomar, 2004). In 1972, she was the first to coin the term “sensory integration” and defined it as “the neurological process that organizes sensation from one’s own body and from the environment and makes it possible to use the body effectively within the environment.” (Ayres, 1972, p.11). Once the brain interprets the sensory information, it triggers responses such as physical actions, thoughts, or feelings (Bakley, 2001). Ayres’ theory has been used for several purposes. First, it is often used to explain the connection between the brain and behavior and why people respond to sensory input in varying ways (DiMatties & Sammons, 2003). It is also used to plan interventions for children in order to improve certain sensory processing difficulties (Bundy, Lane, & Murray, 2002). Finally, this theory is used to predict how behavior will change as a result of intervention related to sensory integration.

Ayres believed that learning is dependent on the ability to absorb and process sensory information from the environment and use it to plan and organize behavior. She used the term “learning” in a broad sense that includes academic learning as well as behavior change and adaptive motor behaviors (Mulcahy, 1994). Those who have a diminished ability to process sensory information may also have difficulty producing appropriate behavior, which may in turn interfere with learning (Bundy et al., 2002). Ayres upheld the notion that the central nervous

system is plastic, meaning that it can be easily molded or changed through varying activities and exercises. By introducing enhanced sensation as a part of meaningful activity, Ayres believed improvements could be made in the ability to process sensory information and therefore increase learning and appropriate behavior. She stressed that the period from age three to seven was critical for developing sensory integration. Unfortunately, this has often been misinterpreted to mean that older children and adults cannot benefit from sensory integration therapy, but researchers now emphasize that it can be used with persons of all ages.

### *Sensory Integration Dysfunction*

According to Ayres theory, dysfunction in sensory integration can be expressed through poor praxis, poor modulation, or a combination of both difficulties (1972). Praxis is related to the ability to plan new movements (Bundy et al., 2002). The behaviors that result from poor praxis include clumsiness, avoidance of motor behavior, and exaggerated or diminished force. These children may also display deficits in posture, gross motor tasks, and difficulty in using both sides of the body in a coordinated fashion.

Modulation refers to the brain's regulation of its own activity and activity level. It balances the flow of sensory information coming into the central nervous system by turning neural switches on and off (Kranowitz, 1998). Within the category of modulation difficulties, researchers have agreed upon two broad types of modulation dysfunction: under-responsiveness and over-responsiveness (Ayres, 1972; Dunn, 1997).

Those who are under responsive may seem uninterested, self-absorbed, and dull in affect. They are often said to be "overly modulated." Theorists believe that these people have a high threshold for sensory stimulation and need a high level of input in order to elicit a response. Most daily activities do not meet the capacity of their sensory threshold, so they need added

activities in order to meet their needs. Parents of children who are under-responsive are often concerned about an auditory problem because their child may not respond quickly to their name or conversation (Dunn, et al., 2002). Further, children who are under responsive are prone to injury because they may not always realize they have hurt themselves (Dunn, 1997).

Those who are over-responsive tend to react strongly to sensory stimulation and are believed to have a very low threshold for stimulation. They tend to be distractible, hyperactive and tend to withdraw, avoid, or control situations in which there are high levels of stimulation. If they are unable to avoid or control the situation, many times they lash out verbally and physically (Dunn, 1997).

### *Sensory Defensiveness*

The most common form of sensory modulation dysfunction is an extreme form of over-responsiveness called sensory defensiveness (Bundy et al., 2002). It has been described by Wilbarger and Wilbarger (1991) as “a constellation of symptoms related to aversive or defensive reactions to non-noxious stimuli across one or more sensory systems.” Behaviorally, a person with sensory defensiveness will have a tendency to react negatively or with alarm to sensory input which is generally considered harmless or non-irritating. Children with sensory defensiveness tend to be rule-bound, ritualistic, and uncooperative. They engage in behaviors that will limit their sensory input and prefer predictable routines in which they know what type of sensory input they will be encountering (Dunn et al, 2002). They tend to be picky regarding fabrics, bathing procedures, and eating. If left untreated, sensory defensiveness can have a negative impact on everyday life. These children will continue to avoid certain situations and consequently have difficulty in social relationships (Stagnatti, Raison, & Ryan, 1999).

### *Tactile Defensiveness*

The most common type of sensory defensiveness is tactile defensiveness (TD), which is often defined as “the tendency to react negatively and emotionally to touch sensations” (Ayres, 1972; Sears, 1981). Tactile, or touch, receptors are found throughout the skin and are activated by external stimuli such as texture, temperature, pressure, and pain (Stagnatti et al., 1999). A person’s reaction to these stimuli is regulated by the sense of touch, which is used continuously on a daily basis (Bakley, 2001). Ayres’ (1972) states that touch is present before birth, and many believe that it continues to be more critical to human functioning than is generally recognized (Kinnealey, 1989). Further, child development theorists such as Piaget, Goldstein, and Bruner have all emphasized the importance of touch in cognitive and motor development. The integration of the tactile sense can be observed in a newborn child by the rooting reflex. When a baby is touched on the cheek, it will instinctively turn its head toward the stimulus.

Ayres originally believed that TD was caused by a disparity between the protective tactile function and discriminative tactile function (1972). The protective system responds to tactile stimuli with movement, alertness, and a high degree of affect. The discriminative system attends to the meaning of the environmental stimuli in order to plan an appropriate response (Sears, 1994). Ayres proposed that, in a child who has TD, the protective system predominates over the discriminative system, resulting in the interpretation of harmless stimuli as something potentially harmful (Sears, 1981). Thus, the child will react in a negative and alarmed manner. More current theories relate tactile defensiveness to a faulty behavioral inhibition system (Lane, 2002) or simply a disorder in the regulation of tactile sensory input (Stagnatti et al., 1999). The actual cause of tactile defensiveness is unknown, but many have attributed it to genetic predisposition,

prenatal issues including chemical use, prematurity, trauma during birth, environmental pollutants, and excessive or insufficient sensory stimulation after birth (Kranowitz, 1998).

Regardless of the etiology of tactile defensiveness, it is known that it interferes with learning, perceptual motor abilities, and most noticeably behavior. Behaviors that are frequently displayed may include hyperactivity, avoidance of certain situations, and emotional outbursts. As a result, children with tactile defensiveness are often misdiagnosed with emotional problems, aggressiveness, and hyperactivity (Royeen & Mu, 2003). Further, a study by Kinnealey (1989) found that when compared to typical children, those with learning disabilities had significantly more difficulty with tactile functioning. The researchers speculate that tactile defensiveness may be a specific problem, but it is more likely one aspect of a more heterogeneous issue. Lane (2002) also found research indicating that tactile defensiveness could be a predisposition for later emotional problems, an extreme need for personal space, and a disruption in personal care. These findings demonstrate the need for further research as well as the development of interventions for children dealing with tactile defensiveness.

Identification of tactile defensiveness is typically based upon multiple behavioral observations of the child. There are several behavioral patterns that are associated with TD. The child may avoid certain clothing textures, specifically those that are scratchy or rough. He or she may also display an unusual preference for certain textures, such as those that are soft or smooth, and will tend to prefer to keep his or her body well covered. This may manifest in the desire to wear long-sleeved shirts and pants, even in warm weather. The child may prefer to stand at the end of lines in order to avoid any physical contact with others. While a child with TD will tolerate his or her own self-touch, he or she will tend to pull away from anticipated touch from others, especially with contact near the face (Sears, 1981). The child will also likely display

aversive responses to non-noxious touch such as hugging, bathing, cutting fingernails, and face washing.

Conversely, a child with TD will seek out and even crave deep touch such as “bear hugs” or pushing against a wall (Kranowitz, 1998). Firm touch feels good to these children and it can even help suppress sensitivity to softer touch. Affective responses to these types of contacts are also common. The child may show aggression to light touch or increased stress when in close physical proximity to others (Sears, 1981). Further, many children with TD will actively avoid playing activities which involve varying textures such as play dough, finger painting, or any other activity that may be messy. Also, the child will likely avoid play activities that involve body contact, which often manifests in solitary play (Lane, 2002). It is important to note that many children will display some of these behaviors occasionally, but children with tactile defensiveness show these behaviors in a consistent, constant pattern. In addition, although their behavior seems disorganized and sporadic, children with TD seek to control situations in which tactile experiences are present (Kranowitz, 1998). By controlling these situations, the child will know when, where, and what type of tactile stimulation to expect, thereby reducing the stress that accompanies unanticipated touch.

### *Intervention*

The primary goal of sensory integration therapy is to increase the child’s participation in normal, daily activities (DiMatties & Sammons, 2003). Interventions involve using enhanced sensation in the context of meaningful, adaptive interactions. Further, Ayres’ theory suggests that sensory experiences are most effective when they are incorporated into a self-selected activity that demands an adaptive response (1972). Most people naturally choose activities that meet their own sensory needs and preferences, but those with sensory integration difficulties lack



the ability to obtain the proper sensory experiences to meet their needs (Wilbarger & Wilbarger, 2002). Many studies have shown that repeated and/or continuous sensory input results in lasting changes in brain function (Wilbarger & Wilbarger, 2002; Ayres, 1972). Therefore, occupational therapists have designed varying activities in order to meet the specific needs of each person's unique sensory difficulty. Further, Kranowitz (1998) and Ayres (1972) both stress the importance of early intervention. They believe that it plays a key role because younger children have a central nervous system that is more flexible and can be more readily changed.

There are several key issues to consider when providing sensory integration intervention techniques. First, Wilbarger and Wilbarger (2002) note that education is a critical first step when dealing with a child with sensory integration dysfunction. Parental education in itself can be therapeutic because it provides awareness and can explain the negative behaviors the child displays. It is also important to prime the child before implementing any interventions. Talk to the child and familiarize him or her with the activity before it begins (Dunn et al., 2002). Wilbarger and Wilbarger (2002) stress that timing, intensity, and duration of sensory activities are also extremely important when implementing the intervention.

One of the more popular methods for treating tactile defensiveness is the "sensory diet," which was developed by Wilbarger and Wilbarger (2002). The Wilbarger approach is comprehensive, intensive, and individualized. Their belief is that certain sensory experiences, repeated frequently over a short period of time, can effectively reduce symptoms of defensiveness. The sensory diet involves the therapeutic use of sensation incorporated into daily activities. These activities are used to treat sensory and/or tactile defensiveness in two ways. First, activities which are most likely to reduce defensiveness are identified and implemented over the course of the daily schedule at regular intervals. For example, a child may benefit from

walking on the carpet with bare feet. This may be implemented every few hours for 15 minutes. Then, adaptations are added to the environment to promote functioning and decrease disruption. An example of an adaptation may be letting the child stand at the end of the line, or seating him on the edge of the classroom in order to decrease unanticipated physical contact with others. Primarily, these adaptations are implemented in order to reduce stress and discomfort. It is important to note that not all children will benefit from the same activities and adaptations. It may take several trials and errors to find activities that best suit each individual child.

Wilbarger and Wilbarger (2002) also have proposed a method of intervention that addresses sensory defensiveness. It uses the therapeutic use of deep pressure and proprioception, and is often called “brushing.” It involves the use of a specialized brush that is densely bristled. This brush does not tickle or scratch, but it delivers a type of deep pressure. The brush is applied to the hands, arms, back, legs, and feet; it is never used on the stomach, groin, buttocks, head or face. The brush is generally used in the direction of hair growth. This procedure is then followed by gentle joint compressions in the trunk, arms, and legs, which delivers the proprioceptive input. This method is often prescribed by occupational therapists and usually is repeated every ninety minutes to two hours.

Although they believe that this intervention is successful, Wilbarger and Wilbarger (2002) note that only those who have received specialized training are qualified to use this method. It should never be used alone as an intervention; however, it can be used in conjunction with other interventions such as a sensory diet. By combining several treatments, there is a better chance for success. Further, this method should not be used with children younger than two months or with children who have other health or physical disabilities. Finally, Wilbarger

and Wilbarger recommend using a specific brush that is available through vendors of sensory integration equipment.

Koomar and Bundy (2002) recommend that children administer the sensory activity to themselves in order to provide a positive experience. The child can choose the body part, amount of pressure, and length of time the sensation is administered. It may also be helpful to experiment with different kinds of pressure and sensation to determine which method is most effective for each child. In 1972, Ayres found that tactilely defensive clients responded best to deep pressure as well as proprioception. Some of the techniques she recommended were the following:

1. Walking with shoes and socks off on textured carpeting
2. Using wide paint brushes or textured mitts for brushing skin.
3. Wrapping Ace bandages around hands and feet.
4. Using weighted vests, backpacks, hats, and blankets.
5. Submerging body in containers of large balls, dried beans, etc.

Koomar and Bundy (2002) also noted that when applying tactile stimulation, it may be more tolerable if it is provided in the direction of hair growth. Going against the hairs may result in hyper-alertness and overactivity. In addition, these authors believe that children tend to feel more comfortable in quiet, enclosed spaces when providing sensation activities. By eliminating extraneous activity and objects, unexpected touch will be minimized.

Sears (1981) also recommended several environmental adaptations for a child with tactile defensiveness:

1. Always approach the child from the front
2. Explain the situation before touching the child.

3. Verbally direct the child through activities.
4. Take caution not to inadvertently brush against the child.

These adaptations were recommended in order to reduce stress level in the child. It is important to minimize sensory experiences which could potentially provoke high levels of anxiety.

Whenever enhanced sensation is incorporated into an activity, it is essential to be observant of the child's responses (Koomar & Bundy, 2002). Although research indicates expected responses from certain sensory activities, each person's response will be individually determined.

### *Efficacy*

Ever since Ayres began publishing her theory on sensory integration therapy, its efficacy has been debated (Kaplan, Polatajko, Wilson, & Faris, 1993). Early reports were based on many poorly controlled studies. However, today sensory integration continues to be criticized because research has been unable to show why it works (Mulcahy, 1994).

Some professionals take a maturational stance in which they believe that a child will "grow out of" the sensory integration dysfunction without treatment (Cermak & Henderson, 1990). In addition, studies regarding efficacy are limited given that they are unable to control for maturational change (Kaplan et al., 1993). In studies by Kaplan et al. (1993) and Wilson, Kaplan, Fellowes, Gruchy, and Faris (1992), researchers found no support favoring sensory integration therapy over other interventions such as tutoring.

Miller (2003) argues that although sensory integration has not been backed by much research, it has not been proven to be ineffective either. Koomar and Bundy (2002) state that one can measure the effectiveness of sensory integration procedures by observing children to see if they concentrate better, behave in a more organized fashion, and enjoy social interactions to a greater degree. A study by Cohn (2000) examined parents' perceptions of occupational therapy

using sensory integration techniques. Most parents perceived changes in their child's abilities, activities, and sense of self-worth. They also believed that it helped them to understand their children in a new way. A study by Kearns (2004) examined the effectiveness of art therapy using sensory integration techniques. The results indicated an increase in positive behaviors after art sessions. Another study by Mulcahy (1994) found that respondents of the surveys felt that progress using sensory integration techniques was slow, but the effects were large. Some of the noticed effects were calmness in the child, increased confidence when attempting new tasks, and improvement in coordination.

In 1982, Ottenbacher conducted a meta-analysis of eight studies addressing the efficacy of sensory integration procedures. He concluded that there was sufficient evidence that sensory integration was effective enough to continue its use in an educational setting. Further, Vargas and Camilli conducted a meta-analysis of 16 studies from 1972 to 1998. They concluded that sensory integration treatment was found to improve psychoeducational and motor performance (1998). Because there is no conclusive evidence regarding the effectiveness of sensory integration therapy, further research is necessary.

### *Critical Analysis*

It is important to look critically at the design of studies that have measured the efficacy of sensory integration procedures. Although many studies have flaws, it is important to control as many variables possible when conducting research. In research concerning sensory integration, many studies have been based upon casual observation, lack an operationalized definition of sensory integration and its procedures, and disregard maturation as a variable that may skew results. Although not all variables can be controlled, many studies lack an appropriate amount of control.

First, many of the studies that have produced positive results are not scientific, but are based upon casual observations of subjects who have received treatment. For example, studies by Cohn (2000) and Mulcahy (1994) examined parents' perceptions of the efficacy of sensory integration through the use of surveys. However, neither study took into account actual changes in behavior. If behavior is not measured and analyzed, it is impossible to know whether the intervention was effective.

In addition, many studies lack an operationalized definition of sensory integration and/or the procedures involved. Sensory integration covers all human senses with varying degrees of tolerance for each sensation. Therefore, there is an array of interventions that are linked to different types of sensory integration dysfunction. Many studies discuss sensory integration as a general topic without discriminating between different types. It is possible that some types of sensory integration procedures are not effective while others are. Therefore, researchers need to focus their studies on smaller areas of sensory integration.

Finally, because those who suffer from sensory integration dysfunction are typically young children who develop quickly and sporadically, the element of maturation needs to be addressed in these studies. It may be possible that children display behaviors related to sensory difficulties one week and the next week those behaviors may be nonexistent. However, it is impossible to control for maturation in a scientific study. Therefore, although it cannot be controlled, researchers need to be aware that it is there and also acknowledge that it is a factor when working with young children.

### *Conclusion*

Research regarding sensory integration has produced contradicting results. Many professionals believe that sensory integration interventions are extremely effective with children

who have sensory integration difficulties, while others are skeptical. In addition, many current studies lack a significant amount of control over extraneous variables. As a result more well-controlled scientific research needs to be conducted regarding the efficacy of these procedures. Specifically, interventions addressing tactile defensiveness should be explored in more depth. In order to help children with sensory integration difficulties, it is necessary to keep researching interventions in this area to find the best solution possible.

### Chapter III: Methodology

The purpose of this proposed study is to compare several techniques related to interventions for tactile defensiveness in order to find the most effective methods of treatment. This chapter will discuss specific methods used to carry out a single-subject design study. Selection of the participant, instrumentation, data collection procedures, and data analysis will be described in detail. In addition, limitations of the study will be discussed.

#### *Subject*

The subject will be identified during the researcher's internship year of graduate school. Therefore, the specific subject will be dependent on the school placement that the researcher receives. The subject will be school-aged (between the grades of kindergarten through high school).

A pool of three possible subjects will be obtained based on the recommendation of teachers. A memo will be sent out to all teachers in the school regarding the details of the research project and the description of behaviors that may indicate difficulty with sensory integration (See Appendix A). In the memo the teachers will be asked to recommend one student from their classes if there are concerns about the specified behaviors. Some of the behaviors may include: avoidance of scratchy or rough textures, preference for smooth or soft textures, preference for hard or deep touch, need for control in situations where they will be touched, a preference to keep body well covered, wearing pants and long-sleeved shirts in warm weather, avoidance of others' initiation of physical contact, aversive responses to hugs, bathing, fingernail cutting, face washing, and aggressive responses to contact that is otherwise considered non-irritating.



Once three possible subjects are identified, the Sensory Profile (Dunn, McIntosh, & Saiter, 2002), an instrument used to identify sensory integration difficulties, will be given to the teacher and/or caregiver. The subject who shows the most difficulties with tactile defensiveness will be selected to undergo the remainder of the study. Permission will be obtained from the parent or guardian of the selected subjects (See Appendix B).

### *Instrumentation*

The Sensory Profile (Dunn, et al., 2002) will be utilized to identify a child who struggles with tactile defensiveness. This instrument is intended to evaluate sensory processing in children ages three to ten. The Sensory Profile consists of 125 items and takes approximately 30 minutes to complete. The questions are geared toward the child's caregiver and address behaviors that are indicative of difficulties with sensory integration. Each item is rated on a 5-point scale (1 = always, 5 = never).

This instrument was standardized with a nationwide sample of 1200 children with and without disabilities (Dunn et al., 2002). The sample was taken from all parts of the nation and was also stratified by age, ethnicity, and socioeconomic status. The reliability of this instrument has been examined and ranges from .47 to .91 (Cronbach's alpha). Further, content validity was established during the development of the Sensory Profile by making sure that the questions addressed the full range of children's sensory processing behaviors. This was accomplished by conducting a literature review, interviewing eight practitioners who are experts in sensory integration, and by performing a category analysis based on the nationwide sample.

### *Data Collection and Research Design*

Once the subject is selected based upon teacher recommendation and results from the Sensory Profile, a target behavior will be identified and operationalized. To operationalize a

behavior, one must define it in terms of the operations required to measure the behavior (Bordens & Abbott, 1999). For example, a definition of aggression may include physically taking one's hands and forcefully touching, pushing, or hitting another person.

The design of the single-subject study will be that of alternating treatments. An alternating treatment design is described by Martin and Pear (1999) as involving two or more treatments for a single behavior in one individual. This particular study will compare the effects of three separate treatments. Further, baseline data will be collected between each treatment phase, resulting in an ABACAD research design. Each phase will consist of three half-hour data collection sessions over the course of one week.

In phase "A" baseline data will be collected by the researcher regarding the child's behavior. The baseline phase (A) will occur before each intervention is implemented. The target behavior will be measured in frequency to determine the number of times the behavior occurs over the course of three half hour observation periods over one week. The frequency will subsequently be recorded using a bar graph (see Appendix C). The period of measurement will be scheduled for a time at which the teacher indicates the child struggles most with the target behavior.

Following the first baseline phase (A), the first intervention phase (B) will be implemented, and frequency will again be recorded during the designated time in three half hour periods over one week. The frequency will again be recorded using the bar graph (Appendix A). After the second phase, the researcher will then go back to the baseline (A) and continue to measure the frequency of the target behavior during the designated times for one week. The baseline is measured again in order to determine if the intervention was actually effective or if another variable was the cause of the behavior change. Next, the second intervention phase (C)

will be implemented for one week while the researcher continues to measure frequency of behavior. This will be followed by another baseline phase (A) and the third intervention phase (D).

At this time, specific interventions will not be identified as they will be tailored to the needs of the particular child who participates in the study. However, there are several interventions that could potentially be used with a child with tactile defensiveness including, but not limited to: Walking with shoes and socks off on textured carpeting, using wide paint brushes or textured mitts for brushing skin wrapping Ace bandages around hands and feet, using weighted vests, backpacks, hats, and blankets, and submerging body in containers of large balls, dried beans, etc. (Ayres, 1972). Further, Wilbarger and Wilbarger (2002) have noted success with increasing awareness of sensory integration dysfunction, using a “sensory diet,” and implementing a brushing protocol.

#### *Data Analysis*

Through all of the phases, the frequency of the target behavior will be measured and graphed (see Appendix C). The data will be analyzed by examining the graph to see if there is improvement in the target behavior during treatment phases. The percentage of change in the target behavior during the treatment phases from the baseline phases will be calculated. Furthermore, all of the treatment phases will be compared to determine if one treatment is more effective than the others with the chosen subject.

#### *Limitations*

Although this study is important to the field of education, there are several limitations of this proposed method of research. There are potential problems in areas of generalization, the number of interventions investigated, the alternating treatment design, and the use of the Sensory

Profile. These limitations should be considered when applying this information to the school setting.

First, the results may not be easily generalized to the larger population because there is only one subject in the study. Interventions are typically tailored to the needs of an individual child. While one particular intervention might work well for the subject, it may not work well for another child. In addition, only three interventions will be investigated in this study. There are several sensory integration techniques that are frequently used in the educational setting, but this research study is not able to address more than three specific methods of intervention. It may be helpful to research other specific interventions in the future.

Although the alternating treatments design is most appropriate for this study, it also has drawbacks. Most obvious is the fact that any differential effects observed of the treatments implemented may be due to the interaction of several treatments rather than one single treatment (Martin & Pear, 1999). It may be difficult to state that one intervention is significantly more effective than another. Finally, it may be helpful to use more than one instrument in the identification of sensory integrative disorder or tactile defensiveness. The Sensory Profile is a very sound instrument, but it would be interesting to see if other instruments yield the same results.

### *Conclusion*

Sensory integration dysfunction is becoming a more recognized issue in the educational setting. Behaviors that are associated with sensory issues can be extremely disruptive in the classroom. As a result, there is a need for more information regarding the functions of these behaviors as well as interventions that may help to decrease the behaviors. This paper reviewed the literature related to sensory integration dysfunction, and more specifically, to tactile

defensiveness. Further, it proposed a methodology in which several interventions for tactile defensiveness may be examined for efficacy in the future. The goal of this research was to examine the literature and related interventions to find the most effective way to decrease behaviors related to tactile defensiveness. By finding effective interventions, there is hope that some of these behaviors will eventually cease to be disruptive in the educational setting. Finally, and most importantly, there is hope that these interventions will help the child function to the best of his or her ability in the classroom.

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## Appendix A: Memo to Teachers

Date

Dear Teacher,

I am currently working on a thesis project as part of a requirement for the Education Specialist (Ed.S.) degree at the University of Wisconsin-Stout. The title of the project is "A Comparison of Interventions for Children with Tactile Defensiveness." The goal of this research is to compare several interventions that address behaviors that may be a result of difficulties with sensory integration. The first step in carrying out this research is to locate children who may be experiencing difficulty with sensory integration and more specifically, with tactile defensiveness. I am requesting that children be recommended to me if they display several of the following behaviors:

- Avoidance of certain textures, specifically those that are scratchy or rough
- Unusual preference for certain textures (soft, smooth)
- Likes to keep body well covered, even in warm weather (wears long pants and long sleeves)
- Likes to stand at the end of lines in order to avoid physical contact with others
- Pulls away from anticipated touch from others, especially with contact near the face
- Aversive responses to non-noxious touch such as hugging, bathing, cutting fingernails, and face washing.
- Aggression towards light touch
- Initiates/seekes hard or deep pressure (pushing into walls or other people)
- Likes to give "bear hugs" or lays on top of other children
- Actively avoids playing activities which involve varying textures such as play dough, finger painting, or any other activity that may be messy
- Avoids or controls play activities that involve body contact
- Plays by his or herself
- Is rigid and likes routine. Gets upset when the routine is altered
- Likes to have control over situations in which touch is anticipated

If you recommend a child for the study, his or her parents will be contacted in order to gain permission to use a rating scale which will measure sensory integration difficulties in their child. Of the children who are recommended, the child who shows the most difficulties with tactile defensiveness will be selected to undergo the remainder of the study. Parents will again be contacted in order to gain further permission for the rest of the study.

If the child you recommend is selected to undergo the remainder of the study, he/she will participate in some sensory activities and interventions. These interventions will hopefully have a positive effect on how the child interacts with his/her environment. You may be asked to help

with some of the interventions, and the child may need to be absent from a small amount of class time (less than 3 hours per week) to be involved in the activities. Furthermore, the child's behavior will be measured over time, so an observer may be present in your classroom (less than 2 hours per week).

I appreciate your cooperation and assistance in this thesis project. If you have any questions regarding behaviors, interventions, or about the thesis project, please contact me at [davichj@uwstout.edu](mailto:davichj@uwstout.edu), or 651-555-1234.

Sincerely,

Jessica Davich, M.S. Ed.

## Appendix B: Parent Consent

Date

Dear Parent/Guardian,

My name is Jessica Davich and I am the School Psychologist at your child's school. I am currently working on a thesis project as part of a requirement for the Education Specialist (Ed.S.) degree at the University of Wisconsin-Stout. The title of the project is "A Comparison of Interventions for Children with Tactile Defensiveness." The goal of this research is to compare several interventions that address behaviors that may be a result of difficulties with sensory integration.

Your child's teacher has recommended your son/daughter to participate in this study. I would like your permission to have your teacher and/or yourself fill out a rating scale which measures how your child deals with touch, texture, and other sensory input. If the rating scale shows that your child displays difficulty with how he/she deals with touch and texture, he or she may be chosen to participate in the remainder of the study. At that time you will be notified of your child's further participation in the study and will be asked for permission again.

The remainder of the study will involve administering one or more different sensory integration techniques to your child and measuring the frequency of his or her behaviors to see if the interventions are successful. These interventions will not be harmful to your child and may even improve his or her behavior. Most children find these activities fun and enjoy the individual adult attention. Your child may miss up to three hours per week in the classroom to participate in the activities.

You and your child's participation in this study is strictly voluntary. All identification and information will be kept confidential. If at any time during the process, you change your mind, you can notify me and we will discontinue.

If you are interested in having the rating scale filled out to see if your child is selected to participate in this study, please fill out and sign the bottom of this page.

Sincerely,

Jessica Davich, M.S. Ed.

\_\_\_\_\_ I give my consent for Jessica Davich to administer the Sensory Profile rating scale to determine whether my child will participate in a study on sensory integration.

\_\_\_\_\_  
(Child's Name)

\_\_\_\_\_  
(Parent Signature)

Appendix C: Bar Graph

### Frequency of Target Behavior

