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THE EFFECT OF BRUSHING ON A TACTILLY DEFENSIVE CHILD

by  
Christine Graham

A Thesis

Submitted in partial fulfillment of the requirements of the  
Master of Arts Degree in the Graduate Division  
of Rowan College in Inverted-Pyramid  
May, 1995

Approved by \_\_\_\_\_

Date Approved 5/9/95

## ABSTRACT

Previous investigations of sensory defensiveness seem to indicate a direct relationship between sensory defensiveness and the "sensory diet" approach as proposed by Wilbarger (1987). This study examined the implementation of the "sensory diet" or brushing technique began with one mildly tactilly defensive subject. Brushing took place three times a day, every day, for approximately an eight week period. Pre and post test instruments used to gather data were the Touch Inventory for Elementary School Aged Children (Royeen, 1986) and the Sensory Integration Inventory for Adults with Developmental Disabilities (Reisman, Hanscher, 1990).

The results indicated that there was no difference between pre and post test scores. Only minor observable changes were noted.

Some reasons for these findings are discussed, including the limited period of interventions.

Christine Graham, MA  
The Effect of Brushing on a Tactilly Defensive Child. 1995 -  
Dr. Kuder - Special Education

#### MINI-ABSTRACT

This study evaluated the effect of the implementation of "sensory diet" (Wilbarger, 1987) as a method to improve sensory defensiveness in an individual diagnosed as mildly tactilly defensive. The results indicate intervention did not significantly decrease the tactile defensiveness in the individual. It's likely the short period of time influenced the results.

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## Chapter I

### INTRODUCTION

Everyone has the ability to sense danger in this environment. We know when a fly lands on our arm, when we might fall, when something is bad and should not be consumed, and when and how to react to a fire ball. We can appropriately respond to this situation with our defense mechanisms. Some people have a tendency to over respond or under respond to a harmless stimuli. This reaction is called "sensory defensiveness". "Sensory Defensiveness" is a constellation of symptoms that are the result of adverse or defensive reactions to non-noxious stimuli across one or more sensory modalities". (Wilbarger, 1991, p.2)

Individuals who are sensory defensive might react adversely to a tag in their clothing or rough textured clothing, or being touched unexpectedly. They may overreact with fear when taken on a carnival ride or be overly sensitive to environmental smells, bright lights, or distracted by noise emitted from a fan. There may be an oversensitivity to one or many types of sensation.

Types of sensory defensiveness include:

1. Tactile Defensiveness--over reaction to touch
2. Oral Defensiveness--avoidance of certain food textures or tastes in the mouth.
3. Gravitational Insecurity--fearfulness of movement or change in position.
4. Auditory Defensiveness-over sensitivity to light, also characterized by excessive blinking or gaze aversion.

Wilbarger (1988) describe three levels of severity. Mild level defensiveness is characterized by near normal behavior. The person might react to a few sensory experiences. He might be described as "picky" or "touchy". A moderately affected person might be affected in two or more areas of life, including social relations and self care. They might exhibit controlling behaviors, compulsive tendencies and disorganization when confronted with change. A severely affected individual is affected in every aspect of his life. All aspects of development may be affected, including social and emotional, as well as academic.

Occupational therapists have been identifying and treating sensory defensiveness since the 1960's. One more recent experimental approach dealing with the problem has been proposed by Wilbarger & Royeen (1987). "Wilbarger proposed a radical alternation of the balance between excitation and inhibition within the nervous system in a short amount of time

compared to more traditional approaches". (Fisher, et al, 1987, p.130)

Wilbarger suggested the following approach to treatment:

1. Awareness of the problem
2. Implementation of sensory diet-- an activity plan using a non-scratching surgical brush, used in conjunction with gentle joint compression to upper and lower extremities and trunk. Presented in a planned and organized manner.
3. Professionally guided treatment--by a licensed Occupational Therapist.

#### The Problem

##### Statement of the Problem

The purpose of this study is to investigate an effective way of reducing sensory defensiveness through the implementation of the "sensory diet", as defined by Wilbarger (1987).

##### Hypothesis

The following hypothesis will be investigated: that a sensory-defensive individual, as measured by TIE, also called the Touch Inventory for Elementary School Aged Children (Charlotte Brasic Royeen, 1990) and will display an "enhanced attentional competency and improvements in motivational, and general psycho-social emotional areas" as measured by TIE and as a result of a planned and scheduled activity program called a sensory diet (Cool, 1990, p.44).



### Importance of the Problem

Caregivers, parents, teacher and other professionals need to have a clear understanding of the nature of the problem. They need to know that conventional methods of discipline, management and daily care of the individual are not always appropriate for the sensory defensive person.

Many sensory defensiveness person may demonstrate behavior that can be easily overlooked by the special education teacher, especially if they are overshadowed by more obvious behaviors such as hyperactivity and distractibility (Ayres, 1972). Making matters worse are the implementation of inappropriate multisensory techniques and behavior management systems. In reality, this disorder requires a neurologically oriented treatment approach (Sears, 1981).

The tactilly defensive child, in particular, may have a great deal of difficulty in the normal school environment. He may not be able to work to his "maximum ability in closely grouped learning experiences due to his discomfort and stress" (Sears, 1981, p.566). He might have many difficulties during school programs where large crowds exist, such as during a school assembly or in a busy lunch room. Standing in line may even cause unexpected hostility and aggression due to his fear and physical intolerance of being touched by others next to him. Inappropriate social responses can result and peers may respond in a negative way to someone who reacts in a negative way to a friendly touch---such as a pat on the back (Sears,

1981).

Problems in the academic areas can also arise. The tactilly defensive child may not be able to tolerate certain manipulative materials, such as sand paper and plastic letters, and simple art projects, science experiments or physical education group games may prove to be disastrous for this child. Reading and language programs may also feed the effects of the defensiveness when adjective/descriptive phrases denoting tactile experiences are introduced into their vocabulary, such as hard as a rock, soft as a kitten and smooth as silk, they require the child to have had the appropriate tactile experiences to understand their meanings (Sears, 1981).

Huss tells us that "Touching involves risk. It is a form of nonverbal communication and, therefore, may be misunderstood by one or both parties involved. It invades intimate space and may be a threat. If we are not in tune with ourselves and the ones we touch, it may be inappropriate. However, non-touch may be just as devastating at a time when words are insufficient or cannot be processed appropriately because of disintegration of the individual." (Huss, 1977, p. 305)

## Chapter 2

### REVIEW OF THE LITERATURE

An investigation of the growth and development of sensory integration, the theoretical positions pertinent to these relationships and the relationship of sensory integration to tactile or sensory defensiveness was also necessary to substantiate this study.

#### **Definition of Sensory Integration: Process and Theory**

During the last twenty years, there has been a steady increase in the use of sensory integration and related procedures by occupational therapists. A. Jean Ayres developed a sensory integration theory, "to better explain the relationship between behavior and neural functioning...her goal was to develop a theory to describe and predict the specific relationship among neural functioning, sensimotor behavior, and early academic learning". (p.3, Fisher. Murray, 1990)

Ayres (1972) originally defined the Sensory Integration process as the "ability to organize sensory information for use" (p.1.). More recently, Ayres (1989) elaborated further stating:

"Sensory Integration is the neurological process that

organizes sensation from one's own body and from the environment and make it possible to use the body effectively within the environment. The spatial and temporal aspects of inputs from different sensory modalities are interpreted, associated, and unified. Sensory integration is information processing...the brain must select, enhance, inhibit, compare, and associate the sensory information in a flexible, constantly changing pattern; in other words, the brain must integrate it." (p.11)

The scope of Sensory Integration theory has three components as described by Cermak (1994): theory, assessment and intervention. The framework, which "enables us to look at, describe and explain behavior, is found in the theory" (p.2). This will enable us to look at an individual and how they react in the environment or in other words "provides an explanation of behavior and relationships between observable events or to help us plan effective treatment programs to predict therapeutic outcomes" (p.6, #1). Theory evolves through empirical research and is constantly being revised and changed to reflect new knowledge. The second component, assessment is somewhat limiting, to certain populations, depending on which tool is utilized. The Touch Inventory for School Aged Children (Royeen and Lane, 1991) is highly recommended by Cermak. The third component is intervention which includes consultation and direct services.

The theory of Sensory Integration is strongly rooted in neuroscience. Ayres' emphasis on neuroscience originated while she was conducting postdoctoral work at the University of Southern California, Los Angeles (Fisher, Murray, 1991). Her work with cerebral palsy and learning disabled children sparked an interest in exploring perceptual and motor components of learning. She began by reviewing relevant neurobehavioral literature and she formed hypotheses about neurobiological process deficits that may be associated with learning disabilities. All of this eventually led to the development of a treatment plan to be used for enhancement of neural functioning (Ayres, 1964). Further review of literature by Ayres showed a strong need for standardized measures of perceptual and motor functioning that could test and validate her hypotheses. Initially Ayres' emphasis was on visual perception but later she looked into other sensory systems especially vestibular, proprioceptive, and tactile and their relationship to learning (Ayres, 1974). Her doctoral work at the University of Southern California included the development of the Southern California Sensory Integration Tests (Ayres, 1980). This test measured visual perception, tactile, kinesthetic perception and perceptual-motor functioning. In 1975, the Southern California Nystagmus Test was added to measure vestibular function (Ayres, 1975). In addition, Ayres supplemented these standardized tests with informal observations of neuro-motor maturation, such as

muscle tone.

Recognizing the limitation of these tests, Ayres and her associates began a major revision in the early 1980's. A new battery of tests emerged--The Sensory Integration and Praxis Test (SIPT), (Ayres, 1989).

Ayres was so inspired by the children she worked with and met, that her desire to better understand their problems acted as a springboard to learning more. She implemented research using these tests to evaluate research, her hypotheses and clinical findings. Findings from this research was used to reveal and modify her original hypotheses and began the evolution of Sensory Integration theory (Fisher, Murray, 1991).

#### ASSUMPTIONS OF SENSORY INTEGRATION THEORY

There are a number of assumptions suggested by Fisher, Murray that underlie sensory integration theory. Some of the assumptions relate to the neural basis of sensory integration and others relate to behavioral aspects of sensory integration. The first assumption is Neural Plasticity--or "the ability of brain structure to change or to be modified" (p.15). This assumption is central to sensory integration theory and suggests that "enhancement of the nervous system is possible through the provision of controlled tactile, vestibular, and proprioceptive sensory inputs" (p.15). According to Ayres (1989) to what extent this interaction occurs depends on plasticity of the brain:

"The brain, especially the young brain, is naturally malleable; structure and function become more firm and set with age. The formative capacity allows person-environment interaction to promote and enhance neurointegrative efficiency. A deficiency in the individual's ability to engage effectively in this transaction at critical periods interferes with optimal brain development and consequent overall ability. Identifying the deficient areas at a young age and addressing them therapeutically, can enhance the individual's opportunity for normal development (p 12).

In her earlier writings, Ayres assumed that the optimal age for sensory integration therapy was between 3-7 (Ayres, 1979). Fisher and Murray have found contrary evidence of this and state that "plasticity persists into adulthood and possibly throughout life" (p.15). Ottenbacher and Short (1985) also concur that "Brain alterations do occur in mature organisms and even in geriatric organisms (p. 302). While the major focus of sensory integration theory is on the young child, my research has uncovered that this theory is also applicable to adults who present with integration dysfunctions (Urbanik, 1986).

Another assumption in sensory integration theory is that sensory integrative process occurs in a developmental sequence, or when sensory dysfunction occurs the "circular process" the will eventually lead to normal development is

disrupted (Short-DeGraff, 1988).

Closely related to the developmental sequence is the nervous system hierarchy. Although Ayres always stressed the Brain functions as a whole, she agreed that "Higher level" integrative functions are dependent on "lower level" structures (1979, 1989). Higher centers of the brain (cortical) encompass reasoning, language and learning while sensory intake and integration occur in lower centers (subcortical) and developed before higher levels. Optimal functioning of higher levels were in fact dependent on optimal functioning of lower structures.

Much criticism has arisen due to this theory (Ottenbacher and Short, 1985) but Fisher/Murray have proposed that greater emphasis be placed on a "systems view" of the nervous system, thereby retaining Ayres' view of the holistic hierarchy, or that both cortical and subcortical structures interact to contribute to sensory integration (1991).

A fourth assumption concerns adaptive behavior, or more specifically, "we learn movements from past experiences only if we recognize that the prior movements were successful. Knowledge of success is presumed to be provided by sensory feedback derived from the production and outcome of the adaptive behavior" (Fisher, Murray, p. 17).

The last assumption is that "people have an inner desire to develop sensory integration through participation in sensorimotor activities." (Fisher, Murray, p. 17) Ayres (1979)



also acknowledged that children with dysfunctional sensory integrative systems lacked an inner drive or motivation to actively participate in their environment. A model to explain intrinsic motivation associated with play was developed by Csikszentmihalyi (1979) in which he hypothesized that "individuals seek challenges that are matched to their abilities... when the task is too easy, the child becomes bored and when the task is too difficult, the child becomes anxious. However, when the challenge matches the skill level of the individual, a 'flow' occurs." (.261).

In occupational therapy and learning disabilities literature, one can find numerous descriptions of theories, practice, treatment and debate about the sensory integration approach. Racey (1980) has noted that the term "sensory integration" itself is too often misused and causes confusion among parents, teachers, and other professionals and among occupational therapists themselves. Many therapists use the term sensory integration to describe many treatment techniques or assessment procedures. Other terms used to describe the same thing are sensimotor therapy, sensimotor integration and developmental therapy (Yack, 1989). Clark, Mailloux and Parham believe that there is a definite difference between sensory integration (which focus on the central nervous system processing) and sensorimotor therapy (which focus on the relationship between specific sensation to specific sensation to specific motor responses) (1985). Another point made by

Kimball is the distinction that needs to be made between occupational therapists that use sensory integration versus occupation therapists applying principle of sensory integration (1988). Wilbarger's brushing technique (sensory diet) is a good example of this. This type of sensory stimulation would not necessarily be categorized as sensory integration yet is clearly based on the sensory integration principle (Cermak, 1994).

Other difficulties have been suggested in studies examining the use of sensory integration with learning disabled children. Although many studies have showed positive outcomes with improvements in academic performance and perceptual motor abilities (Ayres, 1972, Ottenbacher, Short and Watson, 1979, flaws in methodology have been noted (Shaffer, 1984) and attempts to replicate previous studies using learning disabled children have found no significant effects on academic performance or perceptual processing. Difficulty in establishing valid scientific methods is not the only problem of sensory integration research. The most common definition of a learning disability is also a problem because it conflicts with many other definitions of learning disabilities offered. There is also no established criteria for diagnosing a sensory integrative dysfunction (Yack, 1989). Therefore, making the studies difficult to identify and will interfere with study interpretation and replication (Yack, 1989)

Ottenbacher (1982) conducted a "meta-analysis of research literature" study in which he examined 49 published research studies, 8 of which meet his criteria for inclusion into this review. Overall, Ottenbacher found "the average performance of subjects...receiving (treatment for) sensory integration...was better than 78.8% of the subjects in the control groups not receiving (treatment for) sensory integration" (p.1). On quantitative assessment, Ottenbacher suggested that subjects with mental retardation who received treatment did better than 69.8% of comparison subjects, while the average learning disabled subject receiving treatment showed better gains by performing better than 75.2% of comparison subjects. He concluded that when comparing aphasic subjects (38.5% seemed to benefit most from sensory integrative procedures. "The results of this research have demonstrated the effect of sensory integration therapy in the studies reviewed."

Ottenbacher states, overall there was "a highly significant effect for the combined experimental groups receiving sensory integration therapy when compared with the combined control groups not receiving therapy". Ottenbacher also notes that "the justification for some application of sensory integration therapy maybe more affect than demonstrated effect" (p.3).

Ottenbacher (1991) later found several limitations related to the interpretations of the findings. For one,

there is no consistency in areas of improvements, children who were identified as "at risk", were younger than learning disabled or mentally retarded children. Also, none of those studies included follow-up measure, and children in control groups were generally not provided any alternating interventions. A final limitation noted was that only eight studies met the criteria to be included in the quantitative review.

Humphries, Snider, McDougall have acknowledge Sensory Integration treatment for the Learning Disabled child as a controversial approach to the treatment of academic and social problems but have concluded that only one hour of Sensory Integration therapy per week was superior to...no treatment in improving certain aspects of gross motor functioning and motor accuracy" in a particular sample of children. Neither study showed improvement in cognition, attention language, self-concept or academic performance..." (1993, p. 164). Therefore suggesting that very specific changes can occur. Another study which addressed the effect of a Sensory Integration Program on academic Motor Performance and self-esteem in Learning Disabled children concluded that when Sensory Integration therapy was administered for one hour, once a week for six months, there was an effect in academic and motor performance but did not effect self-esteem (Polatajko, et, al, 1991).

More recently, Arendt, et, al, (1988) reviewed eight studies describing the use of the sensory integration theory

on mentally retarded subjects. Based on their analysis Arendt and his colleagues concluded that "there exists no convincing empirical or theoretical support for the continued use of sensory integration theory with that population outside of a research context" (p. 410). Another research--Polatajko, et. al, (1992) reviewed randomized, controlled trials conducted in the second decade after Ayres (1972) and concluded that sensory integration treatment was not effective in the treatment of learning disabled children with academic problems. But was unclear whether or not sensory integration treatment was more effective than perceptual motor approaches. She further suggested that future research be initiated to determine if sensory integration treatment is more effective than maturation alone.

In order to achieve "empirical consensus, future efficacy research...should first establish the integrity of the independent variables: sensory integration programs. Once integrity has been established, research should focus on maximizing the strength of the treatment by ensuring that the dependent variables are related to the theory, sensitive to changes in behavior effected by the treatment and measured in an accurate and reliable manner" (Ottenbacher, 1991, p. 397). Ottenbacher believes that the science of sensory integration is still in its infancy and no single research approach has become the methodology of choice in establishing empirical consensus. He urges his professionals to take steps to "unify

the research paradigm" and regain public confidence (1991).

### Historical Perspective of Tactile Defensiveness

Ayres first brought Tactile Discrimination into focus in 1964. Her theories of tactile discrimination were based on theories of pain reported in 1920 by Head who "postulated a peripheral dichotomy for sensation based on receptor specificity". (p. 1, Fisher, Dunn). In 1965, the Gate Control Theory of Pain, another influence of Ayres, postulated that a "neural mechanism in the dorsal horn acted as a gate to increase or decrease the flow of neural impulses to the central nervous system." An important component of this theory was the role of the cortical influences, like anxiety, anticipation and experiences on the modulation of pain (p. 1, Fisher, Dunn). The neurobiological basis for this disorder still is unclear and very controversial.

Ayres' initial theories about tactile defensiveness are summarized in the following statement made in 1973: "It is provisionally hypothesized that there are dual functional cutaneous afferent systems--a protective system which responds to stimuli with movement, alertness and high degree of affect (often negative) and a discriminative system which enables interpretation of the temporal and spatial nature of stimuli for cognition. Under certain conditions, the two systems lose or never attain their natural balance, the protective system predominating, a state in which hyperactive, distractible behavior is aggravated and perceptual-motor development is

retarded" (p. 86, Ayres, 1973). These two systems act as a continuum rather than a dichotomy (Royeen, 1991). Sears (1981) reminds us that the discriminative system enables the individual to obtain information about himself and his environment, while the protective system addresses survival. It is also interesting to note that Ayres (1964) and Bauer (1977) have both researched and found "significant correlations" between tactile perceptions (predominance of the protective system) both claim that either system cannot coexist. Normally an individual can react to what system is needed at the time. However, when these systems are not well balanced, the tactile defensive child tends to react in a "fight-or-flight way" (p. 110, Ayres, 1979).

Contradicting the continuum, Fisher and Dunn (1983) published a review on the Gain Control Theory, which recognized that the reduction of tactile defensiveness would not lead to improved tactile defensiveness. Rather, they stressed that these are separate disorders of tactile processing and not on the same continuum, explaining that they do occur in isolation. Fisher and Dunn subsequently suggested the phrase "lack of inhibition" to the tactile defensive child. They claimed that it was "appropriate in describing the failure of higher central nervous systems structures to modulate incoming tactile stimuli." (p. 2). Thus advocating use of treatment techniques to decrease arousal, including touch-pressure, proprioception and

vestibular stimulation.

Another term coined from tactile defensiveness is "sensory defensiveness" (Knickerbocher, 1980) and implied increased sensitivity of tactile and other sensory systems. She theorized that the "disorganized response to sensory stimuli can result in imbalance between inhibition and excitation within the nervous system, thus leading to too little inhibition and a flood of input reaching higher central nervous system structures" (p. 120, Royeen, Lane). Knickerbocher suggests that children with sensory defensiveness are usually overly active, hyperverbal, distractible and disorganized. On the opposite continuum, she described the sensory dormant individual whose behavior is disorganized or immature, resulting from "excessive inhibition of incoming sensory input and lack of sensory arousal" (p. 120, Royeen, Lane). This child, she suggests, is usually quiet and compliant. She observed this dormancy and defensiveness in olfactory, tactile and auditory systems. Knickerbocher extended Ayres' concept of tactile defensiveness by extending to other sensory systems.

Current views on tactile defensiveness views this disorder as "one component within a broader dysfunctional category of sensory defensiveness which included auditory and visual defensiveness..and also included gravitational insecurity and adverse response to vestibular stimuli" (Royeen, Lane, p. 121). Wilbarger (Wilbarger & Royeen, 1987)



brought the emotional difficulties associated with this disorder to attention by calling them "sensory affective disorders". Royeen (1989) has built on this theory by hypothesizing that sensory defensiveness and sensory dormancy together may be considered "sensory modulation disorders". He also suggests that "sensory registration" occurs when an individual, in the normal course of the day, spends excessive time at one end of continuum or another (Royeen, Lane, 1991). The channels of registration are opened when the organism identifies the stimulus as unique--that is, the organism cannot find an exact counterpart in memory and, therefore, "registers" the sensory experience. The channels of registration are closed when the organism identifies the stimulus as the same--that is, the organism finds an exact counterpart in memory, and therefore, 'decides' to block the channels of registration because the stimulus is familiar" (Dunn, Winnie, 1983).

#### Evaluation Tools

Royeen assumes that since tactile defensiveness can be considered a characteristic behavior--it can be measurable. In the past, social scientists have measured such behaviors by e.g., interest inventories, but Danella infers that measurement of multi-handicapped children on inventories may reflect the disorganization of their nervous system (1986). Assessing tactile defensiveness in children becomes primary for two reasons: professional credibility and generation of

scientific knowledge (Royeen, 1986). Currently tactile defensiveness is best identified formally through clinical observations using the Southern California Sensory Integration Test (SCSIT), for children four years, ten months and up (Ayres, 1980). Also, a newly developed TIP--Touch Inventory for Preschoolers (Royeen, 1987) and SIPT (Ayres, 1989) measure related to poor tactile discrimination.

Informal measures include information obtained from family and other professionals (Royeen, Lane, 1991), and a sensory history, which asks questions on tactile processing compiled by Wilbarger and Oetter (1989), with young children, it is best to observe tactually based play activities, which is even more valid when combined with other testing interviews.

### Intervention

"The purpose of direct intervention is to reset the defensive orientation of the clients nervous systems using environmental and prescribed sensory experiences and to couple this with elicitation of an appropriate adaptive behavior. Such intervention is theorized to promote more balanced responses to sensory events" (p. 129, Royeen, Lane).

A new experimental approach for treatment of sensory defensiveness is proposed by Wilbarger (1987) in which a "radical alteration of the balance between excitation and inhibition within the nervous system in a short amount of time compared to more traditional approaches" (p. 130, Royeen,

Lane). Wilbarger's approach is a modification of Rood's technique of brushing. Both use a non-scratching surgical brush with joint compression to upper and lower extremities and trunk. This technique will be the focus of my research study.

Three intervention approaches, which are proposed by Wilbarger, are crucial to its effectiveness. The first is awareness of symptoms and behaviors associated with this condition. This step usually consists of caretaker interview/history, which finds out about these behaviors that may be hidden in family routines, e.g. removing labels from clothing, avoidance of restaurants or crowded places. Understanding these behaviors is the first step to providing activities and sensory input to help eliminate the defensiveness. Differentiating between what situation disrupts the child while which other contributes to his recovery from the disturbing events. Secondly, is the implementation of the sensory diet, which is based on the idea that each individual requires a certain amount of sensation to be most alert. Wilbarger tells us that deep pressure on the skin may last up to two hours, whereas slow, rhythmic movement is for calming. The calming measures include pressure on the skin, actively in an upside down posture, joint traction and compression, and heel-to-head rocking. Stress is on making the child feel alert, calm and organized most of the time by using activities on scheduled times throughout the day.

Sensory input can prepare the child for disruptive events that are about to occur. Adult direction and involvements should be limited to making activities available and setting up the environment and supervising safety, the objective is for child to direct himself. Thirdly, the Professionally Guided Treatment--which included rapid and firm pressure with a non-scratching surgical brush on the arms, hands, back legs and feet--never brushing the stomach, head, neck or chest. The brushing should be followed by gentle joint compression to shoulders, elbows, wrists, hips, knees, ankles and sometimes fingers and feet. All of these techniques should be demonstrated by a knowledgeable therapist. The brushing and joint compression routines are suggested to be merged with family routines, e.g. upon waking, bathtime, bedtime, before and after school. Older children can be taught to do it themselves. Oral defensiveness and gravitational insecurity are not addressed by these techniques, but visual, auditory, touch, defensiveness, and postural insecurity are all effected by the technique described above.

As defensiveness improves, the child may begin to feel freedom from the fear of moving and exploring, when this occurs, it may appear as hyperactivity or problem behavior, initially. Therefore, any change in behavior should be properly interpreted and caretakers should have professional guidance in adapting to these new behaviors. Something also worth mentioning, is that some children may resist treatment

at first, avoiding the input that will help them. This may happen the first few times but eventually the child makes adjustments to the techniques. "Persons with sensory defensiveness demonstrate what appears to be lowered thresholds to sensory stimulation so that presentation of a normal stimulus level seems to evoke a painful, adverse response. It is possible that the brushing technique itself may cause discomfort but also allows the defensive person's central nervous system to build tolerance to the sensation" (p. 5, Coal, 1990).

Although there are no controlled efficacy studies on brushing as of this date, it has been claimed by clinicians such as Wilbarger that patients show "enhanced attentional competency and improvements in motivational, cognitive, and general psycho-social-emotional areas of functions following a regimen of brushing and proprioceptive input" (p. 5, Cool, 1990).

### Chapter 3

#### SUBJECT OF THE STUDY

The subject of this study was a 16 year old multiply-handicapped girl (communication handicapped/neurologically impaired). She is an easy going, agreeable girl who agreed to help with this research project. The subject was identified as mildly tactilly defensive, on the basis of the results of the TIE (Touch Inventory for Elementary School Aged Children) (Royeen, 1986) and Sensory Integration Inventory for Adults with Developmental Disabilities (Reisman, Hanschu, 1990), in addition to information obtained from a parent (see appendix for test copies). There were no other more suitable inventories for this particular age group, so two different tests from similar age groups were used.

Most recent psychological testing (1992) indicated a full scale IQ of 54 + 3 (Wechsler Intelligence Scale for Children-Revised). Educational assessments indicate significant perceptual, academic and language deficits. The subject is currently being educated in and out of district, private high school placement, where academics are stressed in the morning and vocational training is pursued in the afternoon.

The subject can be described as over-sensitive to touch. At times, she seems mildly picky or irritated by some sensations (such as turtleneck shirts, nylon stocking, lace or other non-cotton clothing) but not by others. She is also oversensitive to light or unexpected touch by others, unless she is able to initiate the touch.

PROCEDURE:

"Brushing" took place three times a day in subjects, 12 X 15' bedroom, while subject was lying supine on her bed, and the experimenter was seated in the bed next to the subject. The room was very comfortable and, of course very familiar to the subject.

Times of the day in which "brushing" takes place were dictated by her routines, such as waking, after school, and at bedtime. The surgical brush used had non-scratching bristles that put even pressure across the skin when pushed down. The surgical brush was supplied by Avanti Educational Programs and cost \$1 per brush (see appendix).

Treatment included applying rapid and firm pressure touch to the arms, hands, back, legs, and feet with the non-scratching brush with many bristles, in all directions, across the body midline and both with and against body hairs. This was followed by gentle joint compression to shoulders, elbows, wrists, hips, knees, ankles and sometimes fingers and feet for about 10 seconds each. This treatment took on the average of 2-3 minutes for each session.

#### SOURCES OF DATA:

The following instruments were used to gather data for pre-test and post-test. Both were administered by a licensed Occupational Therapist.

Touch Inventory for Elementary School Aged Children (Royeen, 1986) is a 26 item attitude scale measuring tactile defensiveness in children aged 6-10 years. It was assumed that the effects of tactile defensiveness and behavior of children produces stereotypical responses that can be measured by an attitude scale. This list was generated from an empirically based list of descriptors of behaviors associated with tactile defensiveness. Responses consisted of No (1), A Little (2), A Lot (3).

Sensory Integration Inventory for Adults with Developmental Disabilities (Reisman, Hanschu, 1990) is a 110 question inventory organized into four sections associated with sensory integrative processing: tactile, vestibular, proprioceptive and general reaction. For the purpose of this study, the 37 questions associated with the tactile section only were used. The inventory was completed by the parent of the subject, who is the most familiar with the subject. It yielded information about how the client typically responded. Because the inventory was not standardized as a test, there was no set number of items that would have indicated when the child would be considered to have a sensory integrative dysfunction. Items in this inventory were considered 'soft



signs' and behaviors and items considered together reflected patterns of dysfunction. Items were marked Y (yes) column if the behavior was typical and observed, reported or could have been elicited through testing. N (no) column was marked if the behavior was not typical or characteristic of the subject. ? column was marked if parent was unsure that the behavior was typical even though it was observed.

Chapter 4PRESENTATION AND ANALYSIS  
OF THE DATA

This was an attempt to determine if sensory defensiveness could be reduced in an individual through the implementation of the "sensory diet", in a child identified as mildly tactilly defensive. One subject was used for the purpose of this study. The Touch Inventory for Elementary School Aged Children (Royeen, 1986) and the Sensory Integration Inventory for Adults with Developmental Disabilities (Reisman, Hanschu, 1990) were administered as pre/post test batteries. The scores were then analyzed as follows: both tests were divided into the following categories: Touching/Social, Clothing, Daily Living Skills.

Results from the TIE pre-intervention testing indicated more difficulties in touching/social areas. The SIADD showed a very close distribution between the three areas with Touching/Social, and Daily Living Skills being the most affected.

Post intervention scores yielded similar results. The SIADD had 37 items, 14 responses received "yes" responses on pretest. During post intervention, the child was retested with the same materials and the responses remained unchanged.

"Yes" responses reflect a pattern of dysfunction but since no specific number of items must be marked before a client would be considered to have a sensory integrative dysfunction, it was assumed by the examiner that 14 "yes" responses were a sufficient enough number to indicate a mild sensory dysfunction. recommendations on the SIADD test directions considered conversion of items to numeric scores "not appropriate and should not be done" (P.3, Users Guide, SI Inventory).

The TIE yielded similiar results with a pre test scale score of 3.05 and a post test score of 3.05. Both scores indicated that subject was tactilly defensive group versus tactilly defensive group. Both pre and post scores on TIE and SIADD yielded identical results, no differences were noted.

TEST ITEM	T.I.E. (PRE)	T.I.E. (POST)	SIADD (PRE)	SIADD (POST)
Touching/ social	13-2 4-3	13-2 4-3	5-y 2-n	5-y 2-n
Clothing	3-1 2-2	3-1 2-2	6-n 4-y	6-n 4-y
Daily Living Skills	3-2 2-1	3-2 2-1	5-y 3-n	5-y 3-n

TIE: 1-no  
2-a little  
3- a lot

SIADD: y- yes  
n- no

## Chapter 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

In this study, I attempted to investigate the relationship between tactile defensiveness and the "sensory diet" or brushing technique and its effect on a child identified as mild tactilly defensive.

#### Statement of the Problem

The purpose of this study was to investigate an effective way of reducing sensory defensiveness through the implementation of the "sensory diet", as defined by Wilbargar.

#### Hypothesis

The following hypotheses was investigated: that a sensory-defensive individual, as measure by TIE and SIADD will display an "enhanced attentional competency and improvements in motivational and general psycho-social emotional areas" as measured by TIE and SII and as a result of a planned and scheduled activity program called a sensory diet. (Cool, 1990, p.44)

#### Conclusions

The hypothesis that a sensory defensive individual would display "enhanced attentional competency and improvements in motivational and general psycho-social emotional areas" was

rejected. (Cool, 1990, p.44)

The comparison between pre and post test scores resulted in no changes that were significant enough to record. Minor observable changes were noted throughout the test but the recorder could not consider them significant enough to change the post-test answers. Observable changes which could not alter results but should be considered. Initially, the subject was very upset by the daily brushing and needed to be reassured before each session and during sessions. After a two week period, reassurance took place only before each session and by week three, no reassurance took place at all. On week five, subject began to initiate brushing on her own and later that week, asked about brushing herself, which examiner let her do but did not add into program since not all body parts were brushed consistently and joint compressions were not done by the subject.

Based on research literature, I thought that my chances of finding any statistically significant results were evenly distributed. Research from Ottenbacher had suggested that subjects with mental retardation did better than 69.8% of comparison subjects. Although no statistical data could be found or justified. Wilbargar's brushing approach also yielded positive results according to clinicians employing her techniques, although no empirical research has been initiated thus far to support this feeling. Much of the other literature stated that there was no empirical evidence for the

continued use of Sensory Integration theory. But because of my close relationship with the subject, I was very motivated and optimistic that some positive results would be encountered.

My research study differed from the many others examined because all of the ones examined had experimental/control groups and were able to compare those individuals receiving intervention and those individuals not receiving intervention and compare the two groups. Some results indicated improvements in the experimental group. (Ottenbacher, 1991). Others were more closely aligned with my own, finding no empirical support for the justification of continued use of sensory integration.

In conclusion, I must say that although tolerance levels for touch/social did show some observable improvements, they were not significant. But to conclude that Sensory Integration might never work for any individual is still not possible. Time constraints on the study may have influenced the outcome, perhaps if more time was allotted to implementation and more than one subject was used more significant results would have been found. Another consideration for implementation of this study was the practicability of the sensory diet routine. For most classroom teachers brushing subjects 2-3 times a day, 7 days a week is not feasible unless parent and school both coordinate their efforts to carry through this objective. Even in the most

motivated individuals, the routine was sometimes very laborious to carry through on a daily basis.

As a result of my study, it can be suggested that additional research is warranted on the relationship between sensory defensiveness and the sensory diet. The following changes are suggested: future research studies should include more than one individual with similar/same characteristics, therefore establishing a control and experimental group. Ideally, time elements should also be considered with a minimum time allotment of 6 months for implementation.

This study allowed me an opportunity to see the effects of sensory integration in a mild tactilly defensive individual. No significant changes can be acknowledged although minor changes were beginning to be noticed. It may be that time was a key element in determining success/failure of this treatment program.

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