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The Incidence of Caregiver Reported Sensory Processing Disorders in Children Who Are Experiencing Traumatic Stress Reaction

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**THE INCIDENCE OF CAREGIVER REPORTED SENSORY PROCESSING
DISORDERS IN CHILDREN WHO ARE EXPERIENCING
TRAUMATIC STRESS REACTION**

by

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**A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Science
Department of Occupational Therapy**

**Western Michigan University
Kalamazoo, Michigan
June 2001**

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2001

ACKNOWLEDGMENTS

I would like to thank the caregivers who completed the *Sensory Profile Questionnaires* and released the data for use in this study, as well as the staff members of Southwestern Michigan Children's Trauma Assessment Center who administered and collected the forms.

Secondly, I extend thanks to Ben Atchison, PhD, OTR, FAOTA, for his assistance as graduate program coordinator and first reader; and Richard Cooper, EdD, OTR, FAOTA, and Yvette Hyter, PhD, CCC-SLP for their assistance as second and third readers.

Finally, I thank Mr. Alashar Waltz for his provision of word processing and formatting services.

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Ann K. Viviano, OTR, MA CCC-SLP

Western Michigan University, 2001

The purpose of this research project was to determine whether children who are experiencing traumatic stress reaction to childhood neglect or abuse demonstrate sensory processing disorders. It was hypothesized that since neurodevelopment has been disrupted in children who have been exposed to trauma or neglect, sensory processing abilities may also be disrupted.

The *Sensory Profile*, a judgment-based caregiver questionnaire, provides a standard method to measure a child's sensory processing abilities and to profile the effect of sensory processing on a child's functional performance. A convenience sample of 25 children, with documented traumatic stress reaction due to abuse and/or neglect, was evaluated.

The results were scored and interpreted according to the classification system of the *Sensory Profile*: typical performance, probable difference, and definite difference. Results indicated 80% of the children who are experiencing traumatic stress reaction were reported by caregivers to have difficulties with sensory processing.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
LIST OF TABLES	v
CHAPTER	
INTRODUCTION.....	1
THE AFTERMATH OF ABUSE AND NEGLECT.....	3
SENSORY PROCESSING AND INTEGRATION	7
THE SENSORY PROFILE CAREGIVER QUESTIONNAIRE	9
CLINICAL STUDY	12
Statement of the Problem and Objective	12
Value of Study	13
Method	14
Sample	14
Procedure.....	16
Instrument.....	16
Validity Statement for Instrument	17
Reliability Statement for Instrument	17
Scoring.....	18
Results	19
DISCUSSION	23

Table of Contents—Continued

CHAPTER

CONCLUSIONS	27
-------------------	----

APPENDIX

A. Approval Letter From the Human Subjects Institutional Review Board	28
--	----

BIBLIOGRAPHY	30
--------------------	----

LIST OF TABLES

1. Sample by Age.....	15
2. Sample by Gender.....	16
3. Percentages (n=25) for Factor Scores	20
4. Percentages (n=25) for Section Scores.....	21
5. Mean and Standard Deviation of Factor Scores.....	22
6. Mean and Standard Deviation of Section Scores	22

INTRODUCTION

A major tragedy in the United States is that at least 5 million children are victims of and/or witnesses to physical abuse, domestic violence, or community violence (Perry, 1997). The U. S. Department of Health and Human Services reported in *Child Maltreatment 1998* that an estimated 903,000 children were victims of maltreatment nationwide, which is a rate of victimization of 12.9 per 1,000 children. More than half (53.5%) of the child victims suffered neglect, 22.7% suffered physical abuse, 11.5% were sexually abused; and victims of psychological abuse and medical neglect accounted for 6% or fewer each. In addition, a quarter (25.3%) of victims were reported to be victims of more than one type of maltreatment. Nationally, an estimated 144,000 child victims were placed in foster care (U.S. Department of Health and Human Services, 2000). Clearly, child abuse and neglect and the resulting devastation are issues that must be addressed on a national level, on a state level, and in each and every community.

In Kalamazoo, Michigan the team of professionals at The Southwestern Michigan Children's Trauma Assessment Center (CTAC) addresses the needs of children who are experiencing traumatic stress reaction following abuse and/or neglect. CTAC accepts referrals from community agencies; and the team completes family-centered evaluations and makes intervention recommendations that are presented to the child's caregivers. Components of a child's evaluation include determination of the status of cognitive, language, emotional, physical, and psychological

development. One of the specific areas assessed is a child's ability to process sensory information, that is, how the child registers, responds, and regulates normal environmental stimuli.

THE AFTERMATH OF ABUSE AND NEGLECT

Post-traumatic stress disorder is marked by clear biological changes as well as psychological symptoms (National Center for Post Traumatic Stress Disorder, 2000) that can be observed by individuals who are knowledgeable about the affects of abuse and neglect on the physical and mental states of children. However, these changes and symptoms may not be as clear or obvious to caregivers who lack familiarity with the effects of abuse and neglect. Childhood trauma of abuse or neglect has a profound impact on the emotional, behavioral, cognitive, social, and physical functioning of children. Children exposed to trauma may have a range of traumatic stress reactions with symptoms of behavior disorders, anxieties, phobias, and depression (Schwarz & Perry, 1994). Perry (1994) reviewed information on childhood post-traumatic stress disorder with specific focus on the neurobiological sequelae of childhood trauma. He presented preliminary evidence of altered functioning of brainstem functions associated with prolonged 'alarm reactions' induced by traumatic events, which alter cardiovascular regulation, affective lability, and behavioral impulsivity; and increases anxiety, startle responses, and sleep abnormalities.

Perry (1997) asserted the human brain develops in a 'use-dependent' manner, growing, organizing, and functioning in response to developmental experience. Experience results in the critical neurobiological factors associated with violence and/or neglect. The brain makes internal representations of the external world and stores associations between the sensory information from specific events and allows

the individual to generalize to sensory information present in current or future events. The brain stores elements of the traumatic events as cognitive memory, motor memory, emotional memory, and state memory, altering the functional capacity of the traumatized individual (Perry, 1999a).

A growing body of evidence suggests that exposure to violence or trauma alters the developing brain by altering normal neurodevelopmental processes. Trauma influences the pattern, intensity and nature of sensory, perceptual, and affective experiences of events during childhood. Threat activates the brain's hyperarousal stress-response neurobiology, which can affect the development of the brain by altering neurogenesis, migration, synaptogenesis, and neurochemical differentiation. If a child uses dissociative adaptation patterns of survival, there is also overactivation of neurochemical responses in the central nervous system that may result in behaviors of 'freezing,' with mental and emotional disengagement from the immediate situation rather than a 'fight or flight' response to the threat, abuse, or neglect. Most children's response to trauma is a mixture of these two primary adaptive patterns, arousal and dissociation, and the specific symptoms a child develops will be related to the intensity and duration of the adaptive style present during the threat. If the neurobiology of the specific response is activated long enough, there will be molecular, structural and functional changes in those systems. As children adapt to violence, their brain acts to sense, process, perceive, store, and act on information from outside and inside the body to promote survival. Disruptions during critical periods of learning may lead to major abnormalities or deficits in neurodevelopment and behavior (Perry, 1999b;

1999c; Perry & Azad, 1999).

Children who survive a traumatic event may have persistence of a low-level fear state; be impulsive, hyper-vigilant, hyperactive, withdrawn, depressed; have sleep difficulties and anxiety, show loss of previous functioning, have a slow rate of acquiring new developmental tasks, act in a regressed fashion, and/or have persisting physiological hyperactivity (Perry, 1999c). Traumatic stress in childhood increases risk for attachment problems, eating disorders, depression, suicidal behavior, anxiety, alcoholism, violent behavior, mood disorders, and/or chronic post-traumatic stress disorder. Adults victimized by sexual abuse in childhood are more likely to have difficulty in childbirth, a variety of gastrointestinal and gynecological disorders, and other somatic problems such as chronic pain, headaches, and fatigue (Perry, 1999d).

Children who suffer from neglect have a higher probability of emotional, behavioral, cognitive, social, and physical delays and dysfunction than 'comparison' children. Findings strongly suggest that when early life neglect is characterized by decreased sensory input (relative poverty of words, touch and social interactions), brain growth and organization are altered. Results of neuroimaging indicated more scans of the children with global neglect were read with "enlarged ventricles" or "cortical atrophy." Few focal abnormalities were noted. The relative impact of neglect on the brain, as opposed to other physical growth, indicated that the actual lack of experiences played a major role in addition to inadequate nutrition (Perry & Pollard, 1997).

Developmental experiences determine the organizational and functional status

of the mature brain. The acute adaptive states of the brain, when they persist, become maladaptive traits (Perry, Pollard, Blakely, Baker, & Vigilante, 1995). The presentation and course of post-traumatic stress symptoms depend on how far a person has progressed in his development. Assessments and interventions in the aftermath of trauma must consider presenting symptoms and the individual's ability to cope, as well as the biopsychosocial development and the impact of trauma on the child's maturation and development. Additionally, it is critical to intervene with the child's caregivers to elicit their assistance and provide them with support (Schwarz & Perry, 1994). In order to meet the needs of traumatized children it is necessary to evaluate the child's strengths and weaknesses across all domains of functioning and from the perspectives of different observers through an interdisciplinary assessment (Ludy-Dobson et al., 1999).

SENSORY PROCESSING AND INTEGRATION

The profession of occupational therapy involves the therapeutic use of purposeful and meaningful occupations (goal directed activities) to evaluate and treat individuals who have a disease or disorder, impairment, activity limitation, or participation restriction that interferes with the ability to function independently in daily life roles, and to promote health and wellness (American Occupational Therapy Association, 1999). Child abuse and maltreatment results in a variety of problems that have been reviewed in the literature in areas of play (Howard, 1986); development, cognitive competence, emotional development, and social development (Wright, 1994); and motor skills (Hughes & Di Brezzo, 1987). Several authors, including Howard (1986), Wright (1994), and Davidson (1995), have noted implications for occupational therapy intervention. Davidson (1995) suggested documentation of the child's physical appearance, affect, and social behavior, a comprehensive developmental assessment, and observations of the child's sensory integration.

Ayres (1979) defined 'sensory integration' as the organization of sensory stimuli (particularly body position, movement, and touch) in order to produce an adaptive response. Without the ability to properly organize sensory information, children lack the foundation to make adaptive responses to the environmental demands of daily tasks. Sensory integration is considered to be the foundation for appropriate occupational behavior, including self-care, self-management, play, and academic skills (Fisher, Murray, & Bundy, 1991). Sensory integration is one

component of sensory processing. 'Sensory processing' is an encompassing term that refers to the way in which the central nervous system and the peripheral nervous system manage incoming sensory information from the peripheral sensory systems. The reception, modulation, integration, and organization of sensory stimuli, as well as the behavioral responses to sensory stimuli, are the components of sensory processing (Miller & Lane, 2000). Disruptions of sensory processing can lead to a variety of problems developing skills necessary to complete activities of daily living. Wilbarger and Stackhouse (1998) reviewed information in the area of sensory processing and modulation that has been documented within the occupational therapy literature.

Occupational therapists have studied child development and functioning from the perspective of sensory integration using the *Sensory Profile* (Dunn, 1999), a standardized questionnaire, which assesses a child's responses to basic sensory systems and the behavioral outcomes of sensory processing.

THE SENSORY PROFILE CAREGIVER QUESTIONNAIRE

Dunn and colleagues collected data about children's performance and responses to sensory experiences during daily activities and developed a formal measure of children's ability to process sensory information, the *Sensory Profile* (1999). The *Sensory Profile* is a questionnaire on which caregivers report the frequency at which a child's behaviors occur. Dunn (1994, 1997; Dunn & Brown, 1997; Dunn & Westman, 1997) reported on studies with children without disabilities and assessed children's responses to commonly occurring sensory events.

Dunn (1997) proposed a conceptual model that describes sensory processing as an important factor in a child's development and ability to perform daily activities. Professionals and parents are recognizing that reduced sensory processing abilities affect social, cognitive, and sensorimotor development. When considering young children's basic needs, Dunn proposed a continuum of behavioral responses in which children respond to their environment in accordance with or to counteract their neurological thresholds. Neurological thresholds indicate the amount of stimulation needed for the nervous system to notice or react to stimuli. When children act in accordance with their threshold, children with high thresholds respond to very few stimuli and children with low thresholds respond to many stimuli. When children respond to counteract their threshold, children might either exert excessive energy seeking stimulation to meet high thresholds or exert energy to avoid triggering low thresholds.

Case-Smith (1997) related how the *Sensory Profile* contributes to the evaluation and intervention process. Asking a caregiver to complete the *Sensory Profile* as part of the evaluation process has several benefits, including demonstrating the importance of the caregiver's knowledge of the child, helping the caregiver to be an active participant in the child's program, facilitating communication between the therapist and caregiver, and increasing the caregiver's understanding of the child's behaviors within certain situations and how to adapt the environment to meet the child's needs. The fundamental behavior patterns identified by the *Sensory Profile* help to determine the most effective style for interacting with a child. The *Sensory Profile* determines a child's general reactivity to sensory input, his activity level, and his ability to cope with a variety of environments and social situations. By matching a child's sensory thresholds and needs, the therapist can foster engagement, effort, attention, and development. Additionally, Dunn, Brown, and McGuigan (1994) proposed the Ecology of Human Performance with five types of intervention (establish/restore, adapt, alter, prevent, and create) as one framework for developing types of interventions that include the person, the task, and the context.

The *Sensory Profile* has been useful for determining the presence of sensory processing disorders in children with disabilities, and discriminating among certain groups of children with disabilities. Kientz and Dunn (1997) demonstrated the *Sensory Profile* identified and differentiated the sensory processing skills of children with autism or pervasive developmental delay from those children without autism who were typically developing. Ermer and Dunn (1998) indicated that the *Sensory*

Profile discriminated children with disabilities from children without disabilities, and discriminated among children with autism or pervasive developmental disorder and children with attention deficit hyperactivity disorder.

CLINICAL STUDY

Statement of the Problem and Objective

A significant number of children suffer from traumatic stress reaction to maltreatment, which affects their ability to function in the family, school, and community. In order to help these children, appropriate evaluations and treatments need to be determined. Many of the aspects of reduced ability to regulate sensory processing (over-responsivity or lack of responsivity) which are assessed on the *Sensory Profile* are also aspects of a child's behavior when the child is experiencing reactions to traumatic life stressors of neglect and abuse. This research project had one objective: to determine if children who are experiencing traumatic stress reaction to childhood neglect or abuse have sensory processing disorders as reported by caregivers completing the *Sensory Profile*. The purpose of this study was to show relationship between traumatic stress reaction from abuse and neglect and sensory processing disorder.

It was hypothesized that since neurodevelopment has been disrupted in children who have been exposed to trauma or neglect (Perry, 1997), sensory processing abilities may also be disrupted. The statistical evidence from the completed questionnaires of the children with traumatic stress reaction will prove or disprove the null hypothesis:

Ho=Children who are experiencing traumatic stress reaction do not

have sensory processing disorders;

Ha=Children who are experiencing traumatic stress reaction have sensory processing disorders.

Statistical evidence in the form of percentages will then answer the question proposed for this study: What is the incidence of caregiver reported sensory processing disorders in children who are experiencing traumatic stress reaction?

Value of Study

This applied and clinical research study was significant to the field of occupational therapy, the children and their families, and to the community-at-large for several reasons. Violence and traumatic events of many different types have become a factor in American life, resulting in a significant number of children experiencing traumatic stress reaction to abuse and/or neglect. The review of the literature showed that high levels of stress can change the way a child's brain functions, which can impact the child's ability to function in his family, school, and community; and limit a child's activities of daily living, play, and leisure skills. If this study demonstrated a high incidence rate of sensory processing disorders in children with traumatic stress reaction, there may be a large number of children whose lives may be enhanced by identification and intervention of sensory processing disorders.

Since occupational therapists work to remediate performance abilities, adapt tasks, teach disability prevention, and promote health strategies, the field of occupational therapy has many skills to offer children and their families who have been

impacted by trauma and abuse. One important specialty area occupational therapy offers is diagnosis and treatment of sensory processing disorders, which may be one important factor affecting children experiencing traumatic stress reactions.

This study was timely regarding the need for the profession of occupational therapy to determine the incidence of sensory processing disorders in various populations, how sensory processing disorders affect various populations and individuals, and the usefulness of the recently published *Sensory Profile* evaluation tool; and to add to the base of knowledge concerning sensory processing and integration disorders.

Individual children who have been affected by high levels of stress and violence need appropriate evaluation and treatment to reach their highest levels of performance; the families of these children need to know how to structure the environment to help their children; and the community-at-large needs children who can successfully function at school, leisure, and play activities. Intervention programs based on a child's level of sensory processing, as determined by the *Sensory Profile*, may take advantage of the brain's malleability to help the child perform in daily life, which would benefit the child, his family, and the community.

Method

Sample

A sample of 25 caregivers of children who have a history of maltreatment, abuse, and/or neglect provided the data for this study. The children were diagnosed

and evaluated by the transdisciplinary team of Southwestern Michigan Children's Trauma Assessment Center (CTAC) at Western Michigan University in Kalamazoo, Michigan. Inclusion criteria for this study were caregivers of children between the ages of 3 to 10 years who are experiencing traumatic stress reaction to abuse or neglect and who did not have any concurrent diagnosis of physical disorders or syndromes. The research sample of 1,037 children without disabilities from the *Sensory Profile* normative data served as the comparison group. The data was taken between 9-29-00 and 2-16-01, and consisted of the first 25 caregivers to complete the *Sensory Profile*.

The sample of children with traumatic stress reaction who ranged in age from three years to ten years, are presented in Table 1, with 13 being male and 12 being female, as presented in Table 2.

Table 1

Sample by Age

Age (year.month)	Number	% of Sample
3.0-3.11	4	16%
4.0-4.11	2	8%
5.0-5.11	3	12%
6.0-6.11	3	12%
7.0-7.11	4	16%
8.0-8.11	6	24%
9.0-9.11	2	8%
10.0-10.11	1	4%
Total	25	100%

Table 2
Sample by Gender

Gender	Number	% of Sample
Male	13	52%
Female	12	48%
Total	25	100%

Procedure

The Human Subjects Institutional Review Board of Western Michigan University approved this research study. The children's caregivers answered the *Sensory Profile* questionnaire at CTAC or at their home. A member of the CTAC team was present to explain the questionnaire and answer any of the caregiver's questions. The caregivers signed a letter of consent to indicate their agreement to participate in the study. The original questionnaire was placed in the child's medical record at CTAC. The results were scored and interpreted according to the classification system of the *Sensory Profile*: typical performance, probable difference, and definite difference. The data was coded in order to ensure anonymity for each child and family.

Instrument

An evaluation tool, the *Sensory Profile* (Dunn, 1999), was used to provide uniformity of data collection and to determine a child's sensory processing abilities as reported by the child's primary caregivers. The *Sensory Profile*, a judgment-based caregiver questionnaire, provided a standard written method to measure a child's sensory processing abilities and to profile the effect of sensory processing on

functional performance in the daily life of a child. The *Sensory Profile* has 125 items assessing sensory processing, modulation, and behavioral and emotional responses. The caregivers reported the percentage of time their children engaged in each of the 125 behaviors listed on the profile using a 5-point Likert scale: 1 = always, when presented with the opportunity, the child responds in the manner described 100% of the time; 2 = frequently, when presented with the opportunity, your child frequently responds in this manner, about 75% of the time; 3 = occasionally, when presented with the opportunity, your child occasionally responds in this manner, about 50% of the time; 4 = seldom, when presented with the opportunity, your child seldom responds in this manner, about 25% of the time; and 5 = never, when presented with the opportunity, your child never responds in this manner, 0% of the time.

Validity Statement for Instrument

Validity refers to evidence that establishes that a test measures what it was designed to measure. The *Sensory Profile* includes content validity through literature review, expert review, and category analysis; and construct validity including both convergent and discriminant validity.

Reliability Statement for Instrument

Test reliability is an indication that a test provides a precise and stable score. The reliability of the *Sensory Profile* was estimated using internal consistency, which indicates the extent to which the items in each section measure a single construct.

Confidence intervals and standard error of measurement values have also been determined.

Scoring

The children's scores were divided into three groups according to the classification system of the *Sensory Profile* (typical performance, probable difference, and definite difference). Cut off scores were determined for each section and factor, according to the classification system listed in the *Sensory Profile User's Manual*, as follows: Typical performance consisted of scores at or above the point of one standard deviation below the mean for children without disabilities. This range indicated that the child represented the top 84% of the *Sensory Profile* research sample of children. Probable difference consisted of scores at or above the point of two standard deviations below the mean of children without disabilities, but lower than one standard deviation below the mean. This range indicated that the child performed between the 2nd and 16th percentile, representing 14% of the *Sensory Profile* research sample of children. Definite difference consisted of scores below the point of two standard deviations below the mean of children without disabilities. This range indicated that the child was performing like a child in the lowest 2% of the *Sensory Profile* research sample of children.

The item scores were summarized into two groups according to the scoring system of the *Sensory Profile* (factor and section scores). The nine factor scores were as follows: sensory seeking, emotionally reactive, low endurance/tone, oral sensory

sensitivity, inattention/distractibility, poor registration, sensory sensitivity, sedentary, and fine motor/perceptual. The fourteen section scores were as follows: auditory processing, visual processing, vestibular processing, touch processing, multisensory processing, oral sensory processing, sensory processing related to endurance/tone, modulation related to body position and movement, modulation of movement affecting activity level, modulation of sensory input affecting emotional responses, modulation of visual input affecting emotional responses and activity level, emotional/social responses, behavioral outcomes of sensory processing, items indicating thresholds for response.

Results

Five (20%) of the children's scores were within the typical performance range on all of the factor summary scores, and three of those five children also scored within the typical performance range on all of the section summary scores. The remaining twenty (80%) of the children had some scores that fell within the probable difference and/or definite difference range on both the factor and the section score summaries.

Table 3 lists the percentages of occurrence in the sample of twenty-five children for the factor scores and Table 4 lists the percentages for the section scores.

Table 5 lists the mean and standard deviation of the factor scores for the sample of twenty-five children, and Table 6 lists the mean and standard deviation of the section scores.

Table 3

Percentages (n=25) for Factor Scores

FACTOR SCORES (indicates the child's responsiveness to sensory input--either overly responsive or underresponsive)	Typical Performance (Scores at or above the point 1 SD below the mean)	Probable Difference (Scores at or above the point 2 SD below the mean, but lower than 1 SD below the mean)	Definite Difference (Scores below the point 2 SD below the mean)
1. Sensory Seeking	40%	24%	36%
2. Emotionally Reactive	32%	20%	48%
3. Low Endurance/Tone	56%	12%	32%
4. Oral Sensory Sensitivity	80%	20%	0%
5. Inattention/Distractibility	44%	8%	48%
6. Poor Registration	52%	20%	28%
7. Sensory Sensitivity	64%	16%	20%
8. Sedentary	92%	4%	4%
9. Fine Motor/Perceptual	52%	38%	10%

Table 4

Percentages (n=25) for Section Scores

SECTION SCORES	Typical Performance	Probable Difference	Definite Difference
Sensory Processing (indicates child's responses to the basic sensory systems)			
A. Auditory Processing	52%	8%	40%
B. Visual Processing	68%	20%	12%
C. Vestibular Processing	48%	8%	44%
D. Touch Processing	52%	24%	24%
E. Multisensory Processing	40%	16%	44%
F. Oral Sensory Processing	68%	16%	16%
Modulation (indicates the child's regulation of neural messages through facilitation or inhibition of various types of responses)			
G. Sensory Processing Related to Endurance/Tone	56%	12%	32%
H. Modulation Related to Body Position and Movement	40%	20%	40%
I. Modulation of Movement Affecting Activity Level	80%	16%	4%
J. Modulation of Sensory Input Affecting Emotional Responses	52%	16%	32%
K. Modulation of Visual Input Affecting Emotional Responses and Activity Level	36%	20%	44%
Behavior and Emotional Responses (indicates the child's behavioral outcomes of sensory processing)			
L. Emotional/Social Responses	36%	12%	52%
M. Behavioral Outcomes of Sensory Processing	20%	32%	48%
N. Items Indicating Thresholds for Response	44%	36%	20%

Table 5

Mean and Standard Deviation of Factor Scores

FACTOR SCORES	MEAN	STANDARD DEVIATION
1. Sensory Seeking	56.68	14.62
2. Emotionally Reactive	48.68	14.07
3. Low Endurance/Tone	38.0	7.76
4. Oral Sensory/Sensitivity	37.92	5.90
5. Inattention/Distractibility	21.96	7.20
6. Poor Registration	31.88	5.30
7. Sensory Sensitivity	16.52	3.61
8. Sedentary	16.32	2.98
9. Fine Motor/Perceptual	10.0	2.52

Table 6

Mean and Standard Deviation of Section Scores

SECTION SCORES	MEAN	STANDARD DEVIATION
A. Auditory Processing	28.04	7.77
B. Visual Processing	34.96	7.26
C. Vestibular Processing	44.28	7.87
D. Touch Processing	70.6	14.09
E. Multisensory Processing	23.96	6.16
F. Oral Sensory Processing	48.96	8.20
G. Sensory Processing Related to Endurance/ Tone	38.0	7.76
H. Modulation Related to Body Position and Movement	38.2	9.14
I. Modulation of Movement Affecting Activity Level	24.92	3.90
J. Modulation of Sensory Input Affecting Emotional Responses	14.4	3.55
K. Modulation of Visual Input Affecting Emotional Responses and Activity Level	12.28	3.23
L. Emotional/Social Responses	54.6	14.66
M. Behavioral Outcomes of Sensory Processing	17.84	4.45
N. Items Indicating Thresholds for Response	11.12	2.78

DISCUSSION

According to the *Sensory Profile User's Manual* (Dunn, 1999), the *Sensory Profile* is designed to facilitate comparisons of a child's performance with a sample of children without disabilities (n=1,037) using the cut off scores for typical performance, probable difference, and definite difference. In this study, 80% of the children experiencing traumatic stress reaction had some scores in the probable and/or definite difference range, indicating a need for further assessment. At least 50% of the children scored in the probable difference or definite difference in the factor scores of 1. Sensory Seeking, 2. Emotionally Reactive, and 5. Inattention/Distractibility; and the section scores of C. Vestibular Processing, E. Multisensory Processing, H. Modulation Related to Body Position and Movement, K. Modulation of Visual Input Affecting Emotional Responses and Activity Level, L. Emotional/Social Responses, M. Behavioral Outcomes of Sensory Processing, and N. Items Indicating Thresholds for Response.

Means and standard deviation ranges for the children experiencing traumatic stress reaction were reported, but not compared to the *Sensory Profile* research sample, since composite numeric data for the children without disabilities was not listed in the *Sensory Profile User's Manual*. However, since means and standard deviations for children with autism and children with attention deficit and hyperactivity disorder were given in the *Sensory Profile User's Manual*, as well as a visual graph with comparisons of means and 1 standard deviation ranges for children with and

without disabilities, interested readers may compare the scores of the children experiencing traumatic stress reaction. Comparison of scores goes beyond the objective of this paper.

Information from the *Sensory Profile*, which provided the caregiver's perspective on the child's performance at home, would need to be combined with other information from the child's history, formal evaluations, observations, and reports in order to make decisions and interpret the child's *Sensory Profile* in relationship to the child's performance in daily life in home, school, and the community. The *Sensory Profile* provided a pattern of the child's strengths and weakness in sensory processing, and it gave information concerning the child's tendencies to over- or under-respond to environmental stimuli and concerning which sensory systems might enhance or hinder functional performance.

It is recommended that the *Sensory Profile* be included in evaluation protocols for children who have backgrounds that include abuse and/or neglect. The advantages to using the *Sensory Profile* includes established reliability and validity data; and that the *Sensory Profile* has been used to discriminate among other groups of individuals who have sensory processing difficulties (Ermer & Dunn, 1998; Kientz & Dunn, 1997). Another advantage is that the *Sensory Profile* provides a format for organized reporting by the caregiver concerning the child's behavior at home, which may be very different than the child's behavior in a testing situation. Additionally, individuals from many different professions can administer the *Sensory Profile*; therefore, the *Sensory Profile* can be administered as soon as a child is referred for

evaluation by a pediatrician, social worker, psychologist, speech and language pathologist, or occupational therapist. The need for an interdisciplinary evaluation process has been discussed in the literature (Ludy-Dobson et al., 1999).

One significant drawback to this study was that there was no control group to determine the significance level of the findings; although, the research for the *Sensory Profile* included a sample of 1,037 children without disabilities between the ages of 3 and 10 years. Although the research sample for the *Sensory Profile* excluded children who were receiving special education services and were on regular prescription medication, some of the children in the research study for the *Sensory Profile* may have had undiagnosed traumatic stress reaction. Traumatic stress disorder may be either undiagnosed or misdiagnosed in any given population of children due to observable but often misunderstood affects of abuse and neglect on the physical and mental states of children. Additionally, five of the children in this research sample were reported to have typical sensory processing abilities; and these types of children may have been included in the sample of children in the research study for the *Sensory Profile*.

Another drawback involved the reliability of the caregiver's report. Even though a CTAC staff member was present to answer any questions or confusion over terminology on the questionnaire, it is possible that some of the caregivers may have over- or under-reported their child's behaviors on the questionnaire. For example, some of the caregivers may have had children with behaviors that the caregivers were not used to dealing with, so the behaviors may have been reported in the more

deficient range. It is possible that some of the caregivers may have had children whose behaviors improved since placement in foster care, so the behaviors may have been reported in the typical range due to improvement even though the behavior was not at the typical level.

Information from a child's reports and other evaluations needs to be compared and interpreted with the information from the *Sensory Profile* in order to determine the functional implications of a child's sensory processing abilities. Since the sample of 25 children was small and did not match the characteristics of the population sample used in the research group of the *Sensory Profile*, these findings indicate a general tendency, and may not represent all children who are experiencing traumatic stress reaction. Future research would need to involve a larger sample group that matches normative demographic data.

CONCLUSIONS

This study established that 80% of children experiencing traumatic stress reaction were reported to demonstrate some degree of difficulty in the area of sensory processing. There is a need for further studies involving comparison of scores from children experiencing traumatic stress reaction with a matched control group. Additionally, the specific types and patterns of sensory processing disorders exhibited by children experiencing traumatic stress reaction with sensory processing disorders needs to be determined. Preliminary data from this research study indicated definite differences in sensory processing in the following 10 areas of sensory processing: sensory seeking, emotionally reactive to stimuli, inattention/distractibility, vestibular processing, multisensory processing, modulation related to body position and movement, modulation of visual input affecting emotional responses and activity level, emotional/social responses, behavioral outcomes of sensory processing, and items indicating threshold for response. Finally, effective types of intervention, as well as duration and frequency of intervention strategies, needs to be established for specific population groups in order to provide children with appropriate and effective services.

It is recommended the *Sensory Profile* be added to the evaluation process for children who have experienced neglect and/or abuse to help determine a child's areas of strengths and weaknesses, as well areas that need intervention and adaptations for successful performance in daily life occupations.

Appendix A

Approval Letter From the Human Subjects Institutional Review Board

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-5162
616 387-8293

WESTERN MICHIGAN UNIVERSITY

Date: 20 September 2000

To: Ben Atchison, Principal Investigator
Ann Viviano, Student Investigator for thesis

From: Sylvia Culp, Chair *Sylvia Culp*

Re: HSIRB Project Number: 00-09-05

This letter will serve as confirmation that your research project entitled "The Incidence of Caregiver Reported Sensory Processing Disorders in Children Who are Experiencing Traumatic Stress Reaction" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 20 September 2001

BIBLIOGRAPHY

- American Occupational Therapy Association. (1999). *Definition of OT Practice for the AOTA Model Practice Act*. [online]. <http://www.aota.org>
- Ayres, A. J. (1979). *Sensory integration and the child*. Los Angeles: Western Psychological Services.
- Case-Smith, J. (1997). Clinical interpretation of "Factor analysis on the sensory profile from a national sample of children without disabilities." *American Journal of Occupational Therapy*, 51(7), 496-499.
- Davidson D. A. (1995). Physical abuse of preschoolers: identification and intervention through occupational therapy. *American Journal of Occupational Therapy*, 49(3), 235-243.
- Dunn, W. (1994). Performance of typical children on the sensory profile: An item analysis. *American Journal of Occupational Therapy*, 48(11), 967-974.
- Dunn, W. (1997). The impact of sensory processing abilities on the daily lives of young children and their families: A conceptual model. *Infants and Young Children*, 9(4), 23-35.
- Dunn, W. (1999). *Sensory Profile*. Therapy Skill Builders: San Antonio, TX.
- Dunn, W., & Brown, C. (1997). Factor analysis on the sensory profile from a national sample of children without disabilities. *American Journal of Occupational Therapy*, 51(7), 490-495.
- Dunn, W., & Westman, K. (1997). The Sensory Profile: The performance of a national sample of children without disabilities. *American Journal of Occupational Therapy*, 51(1), 25-34.
- Dunn, W., Brown, C., & McGuigan, A. (1994). The ecology of human performance: A framework for considering the effect of context. *American Journal of Occupational Therapy*, 48(7), 595-607.
- Ermer, J., & Dunn, W. (1998). The Sensory Profile: A discriminant analysis of children with and without disabilities. *American Journal of Occupational Therapy*, 52(4), 283-290.

- Fisher, A. G., Murray, E. A., & Bundy, A. C. (1991). *Sensory integration: Theory and practice*. Philadelphia: F. A. Davis.
- Howard, A. C. (1986). Developmental play ages of physically abused and nonabused children. *American Journal of Occupational Therapy*, 40(10), 691-695.
- Hughes, H. M., & Di Brezzo, R. (1987). Physical and emotional abuse and motor development: A preliminary investigation. *Perceptual and Motor Skills*, 64, 469-470.
- Karr-Morse, R., & Wiley, M. S. (1997). *Ghosts from the nursery*. New York: Atlantic Monthly Press.
- Kientz, M. A., & Dunn, W. (1997). A comparison of the performance of children with and without autism on the Sensory Profile. *American Journal of Occupational Therapy*, 51(7), 530-537.
- Ludy-Dobson, C., Guttentag, C., Schick, S., Conrad, D., Carrabine, C., & Perry, B. (1999, December). Interdisciplinary Assessment: An effective model for understanding maltreated children. *ChildTrauma Academy Interdisciplinary Education Series*.
- Miller, L. J., & Lane, S. J. (2000). Toward a consensus in terminology in sensory integration theory and practice. Part 1: Taxonomy of Neurophysiological Processes. *Sensory Integration Special Interest Section Newsletter*, 23(1), 1-4.
- National Center for Post Traumatic Stress Disorder. (2000). *What is post-traumatic stress disorder?* [online]. <http://www.ncptsd.org>
- Perry, B. D. (1994). Neurobiological sequelae of childhood trauma: Post-traumatic stress disorders in children. In M. Murburg (Ed.), *Catecholamine function in post traumatic stress disorder: Emerging concepts* (pp. 253-276). Washington DC: American Psychiatric Press.
- Perry, B. D. (1997). Incubated in terror: Neurodevelopmental factors in the 'Cycle of Violence.' In J. Osofsky (Ed.), *Children, youth and violence: The search for solutions* (pp. 124-148). New York: Guilford Press.
- Perry, B. D. (1999a). Memories of fear: How the brain stores and retrieves physiologic states, feelings, behaviors and thoughts from traumatic events. In J. Goodwin & R. Attias (Eds.), *Splintered reflections: Images of the body in trauma* (pp. 26-46). New York: Basic Books.

- Perry, B. D. (1999b). *Violence and childhood: How persisting fear can alter the developing child's brain*. [online]. <http://www.trauma-pages.com/articles.htm>. Citation: edited (web) version of "The Neurodevelopmental Impact of Violence in Childhood," but the citation is not given at the author's ChildTrauma Academy website.
- Perry, B. D. (1999c). Effects of traumatic events on children: An introduction. *ChildTrauma Academy Interdisciplinary Education Series*, 2(3).
- Perry, B. D. (1999d). Stress, trauma and post-traumatic stress disorders in children: An introduction. *ChildTrauma Academy Interdisciplinary Education Series*, 2(5).
- Perry, B. D., & Azad, I. (1999). Post-traumatic stress disorders in children and adolescents. In D. Mrazek (Section Ed.), *Current opinions in pediatrics*, 11(4), 121-132.
- Perry, B. D., & Pollard, R. (1997). Altered brain development following global neglect in early childhood. *Society for neuroscience: Proceedings from Annual Meeting*, New Orleans.
- Perry, B. D., Pollard, R. A., Blakely, T. L., Baker, W. L., & Vigilante, D. (1995). Childhood trauma, the neurobiology of adaptation and use-dependent development of the brain: How states become traits. *Infant Mental Health Journal*, 16(4), 271-291.
- Schwarz, E., & Perry, B. D. (1994). The post-traumatic response in children and adolescents. *Psychiatric Clinics of North America*, 17(2), 311-326.
- U.S. Department of Health and Human Services. (2000). *Child maltreatment 1998: Reports from the states to the National Child Abuse and Neglect Data System*. Washington, DC: U.S. Government Printing Office.
- Wilbarger, J., & Stackhouse, T. M. (1998). *Sensory modulation: A review of occupational therapy literature*. [online]. <http://www.sinetwork.org>
- Wright, S. (1994). Physical and emotional abuse and neglect of preschool children: A literature review. *Australian Occupational Therapy Journal*, 41, 55-63.