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A Sensory Integrative Approach in the Classroom of a Child with Autism:

A Single Case Study

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Submitted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy of the Graduate School of The University of Scranton

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Dedication

This research study has been dedicated to the first graduating class of 2002, with a Master of Science in Occupational Therapy from the University of Scranton. Through our efforts here at the university, we not only completed our undergraduate and graduate degrees together, but created a family and a sense of unity within the department. Five years ago we entered this university as freshman occupational therapy students. Today, we graduate as friends and co-workers. The special bond developed over these past few years will never be forgotten. Thank you for the best five years of my life.

Chapter 1: Introduction

Statement of the Problem

In the past few years, there has been much discussion over the treatment of children with autism. The DSM-IV (1996) describes autism as a pervasive developmental disorder (PDD) that severely impairs a child's development in several areas, such as the development of peer relationships and reciprocal social interactions, communication and the tendency to use stereotyped language, and stereotypical patterns of behavior that are inflexible and nonfunctional. These self-stimulating, repetitive behaviors may include body-rocking, preoccupation with parts of objects, unusual hand movements, like hitting/slapping, flapping or flicking, and restrictive patterns of interest (Linderman & Stewart, 1999). Studies suggest that children with autism are often overaroused and use their self-stimulating behaviors to reduce their level of arousal and to modulate or block incoming sensory information (Duken & Raising, 1989). Children with autism have difficulty modulating this incoming sensory information and therefore cannot process the stimuli to respond in an appropriate manner (Case-Smith, 1999). These self-stimulating behaviors are usually noisy and disruptive to those working in the same classroom environment as the child.

Studies suggest that therapy involving controlled sensory input increases the sensory processing and development of a child with autism (Linderman & Stewart, 1999). One study stated that "sensory integrative-based occupational therapy before structured behavioral therapy to a 5-year old child with autism appeared to decrease the incidence of self-stimulating behaviors" (Linderman & Stewart, 1999, p. 208). If these studies are valid, then it may be possible for occupational therapists to create a "sensory

diet," or a battery of activities aimed at enhancing sensory integration, for a child with autism in the classroom setting.

> The sensory diet concept is based on the idea that each individual requires a certain amount of activity and sensation to be the most alert, adaptable and skillful. The important thing about a sensory diet is to help the child feel calm, alert, and organized most of the time by using embedded activities scheduled throughout the day (Wilbarger & Wilbarger, 1991, p. 6).

Use of a "sensory diet," may possibly decrease the problem behaviors of the child with autism in the classroom significantly. The creation of a "sensory diet" for a child with autism or with sensory integration dysfunction is a common treatment approach. However, evidenced-based research on sensory integration and "sensory diets" for children with autism is limited. Therefore, the purpose of this study was to document the effects of a "sensory diet" (an individualized sensory program incorporated within the daily routine activities of the classroom) on promoting functional, adaptive behaviors within the classroom setting of a school-aged child with autism. The results of this single-case study documented empirical evidence in this area of occupational therapy practice.

Purpose of the Study

The purpose of this study was to document the effects of a "sensory diet" (an individualized sensory program incorporated within the daily routine activities of the classroom) on promoting functional, adaptive behaviors within the classroom setting of a school-aged child with autism.

Assumptions

- Autistic disorder presents challenges, such as problem behaviors, for the child, family and teacher.
- In order to profit from their education experience, it is beneficial for the child to decrease problem behaviors in the classroom setting.
- Teachers and teacher's assistants will be supportive of therapist's ideas and classroom intervention strategies, and will implement the prescribed "sensory diet" in the classroom.
- The implementation of a "sensory diet" will help to decrease problem behaviors associated with autism in the classroom by incorporating sensory activities into the daily routines of the school day.

Overview of Methods

The following document provides a definition and an explanation of autism, the definition and an explanation of sensory integration and sensory integration dysfunction in children with autism, current occupational therapy interventions for autism, including school-based occupational therapy and sensory integration in the classroom and sensory integration treatment and interventions for children diagnosed with autism. This research project was a quantitative, single-case study of a school-aged child diagnosed with autism. The Temperament and Atypical Behavior Scale was used as a pre and post-test of the study. Clinical notes and problem behavior checklists were also used to document the frequency of problem behaviors of the child in fifteen-minute intervals. The duration of the implemented "sensory diet" in the classroom consisted of a one-month or (10 observation) period.

Significance

The purpose of this study was to determine whether a "sensory diet" in the classroom decreased the frequency of problem behaviors, such as hyperactivity, fixations, and poor communication skills, in a child with autism. Unfortunately, limited research on sensory integration therapy in the classroom exists. Presently, SI lacks universal definitions, adequate assessments and consistent intervention strategies (Mauer, 1999). However, studies suggest that SI has helped children to develop positive changes in cognitive, language, and academic performance, along with increasing sensory modulation, perception, postural control and praxis in children with learning disabilities (Mauer, 1999). Therefore, evidence-based research is necessary to determine the positive effects of sensory integration intervention with children with autism in the classroom. Effective "sensory diets" may be developed to benefit the academic and social performance of a child diagnosed with autistic disorder.

Chapter 2: Literature Review

Autism

Autism is the most common pervasive developmental disorder (PDD) (Kaplan, 1996). According to the DSM-IV, autism is characterized by impairments in social interactions, communication, and behavioral patterns (Kaplan & Saddok, 1996). The diagnostic criteria for autism include: marked impairment in social interactions in the use of nonverbal behaviors, failure to develop peer relationships, lack of sharing enjoyment, interests or achievements with others, and a lack of social/emotional reciprocity. Impairment in communication resides in a lack of spoken language, inability to initiate or sustain conversation with others, stereotyped and repetitive use of language, and lack of developmentally appropriate play. Finally, repetitive and stereotyped patterns of behavior, interests and activities also exist, such as preoccupation with abnormal interest or focus, inflexibility of nonfunctional routines or rituals, stereotyped motor mannerisms (hand flapping/twisting or complex whole body movements) and persistent preoccupation with parts of objects (Kaplan & Saddok, 1996).

Sensory Integration Dysfunction in Children with Autism

It is believed that children with autism experience symptoms from an inadequate sensory integration system and display functional difficulties in arousal modulation, sensory modulation, sensory processing, sensory integration, sensory-affective processing, motor planning and sequencing (Huebner, 2001). It has been noted that many children with autism display inappropriate responses to stimuli, have difficulty organizing information from the senses, show inability to integrate information from senses, reveal limited ability to respond to sensory stimuli in a meaningful manner and

have difficulty using sensory information to execute appropriate responses (Yack, Sutton & Aquilla, 1998). Sensory defensiveness is "a tendency to react negatively or with alarm to sensory input that is generally considered harmless or non-irritating" (Wilbarger & Wilbarger, 1991, 3). Observable signs of sensory integration dysfunction in children with autism include: hyper-sensitivity, avoidance of sensory input, seeking sensory input, abnormal body position, poor coordination, motor control and performance, distractibility, limited attending skills, and either over or under arousal (Yack et al., 1998).

Disturbances in sensory integration and modulation lead to problems in social relations, communication, language, cognition and perception (Case-Smith, 1999). There is empirical evidence that sensory dysfunction also leads to the use of stereotypical behaviors in children with autism. Children with autism who are sensory defensive may perceive the world as dangerous, harmful and even painful. They may develop patterns or stereotypical behaviors to help cope with the irritating world around them (Wilbarger & Wilbarger, 1991). These self-stimulating, repetitive behaviors may include body-rocking, preoccupation with parts of objects, unusual hand movements, like hitting/slapping, flapping or flicking, and restricted patterns of interest (Linderman & Stewart, 1999). Previous research suggests that children with autism are often overaroused and use their self-stimulating behaviors to reduce their level of arousal and to modulate or block incoming sensory information (Duken & Raising, 1989). Children with autism are unable to modulate this incoming sensory information and therefore cannot process the stimuli to respond in an appropriate manner (Case-Smith, 1999).

According to Patricia Wilbarger (1991), three levels of sensory defensiveness exist. In Level I, mild defensiveness, children appear normal, but may be fussy, resistant to change, slightly controlling, overactive, and oversensitive. Level II, moderate defensiveness, affects two or more areas of a child's life. For example, a child may appear overly aggressive in a social environment, such as school, or may have difficulty with simple self-care skills at home, such as bathing, eating and dressing. Level III, severe defensiveness, states that all aspects of a child's life are affected at this stage. At this point, a child is usually diagnosed and their sensory defensiveness may greatly inhibit or interfere with development (Wilbarger & Wilbarger, 1991).

Current Occupational Therapy Interventions for Autism

Numerous occupational therapy approaches exist in treating children with autism. Examples of different OT interventions include: individualized programs with one-on-one training, inclusive educational programs, child-centered play, auditory integration training, play-based interventions and finally, sensory integration intervention (Case-Smith, 1999). Sensory integration is one of the most prominent interventions used by therapists when working with children diagnosed with autism.

Sensory integration. Sensory integration describes the body's ability to receive incoming stimuli, organize input, and process sensory information transmitted from the body and the environment into purposeful, goal-directed movements and activities (Mauer, 1999). One aspect of sensory integration is self-regulation, or "the nervous system's ability to attain, maintain and change levels of arousal or alertness" (Yack et al., 1998, p. 18). The ability to modulate sensory input from the environment allows the nervous system to maintain appropriate levels of arousal . Sensory integration and normal

states of arousal are important for the development of attention, impulse control, frustration tolerance, balance of emotions, learning, communication and social skills.

There is empirical evidence that sensory integration takes place in three different body systems, the vestibular system, the tactile system and the proprioceptive system. Therefore, the goal of SI therapy is to organize the information in the three body systems to enable higher learning and functioning (Yack et al., 1998). The vestibular system is the body's sense of movement and gravity. Only through vestibular processing is the body able to determine up, down, left and right and whether the body is in motion (Trott, Laurel & Windeck 1993). The tactile system is the body's sense of touch. It is through this system, that the body receives information from the internal or external environment. Processing in this system is extremely important because it helps the body to feel safe in the surrounding world, in turn allowing further development to occur (Trott et al., 1993). The proprioceptive system provides information to the body from the muscles, joints and tendons. This information provides insight to where the body is and where each body part is in space at any given moment in time (Trott et al., 1993).

According to an article written by Victoria Nackley (2001), children with impaired vestibular, proprioceptive and tactile systems display difficulties in their ability to learn, move and function in daily life routines. Children with impairments in their vestibular and proprioceptive systems may appear clumsy, display poor balance and body posture, are constantly moving and have poor attention skills. Impairments in these systems are usually accompanied by gravitational insecurity, postural insecurity, decreased bilateral motor coordination and projected action sequences. Children with impairments in their tactile system may present somatodyspraxia, decreased tactile

discrimination, tactile defensiveness, oral defensiveness, visual defensiveness and auditory defensiveness (Wilbarger & Wilbarger, 1991). Symptoms of tactile impairments are poor body scheme, poor hand manipulation and skill, a constant craving for tactile input from others and the environment or avoidance of tactile input and touch. These children may act aggressively and are often distracted (Nackley, 2001).

Sensory Integration Treatment and Interventions. Many children with learning disabilities, such as attention deficit disorder, pervasive developmental disorders, mental retardation, neurological impairments and social/behavioral problems, display sensory integration dysfunction. However, sensory integration does not explain the neuromotor deficits in people with cerebral palsy, down syndrome or stroke (Mauer, 1999). Inconsistency in definitions, assessments, interventions and effectiveness leaves the topic of sensory integration a controversial issue. However, previous studies indicated significant changes in cognitive, language and academic performance, along with increasing sensory modulation, perception, postural control and praxis in children with learning disabilities, including autism who received SI (Mauer, 1999). Although SI improved learning, behaviors and sensory processing in children of previous studies, more research is necessary to provide evidence of the benefits of using sensory integration intervention in therapy settings.

The most important feature of treating children with autism through sensory integration is adaptation to the environment. An efficient SI environment includes room for running, jumping and various equipment along with a variety of play objects, a quiet area to reduce over-stimulation, and the proper control over visual and auditory stimuli (Huebner, 2001). Treatment for sensory processing dysfunction can be applied to all

sensory systems. Vestibular-proprioceptive interventions contribute to motor performance and postural control and may include activities involving balls, barrels swings, scooters and wheelbarrows (Huebner, 2001). Tactile interventions are designed to improve both tactile defensiveness and diminished tactile discrimination. Without intervention, inappropriate reactions to tactile stimuli greatly interfere with everyday life and daily routines. Tactile intervention strategies may include activities involving powder, fabrics, dry beans, grooming objects, brushes and shaving cream (Huebner, 2001). Vision is an important system to address because it is the primary sense used to gain information from the environment. Visual interventions focus on adaptation of the environment and developing postural-ocular control and include activities like watching a fire, monitoring lighting and playing with a flashlight (Huebner, 2001). Due to the fact that communication difficulties are prevalent in autism, auditory intervention is important to promote speech and language. Auditory interventions may include listening to music containing rhythmic beats and avoiding/seeking noisy environments (Huebner, 2001). Finally, low muscle tone and the presence of primitive reflexes need to be addressed for the child to be able to move effectively in the environment. Interventions for low muscle tone and primitive reflexes may include kick ball, hopping, climbing, rocking, scooters, catch, and swings (Huebner, 2001).

School-Based Occupational Therapy and the Sensorimotor Approach in the Classroom. The school system is the most common community setting for children diagnosed with autism to receive occupational therapy services, such as sensory integration. Both public and private schools are hiring occupational therapists and incorporating theses specialized services into the interdisciplinary team. School

resources, such as occupational therapy, are in high demand, especially for families that cannot afford outside therapy services.

School-based services are composed of an educational team, including occupational, physical, and speech therapists, social workers, nurses, teachers and teaching assistants, all who collaborate and work together to benefit each student. Sensory integration is one of the most common frames of reference used by occupational therapists in the educational setting. An occupational therapy evaluation of a student in the classroom setting includes evaluation of the performance areas, performance components and performance contexts of the student (AOTA, 1997). Performance areas include activities of daily living, such as grooming, dressing, and toileting, work/school and leisure. Performance components include the neuromuscular, sensorimotor, visual/perceptual, cognitive and psychosocial aspects of human life and individual activities. Finally, performance contexts include the social, spiritual and cultural environments in which an individual functions. Numerous assessments can be used to assess these three areas of performance, including interviews, observations, screening tools and standardized tests (AOTA, 1997).

In the educational setting, the occupational therapist should use therapeutic activities that address the educational needs of the student. This may include both direct services with the student and environmental adaptations to facilitate classroom daily routines. According to the American Occupational Therapy Association (1997), these services may include: making environmental modifications in the classroom, modifying instruction and curriculum, providing the educational team with alternative strategies,

training educational team members, and utilizing special equipment and/or settings for therapy activities (AOTA, 1997).

Assessment of a child in the classroom falls into two categories. First is the awareness of the child's behaviors related to autism and their sensory processing impairments. Problem behaviors are usually embedded within the daily routines of the child, therefore, a careful sensory history is imperative (Wilbarger & Wilbarger, 1991). The interaction between the teacher and student, and the various learning opportunities provided should also be evaluated to promote learning (Huebner, 2001). Second, is through the implementation of a "sensory diet." "The sensory diet concept is based on the idea that each individual requires a certain amount of activity and sensation to be the most alert, adaptable and skillful. The important thing about a sensory diet is to help the child feel calm, alert, and organized most of the time by using embedded activities scheduled throughout the day" (Wilbarger & Wilbarger, 1991, p. 6). The creation of a "sensory diet" for a child with autism or with sensory integration dysfunction is a common treatment approach. A "sensory diet" would benefit a student with autism by monitoring alertness, focusing attention to increase learning, promoting development in problem solving skills, language, and organization and decreasing the frequency of problem behaviors associated with autism. In other words, an individualized "sensory diet" and environmental modifications in the classroom designed by the occupational therapist help to provide children with autism more opportunities for success throughout the school day (Nackley, 2001).

Clark and Ward's (1999) article, "Charting Results," provides an excellent example of a "sensory diet" established for a child with sensory integration dysfunction,

similar to that seen in autism. In this study, the classroom environment included therapy balls instead of chairs, quiet workstations along the wall, and the more active students seated around the parameter of the room. Classroom activities and routines included finger foods during work periods, the use of colored paper, activities that prompted movement, deep pressure given as needed and "fidget toys for listening times" (Clark & Ward, 1999, p. 74). Breaks were also built into the daily schedule, such as taking a message to the office or sharpening pencils. Home recommendations suggested firm bear hugs and roughhousing activities (Clark & Ward, 1999).

Victoria Nackley (2001) also provides a detailed "sensory diet" outline for the classroom in her article, "Sensory diet applications and environmental modifications: A winning combination." Nackley (2001) divided the "sensory diet" examples into groups according to the type sensory processing dysfunction. The "sensory diet" categories in this article include: decreased discrimination of vestibular and proprioceptive information, decreased discrimination of tactile information, somatodyspraxia, impaired bilateral motor coordination, tactile defensiveness, gravitational insecurity and projected action sequences. Following the title for each category, the author listed several examples of activities used to address the specific sensory processing impairment. For example, for decreased discrimination of vestibular and proprioceptive information, the author suggested active resistance during seatwork, such as chair push-ups or body squeezes, a solid chair with armrests at desk, and donkey kicks or heavy marching at school break times (Nackley, 2001). For decreased discrimination of tactile information, Nackley (2001) suggests writing tool alternatives, such as pencil grippers and felt-tip pens, allowing more time for note taking in class, participating in discriminatory play activities,

such as "feely boxes" and finding different objects in a sandbox during break time, and using weighted utensils at meal time. For impaired bilateral motor coordination, the author suggest alternating chair push-ups during seatwork, a Dycem to stabilize papers, reminder strategies for using the dominant hand, alternating donkey kicks at break time and simplified recess activities and games (Nackley, 2001).

Research Question

Does a prescribed "sensory diet" decrease the frequency of occurrence of problem behaviors in the child with autism observed at the initiation of treatment to the time of termination?

Chapter 3: Methodology

This research project was a single-case study of a school-aged child with autism. The purpose of this single-case study was to determine whether an individualized "sensory diet" implemented in the classroom decreased the frequency of problem behaviors associated with autism and improved attention span and communication skills. This chapter provides an overview of the general design of the study, a participant profile, a data record and description of the materials used, an in-depth look at the data collection procedure and finally, analysis of the data collected for the single-case report.

General Design of the Study

As stated previously, this research project was a single-case study. A single case report can be either a quantitative or qualitative research study that examines an individual over a period of time, ranging anywhere from weeks to years (Bailey, 1997). Data collected from a single-case report is documented through one researcher in a natural setting. Single-case reports are referred to as exploratory studies because they generate a hypothesis for further research and experimentation (Bailey, 1997). Due to the fact that single-case reports only research a single individual, it is difficult to generalize the results to different populations. Therefore, the goal of a single-case study is to develop and generalize theories (Bailey, 1997). According to Bailey (1997), single-case reports are "practiced-based and practitioner-oriented (p. 67)." These studies also identify the course of an individual's change throughout the process and length of a research study. In other words, researchers of single-case study have the opportunity to monitor and continuously assess an individual throughout the study and provide necessary changes to the intervention process. Quantitative single-case studies require baseline

observations and data collection on the individuals' condition and functional capacity before the imitation of the study. The baseline data is then compared to the data collected during the implementation of the treatment (Bailey, 1997).

This single-case report was conducted by one researcher in the classroom of a child with autism. The duration of this project included a one-month intervention period with the student. The goal of this study was to examine the effects of an individualized "sensory diet" in the classroom setting. The researcher hypothesized that a "sensory diet" will decrease problem behaviors associated with autism and improve attention and communication skills. The researcher had the opportunity to observe and document any changes or improvements of the child in the classroom. Due to the fact that single-case studies are difficult to generalize, this study was expanding on the sensory integration model of practice.

Participant

The following information was the criteria for participation in this study. Due to the fact that this project is a single-case study, only one school-aged student diagnosed with autism was required. The student had to display problem behaviors associated with autism, such as hyperactivity, fixations, decreased attention span and poor communication skills. The participant also had to present sensory integration dysfunction. The student was nominated for participation in this study by the school-based occupational therapist and cooperating school district. The student's parents completed a consent form, permitting participation of their child in this research study.

The student participating in this research study was an 11-year-old child diagnosed with autism. The student was non-verbal and presented many problem

behaviors associated with autism. These behaviors interrupted the student's classroom routines during seatwork, recreation and in social settings. The student presented observable impairments in tactile, proprioceptive, vestibular, visual and auditory processing. Problem behaviors associated with touch included: Dislikes holding writing utensils in the hand; tends to use the mouth, not the hands to learn about toys; excessive touching of objects; and people and can react aggressively to touch by others. Proprioceptive problem behaviors included: Difficulty staying in one place; likes to take frequent movement breaks; stabilizes self against furniture; weak grasp; frequently drops books, pencils, etc.; uses a chewing strategy to maintain attention and focus; and uses self-stimulatory behavior to maintain attention or relieve stress. Vestibular problem behaviors included: Needs to take frequent movement breaks; poor sitting balance in chair; and creates movement through rocking or constant shifting. Visual problem behaviors included: Poor eye contact and looking intently at objects. Finally, the student's auditory problem behaviors included: Covers ears frequently; may speak/scream out in a loud voice to screen out incoming noise; constantly makes sound to block out other sounds; seems not to be a part of social play; appears to not hear, even if own name is called; and constantly hums to drown out environmental noise.

This classroom was strictly a classroom designed for students with autism. The room was organized into separate areas for specific functions, such as playtime, deskwork, group work, snack time and computer time. The play area consisted of toys, balls, and games in a corner of the room. Individual desks were spread throughout the room for seatwork and a large table was in the middle of the room for group work. There was also a middle-sized table set up for snack time. The computer was surrounded by

dividers, making this area into a cubby space. Visual cues provided information about what happens at each classroom station. Each student had a nametag hung on the classroom wall. Under their nametag was their daily schedule. The front of the room also contained a picture of each student, with their address and phone number and a picture of their house. The children had to match all of their information during the morning routine.

The teacher already set up many environmental modifications that would have been included in a "sensory diet." This classroom already had a predictable flow of the day. The teacher allowed plenty of time for transitions, organized the resources of the classroom and clarified duties of the students. Schedules designed for each individual child were posted throughout the classroom. The teacher also incorporated sensory activities throughout the day. Gross motor activities, such as morning exercises, were completed before mentally challenging tasks to help increase attention span.

Materials

Three materials were used throughout this study to assess the student's sensory processing needs and to develop an appropriate, individualized "sensory diet." The following information explains each of the materials used for this project in greater detail.

- *Temperament and Atypical Behavior Scale* (Neisworth, Bagnato, Salvia & Hunt, 1999) (See Appendix A for an example TABS Screener and Assessment on pages 54-62).

The Temperament and Atypical Behavior Scale was administered by the researcher to evaluate the student's sensory processing impairments. According to the authors of the TABS, temperament "refers to one's characteristic emotional style or

disposition" (Neisworth et al., 1999, p. 1). This assessment was designed to identify problematic, dysfunctional behaviors that may impede the long-term development of the child. The TABS identifies children developing atypically and who are at risk. The Temperament and Atypical Behavior Scale also evaluates children diagnosed with neurodevelopmental and regulatory disorders, such as autism (Neisworth et al., 1999).

The Temperament and Atypical Behavior Scale consists of a 55-item evaluation, including areas such as "temperament, attention, attachment, social behavior, play, vocal and oral behavior, senses and movement, self-stimulation and self-injury and neurobehavioral state" (Neisworth et al., p. 2). The TABS also addresses four psychometric areas, described as detached, hyper-sensitive/active, underreactive and dysregulated. A detached style consists of withdrawn, self-absorbed and disconnected behaviors from everyday routines and people. A hyper-sensitive/active style consists of overactive, sensitive, aggressive and impulsive behaviors occurring in a variety of situations and environments. An underreactive behavior style is when a child is unresponsive, inalert, passive and lethargic. Finally, a dysregulated style is when a child displays difficulty controlling or monitoring sleep patterns, crying, coping skills and oral-motor control.

The TABS Screener and Assessment tool may be completed by the student's parent or professional, such as a classroom teacher, who understands and is aware of the child's problem behaviors. The assessment consists of "yes" and "no" questions—answering "yes" to the questions where the behavior is a current problem. A high raw score, or a majority of "yes" statements, indicates poor child performance (Neisworth, 1999). When the total raw scores of this assessment exceed or are equal to 5, the child is

at risk for developing a disability. When the total raw scores of this assessment exceed or are equal to 10, the child is identified as having a disability.

The Temperament and Atypical Behavior Scale was developed out of the Baby Atypical Behavior Inventory (BABI) and the Atypical Infant and Toddler Behavior Questionnaire (AITBQ). The atypical behaviors evaluated through the TABS are unrelated to socioeconomic class, geographic factors, sex and ethnic or cultural backgrounds (Neisworth, 1999). Instead, the behaviors assessed through the Temperament and Atypical Behavior Scale are symptomatic to their related syndromes or disabilities. The TABS assessment is a reliable, valid and norm-referenced scale designed to measure the dysfunctional behavior of infants and children. In terms of this assessment, reliability refers to "consistency of measurement using different, but equivalent, samples of test items" (Neisworth, 1999, p. 51). Table 1 on page 21 displays the reliability of the Temperament and Atypical Behavior Scale of both children with disabilities and children considered not at risk.

Table 1

The Reliability of Children with Disabilities and Children Considered not at Risk

Category of the TABS Assessment	Reliability
Detached	.84
Hyper-sensitive/active	.81
Underreactive	.76
Dysregulated	.64
TRI	.91

According to the TABS Assessment, validity is the "appropriateness, meaningfulness, and usefulness of the specific inferences on draws from a child's test performance" (Neisworth, 1999, p. 57). Content validity and construct validity were the two types of inferences used to test the validity of the Temperament and Atypical Behavior Scale. Unfortunately, it is often difficult to determine the validity of an instrument. Therefore, the validity of an instrument, such as the TABS Assessment, is accepted when not shown to be invalid (Neisworth, 1999).

- *Problem Behavior Checklists and Clinical Notes* (See Appendix B for an example problem behavior checklist on pages 63-64 and Appendix C for an example of a clinical note on pages 65-69)

In identifying the frequency of the child's problem behaviors associated with autism, the researcher will complete extensive clinical notes. In this project, clinical notes

are not "traditional field notes." Clinical notes are the researcher's observations of the child's specific problem behaviors associated with autism displayed in the classroom setting. The researcher will document the different behaviors observed in the classroom in fifteen-minute intervals. During data analysis, the researcher will use the clinical notes to tally up the problem behaviors observed throughout the length of this project. The problem behavior checklists will be used in conjunction with the clinical notes. Both sources were designed to systematically compare the frequency of problem behaviors associated with autism before and after the implementation of the "sensory diet".

Data Collection/Procedure

Before the initiation of this research study, this project was approved by the Internal Review Board at the University of Scranton in 2001. See Appendix E for the IRB Approval Letter on pages 73-74. The student's caregiver also signed a consent form, distributed by the researcher, allowing the student to participate in this study. See Appendix F for the caregiver consent for on pages 75-79. An initial observation took place before administration of TABS and problem behavior checklist documentation. By this point, the researcher met the student, regular classroom teacher, the teacher assistant and school occupational therapist. The researcher also had the opportunity to initially observe the child in the classroom setting. Documentation of the problem behaviors associated with autism was documented through problem behavior checklists and clinical notes. Problem behaviors found on the checklist were documented every fifteen-minutes in the clinical notes, along with other observable behaviors. Observations for clinical notes and problem behavior checklists were completed at different times of the day throughout the duration of this project to monitor problem behaviors during the entire

school day. Using the checklists and clinical notes, the frequency of problem behaviors was compared from the initiation of the "sensory diet" to the termination of the project. Insight into the child's performance in class on days the researcher was not present was obtained through the child's classroom teacher and aid.

Evaluation of sensory dysfunction was done by using the TABS Assessment before and after the administration of "sensory diet". While under supervision of the school-based occupational therapist, the researcher primarily administered the TABS. Information to complete the TABS was gained from the regular classroom teacher. The researcher and school-based occupational therapist decided that for the purpose of this project, it was important that the evaluation be completed by an individual working directly with the student in the classroom setting. The use of the Temperament and Atypical Behavior Scale for the participant in this study was attempted. Secondary to the student's severe autistic disorder, the assessment did not adequately evaluate the participant. Therefore the use of the Temperament and Atypical Behavior Scale for children with severe autism should be discontinued in the future.

After evaluation, a "sensory diet" was designed for the individual student in the classroom setting. The "diet" was designed and administered through the collaboration of the student's school-based occupational therapist, the regular classroom teacher and the researcher. After consultation with the teacher and the school-based occupational therapist, the student received a one-month intervention period where the "sensory diet" was integrated into the daily routines of the classroom. After the "sensory diet" was designed for the student, the classroom teacher continued to implement the sensory activities on a daily basis. The "diet" designed for the student does not need to be

discontinued after termination of the study because the teacher can provide carryover throughout the remaining academic year. If a parent is interested in implementing a "sensory diet" at home, the researcher, occupational therapist and classroom teacher can collaboratively design a "sensory diet" appropriate for home and/or with the student. See Appendix D on pages 70-72 for the "sensory diet" activities used in this research study.

The data record for this study was drawn from the quantitative sources stated previously. Table 2 describes the data record of this research project.

Table 2

Data Record

Instruments	Administration
Temperament and Atypical Behavior Scale	• TABS Screener was completed by the classroom teacher during the researcher's initial observation (pre-test) • TABS Assessment was completed by the classroom teacher during the researcher's initial and final observations (pre-test and post-test)
Problem Behavior Checklists	• Completed by the researcher every fifteen minutes during each student observation
Clinical Notes	• Completed by the researcher every fifteen minutes during each student observation

Analysis

The Temperament Atypical Behavior Scale was easy to score. The items following each subtest checked "yes" were be added up. The score from each subtest was placed in the box following the subtest. The scores from each subtest were then transferred into the Raw score column, where they were added. This final score was the Temperament Regulatory Index. The percentiles and standard scores (T-scores) of the raw scores can usually be calculated through the appendix of the assessment. However, the Temperament and Atypical Behavior Scale did not adequately assess the participant in this study. Secondary to the student's severe autistic disorder, the participant scored too low on the evaluation for the raw scores to be transferred into t-scores or standard scores. Therefore, the researcher only compared the results from the raw score section of the pre and post-tests of the TABS Assessment. This comparison determined whether the student's problem behaviors decreased from the initiation to the termination of this research project.

The next step was calculating the frequencies of the problem behaviors associated with autism as displayed in problem behavior checklists and clinical notes. Using the clinical notes, the researcher first developed a list of the student's problem behaviors associated with autism. The researcher then coded each behavior with a number ranging from 1-34. See Tables 7-11 on pages 32-36 for the coding of each problem behavior. The frequency of each behavior was obtained by tallying the number of times that each problem behavior occurred, within 15-minute intervals, in each observation period. The data was entered through creating a list. The letter "p" represented problem behavior. The first number was the number of the observation

ranging from 1-10. The second number was the number of the problem behavior ranging from 1-34. For example P112 indicates, problem behavior 12, observation 1. Table 3 displays an example of how this data was entered into SPSS

Table 3

Coding for the Frequency for Each Problem Behavior—An Example

SPSS Code	Frequency of Each P.B.
P11	8
P12	3
P13	2
P14	2
P15	0
P16	5
P17	1
P18	8
P19	1
P110	3
P111	0
P112	3

The sum frequency of each problem behavior was then divided by the number of 15-minute intervals in that specific observation. In other words, the researcher developed

a ratio of frequency of each problem behavior divided by the number of 15-minute intervals. The letter "b" was used to represent the 15-minute intervals. Numbers 1-10 followed the letter "b" depending on the observation period. For example, b1 would represent the number of 15-minute intervals in observation 1. Table 4 displays an example of how the of 15-minute intervals were entered into SPSS.

Table 4

Coding for the Number of 15-Minute Intervals in Each Observation

SPSS Code	The # of 15-Minute Intervals
B1	9
B2	8
B3	2
B4	7
B5	5
B6	5
B7	5
B8	4
B9	5
B10	4

The researcher then obtained the mean for each problem behavior in each observation by entering the data into an equation in SPSS. The means of each problem

behavior within the 10 observation periods are documented in Table 12 on pages 37-38. An average was then taken across the total 34 problem behaviors to calculate a general mean of all the problem behaviors for each observation. The means calculated were used to determine whether this research project was effective in decreasing the frequency of problem behaviors through the use of an implemented "sensory diet" The mean frequency of problem behaviors within each observation are documented in Table 13 on page 39. Table 5 on page 29 displays the SPSS equation used to calculate the mean of each problem behavior in each observation and the total mean of all the problem behaviors in each observation. As seen previously in Table 3 on page 26 "p11 to p1034" represents the coded number of each problem behavior in each observation. In this equation, "p1m1 to p10m34" represents the mean of problem behavior 1 in observation number 1 through the mean of problem behavior 34 in observation 10. As seen in Table 4 on page 27 "b1-b10" represents the fifteen-minute increments in each observation.

Table 5

SPSS Equation Used to Analyze the Frequencies of Problem Behaviors

Do repeat	*x=p11 to p1034/y=p1m1 to p10m34*
Compute	*y=x/b1-b10*
End Repeat	
Execute	

Chapter 4: Results

Chapter Four will present the empirical results of this single-case research study. The data record includes the pre and post-tests of the Temperament and Atypical Behavior Scale (Neisworth et al., 1999), the problem behavior checklists and extensive clinical notes. This chapter restates how each instrument of the data record was used and discusses how data triangulation indicates the results of the study.

Temperament and Atypical Behavior Scale

The Temperament and Atypical Behavior Scale was administered to the child's classroom teacher at both the initiation and termination of the research study. See Appendix A, pages 54-62 for a copy of the TABS Assessment. Due to the severity of the child's autism, only the raw scores from this assessment could be compared. The child's problem behaviors were so numerous that the scores from the assessment could not be converted into percentiles or T-scores. Therefore, the raw scores from the assessment were used to compare the child's problem behaviors before and after the implementation of the individualized "sensory diet." See Table 6 on page 31 for the results from the pre and post-tests of the Temperament and Atypical Behavior Scale.

Table 6

Pre and Post-Test Scores from the Temperament and Atypical Behavior Scale

	Pre-Test Raw Scores	Post-Test Raw Scores
Detached	14	14
Hyper-sensitive/active	14	14
Underractive	5	7
Dysregulated	2	2
Total Raw Scores	35	37

Results from the pre and post-tests of the TABS reveal that the problem behaviors of the child increased in the Underreactive category from the initiation to the termination of this research study. The raw scores from all of the other categories remained constant.

Problem Behavior Checklists and Clinical Notes

The researcher used clinical observations to identify the different problem behaviors of the child within 15-minute intervals. See Appendix C on pages 65-69.for an example of a clinical note. These 10 observations were the foundations for the development of problem behavior checklists. The researcher documented the problem behaviors observed and coded each behavior with a number, ranging from 1-34. The behaviors were divided into sensory processing categories, such as touch, proprioception, vestibular, visual and auditory. See Tables 7 on page 32 for touch; See Table 8 on page

33 for proprioception; See Table 9 on page34 for vestibular; See Table 10 on page 35 for visual; and See Table 11 on page 36 for auditory.

Table 7

Problem Behavior Checklists Coding Index for Touch

Number of Behavior	Problem Behavior
1	Requires hand-over-hand assistance/dislikes holding writing utensils/doesn't use whole hand
2	Oral stimulation/uses mouth/chewing
3	Excessive touching of others/aggressive behavior such as hitting or biting
4	Rigid and controlling personality
5	Chooses predictable toys
6	Uses toys and objects inappropriately/uses toys for a sensory purpose and not for play
7	Seeks deep pressure/bumps into others

Table 8

Problem Behavior Checklists Coding Index for Proprioception

Number of Behavior	Problem Behavior
8	Hyperactive/difficulty staying in one place/takes frequent movement breaks/gets out of chair frequently
9	Stabilizes self against furniture
10	Weak grasp
11	Difficulty accommodating to changes in environment
12	Uses a chewing strategy to maintain attention/focus
13	Uses self-stimulation to maintain attention
14	Inappropriate use of play with toys/using toys for a sensory purpose
15	Chews on toys and objects to increase attention and focus
16	Seeks out deep pressure through hugs

Table 9

Problem Behavior Checklists Coding Index for Vestibular

Number of Behavior	Problem Behavior
17	Takes frequent movement breaks/craves movement
18	Poor sitting balance in chair
19	Creates self-movement through rocking/constant shifting in chair
20	Turns whole body to look at you

Table 10

Problem Behavior Checklists Coding Index for Vision

Number of Behavior	Problem Behavior
21	Interested in visually stimulating objects
22	Pays attention to detail/fails to see the whole
23	Trouble staying between the lines when coloring or writing
24	Squints
25	Difficulty putting puzzles together
26	Looks intently at objects or people
27	Gets lost easily
28	Difficulty reading facial expressions and social cues
29	Poor eye contact
30	Doesn't use eyes to guide movement

Table 11

Problem Behavior Checklists Coding Index for Auditory

Number of Behavior	Problem Behavior
31	Covers ears frequently/defensive about sounds
32	Doesn't respond when name is called
33	Loud voice to screen out incoming noise
34	Constantly makes noise to block out other sounds/humming

A table was then created with the list of problem behaviors and the tally of each behavior within 15-minute intervals throughout the duration of each observation. See Appendix B on pages 63-64 for an example of a Problem Behavior Checklist. After tallying the problem behaviors, the researcher obtained a sum for each behavior by adding tallies across each observation. The duration of the observation was also calculated by adding the number of 15-minute intervals that occurred. The researcher then calculated the mean of each problem behavior within each observation by creating a ratio: the frequency of the problem behavior divided by the number of 15-minute intervals per observation. See Table 12 on pages 37-38 for the means of each problem behavior within each observation period.

Table 12

The Means of Each Problem Behavior within the Observation Periods

	Obs1	Obs2	Obs3	Obs4	Obs5	Obs6	Obs7	Obs8	Obs9	Obs10
Pb1	8	7	1	8	6	0	8	4	8	6
Pb2	3	0	4	1	5	8	10	3	12	3
Pb3	2	3	1	10	2	11	9	9	10	3
Pb4	2	4	1	9	4	16	11	6	10	6
Pb5	0	0	0	0	0	0	0	0	0	0
Pb6	5	1	5	2	3	0	2	0	1	1
Pb7	1	1	2	3	3	3	2	0	3	1
Pb8	8	5	4	3	3	2	5	3	2	5
Pb9	1	1	0	0	0	4	2	0	1	2
Pb10	3	1	0	0	1	1	1	2	2	2
Pb11	0	0	0	0	0	0	0	4	1	2
Pb12	3	0	4	1	4	8	9	3	12	2
Pb13	5	3	1	3	1	2	5	0	4	5
Pb14	5	1	5	2	3	0	2	0	1	1
Pb15	3	0	4	1	4	8	9	3	12	2
Pb16	2	2	2	4	1	5	2	0	2	2
Pb17	8	6	4	3	3	2	5	3	2	5
Pb18	3	5	1	6	2	4	3	0	2	2
Pb19	0	1	1	2	8	6	2	3	2	0

Pb20	0	0	0	0	0	0	0	0	0	0
Pb21	1	0	1	2	0	5	0	2	0	9
Pb22	1	0	1	2	0	6	0	2	0	9
Pb23	0	0	0	0	0	1	0	0	0	1
Pb24	0	0	0	0	0	0	0	0	0	0
Pb25	0	0	0	0	1	0	0	0	1	0
Pb26	0	0	1	1	0	5	0	2	0	9
Pb27	0	1	0	0	0	0	0	0	0	0
Pb28	0	0	0	0	0	0	0	0	0	0
Pb29	1	2	0	0	0	0	0	0	1	0
Pb30	1	1	0	0	0	1	0	0	1	0
Pb31	4	5	0	2	4	7	9	5	10	4
Pb32	0	1	0	0	0	1	1	0	1	0
Pb33	0	1	0	0	2	4	4	0	8	3
Pb34	4	3	0	5	6	7	1	4	11	5

After obtaining a mean for each problem behavior within each observation, the researcher calculated the total mean of all the problem behaviors within each observation. These means would indicate the average frequency of occurrence of the child's problem behaviors within each observation period. See Table 13 on page 39 for the mean frequency of all the problem behaviors within each observation period.

Table 13

The Mean Frequency of Problem Behaviors within Each Observation Period

Observation	Mean of Problem Behaviors
1	.24
2	.20
3	.63
4	.29
5	.39
6	.69
7	.60
8	.43
9	.71
10	.66

A line graph was used to indicate the change in the frequency of problem behaviors across the 10 observation periods. Results of this graph indicate an increase of problem behaviors from the initiation to the termination of this research study. See Figure 1 on page 40 for the change in the frequency of occurrence of problem behaviors across the 10 observation periods.

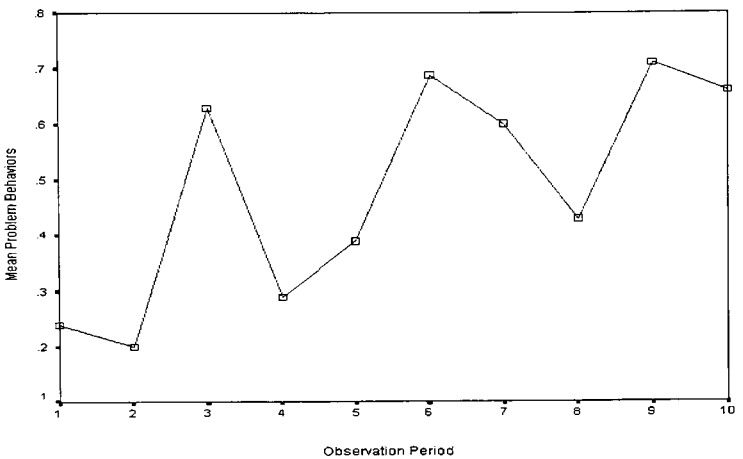

Figure 1

The Change in the Frequency of Occurrence of Problem Behaviors

The results of this graph indicate that the child performed significantly better in observation periods 4 and 8. The clinical notes of observation four reported that this was the first session of the implementation of the "sensory diet" in the classroom. The child was observed from 8:30-10:15 in the morning. According to the clinical notes, the child appeared to enjoy the reward system she was receiving for good behavior. The reward system consisted of chewy low-fat foods, such as celery or raisins, and served two purposes in the classroom. The first purpose of the reward system was to promote more functional, adaptive behaviors in the classroom setting. The second purpose was to enhance the child's oral motor processing. Therefore, the initial implementation of the

"sensory diet" in the classroom was most likely the cause for the decrease in observable problem behaviors.

The clinical notes of observation eight revealed a class trip to the bowling alley. The child was observed for only one hour, which did not consist of the child's regular classroom routine activities. Although some of the child's problem behaviors, such as hitting, humming and covering ears, were present on the trip, much of the behavior observed on the school bus and in the bowling alley did not mirror usual classroom behaviors. For example, the child sat quietly and appeared settled on the bus ride both to and from the bowling alley. The child was also actively engaged in reading a newspaper while at the bowling alley, which help maintain problem behaviors. The findings from the clinical notes provide reasoning for a significant decrease in problem behaviors from observation eight.

Chapter 5: Discussion

Chapter 5 will begin with a restatement of the purpose of this study and the research questions. This chapter will then discuss the findings and conclusions to this research study. Finally, Chapter 5 will discuss the strengths and weakness of this study, the clinical and educational implications and the recommendations for future research in this area.

Purpose of Study

The purpose of this study is to document the effects of a "sensory diet" (an individualized sensory program incorporated within the daily routine activities of the classroom) on promoting functional, adaptive behaviors within the classroom setting of a school-aged child with autism.

Research Question

Does a prescribed "sensory diet" decrease the frequency of occurrence of problem behaviors in the child with autism observed at the initiation of treatment to the time of termination?

Clinical and Educational Implications

The participant of this study was a school-aged, female (11 years old) diagnosed with autism. According to the DSM-IV, autism is characterized by impairments in social interactions, communication, and behavioral patterns (Kaplan & Saddok, 1996). The diagnostic criteria for autism include: marked impairment in social interactions in the use of nonverbal behaviors, failure to develop peer relationships, lack of sharing enjoyment, interests or achievements with others, and a lack of social/emotional reciprocity. Impairment in communication resides in a lack of spoken language, inability to initiate or sustain conversation with others, stereotyped and repetitive use of language, and lack of developmentally appropriate play. Finally, repetitive and stereotyped patterns of

behavior, interests, and activities also exist, such as preoccupation with abnormal interest or focus, inflexibility or nonfunctional routines or rituals, stereotyped motor mannerisms and persistent preoccupation with parts of objects (Kaplan & Saddok, 1996).

This definition of autism directly correlates to the observed problem behaviors of the student participating in this study. As stated previously, the student in this study is non-verbal, preventing the initiation of or sustaining conversation with others. The student also presents a lack of interest in social interactions, a failure to develop peer relationships with others in the class and participates in inappropriate play. The participant of this study was preoccupied with visually stimulating objects, such as a T.V. guide. The student did not use the magazine for reading purposes, but to visually scan the small, stimulating, black and white print. When asked, the student was able to identify and point to different words in the T.V. guide. However, when left alone, the child simply scanned the magazine and quickly flipped through the pages. This decrease in purposeful activity demonstrated a strong need for occupational therapy services in the classroom.

According to the literature, sensory defensiveness is a "tendency to react negatively or with alarm to sensory input that is generally considered harmless or non-irritating" (Wilbarger & Wilbarger, 2001, 3). Observable signs of sensory integration dysfunction in children with autism include: hyper-sensitivity, avoidance of sensory input, seeking sensory input, abnormal body position, poor coordination, motor control and performance, distractibility, limited attending skills, and either over or under arousal (Yack et al., 1998). The student in this study presented several of the problem behaviors stated above and displayed sensory impairments throughout the three main body systems, the vestibular, proprioceptive and tactile systems. For example, the participant was

extremely hyperactive and presented difficulty staying in one place or sitting in a chair for periods of time. The student also presented poor body posture and often sat sideways in a chair until redirected to change position. The participant displayed poor fine motor coordination and required hand-over-hand assistance for all writing and seatwork tasks. Finally, the student of this study was highly distracted and presented limited attention to all classroom work.

Children with autism who are sensory defensive may perceive the world as dangerous, harmful and even painful. Therefore, these children may develop patterns or stereotypical behaviors to help cope with the irritating world around them (Wilbarger & Wilbarger, 2001). These self-stimulating, repetitive behaviors may include body-rocking, preoccupation with parts of objects, unusual hand movements, like hitting/slapping, flapping or flicking, and restricted patterns of interest. Again, the student of this study identified with all of the above characteristics. The participant often presented aggressive behavior through the hitting, slapping, scratching and biting of others. The student also provided self-stimulation by waving hands and arms above the head and through body rocking while sitting in a chair. The results of this study demonstrated a strong need for early, intense interventions for children similar to the participant in this study, diagnosed with severe autistic disorder,

In addition to the sensory deficits stated previously, the student of this study also displayed oral motor impairments and auditory defensiveness. Secondary to oral motor deficits, the student constantly tried to chew/bite on inappropriate objects. For example, the participant attempted to chew on a seat cushion until removed by the teacher. The student's oral motor impairments were the basis for the implementation of the "sensory

diet" used in this research study. Auditory defensiveness frequently caused the student to cover both ears with hands, cover an ear using the shoulder and apply deep pressure to the ear area. The participant also hummed continuously and often screamed out in a loud voice to block incoming auditory stimuli.

The creation of a "sensory diet" for a child with autism presenting sensory integration dysfunction is a common treatment approach. The aim of this study was to implement an individualized "sensory diet" in the classroom of a child with autism that would promote development, language, problem solving, attention and organization. The "sensory diet" was also intended to decrease the frequency of occurrence of problem behaviors associated with autism. Clark and Ward (1999), described several sensory activities developed for the classroom. Two of these "sensory diet" activities were also used in this research study, such as finger foods during work periods (reward system), fidget toys for listening times ("chewy bracelet). Unfortunately, the severity of the child's autism greatly influenced the amount and types of "sensory diet" activities used in this research study. For example, Nackely (2001) also suggests active resistance during seatwork, such as chair push-ups or donkey kicks. However, these activities were functionally too high of a level for the participant of this study to engage. Further research on "sensory diets," especially for children with severe autistic disorder, is necessary for future studies in this area.

The results of this study revealed several factors that greatly influenced this single-case report. The first and most influential factor was the duration of time used in this case study. Unfortunately, the implementation of this project was limited to a one-month intervention period. These time constraints may have prevented significant

changes in the frequency of the child's problem behaviors from the initiation to the termination of the study. Time constraints also affected the amount of sensory activities implemented in the classroom. The researcher only had time to initiate and observe two oral-motor activities in the classroom of the student with autism. In the future, a study such as the one described in this document, may benefit from a sustained period of intervention. In fact, an ideal duration of time would be throughout the student's entire academic year. A longer time period may also enable the researcher to implement additional "sensory diet" activities in the child's daily routines of the classroom. The individualized activities would build upon each other, forming a foundation to address more of the child's sensory processing needs.

In addition to constraints in the duration of this study, the researcher also faced obstacles in the number of sessions observed and the amount of time spent observing the student at each session. In this study, the researcher observed the student 2-3 times per week. Over a one-month intervention period, the researcher observed the student in the classroom 10 times, including the initial observation. The researcher observed the student at different times of the day, in the morning, lunchtime/recess and the afternoon. However, the small number of observations limited the researcher's access to time spent in each segment of the day. The time duration of each observation varied due to the availability of the researcher and the student. Due to the fact that there were days when the student was absent from school, school assemblies were scheduled or class trips were planned, the time duration of observations ranged from 30-120 minutes. In the future, it may benefit a similar study to observe the student more times a week and schedule each observation at different times throughout the week. In efforts of documenting the

student's problem behaviors associated with autism, it may also be beneficial to observe the student for longer periods of time.

The researcher's actual observations of the student also influenced this study. At the initiation of this study, the researcher had no previous contact with the student. Therefore, the researcher was unaware of the student's problem behaviors in the beginning of the study. As the researcher grew more familiar with the student and the number of observations increased, the researcher's ability to identify problem behaviors and their frequency of occurrence also increased. Therefore, the evident trend of increasing problem behaviors from the initiation to the termination of the research project may be secondary to the researcher's improvement in observational skills.

The assessment tool used in this single-case study also influenced the results of this research project. The Temperament and Atypical Behavior Scale is specifically designed for children with autism and was used to assess the student's problem behaviors at the initiation and termination of the project. However, the severity of the student's autism greatly influenced the scores to the assessment. For example, the problem behaviors evaluated in two sections of the assessment were too low to score. This meant that the student performed so low, that the scores were unable to be converted into percentiles or T-scores. Therefore, the only scores on the TABS used to evaluate the student's problem behaviors were the raw scores. However, the results revealed that the scores from the initiation of this study did not improve at the termination of the project. The outcomes of this project reflect the lack of occupational therapy research in assessments developed for children with severe autism. Results of this study also reveal the inaccuracy and inappropriateness of standardized tests used in this population.

Although the TABS Assessment was specifically designed for children diagnosed with autism, it did not accurately assess the sensory processing needs of the student. In the future, a more appropriate assessment should be designed to evaluate a child presenting with severe autistic disorder.

Results from the problem behavior checklists revealed two dips in the frequency of problem behaviors associated with autism in the classroom setting. As stated previously, the first dip was the initial implementation of the individualized "sensory diet" in the classroom. The second dip in the frequency of problem behaviors was secondary to a classroom trip to the bowling alley. These two observations contradicted the literature on common practice with children diagnosed with autism. Previous studies and past literature suggested that regular routines were the best treatment for students with autism in the classroom setting. However, results from this single-case study indicated that possibly a combination of regular routines mixed with novel activities may be a better treatment approach.

Although the findings of the problem behavior checklists revealed that the implementation of the "sensory diet" did not decrease the frequency of the student's problem behaviors, the extensive clinical notes suggested that the "sensory diet" activities facilitated an increase in the student's focus and attention to the task. The implementation of the "sensory diet" not only influenced the participant of this study, but also the other students in the classroom. Secondary to the severity of the participant's autism, the child was extremely disruptive to the other students in the classroom. Therefore, when the "sensory diet" assisted the participant in maintaining focus and attention, it appeared as though the attention of the other students was sustained. When the participant was better

able to focus and was not participating in disruptive behavior, the other children appeared to be more attentive to their schoolwork and the classroom routines. This finding was not just important for classrooms modified to meet the needs of children with autism or for pullout therapy services. This finding may be generalized to inclusive classroom settings as well.

Finally, a strong collaboration within the interdisciplinary team is imperative. Although the researcher and the occupational therapist designed and implemented the "sensory diet," they were not consistently available to carryout the treatment in the classroom. Therefore, education and collaboration with the teacher, teacher assistants and other disciplines involved in the child's treatment is extremely important. The better the collaboration with the interdisciplinary team, the more likely a "sensory diet," such as the one implemented in this study, will be carried out daily.

Strengths

- The researcher was able to work 1:1 with the school-based occupational therapist. Together, the researcher and the occupational therapist designed and implemented and individualized "sensory diet" in the classroom of the child diagnosed with autism.
- The researcher had the opportunity to work 1:1 with the child. This enabled the researcher to focus solely on the needs and problem behaviors of this specific child.
- The researcher observed in a classroom for children with autism. Therefore, the classroom environment was already modified to fit the

needs of the children with autism before the initiation of the "sensory diet."

- The researcher had the opportunity to participate in an integrated therapy approach rather than a pullout treatment approach. In this specific single-case study, an integrated treatment approach was important for carryover of the "sensory diet."
- The researcher worked in collaboration with the classroom teacher and therapeutic staff support (teacher assistant). Therefore, when the researcher was not available to observe the child, the teacher and TSS provided carryover of the "sensory diet" activities.
- Although the results of this study did not reveal a significant decrease in the frequency of problem behaviors, this study established a base line for future studies in this area.

Limitations

- This research project was a single-case study. Therefore the results of this study cannot be generalized to all school-aged children with autism.
- The student who participated in this single-case study was nominated by the cooperating school district and school-based occupational therapist. Therefore, the student in this study may not present the exact same problem behaviors or features of autism as other children with autism. Children with autism are very heterogeneous, making comparison difficult.

- The duration of this research project was a one-month intervention period. In the future, a similar study may benefit from implementing a "sensory diet" across a longer time period, such as an entire school year (nine months).
- Scheduling difficulties also arouse throughout the duration of this research project. The researcher scheduled observations in accordance to the schedules of the classroom. There were several days where class trips, assemblies and holidays interfered with observations. There were also days when the child was sick and missed school.
- At the present time, there is a lack of standardized tests that appropriately and accurately assess children with severe autistic disorder.
- There is a limited amount of research supporting the implementation of a "sensory diet" for children diagnosed with severe autism.

Recommendations for Future Research

If a similar study is implemented in the future, it may be beneficial to narrow the number of problem behaviors targeted. Possibly the researcher could target the 10 most interfering behaviors associated with the child's autism. Narrowing the focus may enhance the researcher's ability to observe and document the frequency of problem behaviors in the classroom. Targeting behaviors may also help treat the child's specific needs and individualize the "sensory diet" activities. See Chapter 4, Tables 7-11 on pages 32-36 for the listing and coding of the problem behaviors of the participant in this study. From the baseline 34 problem behaviors identified in this study, this researcher proposes that the top 10 target behaviors include: (1) requires hand-over-hand assistance/dislikes

holding writing utensils/doesn't use whole hand; (2) oral stimulation/uses mouth/chewing; (3) excessive touching of others/aggressive behavior such as hitting or biting; (4) rigid and controlling personality; (10) weak grasp; (27) gets lost easily; (29) poor eye contact; (31) covers ears frequently/defensive about sounds; (8) hyperactivity/difficulty staying in one place; and (11) difficulty accommodating to changes in the environment.

Although SI improved learning, behaviors and sensory processing in children of previous studies, more research is necessary to provide evidence of the benefits of using sensory integration intervention in classroom settings. As stated previously, limited research exists on developing individualized "sensory diet" programs for child diagnosed with severe autism. The availability of appropriate and accurate assessments for children with severe autistic disorder is also limited. In efforts of treating these clients with quality care, further research in this area of study is imperative.

Appendixes

Appendix A

Temperament and Atypical Behavior Scale Screener

Temperament and Atypical Behavior Scale Assessment Tool

Temperament and Atypical Behavior Scale Conversion Table

Screener

Temperament and Atypical Behavior Scale

Early Childhood Indicators of Developmental Dysfunction

Stephen J. Bagnato, Ed.D., N.C.S.P. | John T. Neisworth, Ph.D.
John Salvia, D.Ed. | Frances M. Hunt, Ph.D.

Instructions for administering the TABS Screener:

Please refer to Chapter 3 of the TABS Manual for important information before administering the TABS Screene Complete (or have rater complete) the information in Section I. Read and discuss directions for Section II with the rate making sure that he or she understands how to respond to the items. Ask the rater to return the Screener for scoring an interpretation when he or she has completed Section II.

I. CHILD INFORMATION

Name of child: _____ Sex: Female ❑ Male ❑

Date of birth: _____ Age (in years and months): _____

Child's address: _____

Name of parent or primary caregiver in household: _____

Relationship to child: Mother ❑ Father ❑ Other _____

Telephone number: _____ Best time to contact: _____

List any previously identified problems or diagnoses for this child.

1. _____
2. _____
3. _____

II. TABS INDICATORS

The following 15 items list some of the most frequent problems in temperament and self-regulation that parents and professionals observe in young children. Read each numbered item and check No if the behavior is not a problem. Check Yes if the behavior is a problem. Return the form to the individual administering this Screener for scoring and interpretation.

Name of child _____ Date Screener completed _____

Relationship to child _____

	No	Yes
1. Emotions don't match what is going on	☐	☐
2. Gets angry too easily	☐	☐
3. Too easily frustrated	☐	☐
4. Has wild temper tantrums	☐	☐
5. Frequently irritable, "touchy," or fussy	☐	☐
6. Can't comfort self when upset	☐	☐
7. Doesn't pay attention to sights and sounds	☐	☐
8. Seems to look through or past people	☐	☐
9. Resists looking you in the eye	☐	☐
10. Too "grabby," impulsive	☐	☐
11. Moods and wants are too hard to figure out	☐	☐
12. Seems to be in "own world"	☐	☐
13. "Tunes out," loses contact with what is going on	☐	☐
14. Overexcited in crowded places	☐	☐
15. Wanders around without purpose	☐	☐

III. RESULTS

Add all the items marked Yes, and place the total in the box below labeled Raw Score. A score of 1 or 2 indicates that the child may be at risk for atypical development and self-regulatory behavior. A score of 3 or more indicates that the child's temperament and self-regulatory behavior are probably atypical for his or her age. Follow-up with a complete 55-item TABS Assessment Tool is recommended for any score other than 0.

Raw Score ☐ Recommended for follow-up with TABS Assessment Tool: Yes ☐ No ☐

ISBN 1-55766-423-4 Manufactured in the United States of America

Assessment Tool

Temperament and Atypical Behavior Scale

Early Childhood Indicators of Developmental Dysfunction

Stephen J. Bagnato, Ed.D., N.C.S.P.
John T. Neisworth, Ph.D.
John Salvia, D.Ed.
Frances M. Hunt, Ph.D.

Instructions for administering the TABS Assessment Tool:

Please refer to Chapter 3 of the **TABS Manual** for important information before administering the TABS Assessment Tool. Complete (or have rater complete) the information in Section I. Read and discuss directions for Section II with the rater, making sure that he or she understands how to respond to the items. Ask the rater to return the Assessment Tool for scoring and interpretation when he or she has completed Section II.

I. CHILD INFORMATION

Name of child: _____ Sex: Female ❑ Male ❑

Date of birth: _____ Age (in years and months): _____

Child's address: _____

Name of parent or primary caregiver in household: _____

Relationship to child: Mother ❑ Father ❑ Other _____

Telephone number: _____ Best time to contact: _____

List any previously identified problems or diagnoses for this child.

1. _____
2. _____
3. _____

II. TABS INDICATORS

The following 55 items list some of the most frequent problems in temperament and self-regulation that parents and professionals observe in young children. Read each numbered item and check *No* if the behavior is not a problem. Check *Yes* if the behavior is a problem. For those items marked *Yes*, check *Need Help* if there is special concern and assistance is needed to cope with the behavior. Return this form to the individual administering this Assessment Tool for scoring and interpretation.

Name of rater: _____ Date Assessment Tool completed: _____

Relationship to child: _____

II. TABS INDICATORS

The following 15 items list some of the most frequent problems in temperament and self-regulation that parents and professionals observe in young children. Read each numbered item and check *No* if the behavior is not a problem. Check *Yes* if the behavior is a problem. Return this form to the individual administering this Screener for scoring and interpretation.

Name of rater _____ Date Screener completed: _____

Relationship to child _____

	No	Yes
1. Emotions don't match what is going on	☐	☐
2. Gets angry too easily	☐	☐
3. Too easily frustrated	☐	☐
4. Has wild temper tantrums	☐	☐
5. Frequently irritable, "touchy," or fussy	☐	☐
6. Can't comfort self when upset	☐	☐
7. Doesn't pay attention to sights and sounds	☐	☐
8. Seems to look through or past people	☐	☐
9. Resists looking you in the eye	☐	☐
10. Too "grabby," impulsive	☐	☐
11. Moods and wants are too hard to figure out	☐	☐
12. Seems to be in "own world"	☐	☐
13. "Tunes out," loses contact with what is going on	☐	☐
14. Overexcited in crowded places	☐	☐
15. Wanders around without purpose	☐	☐

III. RESULTS

Add all the items marked *Yes*, and place the total in the box below labeled Raw Score. A score of 1 or 2 indicates that the child may be at risk for atypical development and self-regulatory behavior. A score of 3 or more indicates that the child's temperament and self-regulatory behavior are probably atypical for his or her age. Follow-up with a complete 55-item TABS Assessment Tool is recommended for any score other than 0.

Raw Score ☐

Recommended for follow-up with TABS Assessment Tool: Yes ☐ No ☐

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DETACHED

	No	Yes	Need Help
1. Consistently upset by changes in schedule			
2. Emotions don't match what is going on			
3. Seems to look through or past people			
4. Resists looking you in the eye			
5. Acts like others are not there			
6. Hardly ever starts on own to play with others			
7. Moods and wants are too hard to figure out			
8. Seems to be in "own world"			
9. Often stares into space			
10. "Tunes out," loses contact with what is going on			
11. Plays with toys in strange ways			
12. Plays with toys as if confused by how they work			
13. Makes strange throat noises			
14. Disturbed by too much light, noise, or touching			
15. Overexcited in crowded places			
16. Stares at lights			
17. Overly interested in toy/object			
18. Flaps hands over and over			
19. Shakes head over and over			
20. Wanders around without purpose			
Detached Raw Score →			

HYPER-SENSITIVE/ACTIVE

21. Upset by every little thing			
22. Often difficult to soothe when upset and crying			
23. Has wide swings in mood			
24. Gets angry too easily			
25. Too easily frustrated			
26. Has wild temper tantrums			
27. Frequently irritable, "touchy," or fussy			
28. Can't wait at all for food or toy			
29. Demands attention continually			
30. Controls adult's behavior, "is the boss"			

	No	Yes	Need help
31. Jealous too often			
32. Mostly on the go, "in high gear"			
33. Doesn't sit still			
34. Too "grabby," impulsive			
35. Almost always refuses to do what is told			
36. Throws or breaks things on purpose			
37. Bites, hits, kicks others			
Hyper-sensitive/active Raw Score →			

UNDERREACTIVE

	No	Yes	Need help
38. Rarely smiles, giggles, or laughs at funny things			
39. Doesn't pay attention to sights and sounds			
40. Doesn't seem to watch moving objects			
41. Shows no surprise to new events			
42. Doesn't react to own name			
43. Doesn't care when others are hurt			
44. Doesn't play much at all			
45. Doesn't enjoy playing with mother or caregiver			
46. Isn't upset when toy is taken away			
47. Almost never babbles or tries to talk			
48. Doesn't react to sounds			
Underreactive Raw Score →			

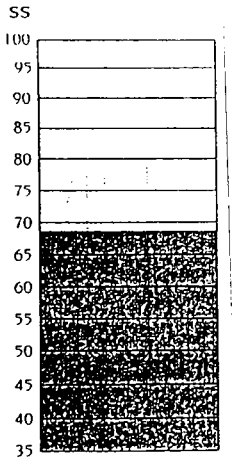
DYSREGULATED

	No	Yes	Need help
49. Often cries too long			
50. Often frightened by dreams or the nighttime			
51. Screams in sleep and can't be comforted			
52. Can't comfort self when upset			
53. Wakes up often and doesn't fall back asleep			
54. Doesn't have a regular sleep schedule			
55. Too often needs help to fall asleep			
Dysregulated Raw Score →			

III. RESULTS

Add the items marked *Yes* in each of the four subtests, and place the totals in the appropriate boxes marked **Raw Score** (e.g., *Detached Raw Score*) after each subtest. Transfer those totals to the spaces under the column titled Raw Scores below. Add the four raw scores to calculate the *Temperament & Regulatory Index* (TRI), and place it in the space provided. Determine percentiles and standard scores (or T-scores) of each of these raw scores by using the Conversion Table in the appendix in the **TABS Manual**. (Refer to Chapter 3 of the manual for a discussion of score conversions.) Although not intended for routine assessment purposes, subtest scores might be useful for research or highly specialized clinical purposes. If using subtest scores, carefully review Chapter 4 for information about subtest reliability and the reliability of differences between subtests. If the child's TRI indicates that he or she may be at risk for atypical development, early intervention and/or further assessment may be necessary.

	Raw Scores		
Detached	.....	.....	.....
Hyper-sensitive/active	.....	.....	.....
Underreactive	.....	.....	.....
Dysregulated	.....	.....	.....
Temperament & Regulatory Index (TRI) (total of four factor raw scores)	_____	_____	_____



NOTES:

SS = Standard Score (M = 100, SD = 15)

☐ Typical ☐ At-Risk ☒ Atypical

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CONVERSION TABLE

	TRI			Detached			Hyper-sensitive/ active			Underreactive			Dysregulated		
RS	%ile	*SS*	*SS*nd	%ile	*T-score*	*SS*nd	%ile	*T-score*	*SS*nd	%ile	*T-score*	*SS*nd	%ile	*T-score*	*SS*nd
0	84	113	115	65	55	54	77	58	57	60	54	53	61	54	53
1	61	109	104	23	47	42	46	53	49	15	42	40	15	42	40
2	48	104	99	13	39	38	32	48	45	6	31	34	5	29	34
3	37	100	96	6	31	35	22	44	42	2	19	30	2	16	30
4	28	95	91	3	23	32	14	39	39	1	7	28	<1	4	26
5	23	91	89	2	15	29	9	34	36	—	—	—	—	—	—
6	18	87	86	<1	7	26	6	29	34						
7	14	82	84	<1	0	24	3	25	31						
8	11	78	82	—	—	—	2	20	28						
9	8	73	79				<1	15	26						
10	6	69	76				—	—	—						
11	4	64	74												
12	3	60	71												
13	1	56	67												
14	<1	51	60												
15	—	—	—												

Note: $N = 621$ children not identified as having disabilities.

Conversion of raw scores *(RS)* to percentiles (%ile), standard scores *(SS)*, and T-scores, and standard scores normalized by area transformation (*SS*nd) for the *TRI* and subtests.

%ile: M = 100, *SD* = 15.

SS: M = 100, *SD* = 15

T-score: M = 50, *SD* = 10

*SS*nd: M = 50, *SD* = 10

Appendix B

Problem Behavior Checklist

"Problem Behaviors"	"15"	"30"	"45"	"60"	"75"	"90"	"105"	"120"	"135"	"150"	"165"	"180"
1												
2												
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Appendix C

Example of a Clinical Note

Clinical Observations

Thursday October 18, 2001: Initial Observation

M is an 11-year-old child diagnosed with autism. She has brown hair and wears glasses. M was dressed very comfortable in a sweat suit with her hair pulled back in a ponytail. M wore slip on sneakers, making it very easy to get her shoes on and off. M is non-verbal.

M's classroom schedule

-morning group
-workstation
-work
-reading
-recess
-lunch
-social studies
-art
-spelling
-home

8:30 M entered the classroom and immediately required assistance in following her morning routine. Unlike with the other children, the teacher had to take M by the hand and help her remove her coat and hang her book bag. The teacher then sat M at the group table where the other children were sitting. While at the table, M began reading the T.V guide she had brought to school with her. She sat with her face extremely close to the paper. While reading at the table, M continuously covered her ears and applied deep pressure to different points on her face. She took her glasses on and off, twirled her hair with one hand and hit the side of her face over and over with the other hand. With the teacher's assistance, M then took a bathroom break before class began.

8:45 While sitting at the group table, M would swing her arms over her head and wave them about. M also continuously hummed or made some type of noise, whether it be moaning or screaming. M was active in her chair and failed to sit correctly. She seemed to prefer facing away from the teacher while sitting sideways in the chair. When the teacher began the activity, M made paid no attention to the teacher, her classmates or the activity. M does have a teacher assistant who was helping her work at the table. M still paid no attention to the activity and failed to even look at what she was supposed to be doing. The T.A. had to work hand-over-hand with M, especially when holding a pencil or completing activities that involved writing. M continued to swing arms overhead and hum, but could be redirected for short periods of time. When asked to complete morning routine of finding her name, address, phone number, house and picture, M required complete hand-over-hand assistance. M was then escorted back to seat while laughing at herself because she knew she was being funny. M did not mind the T.A. having her arms around her or sitting closely next to her.

9:00 M was making some interaction with the T.A. by hugging and laughing. When it was clean up time from group table, M spent her time climbing under the table and running to the window. The T.A cleaned up M's space for her. The classroom then said the pledge. M is nonverbal and paid no attention to what was taking place. It was then time for morning exercises. Although the T.A. tried to help M complete the exercises hand-over-hand, M was unable to complete the activities. M began hitting and slapping the T.A. because she didn't want to exercise. Instead, the T.A. walked M around the room to keep her busy and moving while the rest of the class completed exercises.

9:15 The students then sang their morning songs. Again, M was unable to participate. The teacher then began going over group work. Most of the students read out loud. However, the teacher read M's. The group then began to play a game. M paid no attention and was self-stimulating in her chair by humming and waving her arms above her head. M took another bathroom break and left the room picking her nose.

9:30 It was now time for individual work time. M was 1:1 with the T.A. The first activity was pinching clothespins and putting them on a coffee can. M required hand-over-hand assistance to pinch the pins, but was able to remove them all independently from the can. M had weak fine motor skills and pinch/grasp strength. M often held an ear with one hand and completed the activity with the other. The next activity was pointing to different words. M is able to identify the words, but gets distracted easily and scratched and hit the T.A. when she didn't want to do any more. M was also able to match numbers. However, M continued to hum and hit her face with her glasses throughout this activity. The next activity was matching shapes. M was able to complete this with redirection. M then removed on shoe and got out of her seat. The T.A redirected M back to her chair to finish seatwork.

10:00 Individual work continued. This time, M had glasses off and shoes on. M continued to hit T.A throughout work time, but did finish her activities. The next activity was matching colors and then letters. M required hand-over-hand assistance to hold a pencil and write the letter F three times. After completing this activity, M took one shoe

off, faced sideways in chair, hummed, and had one hand covering one ear with the other ear pressed against her shoulder. The T.A. let M take a break to the play corner. Instead of picking out a toy, M laid on the beanbag and kicked the sit-and-spin. M put both hands over her ears and stared into space. She did not play at all.

10:15 M was being very quite in play corner. After kicking the sit-and-spin, M started to kick the red therapy ball until it rolled away. M did not initiate any form of play with these toys, instead, she just kicked them. Both of M's shoes were off at this point. M finally found a yellow rubber toy. However, instead of playing with it, M chewed on it. M then got up and began climbing on the sit-and-spin while still chewing the toy.

10:30 M continued to climb about the sit-and-spin while chewing her toy. At one point, she had one foot of the sit-and-spin and the rest of her body lying on the radiator. Finally, M laid back down on the beanbag chair continuing to chew her toy.

10:45 M directed to table for snack time. M was still holding her ears and chewing her toy. M could drink her juice and eat her popcorn independently. M kept turning her body sideways in her chair, even after the T.A. sat her correctly at the table. M then stole a pretzel from another student across the table.

Appendix D

"Sensory Diet" Activities Incorporated into the Daily Classroom Routines of the Child

"Sensory Diet" Activities Incorporated into the Daily Classroom Routines of the Child

The participant in this study presented impairments throughout all sensory domains. However, time limitations of the study directly influenced the number of sensory domains that could be addressed through the "sensory diet" treatment activities. Through collaboration with the school-based occupational therapist and regular classroom teacher, the child's deficits in oral motor functioning were targeted in this study. The child in this study presents no difficulty eating or drinking. However, the participant does present a strong tendency to bite objects and other people. Both of the "sensory diet" activities implemented in the classroom and described below were designed to help the child decrease the frequency of occurrence of the problem behaviors associated with autism and to increase attention span and focus to the task.

"Chewy Bracelet"

Clinical observations revealed that the participant of this study often chewed on toys, especially beaded bracelets, instead of playing with or wearing them. It appears as though the child in this study mouths objects to help organize and calm herself. Therefore, a "chewy necklace and bracelet set" was designed for the child in the classroom. The strengths of a "chewy jewelry set" are that the sensory activity is more age appropriate than for the participant to chew on other objects or people. The child has also worn beaded bracelets in the past. Although the participant may enjoy wearing and chewing on these beaded bracelets, the child unfortunately bites through the beads and chews on the hard plastic. This type of behavior is not safe for the child and may lead to choking. The "chewy jewelry set" consists of FDA approved rubber tubing and a stretchy string. The tubing looks similar to a straw and is beneficial for chewing without

biting through the material. In efforts of promoting increased safety, the tubing will be cut into more appropriate sizes. The necklace can be used for pulling or biting by the child when deep proprioceptive input is needed. After testing the "chewy jewelry set" with the child in the classroom, it was decided by the researcher, school-based occupational therapist and classroom teacher that the participant just wear the bracelet. Unfortunately, the child used the necklace for self-stimulatory behavior of swinging it above the head, instead of for its intended purpose. To maintain safety of all those in the classroom, the necklace was taken away and just the bracelets were used throughout the remaining duration of this research study.

Reward System

The second oral motor activity implemented in the classroom was a reward system. The researcher, school-based occupational therapist and classroom teacher believed that a reward system may also help increase the child's attention span and focus to a task. The system included fat free or low fat chewy candies, such as twizzler knots or starburst chews, celery sticks, raisins and dry cereal. The participant received these rewards after presenting good behavior during group or individual seatwork. The child was not rewarded after hitting, biting or when engaging in other aggressive or disruptive behaviors. This activity does not only address M's sensory need to chew on objects during school, but also attempts to enhance learning.

Appendix E

IRB Letter of Approval

THE UNIVERSITY OF
SCRANTON
A JESUIT UNIVERSITY

OFFICE OF RESEARCH SERVICES

To: Caroline McDaniels

From: Eileen Callahan, Director of Research Services

Date: May 15, 2001

Re: **IRB Protocol #44-00**
A Sensory Integrative Approach in the Classroom of a Child with Autism: A Single Case Study

I am pleased to advise you that the IRB has approved the above referenced protocol, with your revisions dated September 5, 2001, effective for one year from this date. Any changes to the protocol must be reviewed by the IRB prior to instituting them.

If you have any questions, please do not hesitate to contact me.

Please also correct principal not principle investigator.

cc: Dr. Margarete Zalon, IRB Chair
Prof. Carol Reinson

SCRANTON, PENNSYLVANIA 18510-4630
(570) 941-6190 • FAX (570) 941-4252

Appendix F

Parent Consent Form

THE UNIVERSITY OF
SCRANTON
A JESUIT UNIVERSITY

DEPARTMENT OF OCCUPATIONAL THERAPY

Date:

Name:
Address:

Dear Parents,

My name is Caroline McDaniels and I am a Graduate Occupational Therapy Student at the University of Scranton. We are asking you to consider allowing your child to participate in my thesis research study. This project has been developed to study whether an individualized "sensory diet" in the classroom will reduce problem behaviors associated with autism, such as hyperactivity, fixations, and hypo/hyper sensitivity. A "sensory diet" consists of a wide variety of non-intrusive sensory activities, such as chair pushups and/or body squeezes during deskwork, donkey kicks and heavy marching during school break time, taking down the chairs from the desks in the morning and erasing the board throughout the day. These individualized activities are designed to address the child's sensory processing needs throughout the standard school day and to help increase attention and functional learning behaviors in the classroom.

The duration of this study will be 1 month in length. An example "sensory diet" for the child is the following: Day 1 the child will be responsible for taking the chairs off the desks in the morning. Day 4 the child will be responsible for removing the chairs and for erasing the board throughout the day. As the study continues, the child will be responsible for their individualized routine tasks, designed to increase the amount of sensory input the child is receiving in the classroom. The "sensory diet" should not disrupt the classroom or the academic work of the child and/or fellow classmates because it incorporates sensory input into everyday activities.

The child participating in this study will be observed in the classroom under the supervision of the child's occupational therapist and classroom teacher. Parents will have the opportunity to review all findings during the study and after it is completed. This study is completely confidential and all materials identifying the child will be destroyed at the termination of this study.

The "sensory diet" will be implemented in addition to the child's regular therapy programs or special services during the school day. This study does not replace the need for medications. Any questions concerning the use of medications should be taken up with the child's physician. However, the child will benefit most from the results of this

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DEPARTMENT OF OCCUPATIONAL THERAPY

study if the medication routine of the child remains the same throughout the length of this project.

Sincerely,

Primary Investigator: Caroline McDaniels OTS
E-mail: mcdanielsc2@scranton.edu
Phone #: (570) 340-3635

Faculty Advisor: Professor Carol Reinson MS OTR/L
E-mail: reinsonc2@scranton.edu
Phone #: (570) 941-6225

OT Supervisor at Scranton School District: Kathy Ulkowski MS OTR/L

THE UNIVERSITY OF
SCRANTON
A JESUIT UNIVERSITY

DEPARTMENT OF OCCUPATIONAL THERAPY

Consent Form

Parents, please complete the following:

I _____, allow my child _____ to participate in this research project being conducted by Caroline McDaniels, a graduate occupational therapy student of the University of Scranton. I understand that this project is under the supervision of Carol Reinson MS, OTR/L, Assistant Professor of Occupational Therapy at the University of Scranton and Kathy Ulkowski OTR/L, Occupational /Therapy at Scranton School District. The investigator has explained the purpose of this research project and that it will help the treatment of future students with autism. I have agreed to let my child participate in this project and meet with the investigator throughout the length of this project.

The investigator has explained that my child will be involved in an individualized "sensory diet," designed to promote learning and reduce behaviors associated with autism in the classroom setting.

The investigator has explained that the observations and data collection for this project will be one month in duration. The investigator has also explained that following completion of this study, my child's teacher will continue the individualized "sensory diet" in the classroom and that similar sensory activities designed for home can be obtained through the researcher upon request.

The investigator has discussed that no changes in other treatments or medications should occur unless authorized by the physician during the length of this project and has encouraged me to continue all present home programming.

The investigator has explained that I may stop my child's participation in this research study at any time and that discontinuation will not affect my child's education, grades or other services.

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DEPARTMENT OF OCCUPATIONAL THERAPY

I have been told the my child's name will remain confidential and that the primary investigator and faculty advisor will be the only person with access to the information collected from this research study. If I have any questions about this research project, or my child's involvement in it, I can call Caroline McDaniels at (570) 340-3635 or Professor Carol Reinson at (570) 941-6225.

Signature Date

SCRANTON, PENNSYLVANIA 18510-4501
(570) 941-4125 • FAX: (570) 941-4380

Appendix G

Cooperating School District Consent Form

Scranton School District

OFFICE OF SPECIAL EDUCATION
425 North Washington Avenue
Scranton, Pennsylvania 18503

William Grochowski, Supervisor
(570) 348-3438

Instruction Advisors
(570) 348-3447

Eileen Callahan
Director of Research Services
Office of Research Services
University of Scranton
Scranton, Pa. 18510

Dear Ms. Callahan:

Students from the Occupational Therapy Department, including Caroline McDaniels have made arrangements to perform research projects under my supervision within the school district. Each student will be responsible for following the universities research policies and guidelines including formally obtaining the required consents from parents and or staff that will be included in their specific project. These projects are in no way a substitution for and are above and beyond the services provided by the occupational therapy program within the school district. Please, feel free to contact me regarding this issue if additional information is required.

Respectfully,

Kathy Ulkoski MS OTR/L
Occupational Therapist
Scranton School District

KBU
Pc: Carol Reinson
Caroline McDaniels
Wm. Grochowski
9/5/01

Appendix H

Operational Definitions

Operational Definitions

The following is a dictionary of terms used throughout the duration of this research study. These terms were defined by the researcher for the purpose of the reader.

- *Arousal modulation*: "The ability to regulate the state of readiness and excitation of the nervous system" (Huebner, 2001, p. 13).
- *Attention impairments*: Inability to focus on tasks or activities, usually due to associated impairments of autism, such as ADHD and mental retardation.
- *Auditory defensiveness*: Over sensitivity to specific sounds, such as vacuum cleaners, motors and alarms (Wilbarger & Wilbarger, 1991).
- *Decreased tactile discrimination*: Poor body scheme, motor planning and hand skill development. Usually crave touch and deep pressure from others and environment.
- *Gravitational insecurity*: Fear of elevators, escalators and feet being off the ground (Nackley, 2001).
- *Impaired bilateral motor coordination*: Difficulty with bilateral activities, such as clapping, keyboarding, crossing midline, buttoning and shoe tying (Nackley, 2001).
- *Intense attachment*: Attachment to unusual objects, "such as a piece of string, rather than a cuddly item" (Batshaw, 1997, p. 428).
- *Motor planning and sequencing*: "The capacity to sequence actions, behaviors, words, images, and thoughts to produce a coherent and understandable outcome" (Huebner 2001, p. 15).

- *Oral defensiveness*: Avoidance of specific types of foods due to dislikes in taste or texture (Wilbarger & Wilbarger, 1991).
- *Postural insecurity*: Avoidance of certain movements or positions (Wilbarger & Wilbarger, 1991).
- *Problem behaviors*: Inability to interact with environment and people, lack of social attention and responsiveness, diminished eye contact, attention impairments, ritualistic use of objects, rubbing of surfaces, body rocking, hand flapping, repetitive jumping, ignoring of objects, intense attachment, prolonged abnormal play, self-injurious behaviors, and toe walking.
- *Prolonged abnormal play*: "Not using toys in their intended manner, but focus on a part of a toy, such as the wheels on a toy truck. A common form of play is to line objects up in rows" (Batshaw, 1997, p. 429).
- *Projected action sequences*: "Inability to plan and initiate movement in response to changing environmental stimuli" (Nackley, 2001).
- *Ritualistic use of objects*: "Obsessive rituals and strict adherence to routines" such as eating at the same time every day, eating the same foods, and placing objects in a specific order or location (Batshaw, 1997, p. 428).
- *Self-injurious behavior*: Head banging and/or any other behavior that causes injury to the child.
- *Sensory-affective processing*: "The ability to process and react to affect and link affective intent to responding" (Huebner, 2001, p. 14).
- *Sensory diet*: See discussion (p. 16).

- *Sensory integration*: See discussion (p. 11).
- *Sensory integration dysfunction*: See discussion (p. 9)
- *Sensory integration intervention*: See discussion (p. 12)
- *Sensory modulation*: "The capacity to internally regulate the amount and intensity of sensory input" (Huebner, 2001, p. 13).
- *Sensory processing*: "The ability to register, decode, comprehend, and differentiate sensory input, sensory sequences, and sensory patterns" (Huebner, 2001, p. 13).
- *Somatodyspraxia*: Poor tactile and proprioceptive processing such as clumsiness, falling and poor organization.
- *Tactile defensiveness*: Aversive response to touch by objects, people and activities involving specific fabrics or consistencies.
- *Visual defensiveness*: Over sensitivity to light, visually distracted and poor eye contact (Wilbarger & Wilbarger, 1991).

References

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