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KENTUCKY MIDDLE SCHOOL GENERAL EDUCATION TEACHERS:
PERCEPTIONS ON SENSORY INTEGRATION OF
STUDENTS ON THE AUTISM SPECTRUM

A Dissertation Presented to
The Faculty of the Educational Leadership Doctoral Program
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education


By
Lynda Cartwright-Harrison

December 2015

KENTUCKY MIDDLE SCHOOL GENERAL EDUCATION TEACHERS:
PERCEPTIONS ON SENSORY INTEGRATION OF
STUDENTS ON THE AUTISM SPECTRUM

Date Recommended 10-21-15


Marty Boman, Chair


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Dean, The Graduate School

12/14/15
Date

DEDICATION

I dedicate this to my parents, Charles A. and Ruth Cartwright, for instilling in me the love of reading, learning, and being a servant leader. My admiration for both runs deep. They taught me, in spite of what adversity comes your way—keep your faith, keep your vision, and keep moving forward. My parents were two of the most inspiring, motivational, and sacrificial people I have ever known. In everything they did, they did it with grace, dignity, and the love of God. Though they could not join me on this journey, I know without a doubt...they were with me every step, every tear, and every celebration along the way. Thanks to God for allowing me to be born of these two amazing parents.

Also, to all the incredible individuals I have known and served on the autism spectrum. I have learned far more from you, than you could ever learn from me. You were my heart's inspiration each and every day. I will take a part of you with me, wherever my journey leads.

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KENTUCKY MIDDLE SCHOOL GENERAL EDUCATION TEACHERS:
PERCEPTIONS ON SENSORY INTEGRATION OF
STUDENTS ON THE AUTISM SPECTRUM

Lynda Cartwright-Harrison

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Directed by: Marty J. Boman, E. Carolyn Tucker, and Antony D. Norman

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This study examines the perceptions of general education teachers in Kentucky middle schools regarding their knowledge concerning Autism Spectrum Disorder (ASD), Sensory Processing Disorder (SPD), and their abilities to implement strategies designed to accommodate students on the spectrum. Participants included both general and special education teachers though the original targeted sampling included general education teachers only. Data were collected using a demographic questionnaire and a Likert scale survey created by the researcher and distributed through a web based program.

Demographic characteristics collected included number of graduate credit hours, age, years of teaching experience, credited hours of training on ASD at the graduate level, as well as professional development concerning ASD and SPD. Likert items included teacher perceptions regarding the adequacy of their knowledge of ASD and SPD and their preparedness to work with students with autism. In general, participants perceived they had adequate knowledge of ASD and SPD and professional development to help students with autism be successful in their classrooms. Teachers reporting more professional development on ASD and SPD felt more prepared to work with these students. However, the more students with ASD or SPD teachers reported having in their classrooms, the less prepared teachers felt. Additionally, more experienced teachers reported less satisfaction with their professional development related to ASD or SPD.

Due to information gathered from general and special education teachers, *t*-tests were performed to differentiate their perceptions on these topics, which indicated that general education teachers scored themselves as more knowledgeable than special education teachers. Findings indicate further study is warranted, and teachers would benefit from increased opportunities for PD concerning ASD, SPD, and classroom preparedness.

CHAPTER I: INTRODUCTION

Chapter I introduces the study with a general overview of the investigated problem, background, need for the study, research questions, and significance of the study.

Background of the Problem

Adam, a seven year old second grader, was observed for behavioral outbursts in the classroom, putting himself in danger of withdrawal from mainstream classes (Murray-Slutsky & Paris, 2005). Even though he performed academically as a “B” student, his teacher became overly frustrated by her failed attempts to gain control of his disruptive behaviors and to educate him at his academic potential. She no longer could tolerate his continued interruptions within the classroom as they appeared to be interfering with his peers’ education.

Adam’s mother sought help from an occupational therapist specializing in sensory integration (SI). Observations of Adam were completed in various educational settings and at home to document both behaviors and the antecedents to determine if his actions were related to attention seeking. The behaviors Adam exhibited included:

- Rocking in his seat
- Putting his feet on the desk
- Stretching his arms and legs
- Falling out of his seat
- Standing at his desk
- Sitting, bearing his full body weight on his hands, and performing arm push-ups.

(Murray-Slutsky & Paris, 2005, p. 169)

These behaviors occurred during activities which required him to be seated within the classroom, in the library, and at home, but not while he was seated watching television. Adam began his school day with his head lying on his desk, and when asked to sit up, his behavior increased until he erupted. Also, these disruptions occurred during teacher lectures, demonstrations, written assignments, and one-on-one or group settings regardless of the noise level. Therefore, the therapists believed that the environment did not serve as the primary cause of his behaviors.

Adam attempted to comply with his teacher's directions and to complete all of his assigned work; yet, he struggled to get the work completed even when he tried to focus. Therefore, his teacher determined that his behaviors did not consist of work avoidance. At times he fell from his seat, bumped into others, or accidentally knocked things off their desk. The occupational therapist believed he sought more than attention (Murray-Slutsky & Paris, 2005). Was he exhibiting this behavior due to sensory seeking requirements?

Adam's behaviors served to provide input from two sensory systems, the proprioceptive and vestibular systems. His out-of-seat behaviors were proprioceptive in nature, while his rocking and fidgeting behaviors were vestibular. As previously stated, Adam began his school day with his head on the desk. After the teacher directed him to sit up, his posture would deteriorate, indicating a possible problem with postural control and endurance.

Hyposensitive or under-responsive children may seek vestibular and/or proprioceptive input to stimulate or arouse their postural and attentional mechanisms. Adam's behaviors seemed to correspond accordingly; therefore, sensory seeking behavior must be considered a possible primary

cause of the behaviors. (Murray-Slutsky & Paris, 2005, p. 171)

The occupational therapist devised SI interventions to assist Adam in addressing his sensory processing difficulties. Adam's teacher noted a significant change in his behavior, with small adjustments to her teaching strategies, after alternative sensory activities were incorporated into Adam's daily routine (i.e., isometric and concentric exercises in his seat every hour).

As a result, Adam remained in school, and he progressed with his classmates with a "B" average. After interventions were implemented, his teacher instructed in a less stressful environment, and the teacher-student relationship improved. If his teacher had been aware of his sensory processing needs and implemented the necessary strategies, Adam would have been more successful while feeling better about his educational experience. Therefore, teachers should gain knowledge to determine whether behaviors serve as attention seeking or sensory seeking (Murray-Slutsky & Paris, 2005).

Teacher Educational Preparation for Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) refers to a category of disability used by school districts to meet the requirement outlined by the Individuals with Disabilities Education Act (IDEA) (Shabha, 2005). According to Skuller (2011), three basic factors determine the success of students regarding their education when receiving a diagnosis of ASD including: early intervention, geographic location of the school, and implementation of educational teaching strategies. Early intervention increases success for these students (Wilkerson, 2012) as they learn strategies in a timely manner. District location serves as a determinant of student ratio, funding, and available school resources, which influences outcomes for students. Also, since highly qualified teachers receive training regarding

research based strategies for instructing this populace, they educate their students in a manner, which provides better outcomes; but as school budgets fluctuate from county to county, finances becomes a primary consideration when selecting teachers (Skuller, 2011). Often, educators without certification in special education serve students with disabilities in rural areas when enrollment is low (Tucker, Personal Interview, 2015).

Students receive special education within the category of autism if they meet the state requirements regardless of the level of severity or functioning (Lord & McGee, 2001). Schools are required to receive written permission from the parent before conducting an evaluation of the child, but can proceed without consent if they follow the due process laws. Special education requires that the team write an Individual Education Plan (IEP) to promote success with the identified supports for the student. Placement of services specifies that most students remain in their classroom with their peers with assistance from a resource teacher certified in special education (Skuller, 2011). For some students who perform at an adequate academic level, an IEP may not exist despite the communication and social needs of these individuals. Barriers for receiving special education services include: parents not wanting their child to be labeled, administrators who want to lessen the strains on their teachers, and school district monetary restraints (Tucker, Personal Interview, 2015)

Teaching students with ASD presents challenges for educators licensed in special education as each individual presents unique physiological needs. Also, general education teachers seldom receive educational opportunities consistent with their colleagues, who possess a special education teaching degree; unfortunately, these students are placed in the mainstream (Busby, Ingram, Brown, Oliver, & Lyons, 2012; Roberts, 2007).

“Teachers are increasingly presented with students who have autism within public education; yet training is not provided to address this increase” (Wilkerson, 2012, p. 124).

Characteristics of ASD

Autism presents as a multifaceted disability affecting 1 of 68 children born in the United States each year (Center for Disease Control, 2014a). These individuals exhibit various deficits and degrees of difficulty in social interaction, verbal and non-verbal communication, and repetitive behaviors. Besides the recognized characteristics, many individuals, estimated at 80 percent (Tomcheck & Dunn, 2007), exhibit sensory integration, which includes responses to stimuli in a faulty manner as they process incoming information. Many students with ASD have difficulty in receiving sensory input such as sounds, sights, smells, touch, and taste, and may affect learning and behavior of students with ASD. Teacher education regarding sensory processing enhances outcomes for their student academically and behaviorally within the educational setting (Ainscow, 1999; Amado, 1993; Andrews & Lupart, 2000; Bellini, Henry, & Pratt, 2011; Schoen, Miller, Brett-Green, & Nielsen, 2009; Shattuck, 2006).

Educational deficits and behaviors vary for each individual with ASD according to a child’s chronological age. Depending on the degree of the intellectual disability, students respond differently to the challenges that occur throughout the school day. As they grow older, these behaviors grow more dissimilar from their peers (Quill, 1995; Robertson & Simmons, 2012; Talay-Ongan & Wood, 2000). Lack of normal peer relationships, absence, or lack of pretend play, presence of repetitive behaviors or focused interests, and a marked impairment of social relatedness become clearly defined

in contrast to normal expectations for children in their age group. Simple tasks such as following directions, initiating interactions, or inhibiting motor stereotypes become more noticeable as the child grows older.

Sensory Processing Disorder in ASD

You don't 'get' why she experiences a flickering light bulb as a bolt of lightning, a doorbell ringing as the sound of a thousand church bells. You don't appreciate why a child might need to tap his foot and run around the classroom to keep from falling out of his chair. And you don't grasp how yogurt, because of its smoothness, may be one of the only foods that doesn't make your daughter feel like she has a mouthful of pebbles.

(Herbert & Weintraub, 2012, p. 2)

This illustration serves as a reflection of how sensory processing affects the daily lives of individuals with ASD, and challenges teachers, especially if they have had no formal training on ASD and sensory processing. Students with sensory processing disorder (SPD) struggle with input from their environment, including sounds, sights, smells, touch, and taste, which consequently affects learning and behavior in the schools. Additional teacher education for general education teachers regarding sensory processing could greatly enhance academic and behavioral success in the educational setting (Grandin & Panah, 2013).

Educating Children with ASD

Teacher attitudes greatly affect the learning for all students. For individuals with ASD studies evaluating teacher dispositions and opinions toward inclusion reveal the necessity for improvements in teacher preparedness regarding ASD (Skuller, 2011).

Attitudes toward inclusion are negatively influenced by students' oppositional behaviors which may have an adverse effect on teacher/student relationships Wilkerson (2012). These stressors impede successful inclusion of students with autism as teachers report that their stress increases due to the amount of work needed for planning and the added pressure from the parents. Special education teachers receive educational opportunities to increase learning about Research Based Strategies. However, general education teachers seldom receive opportunities for specified training offered to special education providers and para professionals (Roberts, 2007).

Most regular education teachers understand the cognitive functioning needs of ASD students in their classroom; however, these students have a plethora of difficulties that may hinder success in the classroom. As more students with ASD are mainstreamed, general education teachers must increase their knowledge about the special needs of these students (Ainscow, 1999; Bellini et al., 2011; Leblanc, Richardson, & Burns, 2014.) especially when taking into consideration how sensory processing affects learning. Ainscow (1999) postulated a need exists for teachers to understand ASD and the many complexities that present throughout the school day because of the various dimensions of this disorder when placed in an inclusive setting. The impact of sensory processing on academic, social and behaviors within their classroom produces challenges for many teachers.

The Problem Defined

A multitude of characteristics exist within the definition of ASD; however, for the scope of this study, sensory integration and its effect on students with ASD, and the challenges regarding learning and behavior will be discussed (Grandin & Panah, 2013;

Lynch, 2004; Pollock, 2009).

Ruble and Dalrymple (1996) recognized these behaviors present difficulties for teachers as students are increasingly being placed in general education classrooms. This continuing upsurge in diagnoses for ASD provides reasoning for more training and PD about SI for general education teacher as these students struggle within the mainstream classes. Characteristics of ASD influencing classroom performance include: learning styles, difficulty in communicating, impairment in social interactions, resistance to change in routine, repetitive body movements, and speech pattern difficulties. These behaviors challenge both students and educators within a fully integrated classroom; therefore, teachers need more knowledge concerning students on the spectrum (Bakley, 2001; Dunn, Saiter, & Rinner, 2002).

Educators innately focus on academic and behavior needs of students with ASD; however, sensory processing gets overlooked and unaddressed, resulting in behavioral outbursts from students due to an over/under stimulation of their neurological system. This sensory intake can create additional stress for the student, creating a barrier for learning. Grandin (2011) asked, “Why are we doing so much research on behavior and none on sensory?” and later continued with the remark, “We need to do a lot more research on sensory issues” (www.youtube.com/watch, 2011, min. 20).

Purpose

Teachers’ perceptions regarding their training for ASD and sensory processing are the focus of this research. A descriptive survey with a correlation design links socio-demographic data to teacher perceptions. The targeted population for this study is Kentucky middle school teachers, and the sample is representative of volunteer

participants. The questionnaire focuses on middle school teachers' perceptions of their knowledge of ASD, the sensory processing needs of students with ASD, and their preparedness for teaching strategies. Data analysis includes computing both descriptive statistics and correlations between demographic factors and teacher perceptions. The central research question for this study is: What are the perceptions of Kentucky middle school general education teachers regarding their preparation to meet the sensory processing needs that may affect students with ASD in an inclusive classroom?

Research Questions

Research confirms a high incidence of sensory processing difficulties exists in children with ASD (Grandin, 1992; Iarocci & McDonald, 2006; Schoen et al., 2009; Watling, 2001). Compared to typically developing children, individuals diagnosed with ASD present with approximately 85 percent more hypo/hyper responses to sensory features, perceptual distortions, and paradoxical responses (Keintz & Dunn, 1997). This study investigates teachers' perceptions regarding training, perceived knowledge, and implementation of classroom strategies pertaining to sensory processing and the needs of students with ASD in middle school educational settings in Kentucky. The guiding questions for this study include:

- (1) What are general education teachers' perceptions about their knowledge of ASD, and how are they affected by demographic and experiential factors?
- (2) What are general education teachers' perceptions about their understanding of the effects of Sensory Processing, and how are they affected by demographic and experiential factors?

- (3) What are general education teachers' perceptions about the adequacy of educational preparation for learning about the needs of students with ASD and Sensory Processing and how are they affected by demographic and experiential factors?

Summary

The number of students with ASD entering into the public school system continues to increase, therefore, teachers require training regarding the unique characteristics, learning styles, and presenting behaviors. These professionals have the task of preparing their students with educational instruction as well as social interaction strategies since both ASD and sensory integration impedes learning and behaviors of students.

This study collects data from general and special educators in Kentucky, using a descriptive survey with a correlation design to examine the relationships between participants' socio- (Independent Variables) and environmental (Dependent Variables) demographics. Specifically the central research question for this dissertation is: What are the perceptions of Kentucky middle school general education teachers regarding preparation to meet the sensory needs of students with ASD in an inclusive educational setting?

In Chapter I, the purpose, need, and research questions for the study are defined. Chapter II reviews the literature to address ASD, SPD, teachers' perceptions of their training, and classroom strategies

CHAPTER II: LITERATURE REVIEW

Introduction

Chapter I outlines the purpose of this study: to examine the perceptions Kentucky middle school general education teachers have regarding their knowledge of ASD, sensory processing, and their training to work with this population. Chapter II reviews the literature including the following topics: AS, Special Education and mandated laws, SPD, and Teacher Training.

Literature for this study was obtained through, but not limited to research engines: ERIC; WEBCO; Google Scholar; and EBSCO using the key words *autism, sensory processing, and teachers' perceptions on ASD and sensory processing, teacher preparedness to educate individuals with ASD, sensory behavior interventions in the classroom, and sensory behavior interventions concerning autism*. Information was gathered from books authored by psychiatrist, medical doctors, occupational therapist, parents, and individuals diagnosed with ASD. The research presented information about various aspects of ASD; however, the main focus remained consistent to acquire information about teacher' perceived knowledge about ASD and sensory processing that affects individuals on the spectrum (Hall, 2013).

Autism literature existed in two main venues: (1) scholarly journals and dissertations; and (2) articles in non-technical magazines and other related sources that are written for parents, the general public, and practicing educators. Scholarly journals and dissertations are represented in this chapter.

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) describes an umbrella term used to include autism and milder variants such as Asperger's Syndrome and Pervasive Developmental Disabilities-Not Otherwise Specified (American Academy of Pediatrics, 2001). ASD presents as a diverse and complex developmental disorder found globally in all racial, ethnic, and social groups. Diagnostically, people with ASD are affected by social and communication impairments, restricted interest, and repetitive behaviors, with the most commonly shared characteristic presenting as inherent difficulty with language (Ashburner, Ziviani, & Rodger, 2008; Marco, Hinkley, Hill, & Nagarajan, 2011).

Individuals with autism tend to be distinctly unique in how their symptoms manifest as some may find it difficult to deal with environmental changes, and require preparation ahead of time for altered routines (Shabha, 2005). At present, there are three primary areas of functioning taken into consideration when determining signs of autism characteristics (Skuller, 2011): (1) interpersonal relationships are unresponsive or abnormal when compared to typical peers, (2) language difficulty in speech and communication skills, and (3) behaviors (insistence on routine, self-stimulating behavior such as hand flapping, inappropriate laughter, lack of interest in things or other people) (Ashburner et al., 2008; Marco et al., 2011).

The American Psychiatric Association's (2013) Diagnostic and Statistical Manual of Mental Disorders (DSM-V) describes symptoms primary to autism including:

- (1) Persistent deficits in social communication and social interaction across multiple illustrative, not exhaustive;
- (2) Restricted repetitive patterns of behaviors, interests, or activities as

manifested by at least two of the following, currently or by history:

- (a) Stereotyped, or repetitive motor movement, use of objects, use of speech;
 - (b) Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior;
 - (c) Highly restricted, fixated interests that are abnormal in intensity or focus; hyper or hyperactivity to sensory input or unusual interest in sensory aspects of the environment.
 - (d) Hyper- or hypo-activity to sensory input or unusual interest in sensory aspects of the environment;
- (3) Symptoms must be present in the early developmental period;
 - (4) Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning. (299.00, F84.0)

“Most individuals with ASD experience the world differently. They experience seeing, hearing, smelling, tasting, and touching in a unique manner” (Shore & Rastelli, 2006, p. 181). Ample clinical evidence exists to substantiate sensory hyper- and hypo-sensitivities in individuals with autism; but, empirical evidence is limited (Talay-Ongan & Wood, 2000). Using a questionnaire to investigate hyper- and hypo-sensitivities in 30 young children with autism and their controls, Talay-Ongan and Wood (2000) investigated auditory, tactile, visual, gustatory, and vestibular domains. Findings revealed the group with autism displayed a significantly greater degree of hyper- and hypo-sensitivities compared to the non-autistic group across all modalities. Also, the research found that sensory sensitivity increased over age as older children expressed sensory

modulation more. Individuals diagnosed with autism present a heightened sensitivity to many things including light, textures, and particular food substances (Hall, 2013; Kientz & Dunn, 1997).

Historical Perspectives

The term *autistic*, derived from the Greek word *autos* meaning *self*, portrays the obvious detachment from the social world (Hall, 2013; O’Neil & Jones, 1997) and describes the “stand-offish” behavior of autism as extreme aloneness. In 1911, Swiss psychiatrist Bleuler first used the expression *autism* when referring to a group of characteristics in relation to schizophrenia. Later in the 1940’s, Dr. Leo Kanner, an American psychiatrist, used the expression autism more copiously when referring to individuals who were withdrawn from society; and the expression “early infantile autism” described the young children he was studying. The association between autism and schizophrenia remained linked until the 1960’s when medical professionals began to diagnose each according to their unique characteristics. In the 1970’s negative treatments were used, which included experimental drug treatments with LSD and electric shock therapy. More positive approaches began in the 1980’s with behavior therapies (Siri & Lyons, 2011).

Although autism was formally documented by Kanner, the disorder was not recognized as a distinct disorder until its appearance in the *Diagnostic and Statistical Manual-Third Edition* (DSM-III) in 1980 as *Infantile Autism* (American Psychiatric Association, 1980). The disorder was recognized by the U.S. Department of Education as a *Disability Category* in 1991 (Ruble, Dalrymple, & McGrew, 2010; Wortman,

2013). Individuals with ASD were educated in special education settings with a variety of other individuals who were diagnosed with other disabilities (i.e., mental retardation, communication disorders, and behavior disorders). Not all special education placements met the educational needs of individuals with autism (Ruble et al., 2010).

Prevalence and Etiology

The prevalence of ASD has increased dramatically since 1998 when studies at that time found one in 150 children being diagnosed with ASD. Currently, the Center for Disease Control and Prevention (2014a) reported that approximately 1 in 68 children are diagnosed with autism, a 30 percent increase since 2012. Many theories proposed for the cause of autism, starting in the 1940's when autism was blamed on emotionally absent child-rearing practices (Hall 2013; Roberts, 2007); however, researchers disputed this claim. Current studies focus on biological causes such as genetic predispositions, prenatal complications, and neurological/structural abnormalities in the brain. Studies have determined that people with autism possess a significant genetic basis, and current reports provide evidence establishing a variety of environmental influences that cause changes in the brain, including electricity and electromagnetic fields (Sage & Evans, 2011). Genetics are linked to the etiology of autism, but researchers revealed other identified factors: advanced parental age, living close to a freeway, pesticide exposure, and medically related exposures. Although not proven, neither were they ruled out (Hall, 2013; Perko & McLaughlin, 2002; Roberts, 2007; Tomcheck & Dunn, 2007).

The rate of autism within families ranges from three-to-ten percent after the birth of one child with autism, leading to a prevailing belief in the likely reoccurrence of the disorder within families (Hall, 2013). Yet, studies on twins demonstrate that autism

extends beyond a genetic disorder, as one twin could be born with ASD while the other was not (Greally, 2014). Research also supports that when increased significant immune complications occur in perinatal and infancy, these children are more likely to be later diagnosed with autism (Hall, 2013).

A number of findings have linked abnormal neurological/biological changes in individuals with ASD. Courchesne, Webb, and Scheurmann (2011, as cited in Hall, 2013) determined, “Autism is undeniably due to irregular brain development beginning in early life” (p. 8). Findings included enlarged overall brain mass, deficits in the left temporal lobe, disturbed left-hemisphere functioning (which is implicated in verbal functioning), and neurotransmitter imbalances (Comer, 2008). In order to understand how the brain works, theorists proposed ASD may be linked to stimulus over-selectivity in which attention interacts with only one component of a stimulus. Advocates explained why some individuals with ASD exhibited remarkable recall and concentration on certain things extremely well, to the exclusion of everything else (Comer, 2008; Hall, 2013).

Cognitive Functioning, Behavioral, and Socio-Emotional Concerns

Autism affects cognitive function, behavior, and socio-emotional skills and is referred to as the ultimate learning challenge due to associated language interactions. This disorder presents various characteristics such as being unmotivated, unexpected responses to reinforcement, or giving obsessive attention to irrelevant details (Perko & McLaughlin, 2002). Although persons on the spectrum display many common characteristics, a diagnosis of autism does not necessitate that all characteristics be present. Universally, no two persons appear alike (Hall, 2013; Penney, 2013; Schoen et al., 2009; Skuller, 2011; Wilkerson, 2012).

Behavioral concerns vary ranging from mild (call out answers in class) to severe (aggression) when experiencing frustration and reacting to over stimulation with tantrums (meltdowns) (Smith, 2008; Tincani, 2007). Behaviors displayed include inappropriate acting-out such as spitting, biting, hitting, throwing objects, and inducing self-harm. Acute emotional outbursts create learning barriers in the classroom which are detrimental to the learning process (Smith, 2008). Negative behaviors are typically managed by a paraprofessional when individuals with severe disabilities act out in the general education classroom. When this occurs, such support increases dependency on paraprofessionals, can interfere with peer interactions, and can undermine general education teachers' ownership of classroom discipline (Giangreco & Doyle, 2007).

Impairment of social interaction remains as a defining feature of autism. Purportedly, ASD individuals placed in mainstream schools were likely to encounter difficulties interacting with their peers. Nonetheless, advocates for inclusion of these individuals cite behavioral modeling of normally developing peers as a beneficial factor (Roberts, 2007). One of the first indications of autism includes a child's severe impairment of social relatedness. Individuals with autism demonstrate deficits in social attachments with close family members (O'Neil & Jones, 1997): struggling with emotions, eye contact, response to directives, and normal social play (Wilkerson, 2012). They appear to be in their own world or detached from their surroundings and are often misunderstood due to limitations of speech and other conventional communication abilities (Perko & McLaughlin, 2002; Skuller, 2011; Wilkerson, 2012; Wortman, 2013).

Language deficits and auditory processing challenges exhibit as core features of ASD, therefore research has typically focused on early development of these skills. In

their study, Worley, Matson, and Kozlowski (2011) selected 74 at risk toddlers (17-37 months) to investigate communication and social differences between toddlers identified with ASD and those diagnosed toddlers with a hearing impairment. The *Baby and Infant Screen for Children with Autism Traits (BISCUIT)* instrument drew comparisons and effectively differentiated between children with ASD and those with hearing problems. Communication impairment and social delays were higher in toddlers with ASD as compared with compromised toddlers with typical hearing loss and impairment (Worley et al., 2011).

Other characteristics exhibited include difficulty generalizing learned behavior from one location to another; therefore, children with ASD need opportunities to develop social competency in naturally occurring environments in the home, community, and employment (Kaiser, Hester, & McDuffie, 2001; Sperry, Whaley, Shaw, & Brame, 1999). Also, as these individuals struggle with expressing their feelings, which interferes with social interactions, their behavior becomes a method to convey feelings such as anger, confusion, frustration, happiness, or boredom. (Hall, 2013; Marco et al., 2011; Penney, 2013).

Sensory Concerns

According to Minshew and Hobson (2008), “Most reports of the sensory symptoms in autism are second hand or observational, and there is little evidence of neurological basis” (p.485). Dr. A. Jane Ayres, a researcher and pioneer in the sensory integration discipline, pioneered the term Sensory Integration Dysfunction and used it throughout her professional career (1954-1988) to describe atypical social, emotional, motor, and functional patterns of behavior related to poor processing of sensory stimuli.

Her reasoning included: (1) the theoretical model hypothesized that an underlying neurological impairment occurred to transfer sensory information efficiently between sensory systems in the brain; and (2) the term referred to the proposed intervention model, which used sensory stimuli in one domain to affect performance in another domain (i.e., the use of deep pressure/proprioceptive input to decrease over-responsivity in the tactile domain) (SPD Foundation, 2014).

Lane, Young, Baker, and Angley (2010) determined individuals identified on the spectrum are frequently observed experiencing difficulties with sensory processing. Their research ascertained children experienced significant differences in sensory processing when compared to their neurotypicals. Pollock (2009) shared findings by Ayers (1979) that some individuals with sensory impairments displayed disconnectedness, giving explanation as to why some exhibit difficulty with learning new skills, organization skills, paying attention, playing with others, and engaging in social interactions.

Individuals diagnosed with ASD often struggle with receiving sensory information such as sounds, sights, smells, touch, and taste. An estimated 85 percent diagnosed with autism exhibit sensory integration dysfunctions (Tomcheck & Dunn, 2007), causing disruptions to the series of steps needed for discerning sensory stimulus essential to producing appropriate motor or behavioral responses. Research substantiates challenges with sensory integration adversely affect learning (Hall, 2013; Penney, 2013; Schoen et al., 2009; Skuller, 2011; Wilkerson, 2012). Atypical sensory-based behaviors remains a ubiquitous feature of ASD (Marco et al., 2011). Related to sensory responses (both hypo- and hyper-), preoccupations with sensory features of objects, perceptual

distortions, and paradoxical responses to sensory stimuli were reported in 42 to 88 percent of children with autism (Baranek, Boyd, Poe, David, & Watson, 2007).

Special Education, IDEA, and the Combating Autism Act of 2006

Special Education provides educational services in content, teaching methods, and strategies designed to assist students with a classified disability while embracing a vast and complex establishment that includes government regulations and case law. The special education teacher provides expertise within the Individual Education Plan (IEP), and coordinates teacher assistants, mainstreaming, general education teachers, school administrators, and parents; the job consists of various roles much like a business manager (Kimball, 2002). Teachers work within an inclusive setting, which emphasizes that children with disabilities shall be educated in the general education setting, as well as having access to advancing in the general education curriculum (Wilkerson, 2012). Alternate, self-contained classrooms assist individuals who struggle to learn in general education environments. The added support given by special education teachers provide curriculum instruction in smaller student-to-teacher ratios, focusing on specialized instruction and interventions (Chen, 2015).

The Individuals with Disabilities Education Act (IDEA) mandates that in order for elementary and high school special education teachers to be highly-qualified, they must have a bachelor's degree; a full state certification or licensure; and have the ability to demonstrate curriculum knowledge for the subjects they teach. In their work, Todd, Beamer, and Goodreau (2014), cited a report completed by the Institute of Education Science, U.S. Department of Education in 2011 that revealed 90 percent of special education teachers were determined to be highly qualified in the nation. Nonetheless, 46

percent of districts in the nation routinely experience difficulty finding qualified special education applicants to serve student with ASD despite the IDEA law requirements (Todd et al., 2014).

The prevalence of individuals with ASD entering school systems necessitate that general education teachers be knowledgeable about individuals on the spectrum. Skuller (2011) asserts that a chronic shortage of qualified special education teachers hinders efforts to provide appropriate educational services to individuals with disabilities. Because of these shortages, too often districts rely on emergency or provisionally certified educators. Even with an increase in the number of these certifications, administrators struggle with finding qualified educators (Scheuermann, Webber, Boutot, & Goodwin, 2003). This dilemma is particularly challenging for rural schools in Kentucky where budgets are limited (Tucker, Personal Interview, 2015).

President Bush signed the Combating Autism Act (CAA; Bush, 2006) into law December 19, 2006, and authorized expanded activities related to treatment through 2011 that focused on six goals:

- (1) increased public awareness of developmental milestones.
- (2) promoted research into the development and validation of reliable screening tools for ASD and other developmental disabilities.
- (3) promoted early screening of individuals at higher risk for ASD and other developmental disabilities.
- (4) increased the number of professionals qualified to confirm or rule out a diagnosis of ASD and other developmental disabilities.

- (5) increased the number of experts able to provide evidence-based interventions for those diagnosed with ASD or other developmental disabilities.
- (6) promoted the use of evidence-based interventions for individuals at higher risk for ASD and other developmental disabilities. (Teffs & Whitbread, 2009)

The CAA (Bush, 2006) passed simultaneously with the IDEA Act to provide better education for children with disabilities; including children with ASD in general education classrooms. In order to fulfill that promise, pre-service and in-service training programs were developed and implemented to assist teachers in preparation to provide appropriate educational services to students with autism (Yeargin-Allsopp, Rice, Karapukar, Boyle, & Murphy, 2003). The Act mandated an increase in the number of individuals trained to provide evidence-based strategies for these individuals.

Parental Concerns about Education

Many parents are involved with their child's education, but communication between parents and teachers often present challenges. Todd et al. (2014) shared sentiments expressed by parents that they felt their child were not receiving a proper education when placed in an inclusive setting, but also believed that being excluded from mainstreaming was worse. Parents felt that educators would benefit from more training about ASD and SPD, particularly the nature and characteristics of ASD, and felt that educators' lack of knowledge escalated negative behaviors.

Penney (2013) shared that teachers perceived they were confident in their knowledge and preparedness for educating individuals with ASD; on the contrary,

parents and individuals felt teachers did not understand their needs at all. A major concern parents expressed was a lack of educator knowledge concerning sensory integration; which inadvertently led to teachers triggering behavioral outbursts. If a student displayed a melt-down or disruptive behavior as a result of over/under sensory stimulation, the usual outcome included the student being removed from class, given procedural school disciplines, and sometimes suspended from school. Parents maintained that if teachers gained better understanding of sensory processing, they would better serve the student utilizing sensory interventions.

Sensory Processing in Autism

Processing sensory information effectively remains imperative in regards to daily functioning as the brain produces functional body responses to data perceived from the environment. Individuals struggling with processing sensory information efficiently do not function normally. Conceivably, if sensory integration becomes skewed in children with autism, normal operation in the brain fails to occur (Murray-Slutsky & Paris, 2005; Shore & Rastelli, 2006). Normally, sensory processing transfers messages from the environment and sensations within the body via the central nervous system (nerves in the brain, spinal cord, and peripheral nervous system) where the brain interprets them and organizes purposeful responses (Grandin & Panah, 2013). Sensory integration therapy serves as one of many treatments used for individuals with autism (Hall, 2013; Murray-Slutsky & Paris, 2005).

Sensory avoidance behaviors are very common in individuals with ASD; however, sensory processing problems are not limited to defensive behaviors (Kern et al., 2006). Some individuals present as sensation seeking and add stimuli to their routine in

an effort to meet sensory thresholds, resulting in very active, continuously engaging, and excitable behaviors (Bertone, Mottron, Jelenic, & Faubert, 2005; Dunn et al., 2002).

Sensory sensitivity patterns often display in individuals as distractibility and hyperactivity, which result in complaints about their environment. They notice more sensory events than others and struggle with these stimuli habitually. The individual's life and environment often need structure to keep sensory input within controllable ranges. Children who present with low registration patterns often appear uninterested, self-absorbed, and uninteresting, and do not seem to notice what occurs around them. Those with low registration are known as *bystanders* and appear aloof and out of it. Individuals who exhibit hyper-sensitivities display very low thresholds and need very little input. They notice everything in their environment such as a light flickering (Dunn et al., 2002).

Anzalone and Williamson (2000) provided the four A's of sensory processing, which individuals use on a day-to-day basis:

- (1) Arousal: The ability to maintain alertness and transition between the states of sleep and wakefulness.
- (2) Attention: The ability to focus selectively on a desired stimulus or task.
- (3) Affect: The emotional components of behavior.
- (4) Action: The ability to engage in goal directed behavior. (p. 145)

Strategies that help a child with ASD to increase arousal (alerting) include chewing or sucking on sour candy or sitting on a movement cushion; whereas strategies used to decrease arousal (calming) include holding fidget toys, playing soft music, or dimming the lights. Also, when participants engage in activities that supplied deep

pressure, such as a firm hug, or lying under a beanbag, calming effects are often observed (Mulligan, 2001).

Sensory Processing: Sensory Integration

Sensory processing disorder is very complex and difficult to understand, particularly when multiple sensory challenges occur at once. Understanding these difficulties provides direction for intervention planning necessary for achieving success in the educational environment (Tomchek & Dunn, 2007). Kranowitz (2003) describes SPD as the “inability to respond appropriately to ordinary experiences and occurred when the Central Nervous System (CNS) processes sensations inefficiently” (p. 9). Irregularities in the sensory input of sound, vision, touch, taste, smell, proprioceptive, and vestibular cause abnormalities in the way this information is received when dealing with more than one sensory channel at a time. As a result, irregularities in sensory intake manifest themselves as the brain attempts to identify the sensory channel through which the stimulation should be collected (O’Neil & Jones, 1997).

According to Ayers (1979), humans have five senses: visual, auditory, gustatory, olfactory, and tactile. Two lesser known senses include proprioceptive and vestibular senses. The following define the seven senses:

- Visual sense: processed through the retina of the ocular or eyes
- Auditory: the outer ear perceived sound waves
- Gastric: the tongue’s taste buds, which include salty, bitter, sweet and sour
- Olfactory: the ability to smell odors in the air with the nostrils
- Tactile: receptors that live on human skin which process the environment

- Proprioceptive: sensory information processing tied to the stretching and flexing of the bodies' muscles with everyday movement and exercise.
- Vestibular: the inner ear influenced by gravity and movement of the head and neck.

Research regarding challenges individuals with autism have associated with processing these senses remains limited, with most studies relying on parental or self-reports.

Auditory

Rogers and Ozonoff (2005) investigated findings on auditory stimuli, which provide evidence of sensory processing difficulties for individuals with autism, including both non-responsiveness and under-responsiveness. Recent electrophysiological evidence suggests children with ASD experience a deficit in automatic detection of change in auditory stimulation and respond less to changes in sounds than their neuro-typical peers. These findings remain consistent with behavioral observations of auditory filtering difficulties that were experienced by children with autism (i.e., not responding when someone called their name). Individuals on the spectrum who experience sensory processing difficulties react to sounds by initiating behaviors such as holding hands over their ears when sounds appeared normal to their peers, disliking loud sounds resulting in a melt-down, or not responding to verbal directions.

Visual

Individuals with ASD exhibit atypical visual behaviors, construed as avoidance or even fear of visual inputs, such as squinting, covering their eyes in bright lights, or wearing sunglasses in-and-out of doors, or seeking other visual stimuli like twisting fingers in front of their eyes (Marco et al., 2011, Westling & Fox, 2000). Various

differences were found in the visual complications of individuals with ASD in the literature. On the other hand, Klin (2005) used Magnetic Resonance Images to determine eye tracking and found that activation of the temporal lobe, occipital lobe, and amygdala (the brain structure responsible for autonomic responses associated with fear) decreased in typical individuals. Furthermore, studies of face processing using an electroencephalogram, often called EEG, found convergent evidence of differences between typical individuals and individuals with autism. Such differences are likely detrimental to the social interactions of individuals with autism.

Tomcheck and Dunn (2007) studied 281 children between the ages of 3 and 6 years with ASD and typically developing toddlers. Ninety-five percent of the individuals with ASD demonstrated some degree of sensory processing dysfunction on the *Short Sensory Profile*. Avoidance of eye contact and inefficient use of eye gaze proved early detectors of social weakness in infants. A study conducted by Talay-Ongan and Wood (2000) found that some children were inclined to fixate in space and spent long periods of time concentrating on and examining objects and pictures.

Gillingham (1999) reported the work of Dr. Lorna Wing who found that individuals with ASD have problems understanding of signals sent to the body via of the senses, especially sight and hearing. The eyes and ears of individuals diagnosed with ASD appear normal, but the visual and auditory signals to the brain do not seem to link with an understandable picture of the outside world. Disconnectedness of visual input causes misreading of messages to the brain, which results in misunderstanding of gestures, and, thus, affects communication. According to Wing, participants present behavior problems when they became frustrated by their inability to communicate.

Tactile

Individuals with ASD often respond with tactile defensiveness presented as either hypo- or hyper-sensitive reactions based on atypically low- or high-thresholds for sensory input. Talay-Ongan and Wood (2000) reported that children responded with tears and distress to innocuous experiences such as brushing teeth, touching sticky substances, getting caught in the rain, or wearing wet clothing. Consequently, individuals with ASD pursued sensory inputs such as touching long hair, water, soft towels, sand, etc. in order to balance their sensory system. Parents reported failure to react to pain, bee stings, burns, and not crying after a hard fall.

Minschew and Hobson (2008) administered the Tactile Functions Domain of the *Luria Nebraska Test* to assess tactile sensation, tactile inattention, finger anoxia (inability to recognize and identify objects or persons), stereo-gnosis (ability to perceive and recognize the form of an object in the absence of visual and auditory input), and finger-tip writing. Participants consisted of 60 high functioning individuals with ASD of all age levels, and 61 typical in the control group. They found significant differences between the two groups in self-reported sensory sensitivities, with individuals with ASD reporting atypical responses to various stimuli. Some reported differences were facial recognition (denoted as face blindness), pain thresholds, and response to tactile sensory information (such as hyper- or hypo-sensitivity to sounds, light, smells, and touch).

Olfactory

In their study, Talay-Ongan and Wood (2000) also explored differences in olfactory responses between typical children and those with ASD. They acknowledged that their data were limited to participant self-reporting and observations by parents. Individuals with autism reacted to smells causing them to hold their nose, utter total

disgust to certain smells, or engage in long drawn breaths to take in more of a smell.

Some children in the ASD group appeared oblivious to many smells; others sought out smells of soap, garbage or feces; still others did not seek any aromas.

Gastric

Research reports some children with ASD display hypersensitivity to certain food textures, tastes, smells, and/or appearance that leads them to avoid and restrict some foods. For example, researchers Talay-Ongan and Wood (2000) found that gastric sensitivities were prominent in parent anecdotal comments as their child had a very limited diet. Food textures such as soft, lumpy, or mushy appeared as determinants for the rejection of particular foods. Other gastric related behaviors included: touching, smelling, breaking foods into small pieces, and pica (ingestion of non-food objects).

Vestibular

Vestibular sensory integration involves taking information pertinent to movement of the head and body to provide support for balance, coordination, eye control, attention, security of movement, emotional security, and in some language development. Participation in activities such as swinging, jumping, and bouncing are vital for strengthening sensory processing abilities and are referred to as vestibular sensory input that regulates systems and modulates hyper- or hypo-responses (Yack, Aquilla, & Sutton, 2002). Some signs of vestibular dysfunction include bumping into tables and chairs, falling out of a chair, awkward gait, and difficulty maneuvering in crowds.

Talay-Ongan and Wood (2000) developed a parental survey, *Sensory Sensitivity Questionnaire-Revised (SSQ-R)*, to compare 30 children with autism (ages 4-14) with 30 typically developing peers. Within the vestibular domain, several parents reported that

their children with ASD lacked an awareness of customary behaviors concerning personal space, such as moving within close proximities to total strangers or touching another person's hair without permission. Documentation also provided information concerning behaviors where some children with ASD totally avoided activities involving whirling or spinning, others became ill after such activities, while still others showed no signs of dizziness. Their findings supported research indicating that children diagnosed with ASD frequently perceived sensory information differently than typically developing peers.

Proprioception

Proprioceptive sensory integration communication provides information of where the body is in relation to space, assisting in keeping balance. Researchers Blanche, Bodison, Chang, and Reinoso (2012) evaluated how proprioceptive difficulties affect children with ASD using a researcher developed questionnaire, *Comprehensive Observations of Proprioception*. Participants were comprised of 32 children with ASD, 26 with developmental disabilities (excluding ASD), and 28 typically developing children. Results indicated that children with ASD displayed distinct patterns of proprioceptive processing difficulties, such as tiptoeing, pushing others or objects, falling, crashing, and running, and that "proprioceptive difficulties may contribute to decreased motor planning and postural control leading into disruptive behaviors that negatively affected their participation in daily task" (Blanche et al., 2012, p. 623).

Individuals with ASD varied in the number of symptoms and severity of sensory challenges, leaving teachers with the difficult task of finding programming that assisted each child while also attempting to take into consideration the sensory parameters noted

to have a negative effect on behavior. Yet, sensory modulation “allows a person to achieve and maintain an optimal range of performance and to adapt to changes in daily life” (Tomchek & Dunn, 2007, p. 197). Although challenging for teachers, such programming supports individuals in regulating sensory responses so that the reaction they present are more acceptable in the school environment (Baranek et al., 2007; Kranowitz, 2003).

Teacher Training

Training for teachers continues to be a large barrier in providing successful programming for individuals with autism (Skuller, 2011) as they must understand individuals with ASD in an inclusive setting as well as the signs of SPD (Andrews & Lupart, 2000; Bellini et al., 2011; Bunch, Lupart, & Brown, 1997; Iarocci & McDonald, 2006; Leblanc et al., 2014). Cassady (2011) found that the negative attitudes of many teachers toward inclusion were couched in concerns about the negative consequences inclusion created for all other students. In her study, teachers voiced that mainstreamed students with ASD created a burden and decreased the efficacy of teaching for typical peers and brought feelings of frustration and guilt because of the time taken away from nondisabled students. Also reports included concerns about the inordinate amount of time required for additional meetings, required documentation in addition to mandated paperwork, and collaboration with other specialists. Horne and Farrell (2009) concurred that much frustration comes from teachers feeling inadequately prepared to teach these individuals. Despite these negative responses, other teachers reported positive attributes of having an inclusive learning environment as it aided in the social development for both students with special needs and those without. Teachers noticed that peer interactions

among both groups through modeling and simple physical proximity promoted an increase in self-esteem and profoundly affected the sense of belonging to these learners (Horne & Farrell, 2009).

Research has established that teacher education related to sensory processing greatly enhances educators' chances to achieve academic and behavioral success with children with autism (Ainscow, 1999; Amado, 1993; Andrews & Lupart, 2000; Bellini et al., 2011; Grandin & Panah, 2013; Leblanc et al., 2014; Schoen et al, 2009; Shattuck, 2006). Yet, research in the past fifty years has shown that general educators often perceive they do not have adequate training to teach children with special needs in an inclusive environment (Kilanowski, Foote, & Rinaldo, 2010). Thus, it is not surprising that, in her survey of teachers, Armour (2012) found no evidence that they were providing sensory interventions to support children with autism in the classroom. Additionally, many teachers argue that training and professional development need to be made more easily available and not restricted to limited college courses (Hayes, Baylot, Williamson, Black, & Winsor, 2013).

Teacher Perceptions about Autism

Individuals with ASD represent a heterogeneous group exhibiting variations in the severity of their disability and with various symptoms; therefore, no one instructional method succeeds with every individual. To choose the best method of instruction for each child, teachers need to be knowledgeable in more than one approach (Scheurmann, Webber, Boutot, & Goodwin, 2003). Research has found that with an increased awareness of autism, teachers were better able to identify characteristics presented by ASD individuals (Roberts, 2007). Additionally, their attitudes toward inclusion, their

confidence in their skills, and their ability to access resources support the success of the inclusion process (Skuller, 2011; Williamson, 2013). Also, the teacher-student relationship affects a child's social status in the classroom, thus demonstrating the importance of this relationship (Roberts, 2007).

Classroom Strategies and Interventions

Odom, Collet-Kilingerberg, Rogers, and Hatton (2010) have identified 27 “evidence-based practices” that focus on intervention strategies to assist learners with ASD. Their work describes teachers participating in trainings related to these strategies and various methods to successfully implement them. They also emphasize the need for continued training, administrative support, and planning time for teachers to implement these evidence-based practices successfully. Another component of their work focused on the realization that with the increase of individuals diagnosed with ASD, more services will be required to identify effective educational interventions.

Scheuermann et al. (2003) found limited data regarding personnel preparation in autism and no data regarding the number of specialists trained in ASD. This lack of preparation is reflected in both school personnel preparation programs, and, in particular, pre-service teacher training, even as data suggest a steady increase in the number of individuals identified with ASD entering the school system (Shattuck, 2006). It is arguable that if educational programs were made accessible in summer, evening, and weekend formats, teachers could continue to teach while expanding their skills to meet the needs of their identified students (Tucker, Personal Interview, 2015).

On the other hand, Roberts (2007) found that teacher who were provided sufficient knowledge of ASD felt empowered to work more effectively with their

students and were confident in their ability to create environmental conditions within the classroom to support individuals with ASD.

Individuals with ASD often require motivation and reinforcement towards fostering independence. Dawson and Watling (2000) found that teachers who understood these principles designed and organized their classrooms using various strategies, written schedules, visual cues, and organizational strategies. Sensory intervention strategies involved the use of planned and controlled sensory experiences including, but not limited to, vestibular, proprioceptive, and somatosensory activities such as swinging, deep pressure touch, and tactile stimulation. These approaches, also known as sensory modulation strategies, were commonly implemented in a classroom environment, and were beneficial for individuals diagnosed with ASD when they demonstrated difficulty with filtering and adjusting in response to sensory stimuli. For example, most schools used fluorescent lighting, which the average person was able to block out the humming and flickering caused by this type of lighting, the sensory stimulation became quite irritating to individuals with ASD. Consequently, individuals suddenly cued into the sound and flickering, losing track of everything else was going on around them (Kern et al., 2006).

Traditionally, special education teachers and general education teachers have very separate roles. The special education teacher assumed responsibility for individuals with disabilities when in special education settings. General education teachers accepted responsibility for individuals when they attended the mainstreamed environment (Simpson, Boer-Ott, & Smith-Myles, 2003). As the pedagogy of special education has

involved, so has the settings in which a student received their free and appropriate public education.

Lerman, Vorndran, Addison, and Kuhn (2004) reported that teachers receive relatively little, if any, instruction in evidenced-based practice for children with autism. This poses a serious concern considering the number of ASD individuals' entering into school districts keeps increasing. Research has determined service training related to autism remain crucial for all teachers, whether in special or general education. Many argue that every teacher and administrator should be afforded the opportunity to be educated in all factors related to understanding individuals with ASD (Roberts, 2007; Skuller, 2011; Wilkerson, 2012).

A major component for planning adequate programming for individuals with autism depends on school administrators, as it is their responsibility to ensure successful learning opportunities for all individuals, including individuals who have disabilities (Bays & Crockett, 2007). Principals, as well as general and special education teachers, need to be well versed in the unique needs of individuals attending special programs (Skuller, 2011).

Teacher Training and Professional Development

Principals traditionally lack experience dealing with special education populations in their schools, and, unfortunately, typically prefer not knowing (Lashley, 2007). Yet their leadership in providing teachers with the knowledge and tools to support the learning of all students remains critical. Perceptive leaders can strengthen the efficacy of all teachers by identifying paradigms that develop successful team performance (Ross & Gray, 2006). Instructional leadership can serve as “a tool with the potential to help

educators fulfill the individualized purpose of the IDEA by ensuring that a qualified student receives a free appropriate public education that emphasizes special education” (Bays & Crockett, 2007, p. 145).

A study by Wilkerson (2012) revealed 67.4 percent of regular education teachers reported having a student with ASD in their class. Of these teachers, 84 percent recounted no formal training on ASD, and 81.3 percent shared that the training they received was inadequate. Wilkerson also found that teachers are not receiving sufficient training opportunities once they are employed. He recommended future research which examines more PD for general education regarding ASD as these teachers had consistently expressed misgivings about teaching children with autism due to feelings of inadequate preparation (Busby et al., 2012). Many researchers suggest that as teachers feel competent in their abilities to teach children with autism, they become motivated to address the challenges, and accept responsibility for teaching these children (Rodriguez, Saldana, & Moreno, 2011; Skuller, 2011; Wilkerson, 2012).

Hayes et al. (2013) maintained that efforts are needed to educate a new generation of teachers who are more adequately prepared to work with students with ASD, as well to provide teachers the tools necessary to meet appropriate expectations in the classroom. Their research revealed that current opportunities for professional development and college courses alone are not sufficient to meet the needs of teachers working with students with ASD. Wilkerson (2012) agreed stating, “Not all teachers are adequately trained on autism before entering the school system” (p. 124). Similarly, Busby et al. (2012) determined it is imperative for teachers to be more adequately prepared through educational programs when dealing with the realities of having individuals with ASD in

the classroom. Teachers in Kentucky are certified in special education according to the Kentucky Authority Regulations: *16 KAR 4:020. Certification requirements for teachers of exceptional children* states: “Certification Requirements for assignment of Special education Personnel, ...section (10) Autism (a) A teacher shall be assigned to serve pupils identified with autism at any grade level based on the learning characteristic(s) and services needs of the child, and (b) A teacher assigned to pupils identified with autism shall possess a certificate for teaching exceptional children” (Kentucky Department of Education [KDE], 2015). To meet this need, the Kentucky Autism Training Center provides teachers information from the National Professional Development Center on ASD and has taught cadres (approximately 60 teachers and therapists) regarding ASD through regional special education cooperatives; these individuals in turn have trained other teachers with the specific purpose of providing professional development to their respective districts (Coldiron, 2010).

This chapter reviewed the literature regarding the history of ASD, its characteristics, SPD (involving the seven senses), the impact of inclusion on schools and teachers, and teacher training. Chapter III will outline the methodology of this research, focusing on the participants, instrumentation, methods of analysis, and limitations of this study.

CHAPTER III: METHODOLOGY

Chapter II explored the literature concerning ASD, sensory processing, and teachers' perception regarding their classroom preparation for working with these students. With the increase in numbers of students diagnosed with ASD, most schools provide education for these students in mainstream classes with their peers. This common practice has greatly changed the educational strategies general education teachers need, as well as the classroom dynamics they and their students experience. Chapter III describes the methodology of this study including research design, participants, and instruments/survey, procedures, and data analysis. Consistent with other research, limitations existed in this study and are further explained in this chapter.

Research Design

The data set for this study served to answer the three research questions regarding general education teachers' perceptions about ASD, SPD, and the adequacy of educational provisions to assist in teacher preparedness. Additional demographic questions included in the survey allowed for comparison of teacher's responses across various demographics of the participants.

This study utilized a descriptive survey with a correlation design to examine the relationships between participant socio-demographics and the themes addressed in the research questions. The socio-demographic factors of the middle school general education teachers comprised the independent variables, while their perceptions of their knowledge of ASD, sensory processing, and strategies used in the classroom, provided the dependent variables (Figure 1).

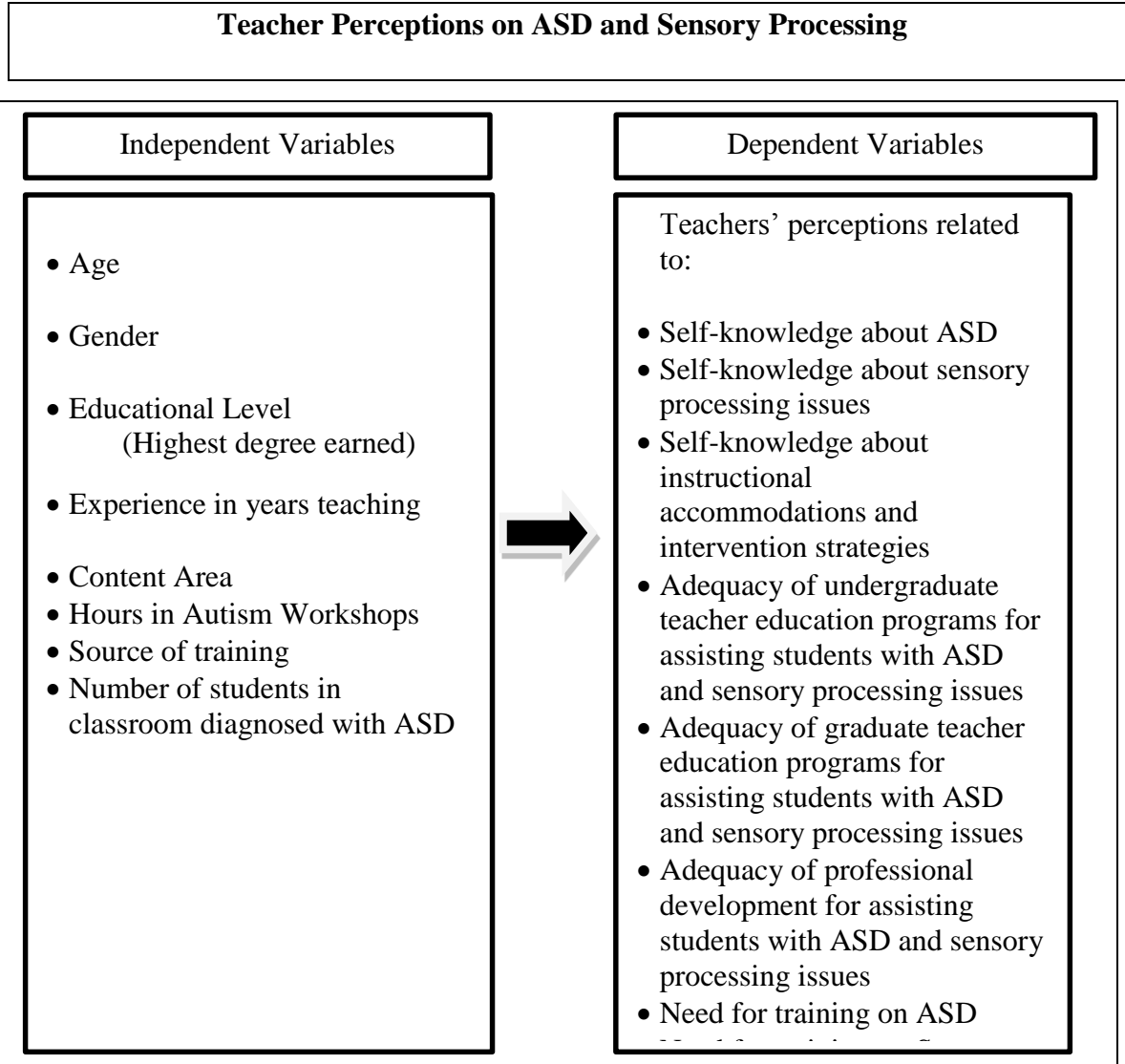


Figure 1. Logic model for teacher perceptions on ASD and sensory processing: correlation of socio-demographic factors to teachers' perceptions of their preparation and understanding of ASD, sensory processing, and classroom instruction for students with ASD.

Approval for this study was obtained from the Western Kentucky University Investigative Review Board (IRB) due to the involvement of Human Subjects. This process was completed in an expedited manner due to the facts that the teachers were adults and not part of a protected group. After receiving notification of approval, data

collection began adhering to the rules of privacy which safeguards participants' information as required by law (Appendix A).

Research Participants

The population for this study included Kentucky middle school teachers in public schools from the eleven educational regional divisions during the 2014-2015 school year. The focus on middle schools developed as the KDE (2013) reported that a higher number of students are diagnosed with ASD in these grade levels as compared to elementary and high schools.

All participants volunteered to complete the survey, and taught in sixth, seventh, and eighth grade, representing diverse locations, communities, and socioeconomic structures from various regions in Kentucky. The teacher sample consisted of 61 participants, with 44 finishing the survey resulting in a 72 percent completion rate. Forty-two identified as female; and 40 participants reported their teaching experience as ranging from 1 to 39 years, with an average of 13.2 years. Self-reported ages spanned from 24 to 65 years, with an average of 41.7 years. Although the study began with a focus on regular education teachers, 7 of the 41 respondents reported to be certified in special education (SPED). The average number of students diagnosed with ASD in the participants' classroom included 1.5, with a minimum of zero and a maximum of ten. These demographic results allowed for a better understanding of the participants, and further analysis of their experiences in relation to their perceived levels of knowledge.

Instrumentation

The survey for this study was created by the researcher to obtain data concerning teachers' perceptions of ASD, SPD, and their professional preparation for working with

this population. The questionnaire utilized questions consistent with the empirical research questions as illustrated in Figure 1 (previously presented in this chapter).

The survey (Appendix A) consisted of five sections with the first providing the socio-demographic characteristics of the respondents. Sections II-IV collected teachers' perceptions regarding the various research questions. The survey contained a final qualitative section collecting teachers' thoughts about working with students with ASD and sensory processing, but these responses were not analyzed for this study.

The *Kentucky Middle School Teachers' Perceptions about ASD and Sensory Processing* survey was developed by the author under the guidance of a committee with expertise in various fields consisting of an ASD program director, a former Kentucky Department of Education consultant, and the director of the Educational Leadership Doctoral Program. Although the questionnaire was designed after viewing various existing instruments from related research, it was created specifically for the research questions of this study. Pertinent changes to the survey were completed to assure understanding and clarity for the participants. Data collection and coding remained consistent with guidelines outlined by the IRB in order to maintain confidentiality for human subjects, with all raw data stored in a secure electronic format for five years.

Procedures

The researcher contacted school superintendents in Kentucky's regional education districts via phone and e-mail communication to obtain permission to administer the survey to their middle school general education teachers. Superintendents who supported participation in the study forwarded the research information to respective principals, who then forwarded the information to their teachers. Before beginning the survey,

superintendents and teachers were provided directions regarding how to complete and submit the questionnaire. As stated in the IRB, participation in the study required minimal risk, and their participation in the online survey served as their consent signature (Appendix B). The researcher forwarded the survey to teachers through an electronic survey system, which allowed completion of the survey at their convenience. Participants exited the survey at any time if they chose to do so. The introduction and survey were written with the intent to make the study welcoming and efficient, allowing participation during planning times or other breaks in the work day when they were not actively engaged with students. The researcher understood time constraints that occur during the teaching schedule.

Data Analysis

Data collected within the electronic survey system presented the number sets in an organized manner for easy review by the researcher. These data were transferred into the *Statistical Package for Social Sciences* (SPSS), a software program for quantitative research. Descriptive statistics were calculated on socio-demographic factors and teachers' perceptions of the topics in the survey; additional correlation and regression statistics were carried out as appropriate for the logic model present in Figure 1.

Responses were tabulated and evaluated to determine the teachers' perceptions regarding the questions. This study also identified teachers' awareness regarding educational strategies for students identified with ASD and collected pertinent information on teachers' perceptions about any future continued education opportunities they felt would be beneficial. For each survey question, means, variances, and standard deviations were calculated when applicable. Based on aggregated responses, percentage

calculations determined which variables were important for further analysis. Although the survey contained some open-ended responses, these data were not analyzed for this research

Limitations

Several limitations to the study emerged during the research that produced probable potential effects on the study. Timing regarding the distribution of the survey to the sampling served as profound deterrent on the return quotient. The survey completion time started in mid spring, a time when the public schools began the state mandated, end-of-year testing. A second follow up on the survey was not provided to the participants, posing yet another constraint because of time limitations and the end of the school year. The goal completion rate of at least 100 participants was not met. Also seven SPED teachers decided to contribute by completing the survey. Their information proved interesting for the research, but they were not specified in the original research questions.

Another limitation existed due to the fact that participation in the study was voluntary. Information was sent to superintendents across regional districts of the state of Kentucky. Only a limited number of superintendents received a courtesy call before the email was distributed to inform them about the study and survey, again because of time constraints. Procedurally, superintendents needed to communicate information about the surveys to the principals. If this process did not occur, then the middle school teachers lacked awareness of the study. Some superintendents responded with positive comments and provided assurance that teachers would be encouraged to participate; others sent correspondence of regret that their teachers would not participate due to various responsibilities within the school. The researcher knew little information regarding which

regions participated in the study since the survey was sent electronically, and teachers did not have to identify their school district location.

Bias regarding various topics hinders research outcomes, and the researcher understood that biases existed concerning ASD among superintendents, principals, and teachers. For instance, participants familiar with someone who was diagnosed with ASD (such as family, friends, students, etc.) may have had a stronger desire to participate in the study. However, administrators and teachers who did not experience a personal connection with an individual with ASD or who experienced a negative interaction with parents or a student could lack understanding regarding the potential value of the survey.

Other weaknesses within the study, include participants' attitudes toward atypical students as compared to typical students, survey design (e-mailed survey vs. personal delivery), as well as the limitations associated with using a survey to gather teachers' perceptions about ASD, sensory processing, and classroom preparedness.

Summary

General education middle school teachers completed a survey to obtain information about teachers' perceptions concerning ASD, SPD, and educational preparation to work with students on the autism spectrum. Research surveys were distributed to Kentucky middle school teachers via email across all regions of the state to collect data representative of schools in rural, suburban, and inner city locations. This study used a quantitative design with all information gathered via a web-designed survey. The population for this study started with middle-school, general education teachers only, but responses returned from seven teachers who identified as SPED certified. The relationship between the independent and dependent variables provided the correlation

between teacher demographics and perceived knowledge about ASD and sensory processing.

In this chapter, the method used for this research was explained using an electronic survey completed by middle school teachers, both general and special educators. Tabulations of the numbers were discussed as well as the limitations of the study. Chapter IV will present the results from the analysis of the research questions, highlighting significant outcomes as well as some comparisons of results.

CHAPTER IV: ANALYSIS OF DATA

Chapter III discussed the participants and survey used for this research which focused on the perceptions of middle school general education teachers regarding ASD, SPD, and their need for further professional development. The computer programs used for the survey and analysis of the data of the study were outlined and well as the limitations of the study. Chapter IV discusses the results of this study, including the key data sets and findings.

Demographic Data

The number of students entering into public schools with the diagnosis of autism is increasing rapidly, with a current prevalence rate of 1 out of every 68 children live births (Center for Disease Control, 2014b); this increase in number indicates that teachers and administrators need to expand their knowledge about this disability. Teachers in the general education classroom are challenged with planning, programming, and providing provisions as covered in their IEP. Research indicated that teachers who felt inadequately prepared to teach this population exhibited a greater level of stress and wanted additional professional development (Scheuermann et al., 2003; Skuller, 2011). “The complexity of knowledge and skills needed to effectively teach the special needs population, especially children with autism, requires considerable training” (Skuller, 2011; Wortman, 2013).

This correlational research study examined the relationship between teachers’ demographic information and their perceptions about ASD, SPD, and educational preparedness. The research survey examined how individual teacher characteristics influenced their perceptions of the aforementioned variables.

There was one Null variable in this study: SpedTeachNull. The variable is the result of a transformation of qualitative data to quantitative data. SpedTeachNull was the result of an open ended question which asked teachers to identify the primary subject they taught; SPED teachers received a "1," all else a "0."

Descriptive Statistics

All research questions in this study required an examination of descriptive statistics for both independent and dependent variables, with results reported in Table 1. The majority of teachers were general education teachers (83.7 percent), with 16.3 percent of the participants being identified as SPED teachers. Overall, the participants of this study were predominately female (78.5 percent), which is consistent for Kentucky (KDE, 2015). The average age of participants in the survey was 41.7. Also, years of experience was listed as a choice on the survey providing information on the relationship between chronological age and years teaching; the average for this variable was 13.2 years with 93 percent of participants responding.

Data Analysis Procedures

The researcher conducted a non-experimental, cross sectional, explanatory, correlational study, with data collected during one period of time. A simultaneous multiple regression model was completed to determine if teacher demographics and experiential factors influenced teachers' perceptions about ASD, SPD, and classroom preparedness when teaching students on the spectrum. Results are presented using a brief discussion and table format for each of the questions.

Table 1

Descriptive Statistics for All Variables

Variable	<i>M</i>	<i>SD</i>	Minimum	Maximum	Range	Respondents
KnowledgeASD	2.776	0.948	1	5	4	50
KnowledgeSPD	2.873	1.092	1	5	4	50
UGLevel	3.738	1.013	1	5	4	49
GLevel	3.738	1.215	1	5	4	42
PD	3.84	1.221	1	5	4	46
Age	41.76	10.98	24	65	41	41
Gender	1.79	0.415	1	2	1	42
YearsExp	13.21	8.789	1	39	38	40
SpedTeachNull	0.16	0.373	0	1	1	59
HoursPD	7.71	15.64	0	80	80	31
NumASDinClass	1.57	2.007	0	10	10	37
CompiledPrep	3.88	0.990	1	5	4	42

Note: KnowledgeASD = grand mean of ASD knowledge after calculating individual means across ASD-related items; KnowledgeSPD = grand mean of SPD knowledge after calculating individual means across SPD-related items; UGLevel = grand mean of undergraduate level of preparation in ASD after calculating individual means across items; GLevel = grand mean of graduate level of preparation in ASD after calculating individual means across items; PD = grand mean of professional development in ASD after calculating individual means across items; YearExp = Number of years of teaching experience; Gender = 1 – Male, 2 – Female; SpedTeachNull = 0 – General Education Teacher, 1 – SPED Teacher; HoursPD = number of hours in ASD training; NumASDinClass = number of students with ASD teacher reported in classroom; CompiledPrep = grand mean of combined UGLevel, GLevel, and PD preparation in ASD after calculating individual means in each area.

Research Questions

Question 1: *What are general education teachers' perceptions about their knowledge of ASD, and how are they affected by demographic and experiential factors?*

In order to determine general education teachers' perceptions about their knowledge of ASD, data were collected using seven items about their knowledge of autism measured by a Likert-type scale with the following range: 5 – Very High

Knowledge, 4 – High Knowledge, 3 – Medium Knowledge, 2 – Low Knowledge, 1 – Very Low Knowledge. Results are shown in Table 2. The overall mean scores (*M*) ranged from 2.55 to 3.32, and standard deviations (*SD*) ranged from .95 – 1.14, indicating that on average teachers felt that their level of knowledge regarding ASD was sufficient. Teachers felt most prepared in their knowledge about specific disorders on the ASD Spectrum and least prepared regarding the impact of ASD on emotional control.

Table 2

Descriptive Statistics for ASD Knowledge Components

Variable	<i>M</i>	<i>SD</i>
1. Recognizing characteristics of ASD	2.68	1.06
2. Neurological Concerns	3.14	1.14
3. The specific disorders on the ASD Spectrum	3.32	0.98
4. Impact of ASD on social skills and adjustments	2.57	1.04
5. Impact of ASD on emotional control	2.55	1.02
6. Impact of ASD on behavior	2.59	0.98
7. Impact of ASD on learning	2.63	0.95

In order to determine the relative impact of demographic and experiential factors of perceived knowledge of ASD, multiple regressions were run. Analysis of question 1 began with the inclusion of all variables as independent variables in order to determine what significance the variable held. After multiple regressions were run on all demographic and experiential factors, the best fit regression (Table 3) showed that number of ASD students (NumASDinClass) in the classroom and amount of professional

development (ProfDev) were the most predictive factors. Having a student diagnosed with autism in their classroom was significantly negatively related to the perceived knowledge teachers had about ASD. In essence, the more students with ASD in their classroom, the less confidence teachers felt regarding their knowledge of ASD. On the other hand, professional development had a significant positive coefficient, indicating the more training teachers received, the more confident they felt.

Table 3

Best Fit Regression of ASD Knowledge on Experiential Factors

Variable	B	SE	Beta	<i>t</i>	Sig <i>t</i>
(Constant)	1.172	0.436		2.685	0.011
NumASDinClass	-0.137	0.051	-0.292	-2.658	0.012
PD	0.511	0.101	0.6	5.069	0.000

Question 2. *What are general education teachers' perceptions about their understanding of the effects of Sensory Processing Disorder, and how are they affected by demographic and experiential factors?*

To determine general education teachers' perceptions about their knowledge of SPD, six items were examined using a Likert scale with the following range: 5 – Very High Knowledge, 4 – High Knowledge, 3 – Medium Knowledge, 2 – Low Knowledge, 1 – Very Low Knowledge. The overall mean scores (*M*) ranged from 2.76 to 3.18, and the standard deviations (*SD*) ranged from 1.10 – 1.19 (Table 4). Teachers felt most prepared in their knowledge of SPD related to neurological connections between the brain and sensory systems and the least prepared in the impact SPD has on behavior.

Table 4

Descriptive Statistics for SPD Knowledge Components

Variable	<i>M</i>	<i>SD</i>
1. Recognizing problems related to sensory processing	2.94	1.10
2. Neurological connections between the brain and sensory systems	3.18	1.19
3. Impact of sensory processing on social skills and adjustments	2.78	1.15
4. Impact of sensory processing on emotional control	2.80	1.12
5. Impact of sensory processing on behavior	2.76	1.13
6. Impact of sensory processing on learning	2.78	1.13

Regression analysis for question 2 began with the inclusion of all variables to determine what significance the variable held (Table 5). Once more, after trial and error, a regression analysis determined that the variables yielding the most significance for teachers' perceptions about sensory processing included number of students with ASD in the classroom and the amount of professional development teachers had completed. Again, having a student diagnosed with autism in their classroom was significantly negatively related to the perceived knowledge teachers had about ASD. Also, professional development had a positive coefficient, indicating that training boosted teacher confidence.

Table 5

Best Fit Regression of SPD Knowledge on Experiential Factors

Variable	B	SE	Beta	<i>t</i>	Sig <i>t</i>
(Constant)	0.661	0.448		1.475	0.149
NumASDinClass	-0.137	0.058	-0.263	-2.357	0.024
PD	0.644	0.105	0.683	6.111	0.000

Question 3. *What are general education teachers’ perceptions about the adequacy of educational preparation for learning the needs of students with ASD and Sensory Processing Disorders and how are they affected by demographic and experiential factors?*

Research question 3 required an examination of descriptive statistics for the three types of training: undergraduate level, graduate level, and professional development (PD). Each area was the compilation of eight items concerning teacher perceptions about the adequacy of their training on ASD and SPD. Information was gathered using a Likert scale with the following range: 5 – Very High Adequacy, 4 – High Adequacy, 3 – Medium Adequacy, 2 – Low Adequacy, 1 – Very Low Adequacy. For adequacy of undergraduate level training, the overall mean scores (*M*) ranged from 3.26 to 4.14, and standard deviations (*SD*) ranged from 1.00 – 1.42 (Table 6). Teachers reported the highest adequacy of ASD and SPD training occurred in their general education classes but reported the least adequacy in their number of special education classes.

Table 6

Descriptive Statistics for Undergraduate Level of Training

Variable	<i>M</i>	<i>SD</i>
1. Number of special education	3.26	1.42
2. Coverage of ASD in general ed. Classes	4.14	1.00
3. Coverage of ASD in special ed. Classes	3.42	1.15
4. Coverage of sensory processing general ed. classes	4.06	1.11
5. Coverage of sensory processing special ed. classes	3.63	1.14
6. Coverage of accommodations for ASD	3.69	1.12
7. Coverage of instructional interventions for ASD	3.69	1.14
8. Coverage of accommodations for sensory processing	3.82	1.13
9. Coverage of instructional interventions for sensory processing	3.86	1.12

Similarly, for adequacy of graduate level training, the overall mean scores (*M*) ranged from 3.73 to 3.91, and standard deviations (*SD*) ranged from 1.19 – 1.26 (Table 7). Teachers reported the highest adequacy in graduate preparation related to coverage of instructional interventions for ASD and the number of clock hours devoted to SPD. In contrast, they reported least adequacy in their graduate coverage of instructional interventions for ASD.

For adequacy of PD, the overall mean scores (*M*) ranged from 2.16 to 2.34, and standard deviations (*SD*) ranged from .97 – 1.12 (Table 8), with means notably lower than teachers' reported adequacy of both their undergraduate and graduate training in ASD and SPD.

Table 7

Descriptive Statistics for Graduate Level of Training

Variable	<i>M</i>	<i>SD</i>
1. Number of clock hours devoted to ASD	3.87	1.24
2. Number of clock hours devoted to Sensory Processing	3.91	1.26
3. Coverage of ASD	3.91	1.23
4. Coverage of SPD	3.87	1.24
5. Coverage of accommodations for ASD	3.82	1.21
6. Coverage of accommodations for SPD	3.80	1.26
7. Coverage of instructional interventions for ASD	3.73	1.27
8. Coverage of instructional interventions for SPD	3.89	1.19

Table 8

Descriptive Statistics for Professional Development

Variable	<i>M</i>	<i>SD</i>
1. Inclusion strategies regarding ASD	2.30	1.05
2. Inclusion strategies regarding SPD	2.34	1.12
3. Maximizing the effects of collaboration for ASD	2.16	0.97
4. Maximizing the effects of collaboration for SPD	2.18	0.99
5. Classroom accommodations for ASD	2.18	1.04
6. Classroom accommodations for SPD	2.23	1.05
7. Instructional interventions for ASD	2.18	1.02
8. Instructional interventions for SPD	2.30	1.11

Regression analysis for question 3 began with the inclusion of all variables to determine their significance (Table 9) related to teacher' compiled preparation in ASD/SPD (see Table 1 for additional information). After trial and error, a regression analysis determined that the variables yielding the most significance for teachers' perceptions about adequacy of training were the number of years' experience and their status as a special education teacher (SpedTeachNull). Once again the relevant variables had negative coefficients indicating an increased attitude of disillusionment with training. This indicates that as teachers get more experience working with students with ASD they are less likely to believe training was helpful.

Table 9

Best Fit Regression of Compiled Preparation on Experiential Factors

Variable	B	SE	Beta	<i>t</i>	Sig <i>t</i>
(Constant)	4.562	0.248		18.388	0.000
YearsExp	-0.032	0.015	-0.265	-2.07	0.046
SpedTeachNull	-1.307	0.358	-0.54	-3.656	0.001

Independent Samples *t*-Tests

The majority of the sample surveyed (73 percent) identified themselves as regular education teachers; however, 17 percent of the sample identified themselves as SPED teachers even though the directions on the survey specifically stated that targeted participants were general education, middle school teachers. The researcher decided to include this data set as interesting information was presented, despite the fact that the number in this group was lower than ideal for this type of research. In order to determine

outcomes including SPED teachers into the study, two independent *t*-tests (with equal variances assumed based on non-significant results from Levene’s test of homogeneity of variance) were conducted on the perceived knowledge teachers had about ASD and SPD. These results indicated a significant difference, as general education teachers were more comfortable with their perceived knowledge levels than SPED teachers (Table 10).

These findings support Penney’s (2013) study comparing teachers’ perceptions of their knowledge about ASD and classroom strategies to the perceptions of parents/guardians. Although teachers perceived they were adequately prepared to educate students on the spectrum, parents reported that teachers did not understand ASD and were not adequately prepared in classroom strategies.

Table 10

Independent Sample t-Test Knowledge ASD/SPD and SPED Teacher Status

	<i>t</i>	df	Sig. (2-tailed)	Mean Difference	SE Difference	95% CI
KnowledgeASD	4.259	39	0.000	1.27358	0.299002	[.6687 , 1.8783]
KnowledgeSPD	3.544	39	0.001	1.2731	0.35921	[.5465 , 1.9997]

Summary

This chapter discussed the results of the statistical data analysis for this study. The present research evaluated middle school general education teachers’ perceptions regarding their knowledge of ASD, sensory processing, and the preparedness needed to teach students on the spectrum. The survey was to be distributed with specification to deliver it to general education teachers to obtain information from that particular sampling. However, the addition of the special education specialist allowed a

comparative analysis of the perceptions of both groups. The three study questions indicated general education teachers are far more confident in their training and knowledge of issues regarding ASD and SPD. The results for this study revealed 54 percent perceived they had *adequate knowledge* about ASD, and 56 percent had knowledge about *sensory processing*. Those participating reported 76 percent had received some measure of *professional development* on ASD and SPD, and, of those respondents, 50 percent felt the training was adequate, but 40 percent felt more training would be beneficial.

Chapter 4 reviewed the analysis of the data as outlined in the previous paragraph. The final chapter of this study will discuss the findings and provide recommendations for further research regarding ASD, SPD, and teachers' knowledge.

CHAPTER V: CONCLUSION

In Chapter IV, the dialogue focused on self-reports by teachers' regarding their perceptions about their knowledge of ASD, SPD, and their educational training for teaching these students: what they shared about their perceptions and the information that proved significant. In Chapter V, discussion will focus on the findings related to the three research questions, literature, and represented variables. In addition, this chapter presents recommendations for educators and administrators as well as limitations and recommendations for further study.

Discussion of Findings

Sampling for this research was taken from certified middle school teachers employed by districts in Kentucky, and variables were quantified using descriptive statistics. This study assessed teachers' understanding and preparedness for teaching students ASD the sensory processing challenges these students often face. Quality training on the characteristics concerning ASD and classroom strategies specific to sensory processing are necessary with the huge increase of students with ASD mainstreamed into the regular education classroom. This preparation increases maximum success in learning, behaviors, and social interactions for individuals with ASD in order to ensure a full and valued life.

The three research questions that guided this study were:

- (1) What are general education teachers' perceptions about their knowledge of ASD, and how are they affected by demographic and experiential factors?

- (2) What are general education teachers' perceptions about their understanding of the effects of Sensory Processing Disorder, and how are they affected by demographic and experiential factors?
- (3) What are general education teachers' perceptions about the adequacy of educational preparation for the learning needs of students with ASD and Sensory Processing Disorders and how are they affected by demographic and experiential factors?

Teachers' perceptions were assessed, along with demographic and experiential factors, using a Likert scale survey developed by the researcher that was distributed through an e-mail survey tool. Accumulated data were scrutinized through the SPSS (Statistical Package for Social Sciences) program designed for statistical analysis. This correlative study was designed to determine what, if any, demographic factors were related to teachers' perceived preparedness for teaching students with autism.

Findings from this study and the effect of demographic and experiential factors showed general education teachers perceived their knowledge was in the mean range, indicating they were somewhat confident in their knowledge of autism in the areas of neurological concerns, specific disorders symbiotic with ASD, the impact of ASD on social skills, emotional control, behavior, and learning. However, when general education teachers were removed from the data set and an analysis run on special education teachers' perceptions about knowledge of ASD, the mean score dropped considerably. This may be indicative of teachers' perceptions about their aptitudes being influenced by lack of understanding and/or educational preparedness. Special education teachers' responses were consistent with the saying, "the more you know, the more you realize you

do not know.” Again, due to the small number of special education teachers involved in this study, further research is required.

Data gathered on teachers’ perceptions about their knowledge regarding ASD revealed that the more students with autism teachers had in the classroom, the worse they perceived their understanding of ASD. Conversely, participants with more professional development related to ASD felt more confidence implementing teaching strategies.

The relationship between general education teachers’ perceptions about their understanding of SPD and their years of teaching experience and other experiential factors were consistent with those found for ASD generally. Once again, the number of students with ASD in the classroom was negatively related and the amount of professional development was positively related to teacher’s perception of the adequate understanding of SPD. In other words, professional development increased confidence while having more students with ASD decreased confidence.

An analysis of the different types of training for ASD and SPD showed that undergraduate, graduate, and professional development were all reported to be relatively similar with means of 3.74, 3.74, and 3.84 respectively. As a result of the consistency between the three variables, they averaged into a new variable called compiled preparation for the regression analysis. Years of teaching experience and whether one was a special education teacher were significantly related to perceived effectiveness of training. Both had negative coefficients, which indicates that more teaching experience in general and being a special education teacher in particular decreased teachers’ perceived effectiveness of the ASD and SPD training.

Reflections

This research process provided a complex literary challenge with a plethora of questions and doubts that present when choosing what type of research to do (qualitative, quantitative, mixed method), the research questions, and survey development, not to mention the many other thought provoking issues that arise during the research. A quantitative research design was chosen for this study for the purpose of gathering data on teachers' perceptions on ASD, SPD, and classroom preparedness to obtain information in a succinct amount of time. Researching the literature provided information from previous studies to help in the validation of the study, but this information remained limited. Quantitative research allowed for a survey to be developed that provided the necessary data with as little subjectivity as possible, while being convenient for the participants.

One vital drawback to this study was the lack of prudence concerning possible biases that affect human perspective. For instance, superintendents are influenced by policy, procedures, and finances when they are commissioned with the responsibility of decision making. In circumstances such as participating in research, administrators weighed checks and balances of such an undertaking and the adverse effects on any of afore mentioned influences. Also, opinions of administrators and teachers on the significance of doing a study on ASD, sensory processing, and classroom preparedness can influence outcomes. Teachers may feel they do not lack knowledge in the area of ASD; therefore, the research has no value for them, as people are often confident in their understanding if they have not been confronted with actually working with this population. Educators who are personally involved with these students and their sensory

needs may possess a stronger desire to complete the survey. Participants need purpose to become involved in a study, such as motivation and rationale to help someone regarding the significance of research, as they appreciate affirmation that their contribution is important and valued. That the delivery of this research's survey had to filter through both superintendents and then principals before being sent to teachers may have had an important impact on the deficits in the number of participants.

Recommendations

Due to the findings of this research, the following recommendations are presented:

- Schools need to provide general education teachers and special education teachers with professional development in the areas of ASD, SPD, and classroom strategies concerning communication, aggressive behaviors, and sensory processing that have a profound effect on learning, behavior, and social interactions of children with ASD.
- All school personnel (administrators, teachers, bus drivers, and playground staff) need to be trained regarding ASD and their sensory needs.
- Due to current availability of cadre trainings for all educators in Kentucky, school leaders should facilitate efforts to provide this training and allow easy access to these trainings.
- Adequate and collaborative planning time needs to be provided for school personnel regarding students with autism and disabilities.
- Sensory breaks/rooms should be available for students who exhibit challenges due to sensory overload in order to prevent melt-downs, classroom

disruptions, and maximum support. Teachers need to realize that these breaks are not a reward, but rather a teaching tool for helping students as they learn how to modulate their behaviors.

- Discipline policies need to be reevaluated regarding students' behaviors so that they can actively be involved in their education rather than removed from their peers into a self-contained classroom or suspended from school.

General education teachers are responsible to educate students with special needs as laws mandate the inclusion of this children diagnosed with ASD into the general education classroom. School routines with transitions, crowding of hallways, expectations of performance, and social skill training place a great deal of stress on all students, typical as well as atypical learners. Significant time to plan and collaborate with necessary professional support staff should be a priority in the school systems. Adequate and appropriate trainings for teachers and support staff regarding ASD, SPD, and classroom preparedness should be provided, along with support from advocates to assure optimum success for this population and learning for all students.

Implications for Further Study

Findings in this study indicated that general education teachers felt they possessed a greater understanding of ASD, SPD, and classroom preparedness than special education teachers. Future studies should focus on whether these perceptions are accurate regarding regular educators' understanding of this population. Similar to the study by Penney (2013), teachers often perceive themselves more knowledgeable than parents of students with ASD and students on the spectrum. One might ask, if special education teachers receive more professional training on ASD, why do they not believe they have the

knowledge needed to work with students on the spectrum, particularly since they are considered by most to be the experts within the schools?

Future studies should add to the literature concerning what general education teachers know about the specific indicators of ASD and SPD, along with what classroom strategies are needed to address specific learning, behavior, and social skill interactions of students on the spectrum. Such a study could provide a more well-defined understanding of exclusive indicators of ASD, SPD, and teacher preparedness without including the support of special education representatives or other support staff. This work should also be completed with a larger population of participants and should extend to administrators, school staff, regular education teachers, and special education representatives. Together teachers can support students with ASD so that their education provides them the necessary skills crucial throughout their lifetime. This process improves life for all participants within schools.

Conclusion

This research focused on the perceptions of teachers regarding their knowledge of ASD, SPD, and strategies necessary to educate these students. Two significant variables for this study were the (1) number of years' experience and (2) number of ASD students in the classroom. Even more interesting to the researcher was the fact that although a smaller population of special educators completed the survey, the data indicated that regular education teachers felt somewhat more confident with their skill level in all three domains. Comparison between regular and special education teachers indicated that even though special education teachers receive more training regarding ASD, they rated their knowledge lower than their colleagues (general education teachers).

This study furthered the research regarding perceptions of teachers and students with ASD, but at the same time presented more questions. Regardless, more students with special needs, including ASD and SPS, will be entering classrooms; therefore training remains critical so that all school personnel understand these students' unique sensory needs as well as strategies to implement regardless where the student is transitioning throughout the school day. As more training is provided, the educational process will enhance life for these individuals as well as for their peers and teachers.

REFERENCES

- Ainscow, M. (1999). *Understanding the development of inclusive schools*. London: Falmer Press.
- Amado, A. (1993). *Friendship and community connections between people with and without developmental disabilities*. Baltimore: Paul H. Brookes.
- American Association of Pediatrics. (2001). The pediatrician's role in the diagnosis and management of autistic spectrum disorder in children. *Pediatrics*, *107*, 1221-1226.
- American Psychiatric Association. (1980). *DSM-III*. Retrieved September 17, 2015, from www.dsm3.org
- American Psychiatric Association. (2013). *DSM-V*. Retrieved from www.dx.doi.org
- Andrews, J., & Lupart, J. (2000). *The inclusive classroom: Educating exceptional children*. University of Calgary, Scarborough: Nelson-Thompson Learning.
- Anzalone, M. E., & Williamson, G. G. (2000). Sensory processing and motor performance in autism spectrum disorders. In B. Prezant, & A. Wetherby (Eds.), *Autism spectrum disorders: A transactional developmental perspective* (pp. 143-166). Baltimore: Paul H. Brooks Publishing Company.
- Armour, K. (2012). Teaching and teacher education. *An International Journal of Research and Studies*, *28*(3), 303-484.
- Ashburner, J. Z., Zivani, J., & Rodger, S. (2008). Sensory processing and classroom emotional, behavioral, and educational outcomes in children with autism spectrum disorder. *American Journal of Occupational Therapy*, *62*, 564-573.

- Autism. (2014, April 25). *The sensory world of autism*. Retrieved from Autism:
<http://www.autism.org.uk/living-with-autism/understanding-behavior/the-sensory-world-of-autism>
- Autism World. (2014). *The medical/psychiatric diagnosis of autism: The DSM-V criteria*. Retrieved from Autism World: <http://www.autism.org/general/dsm.shtm>
- Ayers, A. (1979). *Sensory integration and the child*. Los Angeles: Western Psychology Services.
- Bakley, S. (2001). Through the lens of sensory integration: A different way of analyzing challenging behavior. *Young Children* 56(6), 70-76.
- Baranek, G. B., Boyd, B. A., Poe, M. D., David, F. J., & Watson, L. (2007). Hyper-responsive sensory patterns in young children with autism, developmental delay, and typical development. *American Journal of Mental Retardation*, 112, 233-245.
- Bays, D., & Crockett, J. B. (2007). Investigation instructional leadership for special education. *Exceptionality: A Special Education Journal*, 15(3), 143-161.
- Bellini, S., Henry, D., & Pratt, R. (2011). From intuition to data: Using logic models to measure professional developmental outcomes for educators working with students on the autism spectrum. *Teacher Education and Special Education*, 34(1), 37-51.
- Bertone, A., Mottron, L., Jelenic, P. L., & Faubert, J. (2005). Enhanced and diminished visuospatial information processing in autism depends on stimulus complexity. *Brain*, 128, 2430-2441.
- Blanche, E. I., Bodison, S., Chang, M. C., & Reinoso, G. (2012). Development of the Comprehensive Observations of Proprioception (COP): Validity, reliability, and factor analysis. *American Journal of Occupational Therapy*, 66, 691-698.

- Busby, R., Ingram, R., Brown, R., Oliver, J., & Lyons, B. (2012, Winter). Teaching elementary children with autism: Addressing teacher challenges and preparation needs. *Rural Educator*, 33(2), 27-35.
- Bush, G. W. (2006, December 19). *Fact sheet: Combating Autism Act of 2006*. Retrieved July 17, 2015, from The White House President George W. Bush:
<http://georgewbush-whitehouse.archives.gov/news/release/2006/12/pring/20061219.html>
- Cassady, J. M. (2011). Teachers' attitudes toward the inclusion of students with autism and emotional behavioral disorder. *Electronic Journal for Inclusive Education*, 2(7), 1-24.
- Center for Disease Control and Prevention (2014a). CDC Estimates 1 in 68 children has been identified with autism spectrum disorder. U. S. Department of Health and Human Services. Retrieved from:
<http://www.cdc.gov/media/releases/2014/p0327-autism-spectrum-disorder.html>
- Center for Disease Control and Prevention (2014b). Data and Statistics: Community Report on Autism 2014. Retrieved from:
<http://www.cdc.gov/ncbdd/autism/dat.html>
- Chen, G. (2015, March 3). *Understanding self-contained classrooms in public schools*. Retrieved from Public School Review:
<http://www.publicschoolreview.com/blog/understanding-self-contained-classrooms-in-our-public-schools>

- Coldiron, M. (2010, September). *Initiative uses training network to help students with autism*. Retrieved October 13, 2015, from Kentucky School Advocate: A publication of the Kentucky School Board Association:
<http://www.ksba.org/downloads/10%20September%20advocate.pdf>
- Comer, R. J. (2008). *Fundamentals of abnormal psychology*. New York: Worth Publishers.
- Dawson, G., & Watling, R. (2000). Intervention to facilitate auditory, visual, and motor integration in autism: A review of the evidence. *Journal of Autistic and Developmental Disorders, 30*(5), 415-421.
- Dunn, W., Saiter, J., & Rinner, L. (2002). Asperger syndrome and sensory processing: A conceptual model and guidance for intervention planning. *Focus on Autism and Other Developmental Disabilities, 17*(3), 172-185.
- Giangreco, M. F., & Doyle, M. B. (2007). Teacher assistants in inclusive schools. In L. Florian (Ed.), *The SAGE handbook of special education* (pp. 429-439). London: Sage.
- Gillingham, G. (1998). *Autism: Handle with Care* (3rd Ed.). London. Tacit Publications, Inc.
- Grandin, T. (1992). *An inside view of autism: High functioning individuals with autism*. New York: Plenum Press.
- Grandin, T. (2011, Nov. 28). Temple Grandin: Presentation YouTube. University of Nevada. Retrieved from: <http://www.youtube.com/watch?V=5uAUHF1TQPPQ>
- Grandin, T., & Panah, R. (2013). *The autistic brain: Thinking across the spectrum*. Boston: Houghton Mifflin Harcourt.

- Greally, J. (2014, May 29). *Study shows environmental influences may cause autism in some cases*. Retrieved from Autism Research:
<http://www.einstein.yu.edu/news/releases/1011/study-show-environmental-influences-may-cause-autism-in-some-cases>
- Hall, L. J. (2013). *Autism spectrum disorders; From theory to practice*. New York: Pearson Education, Inc.
- Hayes, J. A., Baylot, C. L., Williamson, R., Black, T., & Winsor, D. (2013). Educators' readiness to teach children with autism spectrum disorder in an inclusive classroom. *The Researcher*, 25(1), 67-78.
- Herbert, M., & Weintraub, K. (2012). *Behavior problems: What's triggering your child's outburst?* Harvard University: Random House Publishing Group.
- Horne, E., & Farrell, V. (2009). Making it work: Teachers' perspectives on inclusion. *International Journal of Inclusive Education*, 13(3), 273-286.
- Iarocci, G., & McDonald, J. (2006). Sensory integration and the perceptual experience of persons with autism. *Journal of Autism and Developmental Disorders*, 36(1), 77-90.
- Kaiser, A. P., Hester, P. P., & McDuffie, A. S. (2001). Supporting communication in young children with developmental disabilities. *MRDD Research Review*, 7, 143-150.
- Kentucky Department of Education. (2013). *December 1 child count*. Retrieved from:
<http://education.ky.gov/specialed/excep/Documents/ICDocs/InfiniteCampusChildCountChecklist.pdf>
- Kentucky Department of Education. (2015). *Kentucky education facts*. Retrieved from:
<http://education.ky.gov/comm/edfacts/Pages/default.aspx>

- Kern, J. K., Trivedi, M. H., Grannemann, B. D., Garver, C. R., Johnson, D. G., Andrews, A. A., et al. (2006). Sensory correlations in autism. *Autism, 11*, 123-134.
- Kientz, M. A., & Dunn, W. (1997). A comparison of the performance of children with and without autism on the sensory profile. *American Journal of Intellectual and Developmental Disability, 28*, 530-537.
- Kilanowski, L., Foote, C. J., & Rinaldo, V. J. (2010). Inclusion classrooms and teachers: A survey of current practices. *International Journal of Special Education, 43-56*.
- Kimball, J. (2002). Behavior-analytic instruction for children with autism: Philosophy matters. *Focus on Autism and Other Developmental Disabilities, 17(2)*, 66-75.
- Klin, A. (2005). Three things to remember if you are a functional magnetic resonance imaging researcher of face processing in autism spectrum disorders. *Biological Psychiatry, 64*, 549-551.
- Kranowitz, C. S. (2003). *The out-of-sync child has fun: Activities for kids with sensory integration dysfunction*. New York: Perigee.
- Lane, A. E., Young, R. L., Baker, A. E., & Angley, M. T. (2009). Sensory processing subtypes in autism: Association with adaptive behavior. *Journal of Autism Developmental Disorders, 40*, 112-122.
- Leblanc, L., Richardson, W., & Burns, K. A. (2014). Autism spectrum disorder and the inclusive classroom. *Teacher Education and Special Education 32(2)*, 166-179.
- Lerman, D. C., Vorndran, C. M., Addison, L., & Kuhn, S. C. (2004). Preparing teachers in evidence-based practices for young children with autism. *School Psychology Review, 33*, 510-526.

- Lord, C., & McGee, J. P. (2001). *Educating children with autism*. Division of Behavioral and Social Science and Education National Research Council. Washington DC: National Academy Press.
- Lynch, S. A. (2004, July). Sensory processing: Meeting individual needs using the seven senses. *Young Exceptional Children*, 7(4): Retrieved May 4, 2014, from Sage: [http://yec.sagepub.com/content/7/4 \(4\) 510-526](http://yec.sagepub.com/content/7/4 (4) 510-526).
- Marco, E. J., Hinkley, L. B., Hill, S. S., & Nagarajan, S. S. (2011, January 26). Sensory processing in autism: A review of neurophysiologic findings. *Pediatric Research*, 69(5), 48R-58R.
- Minschew, N., & Hobson, J. (2008). Sensory sensitivities and performance on sensory perceptual tasks in high-functioning individuals with autism. *Autism Developmental Disorders*, 38, 1485-1498.
- Mulligan, S. (2001). Classroom strategies used by teachers of students with attention deficit hyperactivity disorder. *Physical & Occupational Therapy in Pediatrics*, 20, 25-44.
- Murray-Slutsky, C., & Paris, B. (2005). *Is it sensory, or is it behavior?* New York: Psychological Corp.
- Odom, S., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Preventing school failure. *Evidence Based Practices for Children and Youth with Autism Spectrum Disorder*, 54(4), 275-282.
- O'Neil, M., & Jones, M. P. (1997). Sensory-perceptual abnormalities in autism: A case for more research? *Journal of Autism and Developmental Disorders*, 27 (3), 283-293.

- Penney, S. (2013). Qualitative investigation of school-related issues affecting individuals diagnosed with autism spectrum disorder and co-occurring anxiety and/or depression. *Autism Insights*, 2013(5), 75-91. Retrieved from <http://www.la-press.com>
- Perko, S., & McLaughlin, T. F. (2002). Autism: Characteristics, causes, and some educational interventions. *International Journal of Special Education*, 17(2), 59-68.
- Pollock, N. (2009, September). *Sensory integration: A review of the current state of evidence*. Retrieved from National Professional Development Center for ASD: <http://www.caot.ca/otnow/sept09/sensory.pdf>
- Quill, K. (1995). *Teaching children with autism: Strategies to enhance communication and socialization*. Albany, NY: Del Mar Publishers.
- Roberts, J. A. S. (2007, June 20). *Autism inclusion: Teacher's perspectives on the mainstreaming of autistic students*. Retrieved September 17, 2013, from <http://hdl.handle.net/10539/4972>
- Robertson A. E., & Simmons, D. R. (2012). The relationship between sensory sensitivity and autistic traits in the general population. *Journal of Autism Development: Discord*, 43, 775–784.
- Rodriguez, I. R., Saldana, D., & Moreno, F. J. (2011, December 19). *Support, inclusion, and special education teachers' attitudes toward the education of students with autism spectrum disorders*. Retrieved from Hindawi Publishing corporation: <http://www.hindawi.com/journals/aurt/2012/259468>

- Rogers, S. J., & Ozonoff, S. (2005). Annotation: What do we know about sensory dysfunction in autism? A critical review of the empirical evidence. *Journal of Child Psychological Psychiatry, 46*, 1255-1268.
- Ruble, T. A., & Dalrymple, N. J. (1996, November 1). An alternative view of outcome in autism. *Focus on Autism and Other Developmental Disabilities, 3*-14.
- Ruble, T. A., Dalrymple, N. J., & McGrew, J. H. (2010). The effects of consultation on individualized education program outcomes for young children with autism: The collaborative model for promoting competence and success. *Journal of Early Intervention, 32*(4), 286–301.
- Sage, C., & Evans, N. (2011). Electromagnetic Fields. Retrieved from:
http://www.HealthySchools.org/downloads/EMFs_CHE_2011.pdf
- Sanders, J. L. (2009). Qualitative or quantitative differences between Asperger's disorder and autism? Historical considerations. *Journal of Autism and Developmental Disorders, 39*(11), 1560-1567.
- Scheuermann, B., Webber, J., Boutot, E. A., & Goodwin, M. (2003). Problems in personnel preparation in autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 18*(3), 197-206.
- Schoen, S. A., Miller, L. J., Brett-Green, B. A., & Nielsen, D. M. (2009). Physiological and behavioral differences in sensory processing: A comparison of children with autism spectrum disorder and sensory modulation disorder. *Frontiers in Integrative Neuroscience*. Retrieved from: <http://www.ncbi.nlm.nih.gov>

- Shabha, G. (2005, May 24). *An assessment of the impact of the sensory environment on individuals' behavior in special needs schools*. Retrieved from:
www.emeraldinsight.com/0263-2772.htm
- Shattuck, P. J. (2006). The contributions of diagnostic substitution to the growing administrative prevalence of autism in the U. S. special education. *Pediatrics*, *117*(1), 102-137.
- Shore, S. M., & Rastelli, L. C. (2006). *Understanding autism for dummies*. Hoboken: John Wiley & Sons.
- Simpson, R. L., Boer-Ott, S. R., & Smith-Myles, B. (2003). Inclusion of learners with autism spectrum disorders in general education settings. *Topics in Language Disorders* *23*(2), 116-133.
- Siri, K., & Lyons, T. (2011). *Cutting-edge therapies for autism*. New York, New York: Skyhorse Publishing.
- Skuller, J. B. (2011, May 1). *Teacher efficacy, teacher burnout, and attitudes towards students with autism*. (Unpublished doctoral dissertation) University of Louisville, Louisville, KY.
- Smith T. (2008). Empirically supported and unsupported treatments for autism spectrum disorders. *Scientific Review of Mental Health Practices*, *6*, 3-21.
- Sperry, L. A., Whaley, K. T., Shaw, E., & Brame, K. (1999). Services for young children with autism spectrum disorder: Voices of parents and providers. *Infants and young Children*, *11*(4), 17-33.
- SPD Foundation. (2014). *About SPD*. Retrieved from:
<http://www.spdfoundatin.net/about-sensory-processing-disorder>

- Talay-Ongan, A., & Wood, K. (2000). Unusual sensory sensitivities in autism: A possible crossroad. *International Journal of Disability, Development, and Education*, 47(2), 201-212.
- Tincani, M. (2007). Moving forward: Positive behavior support and applied behavior analysis. *The Behavior Analyst Today*, 8(2), 179-193.
- Todd, T. A., Beamer, J., & Goodreau, J. (2014). Bridging the gap:Teacher-parent partnerships for students with autism spectrum disorder. *LEARNing Landscapes*, 287-304.
- Tomcheck, S., & Dunn, W. (2007). Sensory Processing in Children with and without autism: A comparative study using the short sensory profile. *American Journal of Occupational Therapy*, 61(4), 190-200.
- Tucker, E. C. (2015, September 17). Autism concerns in the public schools in Kentucky. (L. Harrison, Interviewer)
- Watling, R. L. (2001). Comparison of sensory profile scores of young children with and without autism spectrum disorders. *American Journal of Occupational Therapy*, 55, 416-423.
- Westling, D. L., & Fox, L. (2000). *Teaching students with severe disabilities*. Upper Saddle River, NJ: Merrill/Prentice Hall.
- Wilkerson, S. E. (2012, May 12). *Assessing teacher attitude toward the inclusion of students with autism*. (Unpublished doctoral dissertation). Retrieved September 27, 2013, from ProQuest:
<http://digital.library.louisville.edu/utills/getfile/collection/etd/id/2428/filename/5225.pdf>

- Worley, J. A., Matson, J. L., & Kozlowski, A. M. (2011). The effects of hearing impairment on symptoms of autism in toddlers. *Developmental Neurorehabilitation, 14*(3), 171–176.
- Wortman, D. (2013, December). Are educators prepared to teach students with autism? *A Master's Research Project*. Dayton, Ohio, USA: Patton College of Education and Human Services.
- Yack, E., Aquilla, P., & Sutton, S. (2002). *Building bridges through sensory integration: Therapy for children with autism and other pervasive developmental disorders*. Arlington, TX: Future Horizons, Inc.
- Yeargin-Allsopp, M., Rice, C., Karapukar, T., Boyle, C., & Murphy, C. (2003, January 1). *Prevalence of autism in a US metropolitan area*. Retrieved March 1, 2015, from mamananetwork: <http://jama.jamanetwork.com/article.aspx?articleid=195703>

APPENDIX A: IRB Approval Letter



*INSTITUTIONAL REVIEW BOARD
OFFICE OF RESEARCH INTEGRITY*

DATE: May 5, 2015
TO: Lynda Harrison, EdD
FROM: Western Kentucky University (WKU) IRB
PROJECT TITLE: [751318-1] Kentucky Middle Schools General Education Teachers:
Perceptions Regarding Sensory Processing for Students on the Autism
Spectrum
REFERENCE #: IRB 15-411
SUBMISSION TYPE: New Project
ACTION: APPROVED
APPROVAL DATE: May 5, 2015
EXPIRATION DATE: May 5, 2016
REVIEW TYPE: Expedited Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a *signed/implied* consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of May 5, 2016.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Paul Mooney at (270) 745-2129 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

APPENDIX B: Teacher Survey

Block 5

Dear Teacher,

You are being asked to participate in a project conducted through Western Kentucky University. The following survey concerns your perceptions regarding Autism Spectrum Disorder (ASD) and sensory processing in students with autism. By completing and submitting your survey responses you indicate your willingness to participate in this survey. Your participation is voluntary and you may withdraw at any time by simply exiting this survey prior to submitting your responses.

Of course, your participation is appreciated as it will serve to benefit our understanding of teachers' preparation to work with students on the Autism spectrum.

Section I: Autism and Sensory Processing

Please rate the following sets of items based on **your perceptions of your knowledge/understanding** regarding Autism Spectrum Disorder (ASD) and sensory processing in students with autism.

Section I: Autism and Sensory Processing

Please select your answer regarding your knowledge of each item below using the following response scale: 5 = Very High Knowledge, 4 = High Knowledge, 3 = Medium Knowledge, 2 = Low Knowledge, or 1 = Very Low Knowledge.

Your Knowledge of Autism Spectrum Disorder (ASD)

	(5) Very High Knowledge	(4) High Knowledge	(3) Medium Knowledge	(2) Low Knowledge	(1) Very Low Knowledge
Recognizing characteristics of ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neurological concerns (connections between the brain and sensory systems)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The specific disorders (and differences between them) on the ASD Spectrum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD on social skills and adjustment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD on emotional control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD on behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD on learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Your Knowledge of Sensory Processing in Students with ASD

	(5) Very High Knowledge	(4) High Knowledge	(3) Medium Knowledge	(2) Low Knowledge	(1) Very Low Knowledge
Recognizing problems related to sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neurological connections between the brain and sensory systems)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of sensory processing on social skills and adjustment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of sensory processing on emotional control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of sensory processing on behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of sensory processing on learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section II: Educational Preparation

Section II: Educational Preparation in ASD

Please select your answer to each item below regarding the adequacy of your undergraduate preparation using the following response scale: 5 = Very High Adequacy, 4 = High Adequacy, 3 = Medium Adequacy, 2 = Low Adequacy, or 1 = Very Low Adequacy.

Your Level of Undergraduate Education Preparation for ASD

	(5) Very High Adequacy	(4) High Adequacy	(3) Medium Adequacy	(2) Low Adequacy	(1) Very Low Adequacy
Number of special education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of ASD in <u>general education</u> classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of ASD in <u>special education</u> classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of sensory processing <u>general education</u> classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of sensory processing in <u>special education</u> classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of accommodations for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of instructional interventions for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of accommodations for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Coverage of instructional interventions for sensory processing

Please select the number of credit hours you have taken at the **Graduate** level.

- 0-14 hours
- 15-29
- 30-36 hours
- Master's or Rank I plus 15 hours
- Master's plus 30 core-specialist degree
- Doctorate

Block 3

Please select your answer to each item below regarding the adequacy of your graduate preparation using the following response scale: 5 = Very High Adequacy, 4 = High Adequacy, 3 = Medium Adequacy, 2 = Low Adequacy, or 1 = Very Low Adequacy.

Your Level of Graduate Education Preparation for ASD

	(5) Very High Adequacy	(4) High Adequacy	(3) Medium Adequacy	(2) Low Adequacy	(1) Very Low Adequacy
Number of special education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of ASD in general education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of ASD in special education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of sensory processing general education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of sensory processing in special education classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please select your answer to each item below regarding the adequacy of your professional development or other training using the following response scale: 5 = Very High Adequacy, 4 = High Adequacy, 3 = Medium Adequacy, 2 = Low Adequacy, or 1 = Very Low Adequacy.

Your Level of ASD Professional Development or Other Related Workshops

	(5) Very High Adequacy	(4) High Adequacy	(3) Medium Adequacy	(2) Low Adequacy	(1) Very Low Adequacy
Number of clock hours devoted to ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number of clock hours devoted to sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of accommodations for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of accommodations for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage of instructional interventions for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coverage for instructional interventions for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Section III: Need for Additional Training

Section III: Need for Additional Professional Development/Training

Please mark your answers to the items below regarding the benefits of further ASD related professional development using the following response scale: 5 = Very High Benefit, 4 = High Benefit, 3 = Medium Benefit, 2 = Low Benefit, or 1 = Very Low Benefit.

How much would it benefit you to receive additional professional development/training about the following aspects of ASD and sensory processing?

	(5) Very High Benefit	(4) High Benefit	(3) Medium Benefit	(2) Low Benefit	(1) Very Low Benefit
Characteristics and impact of ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Characteristics and impact of sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD and sensory processing on social skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD and sensory processing on emotional control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD and sensory processing on behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of ASD and sensory processing on learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much would it benefit you to receive additional professional development/training about the following aspects of classroom accommodations and instructional interventions?

	(5) Very High Benefit	(4) High Benefit	(3) Medium Benefit	(2) Low Benefit	(1) Very Low Benefit
Inclusion strategies regarding ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inclusion strategies regarding sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maximizing the effects of collaboration for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maximizing the effects of collaboration for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Classroom accommodations for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Classroom Accommodations for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructional interventions for ASD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructional interventions for sensory processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Biographical Information

In your opinion, how does sensory integration impact academics, behavior, and social interactions?

In your opinion, how would learning about ASD and sensory integrations benefit your teaching or classroom?

Please list strategies you currently use for students with ASD related to sensory processing.

Please provide the following demographic information.

Your current age in years:

Gender:

- Male
- Female

Teaching experience in years:

Primary Subject of Teaching:

- English/Language Arts
- Math
- Science
- Social Studies
- Arts and Humanities
- Other (Please specify)

Number of hours in ASD or related professional development/training you have received

Number of students with ASD who are currently in your classroom
