The Highly Sensitive Student: The Relationship between Sensory Processing Sensitivity and Academic and Behavioral Outcomes

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Abstract

At least one of five children have the personality trait Sensory Processing Sensitivity (SPS) (Aron, 2002). Students with SPS, otherwise known as highly sensitive children (HSC) process information deeply, are easily overstimulated, have high levels of empathy accompanied by emotional reactivity, and are sensitive to subtle stimuli in their environment. The trait can have positive implications with a supportive home environment but under stress, the negative aspects can become prominent, leading to poor educational outcomes (Greven et al, 2020; Boterberg & Warreyn, 2016). Children with SPS may need extra support for emotional and behavioral issues or comorbidities of SPS and another issue. This study sought to understand how the trait presents in children at school. More specifically, how the presence of the SPS trait would impact academic performance and behavior.

This mixed-methods study used an explanatory sequential design to look at patterns and themes within the data. Statistically, there were no correlations between the high sensitivity students and math scores, reading scores, or any behavioral measure. However, the percentage of at-risk/clinically significant scores for behavioral measures was noticeably different for HSC in several areas indicating that with a larger sample, a statistical difference may be noted. Thematically, teachers reported that students with the trait had either excellent grades or really struggled in academics. Behaviorally, students hid their struggles, had issues with overwhelm, and showed signs of anxiety. Despite a lack of specific knowledge of the trait, teachers had extensive background information in each student and were able to develop supportive classroom strategies to assist children with high sensitivity.

Keywords: sensory processing sensitivity, high sensitivity, academic performance, special education, school psychology

Dedication

This dissertation is dedicated to my husband, Louie, for his endless support and calming presence and to my children, Louis & Isla, who always make me want to be better and show them what is possible.

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Chapter I. Introduction

Background of the Problem

The National Center for Education Statistics reports that 7.1 million students (14%) receive special education services through the public school system under the Individuals with Disabilities Education Act (IDEA) (2020). Public schools are dealing with a growing number of children with special needs from single learning disabilities to mental health disorders and many with challenging lifelong health concerns like food allergies, autism, ADHD, and seizures (Marino, 2019). Children in poverty are more highly affected by difficult home lives increasing the risk of need for special education services (Bornstein & Bradley, 2014). Difficult childhoods are also predictive of having negative implications for children and adults with the personality trait, Sensory Processing Sensitivity (SPS). This trait, under poor conditions, can lead to a special education diagnosis or misdiagnosis of attention deficit hyperactivity disorder, autism spectrum disorder, internalizing problems such as anxiety and depression, or medically unexplained physical symptoms (MUPS) (Greven et al, 2020; Boterberg & Warreyn, 2016). This indicates that children with SPS may be receiving unneeded special education services or need special education services to help with emotional and behavioral issues triggered by lack of support and knowledge of the SPS trait or comorbidities of SPS and another issue.

In 1997, Aron and Aron coined the academic term Sensory Processing Sensitivity (SPS) to describe a personality or temperament trait of high sensitivity previously not well understood. At its core, high sensitivity simply means processing all information deeply. The SPS trait has been broken down into smaller pieces to understand its intricacies. These aspects include depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtle stimuli, which is abbreviated as D.O.E.S (Aron, 2002). Depth of processing is the tendency to

have deep, detailed, and elaborate processing of internal and external stimuli. Overstimulation refers to the distress, discomfort, or overwhelm felt from processing information so immensely. Emotional reactivity and empathy include the strongly felt positive and negative emotions by people with SPS. Finally, sensitivity to subtle stimuli is the awareness of small, subtle details (Aron, 2002). While the trait can be broken down, all four aspects must be present to be considered a Highly Sensitive Person (HSP) or Highly Sensitive Child (HSC). However, one of the four areas may be more prevalent than others (Aron, 2002). This depth of processing and emotionality have many implications for how children process the world around them. In particular, new situations, like school, have the potential to cause challenges.

Previous personality and child development researchers have attempted to understand this trait, often missing pieces of the multi-faceted characteristic, a trait that plays an important role in the educational context (Tillman et al, 2018). The SPS trait is observable in 10 – 35% of samples, typically falling between 15 – 20% of children. Because the SPS trait can be seen in approximately 1 out of 5 people, it is considered a normal variation of personality rather than a disorder (E. Aron et al, 2012; Aron, 2002). Even so, it is important to recognize that the trait can seem like a disorder in some conditions. Carl Jung described sensitivity in introversion as the desire to stop, reflect, and relate information (E. Aron et al, 2012). His personality work was the first to describe aspects of SPS, yet only 70% of people with high sensitivity are introverts. Others have related the trait to social withdrawal, neuroticism, and inhibition (E. Aron et al, 2012; Aron & Aron, 1997). Since Aron and Aron presented the theory of Sensory Processing Sensitivity, other researchers have built on their research to develop similar frameworks including Vantage Sensitivity, Environmental Sensitivity, Differential Susceptibility Theory, Biological Sensitivity to Context, and Negative Emotionality (Pleuss, 2018). This means that

researchers have been trying to understand SPS for over 100 years, with the past 20 - 25 years seeing the most progress.

Research on how this trait presents in children in schools is minimal and/or anecdotal. A truncated version of the Highly Sensitive Person Scale (HSPS) was developed in 2002 for parent reporting of child sensitivity (Aron, 2002; Aron & Aron, 1997). In 2018, Pleuss et. al. validated the Highly Sensitive Child Scale (HSCS), a child self-report version of the HSPS for children aged 8 and older, two decades past the initial publication of the HSPS. Initial research on how Sensory Processing Sensitivity affects children was done through interviews with adults about their childhood experiences (Aron & Aron, 1997). This data and subsequent data revealed that HSPs that had an unhappy childhood were likely to have more internalizing behavior problems than non-HSPs with difficult childhoods. However, HSPs with happy childhoods did not differ from their non-HSP peers, or they were happier than their peers (Aron, 2002). The childhood years are important developmental years that directly influence the outcome of children with SPS.

Similar to overall childhood, children with high sensitivity and high-quality parenting are likely to have greater responsivity to cues, often being productive classmates and leaders. High sensitivity children with low-quality parenting have been shown to have negative effects on the child, often resulting in externalizing behaviors such as aggression, antisocial tendencies, or hyperactivity. These changes in parenting quality do not have behavioral implications for low sensitivity children (Pluess et al, 2018). It is implied that in school, children with high ratings on the HSC scale with high quality parenting will enjoy learning, be creative and deep thinkers, and seek to be liked by their teachers. Alternatively, children with low quality parenting may show signs of disinterest, lack of motivation, and other behavioral problems (Aron, 2002). Therefore,

the parenting quality is likely to have implications for how the child behaves in the school environment. This study may assist in understanding school psychologist knowledge of SPS and how high sensitivity directly impacts students and the potential to be identified for special education services.

The data indicate that approximately 1 in 5 children identify with the Sensory Processing Sensitivity trait (E. Aron et al, 2012; Aron, 2002). Children have academic, social, and behavioral demands on them daily at school and at home. Without proper identification of the trait, many children, particularly those with difficult childhood situations, are likely to be referred to special education to identify and intervene (Greven et al, 2020; Boterberg & Warreyn, 2016). However, due to the novelty of the scale for testing, it is unlikely that most educators or school psychologists are utilizing this body of research to identify and assist students with the SPS trait. In an already overburdened special education system, missing this trait could place students unnecessarily into special education, add duration to the intervention period, or miss students who need support to perform at their best. Further, internalizing problems in children are growing, yet only 20-30% receive help for mental health issues (Crespi &Politikos, 2012). Students with SPS are more likely to have internalizing problems than their peers, demonstrating that identification of the trait and support for students with SPS may diminish the need for mental health intervention (Greven et al, 2020; Boterberg & Warreyn, 2016).

Rationale & Significance of the Study

This study is significant because there may be children misidentified for special education simply due to the presence of the Sensory Processing Sensitivity trait. While all students need to learn coping and adaptation skills, particularly in school, children exhibiting the SPS trait may need differentiated support to perform their best. SPS should not be confused with

a Sensory Processing Disorder which occurs when the central nervous system is unable to organize the information it receives and create appropriate responses (SPD Foundation, 2020). Children with SPS process intricate details with high levels of emotion, sometimes causing a similar looking response of overstimulation (Aron & Aron, 1997). United States classrooms are designed to be highly stimulating, colorful, and dynamic creating an environment that is not ideal for highly sensitive children (Aron, 2002). Younger children who have yet to learn how to adapt to the typical school environment are likely to have increased overstimulation (Lionetti et al, 2017). By educating school psychologists and teachers on the trait, it may be possible to prevent students from needing tier two or three intervention services in an already overwhelmed special education system.

Regardless of a need for special education, children with Sensory Processing Sensitivity still have specialized needs. Children in school are asked to process significant amounts of information both from their environment and to learn. In the typical 7-hour school day, the amount of information to be processed has the potential to wear out a HSC. Their brains are absorbing higher amounts of sensory inputs than their peers increasing the need to screen out distractions (Aron, 2002). The needs of highly sensitive children may not be covered under Individuals with Disabilities Education Act, however, if they are not met in the typical classroom setting, the alternative may be a need for special education services in the emotional disturbance category or improper categorization with autistic or ADHD students. Highly sensitive children need an optimal level of arousal. When they are overstimulated, it can cause internalizing or externalizing behavior problems leading to poorer cognitive functioning (E. Aron et al, 2012). Further, in the clinical setting, highly sensitive children have been found to be responsive to interventions indicating that simple changes in the classroom may be enough for children who

have not yet learned to work through the challenging aspects of the trait (Aron, 2002). There are more demands and expectations of children at school than at home. With the addition of potential punishment and school social life, any child may feel the strain, but those with high sensitivity feel this more deeply. This study seeks to understand how Sensory Processing Sensitivity directly impacts student academic performance and behavioral outcomes in elementary aged students.

Finally, this study will provide statistical evidence on how Sensory Processing Sensitivity relates to behavior and academic achievement within the school system. There is a gap in the research on how school affects children with high sensitivity, specifically in the United States. Researchers in Italy, England, and Japan have dabbled into bullying and depression program efficacy in high vs. low sensitivity students. They have found that intervention programs tend to be more effective for students with the SPS trait than those with low sensitivity (Iimura & Kibe, 2020; Pleuss & Boniwell, 2017; Pleuss et al., 2018). These studies include cultural differences that may need to be accounted for in future research. Further, most existing studies look at adolescents rather than children. As aforementioned, there is anecdotal evidence from adult recounts of their childhood experiences, and documentation of how SPS causes some children to show signs of ADD or Autism Spectrum Disorder, while others are perfectionist leaders in their classroom (Aron & Aron, 1997). This research will provide statistical data to better understand the relationship between presence of the trait, academics, and behaviors, thus filling in a gap in the research. This data will clarify student needs, interventions, and the role of the school psychologist for students with Sensory Processing Sensitivity.

This research has the potential to impact school psychologists, students, teachers, and parents. School psychologists are investigators, using all the tools available to them to

understand what is causing specific academic or behavioral problems. The Highly Sensitive Child Scale and understanding of Sensory Processing Sensitivity in the school setting could provide a new tool. Teachers can use the resources provided to make classroom modifications to help students with the SPS trait and school psychologists can use the information in RTI and assessments. Ultimately, students are the main beneficiary of this research. If a child is highly sensitive, the ability to better understand themselves and have their parents, teachers, and other adults understand them will allow them to receive supports to make the traditional school setting less overwhelming to them. Finally, if a student is identified as a HSC, the parents will be a huge part of the team working to address their child's needs, benefiting them. If approximately 20% of children are highly sensitive, this research is needed to fill in the gap to provide for all elementary students (Aron, 2002).

Purpose of Study

The purpose of this study is to examine academic achievement and behavioral outcomes of elementary students based on the presence of the SPS trait using the Highly Sensitive Child (HSC) scale and to explore teachers' perceptions of working with high sensitivity children. The most common issue among children with high sensitivity is the development of anxiety or depression (Aron, 2002). Many children with internalizing problems never receive the help they need. In fact, only 20-30% of children do receive needed help (Crespi &Politikos, 2012). It is the job of school psychologists to help all children within their district. This data will provide the knowledge and data to support necessary training in SPS identification and intervention.

Theoretical Framework

This study is guided by the theory of Sensory Processing Sensitivity (SPS) developed by Aron and Aron (1997). Dating back to the early 1900s, portions of the SPS trait were studied,

however, this seminal research provides a clear understanding of the intricacies of the personality trait. This theory posits that people with SPS process all information deeply. Depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtly stimuli all must be present for an individual to identify as a Highly Sensitive Person (HSP) (Aron, 2002). Other researchers have built on the SPS research to develop similar frameworks including Vantage Sensitivity, Environmental Sensitivity, Differential Susceptibility Theory, Biological Sensitivity to Context, and Negative Emotionality (Pleuss, 2018). While these frameworks add to the body of work, SPS is seen as a stable trait that may be biologically-based (Bakker & Moulding, 2012). At this time the SPS Theory as developed and evolved by Aron and Aron is the most widely accepted and grounded research to guide and determine presence of the trait.

Research Questions

The three research questions below were central in this study. The first sought to determine if highly sensitive students have any academic advantages or disadvantages as compared to their non-HSC peers. The second question looked at any behavioral patterns between children with the trait versus those without the trait. Finally, the third question probed teachers to gain their insights into working with children who have Sensory Processing Sensitivity.

1. How do highly sensitive elementary students perform academically as compared to their low sensitivity peers?
2. What are the behavioral patterns of highly sensitive students as compared to their low sensitivity peers?
3. What are teacher's perceptions of working with highly sensitive students?

Definition of Terms

Several terms are used frequently throughout this study. The following definitions add clarity to the terms utilized:

Sensory Processing Sensitivity (SPS). The temperamental trait in which a person exemplifies depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtle stimuli (Aron & Aron, 1997; Aron 2002). Sensory Processing Sensitivity should not be confused with Sensory Processing Disorders (SPD) or Autism Spectrum Disorders (ASD). SPS is a personality trait whereas SPD and ASD are neurological disorders. The three can look similar as all three can cause over-reactivity to one's environment. However, the similarity ends here. In SPS individuals, the overstimulation is situational, and their sensory signals are not disorganized as those with SPD or ASD.

Highly Sensitive Child (HSC)/Highly Sensitive Person (HSP). A child/person who identifies with having the Sensory Processing Sensitivity trait (Aron, & Aron, 1997).

Academic performance. Academic performance includes the reading and mathematic ability of a student which are assessed using norm-referenced assessments and classroom evaluations based on the student's age and grade level (Parker, 2017).

Special education. Special education refers to school provided education services to students who identify with one of the thirteen categories of disability as defined by the Individuals with Disabilities Education Act. The categories are as follows: autism, deaf-blindness, deafness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic disability, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, or visual impairment including blindness (IDEA, 2004).

Subjectivity & Researcher Positionality

I have had a varied work experience but very little in a role that is similar to that of a school psychologist. I was a program coordinator at a large research University where my role was to design workshops for students from high school age to professionals. My current role is as the executive director of a children's museum. In this role, I am responsible for the overall wellbeing of the business which including setting the culture for the museum. In this role, I interact with people of all types of races, abilities, and backgrounds. I do my best to make the museum a place that anyone can afford to come, feel welcome, and have an ability to play once they are in the facility. I think this role has made me more accepting of people while also more aware of how people act towards others. This experience has shown me that everyone deserves to be treated with respect and given the benefit of the doubt. I have seen the importance of our sensory cool down room at the museum. It has made me appreciate how each person has the ability to change the atmosphere of those around them and the importance of understanding but also working to make accommodations to those who need something a bit different.

Inevitably, I have several research biases that I need to disclose but also work to mitigate. I have been a member of the Highly Sensitive Parents Facebook group since starting to research this topic. In doing so, I am reading about parents who think their child has the SPS trait. Based on this, I have experience in hearing about how SPS is affecting children at school. To mitigate this experience bias, I will clearly document my coding to avoid trying to confirm the research to what I have read already. In addition, the population selection is a convenience sample so it may not be representative of the larger population. The sample choices are clearly communicated in the study and its limitations. I also have a theory bias in that I believe the theory of Sensory Processing Sensitivity is assumed to be true in my dissertation and is the basis of the research.

However, the research questions for my study are written to explore whether there are in fact differences in students with high sensitivity. I am understanding that the study may show there are no differences which would add to the research even if it disproves parts of the theory.

Chapter II. Literature Review

As of 2020, the National Center for Education Statistics reported that 7.1 million children received special education services under the Individuals with Disabilities Education Act (2020). This amounts to 1 in 7 students receiving services. Poverty increases the risk of special education services due to more difficult life circumstances (Strauss, 2019). School psychology practice is often disorder-focused, however, some researchers have argued knowledge of personality theory would benefit school psychology practice (Crespi & Politikos, 2012). Clinical and counseling psychologists are expected to be well-versed in personality theory, therefore school psychologists need knowledge and training in personality theories as well. Sensory Processing Sensitivity (SPS) is a personality theory that presents in roughly 20% of the population. The trait is described as having depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtle stimuli (Aron, 2002). SPS is exacerbated by poor childhood circumstances and inadequate parenting (E.N. Aron & A. Aron, 1997). In poor conditions, SPS can lead to a special education diagnosis or misdiagnosis of attention deficit disorder, autism spectrum disorder, internalizing problems such as anxiety and depression or medically unexplained physical symptoms (MUPS) (Greven et al, 2020; Boterberg & Warreyn, 2016). However, it is possible that understanding the trait would lead to lower referrals to special education or that children with internalizing issues may be missed, causing potential problems in adulthood.

To date, research in children and how Sensory Processing Sensitivity affects them in a school setting has been minimal yet, the trait has the potential to impact every area of life for students with it. It appears that the trait is, at least in part, genetic, as shown in the *5-HTTLPR* short alleles and *DRD4* 7-repeat allele which are all genetic markers for sensitivity (Hartman &

Belsky, 2015). While all students need to learn coping and adaptation skills, children with Sensory Processing Sensitivity may need different support than their peers. This research will provide statistical data to understand why and how the trait presents in elementary children, thus filling in a gap in the research. The data will clarify student needs, interventions, and the role of the school psychologist for students with Sensory Processing Sensitivity. The current chapter examines the literature on Sensory Processing Sensitivity theory, scale development, and how the trait presents in children, adolescents, and adults.

Sensory Processing Sensitivity as a Personality Trait

Researchers in personality theory tend to agree that differences in disposition are evident from a very early age and remain relatively stable over time and various situations (Teglasi et al., 2007). However, personality is an abstract concept that cannot easily be measured. Patterns of behavior, emotions, and cognitions are used to quantify intangible concepts like personality. The various dimensions of a trait are measured using constructs which are researcher-defined and scientifically supported approximations of abstract concepts (personality). Constructs are dynamic, but with adequate scientific testing, provide a way to measure and inform. Personality traits, as defined by constructs are useful in understanding differences between individuals and how each individual responds to various situations (Teglasi et al., 2007).

Sensory Processing Sensitivity (SPS) is theory of personality coined by Elaine and Arthur Aron in a series of seven studies which sought to define the characteristics a sensitivity trait which could not be adequately explained by other personality theories. SPS is a trait that appears in roughly 10-35% of the population, an estimate of 20% of children, making it too great a percentage of the population to be considered a disorder (E.N. Aron & A. Aron, 1997; E.N. Aron et al., 2012; E.N. Aron, 2002). High sensitivity characteristics include depth of processing,

overstimulation, emotional reactivity and empathy, and sensitivity to stimuli. Those with SPS will likely have deep, elaborate processing of internal and external stimuli, become uncomfortable or distressed from the amount of information they are processing, have strong positive and negative emotions, and notice even the smallest of details (E. Aron et al., 2012, Aron, 2002). Regardless of how the aspects are split, to be considered a Highly Sensitive Person (HSP) or Highly Sensitive Child (HSC), all four of the nuances of the trait must be present. However, one or more of the four areas may be more prevalent (Aron, 2002).

Carl Jung described sensitivity based on the concept of introversion; the preference to stop and reflect or observe (Jung & Godwyn Baynes, 1921 as cited in E.N Aron & A. Aron, 1997). Eysneck (1967) expanded on Jung's research to include two dimensions; introversion and neuroticism. Neuroticism refers to the tendency to have high emotional reactivity and distress (Greven et al., 2019). E.N. Aron and A. Aron (1997) compared these existing theories to their proposed theory on SPS and found low to moderate correlations to introversion (Pearson's r median correlation around 0.29) and fairly high associations with neuroticism (median .54). However, neither were able to describe the nuances of sensitivity. In later research E. Aron (2002) commented that about 70% of highly sensitive people are introverts which further illustrates the point that introversion alone does not describe highly sensitive individuals. Gray (1981) had an alternate theory of personality based on two motivational systems of the brain. The Behavioral Inhibition System (BIS) which is similar to the pause to check mentality of highly sensitive people and the Behavioral Approach System (BAS), which is the urge to satisfy needs (Greven et al. 2019). Smolewska et al. (2006) compared the HSPS to the BIS/BAS model and found that the BIS was related significantly to all of the HSPS factor scores, especially EOE (Ease of Excitation) but the BAS was unrelated to SPS.

McCrae and Costa's (1994) five-factor model of personality adds additional factors to the aforementioned models. The domains are extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness (McCrae & Costa, 1994 as cited in Greven et al. 2019). Globally, SPS has been found to have a positive association with neuroticism and openness to experience and a negative association with extroversion (Smolewska et al., 2006; Pleuss et al., 2018). When SPS is broken down into its three dimensions, Ease of Excitation (EOE), Aesthetic Sensitivity (AES), and Low Sensory Threshold (LST), EOE and LST were related to neuroticism. Contradicting the global positive association with openness, one study found that EOE and LST were inversely related to openness (Lionetti et al., 2018). Another study found EOE and LST to be inversely related to extroversion, consistent with the global findings, and conscientiousness (Pluess et al., 2018). AES has repeatedly been shown to have an association with openness to experience (Smolewska et al., 2006; Lionetti et al., 2018) and to conscientiousness (Pleuss et al., 2018). As demonstrated by the initial conceptualization and study of Sensory Processing Sensitivity, and many studies thereafter, existing models of personality are unable to fully capture all the temperamental constructs of the trait.

Scale Development

In conjunction with the initial development of Sensory Processing Sensitivity by Elaine and Arthur Aron (1997), they also developed a 27-item adult self-report Highly Sensitive Person Scale (HSPS). A series of seven studies defined the psychometric properties to produce a scale with internal consistency reliability (study 6 - α=.87 and study 7 - α=.85) and discriminant, convergent, and overall construct validity. Further, their research suggests that SPS is unidimensional. In one study, the variables accounted for 54% of common variance for the 27

items and another 47% of common variance with scree test suggesting at single factor solution. This set of studies established the HSPS for subsequent researchers to continue work on SPS.

Aron et al. did a review of literature in 2012, in part to look at how the scale has performed in studies from other researchers. Studies using the Highly Sensitive Person Scale (HSPS) found alphas greater than .85 (Aron et al., 2012). Contrary to their initial findings of a single factor solution, themselves and others also found multi-factor solutions with different data. Smolewska et al. (2006) sought to evaluate the original HSPS with a larger sample and to test how it relates to other personality constructs. A sample of 851 college students from a US university participated in the study. The HSPS, NEO-FFI and BIS/BAS scales were used with good internal consistency. Exploratory and confirmatory factor analysis were performed on the HSPS resulting in a three-factor model fit including Ease of Excitation (EOE), Aesthetic Sensitivity (AES), and Low Sensory Threshold (LST). This three-factor structure differs from the originally proposed unidimensional construct. Similarly, Evans and Rothbart (2008) also found that the HSPS did not fit a unidimensional construct but rather supported either a two or three factor model. They argued for a two-factor model based on measures from their Adult Temperament Questionnaire (ATQ) with relationships to their factors “sensory discomfort” and “orienting sensitivity”. Liss et al. (2008) also found fit for a three-factor model for the HSPS. The research to date appears to lean toward a three-factor model for the scale, however, additional research would be helpful to continue to understand factorial fit.

Sensory Processing Sensitivity (SPS) is not an adult only trait; there are aspects of the trait that can be seen in infancy. Therefore, in addition to a scale for adults, researchers have since developed a parent-report HSP scale for children and a self-report Highly Sensitive Child Scale (HSCS). Using the adult HSPS, Boterberg & Warreyn (2016) asked parents of Belgian

children to report on their children. The scale used in this manner had a Cronbach's alpha of .91 showing high internal consistency and was a reliable measure of SPS in children. Pluess et al. (2018) sought to create a child self-report version of the Highly Sensitive Person Scale that would measure the same qualities as the adult and parent-report versions of the scale. They conducted a series of five studies finding that 12 of the items had the best fit to the adult scale. The 12-item scale was internally consistent and reliable for children and adolescents ages 8-19. In comparing to the Big Five personality traits, the study showed divergent validity of the 12-item HSC scale. Consistent with previous authors, testing of cutoff confirmed that the highly sensitive group makes up somewhere from 20-35% of the population studied (Pleuss et al.,2018).

In the three years since development of the Highly Sensitive Child Scale (HSCS), several authors have translated the scale into other languages. Tillman et. al. (2018) created a short-version of the HSCS in German for use with secondary students. Similar to translation to other languages, the authors wanted to see how the factorial structure translated into the German language. A sample of 301 secondary students participated in the study. The factorial structure revealed a two-factor solution with a correlation of r=. 30 and good validity. Iimura and Kibe (2010) performed a two-wave longitudinal study of Japanese adolescents to look at the validity of the Japanese version Highly Sensitive Child Scale (J-HSCS). A sample of 942 students ages 12 – 16 were asked to rate their sensitivity using the J-HSCS at time 1 and time 2 (internal consistency of Cronbach's alpha = .78). At time one, students were also asked to complete the Japanese version of the Positive and Negative Affect Scale (PANAS-J). Finally, the BIS/BAS scales were used at time 2 to compare to the J-HSCS. The J-HSCS was found to fit a bifactor model and have good psychometric properties similar to the original HSCS. The J-HSCS showed factorial and convergent validity (Iimura & Kibe, 2020).

As illustrated, the Highly Sensitive Person Scale (HSPS) has shown consistency and validity when used in adults in English and subsequently in other languages. Similarly, both the parent-report Highly Sensitive Child Scale (HSCS) and the child-report version have held in language translation with both good internal consistency and validity. Fit for the SPS model is still under investigation. As each of the scales have been tested and validated, researchers have found one factor, two factor, and three factor fit, indicating additional research is needed.

Dichotomous versus Continuum

The research suggests that anywhere from 10-35% of people will identify with Sensory Processing Sensitivity (SPS) with the average being around 20%, with no gender differences (Aron & Aron, 1997; Aron, 2002; Aron et al. 2012). Those in the top 20% of scores on the HSPS are typically considered to be highly sensitive with the remaining 80% not being highly sensitive. E.N. Aron and A. Aron (1997), and authors thereafter, found the variable to be dichotomous with the break point anywhere between the aforementioned 10-35%. In the past years, researchers have demonstrated that SPS may fall on a continuum rather than being a dichotomous variable as previously thought (Linonett et al, 2018; Pluess et al., 2018; Boterberg & Warreyn, 2016).

Using the orchid-dandelion metaphor, which simply classifies sensitive children as orchids, or more susceptive to their environments, and dandelions as children with more resilience, Lionetti et al. (2018), sought to look at where the cutoffs are for people with high sensitivity and low sensitivity, specifically to see if SPS is a dichotomous trait or exists on a continuum. Multiple samples have revealed that there is in fact a third group of medium sensitivity people who are labeled tulips. The first sample of 906 psychology students from a US university completed the HSPS to help validate cut off scores. The second sample of 230

psychology students from a UK university completed the HSPS, a self-report measure of the Big Five personality traits, and a mood induction task. Latent class analyses were done to determine cut-off scores, revealing a three-class model with 31.27% in the low sensitivity group, 42.15% in the medium sensitivity group and 26.58% in the high sensitivity group. The cuts off scores were estimated using the intersection points of the distribution curves between the three groups. The authors suggest that the general population likely fits into a 30-40-30 split on sensitivity. The three groups differed significantly in extraversion and neuroticism. Post hoc testing revealed that the high sensitivity group had significantly lower levels of extraversion and all three groups differed significantly in neuroticism. There was also a marginally significant association between HSP and negative emotional reactivity. This paper was able to identify three groups rather than two sensitivity groups with the existence of high sensitivity making up about 30% which is consistent with previous findings on SPS. This means that sensitivity is not a binary trait but a normally distributed trait. The majority of people fall into the tulip group (more common and less fragile than orchids).

Similarly, Pluess et al. (2018) indicated that the highly sensitive group makes up somewhere from 20-35% of the population studied with the Highly Sensitive Child Scale (HSCS). This matched the 30-40-30 split suggested by previous researchers. However, the authors suggest that rather than just a high and low sensitivity group, a medium group immerged across their samples. The sensitivity levels using the scale appear to be normally distributed indicating a 30/40/30 split for sensitivity levels would be appropriate. Boterberg and Warreyn (2016) also found the SPS variable to have a normal distribution when using a condensed parent-report version of the HSCS. Thus, the most recent research on SPS as a variable illustrates a normal distribution across the population.

Susceptibility to Environment

Sensory Processing Sensitivity (SPS) is often studied within the context of environmental susceptibility, or how the personality trait interacts with environmental influences. In other words, how a person responds to negative and positive stimuli. In a review of literature on environmental sensitivity, Belsky & Pluess (2009) shared that the earliest framework is the diathesis-stress model which posits that some individuals are naturally prone to vulnerability when exposed to negative events/stressors. Newer research in differential susceptibility and biological sensitivity to context pose that susceptibility is a range, and that susceptibility can be positive with greater reactions to positive stimuli than peers, while also having greater reaction to negative stimuli than peers. DeVilliers et al. (2018) did another review providing background for alternative susceptibility theories and suggesting a more positive outlook, vantage sensitivity. The vantage sensitivity framework states that some individuals are more responsive to positive exposures. Other similar frameworks, differential susceptibility and biological sensitivity to context suggest environmental susceptibility is a combination of the diathesis-stress model and vantage sensitivity. Therefore, personalities who are environmentally susceptible, such as those with Sensory Processing Sensitivity, are likely to react more negatively to negative stimuli, and more positive to positive stimuli.

Several studies have supported the presence of environmental susceptibility in those with Sensory Processing Sensitivity. In particular, there appears to be a correlation between high sensitivity and negative affectivity (Lionetti et al., 2018; Aron et al. 2005) and the negative affectivity is not moderated by mindfulness practice (Baaker & Moulding, 2012). However, as suggested by the differential susceptibility model, highly sensitive children have demonstrated that they are susceptible to both positive and negative stimuli (Slagt et al, 2018). Yet in another

instance, supportive positive environmental influences (perceived teacher support, school climate, autonomy) caused high SPS individuals to be more positively affected by the optimism of their peers (Iimura and Kibe, 2020). However, peers with low sensitivity did not show a change in well-being. While additional research on environmental susceptibility model fit may be necessary, it appears that HSPs are more greatly affected by both positive and negative environmental stimuli than the general population.

Childhood Quality

Childhood quality is a significant environmental factor that has been shown to cause increased negative affectivity in adults with Sensory Processing Sensitivity (E.N. Aron & A. Aron, 1997). Children with high sensitivity and high-quality parenting are likely to outperform their classmates by being perfectionist, productive, class leaders (Aron, 2002). High sensitivity children with low-quality parenting can become overwhelmed by the school environment resulting externalizing behaviors such as aggression, antisocial tendencies, or hyperactivity (Pluess et al., 2018). When interviewing and studying adults with high sensitivity, those with HSP with high quality parenting did not differ from non-HSP with positive childhood environments (Aron, 2002). Alternatively, HSP who felt they had low quality parenting correlated with unhappy childhoods. Further, those high sensitivity individuals with unhappy childhoods were more likely to have issues with depression and anxiety in adulthood (E.N. Aron & A. Aron, 1997). Parenting quality and childhood quality have time and again shown to significantly change the outcome for people with SPS.

Acevedo et al. (2017) used fMRI and emotional pictures to look at parenting quality and Sensory Processing Sensitivity. Their results support former behavioral studies that found high QCP and high SPS can increase the positive effects of SPS. They also show the QCP with a high

SPS individual allowed for normal emotional processing of negative stimuli. Thus, high quality parenting improved adaptive functioning in high SPS women. Aron et al. (2005) did a study to see if Highly Sensitive People have a stronger association between shyness and adverse child environment, a stronger association between adverse childhood environment and negative affectivity, and if negative affectivity mediates shyness, SPS, and childhood environment. The authors conducted a series of four studies to test these ideas. They found that HSPs are more likely to be shy and demonstrate negative affectivity if they experienced negative childhood environments. However, without adverse childhood conditions, HSP are no more likely to be shy than their non-HSP peers. Negative affectivity is stronger in HSP with adverse childhood environments that non-HSP adults. The results of this study clearly link shyness, negative affectivity and sensory processing sensitivity. Further, the quality of parenting particularly changes the outcome of adult negative affectively and shyness demonstrating the importance of high-quality parenting for children with SPS to have positive outcomes as adults (Aron et al, 2005). Another study by Slagt et al. (2018) looked at negative emotionality as susceptibility markers in kindergarteners located in The Netherlands. Taking into account parenting behaviors, child outcomes, externalizing behaviors, and prosocial behaviors, they found that parenting quality interacted with SPS in predicting externalizing behaviors but not prosocial behaviors indicating that children with SPS are susceptible to both negative and positive circumstances (Slagt et al, 2018).

Several researchers have sought to understand parenting quality from the lens of attachment theory. Attachment theory is often used to study coping strategies and emotional regulation (Goldberg & Scharf, 2020). Bowlby (1988) argues that the attachment system affects how an individual will respond to stressful events and is established during infancy. Attachment

is the desire to be close to a significant individual (ex. parents) to calm oneself during distress. Ties have been found between SPS and attachment insecurity, the result of unavailable or nonresponsive parenting during infancy (Meyer et al., 2005; Meredith et al., 2016; Bowlby, 1988). Anxious attachment, a type of attachment insecurity that causes hyperactivating strategies, self-centeredness, and distress when others need assistance, has been specifically linked to SPS (Meredith et al., 2016). More recently, in a study of parents with SPS, the parents' SPS levels were associated with the parents' attachment avoidance and attachment anxiety (Goldberg & Scharf, 2020). This caused intrusive and inconsistent parenting. Parents with SPS find parenting more challenging than non-SPS individuals; the link to insecure attachment is likely to cause further distress for both the parent and the child (Aron et al., 2019). It is clear from the above studies that parenting quality is a significant predictor of both positive and negative outcomes for children and adults with Sensory Processing Sensitivity.

Physical & Emotional Health

High sensitivity has many benefits but can also cause physical and emotional problems such as anxiety and depression, difficulty with emotional regulation, distress, medical unexplained physical symptoms, sleeping problems and eating problems (Bakker & Moulding, 2012; E.N. Aron & A. Aron, 1997; Aron, 2002; Brindle et al., 2015; Boterberg & Warreyn, 2016). As mentioned previously, childhood environment and parenting quality appear to have the most lasting effects for individuals with SPS (E.N. Aron & Aron, 1997). In particular, internalizing problems tend to be the most prevalent issues for HSPs who are not well adjusted. Bakker and Moulding (2012) looked at a convenience sample in New Zealand/Australia to see whether there was a relationship between SPS, mindfulness, acceptance, and negative affect. The High SPS individuals reported higher depression, anxiety, and stress. These individuals also

reported lower mindfulness, acceptance, and psychological flexibility. In a similar study in New Zealand/Australia, Brindle et al. (2015) sought to understand the relationship between Sensory Processing Sensitivity, emotional regulation and psychological distress. Each participant was asked to self-report on the Highly Sensitive Person Scale (HSPS), Depression and Anxiety Stress Scale (DASS), The Difficulties in Emotional Regulation Scale (DERS), and Distress Tolerance Scale (DTS). The HSPS correlated with high levels of negative moods (depression - .92, anxiety - .85, stress- .85). Moderate correlations (between .4 and .7) were shown between HSPS and emotional regulation. The ability to handle distress and awareness of emotion and strategies were found to be mediating variables. These results can be applied to clinical interventions for those with SPS, specifically those dealing with depression and anxiety. Emotional regulation and self-efficacy strategies may be helpful in dealing with adults who demonstrate high sensitivity and negative moods.

Tillman et al (2018), looked at a variety of personality constructs as well as emotional outcomes for high school students with SPS. Participants were asked to complete a variety of measures including the German HSCS, scales for openness, neuroticism, and extraversion from the Big Five personality traits, intrinsic interest in school, scientific interest, school-related self-efficacy, frequency of positive and negative affect, psychological well-being, physical well-being, and functional capacity in school. These students were also asked to provide their last report card grades in math and German language. A significant negative relationship was found between physical (-.32) and psychological well-being (-.34) and functional capacity (-.30) with the total value of SPS. A small negative relationship (-.24) was also found between SPS and self-efficacy. These interactions indicate that high sensitivity has impacts on the overall health of high school students, and the ability to advocate for oneself.

In Belgium, Boterberg & Warreyn (2016), considered how high sensitivity children in adolescents would impact daily functioning. Children with high SPS had more MUPS, sleeping problems, and eating problems compared to their peers illustrating issues with daily functioning. High SPS children also showed less antisocial behavior. The parent-report HSPS is a useful tool to evaluate children whether a child is a HSP. The authors suggest their results indicate higher internalizing problems and issues with daily functioning for children with the trait. This study also indicates that externalizing problems are lower in children high in SPS (Boterberg & Warreyn, 2016). Internalizing problems are often difficult to detect and go untreated in many children. Only 20-30% of children with internalizing problems receive needed help (Crespi & Politikos, 2012).

While highly sensitive people are more prone to emotional and some physical symptoms, they are also more likely to have positive outcomes from interventions (positive stimuli). Simply knowing about the personality trait and learning study skills and adaptability is beneficial to a HSP (Cater, 2016; Aron et al. 2012). deVillers et al (2018) performed a review of literature and concluded that children and adults with high sensitivity are shown to have higher response rates to therapeutic interventions such as cognitive behavior therapy (CBT). Specifically, high sensitivity individuals are likely to improve with shorter and less intense interventions where low sensitivity individuals may need lengthier and more intense interventions. Pluess and Boniwell (2015), did a large study of a new school-based preventative depression program. The program was delivered to all children in a girls-only 6th grade school in London with the 7th grade cohort acting as the control group. The program used CBT and positive psychology concepts with the goal of increasing emotional resilience to prevent depression. A 20-item depression measure was used at time one and time two and the HSCS was given at post-treatment for only the treatment

group. Concurrent negative affect measured with PANAS was corrected in the SPS scores. SPS was not associated with depression at pre or post assessment. Extreme groups (top 25% and bottom 25% for sensitivity) were created to look at depression using t-tests within groups. The high SPS group did not differ at pre and post-test but had significantly lower depression 6 and 12 months after treatment indicating that high sensitivity individuals have better outcomes from interventions. Demonstrated by the differential susceptibility model, physical and emotional health, and interventions to aid in preventing or eliminating issues have both the potential to have stronger positive and negative outcomes based on the stimuli.

Brain Activity

Changes in neural activity can be seen in individuals with Sensory Processing Sensitivity in comparison to their peers. Using fMRI, changes in activation of areas of the brain are able to be detected while completing a task. In visual tasks, one study (*NI*=20) found that cultural differences became irrelevant in high sensitivity individuals because the trait causes the participants to focus on all the details of the stimuli (Aron et al., 2010). Another study with a small sample of Chinese students (*N*=18) looked at whether high sensitivity individuals would spend more time processing visual stimuli (Jagiellowicz et al. 2011). Analysis of the data found that the higher rating on SPS, the longer time the participant took to respond to minor changes. High SPS individuals also tended to respond more quickly on slow than fast trials and had activations in the temporal lobe, the claustrum, and the cerebellum (increased brain activation). This illustrates that high SPS individuals are attending to details when responding to minor changes and activating the visual attention areas of the brain.

Using emotional pictures from the International Affective Picture System, a third study explored whether high SPS adults (*N*=14) would show greater processing to affective images and

whether processing would change based on childhood parenting quality (QCP) report (Acevedo, 2017). The fMRI results showed that SPS and high-quality parenting together increased activation of memory, emotion, and physiological regulatory areas in the brain. Activation was also seen in across the default mode network (DMN). The activation of the DMN includes depth of processing and sensory sensitivity processing. Positive stimuli and high SPS activated the areas of the brain responsible for reward, calm, arousal, and sensory pleasures as well. In response to negative stimuli, activation was stronger in areas responsible for emotional regulation (Acevedo et al, 2017). This aligns with one study on the relationship between ADHD and SPS where a positive correlation was found in adults with self-reported ADHD and SPS, specifically noting the overlay of emotional reactivity (Panagiotidi et al., 2020) In a simple visual test, without fMRI, the three subscales of the HSP correlated with faster reaction times on tasks (Gerstenberg, 2012). Highly sensitive respondents also had fewer errors on the tasks, however, they were also more stressed from the task than low sensitivity individuals illustrating that high SPS individuals have better and faster visual processing. The results of these studies illustrate that high sensitivity changes how the brain functions in response to stimuli. However, all of these studies had very small sample sizes, so the reliability and validity of the data is unclear. Larger sample sizes are needed to extrapolate the data to the general population.

Summary

The literature reveals that Sensory Processing Sensitivity can be a very positive trait or have detrimental effects based on the environmental factors that are often out of a child's control. High sensitivity individuals process intricate details about the people, places, and emotions around them which can be overwhelming and sometimes cause anxiety, distress, shutdown, outbursts, or physical symptoms (E.N. Aron & A. Aron, 1997; Aron, 2002) The trait affects

many areas of a person's life making it important to understand and share information on how the trait presents in a school setting. It is suggested that the presentation of SPS can be mistaken for autism spectrum disorder and attention deficit hyperactivity disorder. Only a few studies exist on the relationship between ADHD and SPS as of this review, but all of these are with adult subjects. No known studies have been completed on the relationship between ASD diagnosis and SPS. The research also indicates that high SPS individuals are more likely to have issues with emotion regulation, anxiety, and depression (Bakker & Moulding, 2012; E.N. Aron & A. Aron, 1997; Aron, 2002; Brindle et al., 2015; Boterberg & Warreyn, 2016). All of these issues are indicated in the Diagnostic and Statistical Manual on Mental Disorders (DSM-5) and many can lead to the necessity for additional support if a student qualifies either under the Individuals with Disabilities Act or a Section 504 plan. It is necessary to be able to differentiate the trait from actual disabilities and/or prevent misidentification. Most importantly, all students need support to achieve their best academically and further knowledge in school psychology has the potential to increase the achievement of 1 in 5 students.

Parenting quality and childhood environment can have the most impact on adult outcomes of a child with high sensitivity (Pluess et al., 2018; Aron, 2002; Acevedo et al., 2018). This is particularly salient when the parent has SPS but also exhibits insecure attachment, causing neglectful or overbearing parenting style (Goldberg & Scharf, 202). Other childhood environment factors such as poverty, divorce, mistreatment, or any other negative/stressful situations in childhood are likely to negatively impact children with SPS throughout their life. Alternatively, children with high quality parenting and positive childhood experiences are likely to show greater benefits to positive stimuli. It is suggested that these children will be classroom leaders, seek to be liked by peers and teachers, and be creative thinkers while their negatively

impacted SPS peers may present as uninterested, unmotivated or exhibit behavior problems (Aron, 2002). School psychologists may have the opportunity to provide school-wide or individual interventions to support students who may have poor parenting quality or need positive adult role models. Classrooms in the United States are colorful and dynamic environments, but not necessarily set up for a child who is constantly processing all the stimuli in their environment. All young children are still learning skill in emotion regulation and adaptation, and while this is expected of high sensitivity individuals, it may require a different approach.

To date, research studies on Sensory Processing Sensitivity have not focused on understanding specifically how the trait presents in the school setting. If children with high sensitivity have similarities or co-existence with several diagnosable disorders, are they being diagnosed with disabilities at a higher rate than their lower sensitivity peers? We do not know whether there are correlations to special education diagnoses but by better understanding how the trait presents in the school setting, it may be possible to prevent students from needing additional supports in an already overwhelmed special education system. Moreover, whether a child qualifies for special education services or not, students with SPS may still have specialized needs. An optimal level of arousal is needed for an SPS child to function at their best, simple changes may help these students succeed as they are learning to adapt to the challenging aspects of the trait while honing in on the positive aspects. We simply do not know how SPS specifically affects academic and behavioral outcomes in the school environment.

All this said, studies have shown that children with Sensory Processing Sensitivity are much more responsive to positive interventions such as peer support, school wide programs, and cognitive behavior therapy (Bakker and Moulding, 2012; Tillman et al., 2018; Boterberg &

Warreyn, 2016; Pluess & Boniwell. 2015). Moreover, it is demonstrated that treatment may be quicker and less intense, to have the same outcomes as a low sensitivity child. These findings are important in developing intervention programs that may support students with the trait. While personality is relatively unchanging, school psychologists have the opportunity to intervene and change the outcomes for students struggling with SPS. To do this, they first need to know about the trait, understand how it presents in children, and learn which versions of the scale are most relevant to the age of the child.

Chapter III. Methodology

Research suggests 10-35% of people have the personality trait Sensory Processing Sensitivity (SPS) although little is known about how the personality trait presents in the school environment (Aron & Aron, 1997; Aron, 2002; Aron et al. 2012). The purpose of this study is to explore whether the presence of the high sensitivity personality trait has any implications for academics or behavior in elementary aged students, and the perceptions of teachers who work with high sensitivity students. This chapter will provide a clear understanding of the study design, participants, instrumentation and data sources, data collection procedures, and data analysis. In addition, ethical considerations, assumptions, and trustworthiness will be discussed. Using a mixed-methods design this study aims to answer the following research questions:

Research Questions

1. How do highly sensitive elementary students perform academically as compared to their low sensitivity peers?
2. What are the behavioral patterns of highly sensitive students as compared to their low sensitivity peers?
3. What are teacher's perceptions of working with highly sensitive students?

Research Design

This mixed-methods study used an explanatory sequential design to understand how the personality trait Sensory Processing Sensitivity (SPS) presents in elementary students in the school setting. Research to date has anecdotally provided insights to how children with high sensitivity may present in a school setting but there is no specific data on whether the trait correlates with changes in academic performance or behavioral patterns. This information is necessary for school psychologists, teachers, and other in school providers to know how to help

struggling high sensitivity children learn. Mixed-methods research integrates both qualitative and quantitative data to garner information that could not be provided by one methodology alone; in recent years it has been called the third research paradigm (Creswell, 2018; Johnson et al., 2007) Mixed-methods was chosen for this study to provide both the necessary data on academic and behaviors in children with the SPS trait while getting allowing for rich, detailed explanations of experiences in the classroom. For these reasons, mixed-methods was the best choice to answer the proposed research questions.

More specifically, this mixed-methods study utilized an explanatory sequential design. Explanatory sequential design involves collecting quantitative data first followed by collecting qualitative data to further understand and provide depth to the information gathered in the quantitative phase (Creswell, 2008). The quantitative portion of the study was conducted using a correlational design to understand the relationship between sensitivity level, academic achievement, and behavioral patterns. Correlational design allows for the measurement of the relationship between two or more variables and the strength of those relationships (Creswell, 2014). The Highly Sensitive Child Scale (child report) was administered to students determine high, medium, and low sensitivity levels. Teachers completed the Behavioral Assessment System for Children-Third Edition (teacher report) and provided benchmarking academic data in the areas of reading and math. This data provides information on relationships and patterns of highly sensitive children.

The qualitative portion of the study was conducted using essential qualitative research to explore emergent themes. Developing themes that are found in the data based on what teachers are seeing in the classroom environment provides real world applications to working with high sensitivity. Teachers experiences were explored through interviews following data collection on

behaviors and academics of the students in their classrooms. The flexibility of essential qualitative research allowed for probing to fully develop the perspectives of teachers who work with high sensitivity students.

Participants & Sampling Technique

Participants for the study were selected using a purposive convenience sample to garner academic and sensitivity data and a stratified random sample for behavioral data. The goal was to select two highly sensitive children and two non-highly sensitive children from each classroom for the behavioral portion of the data due to the time and depth of questions on the BASC-3. The Highly Sensitive Child Scale – self report version is valid and reliable for children ages 8-18. As the cutoff for elementary schools vary from after grade 4 to after grade 5, participants for this study were from grade 3, ages 8 and 9, and one classroom of grade 4 students. Aron (2002) projects that the typical United States classroom can be extremely overwhelming for a highly sensitive child. Further the negative affectivity of the trait can be compounding later in life (Aron, 2005). Thus, the lowest age for self-report is the best age to get information direct from the source. Classrooms/teachers were chosen by convenience from a Midwestern school district with thirteen schools and enrollment between 5,500-6,000 students. Teachers, students, and the student's parents all had the opportunity to opt-out of any part of the research.

Ethical Considerations

This study involved both students and teachers as the participants. All data from the study is confidential and names have been redacted for the school(s), teachers, and students. Any identifying information was removed for safety and confidentiality. Teachers are protected through an informed consent to participate in the interview portion of the study and consent for providing academic and behavioral data. This informed consent made it clear that participation

was voluntary and participants were free to drop out of the study at any time. Students were protected through an opt-out informed consent to their parents and an assent by each student to fill out the brief questionnaire. The study was submitted to the University of Findlay Institutional Review Board for approval prior to beginning any research.

Instrumentation & Data Sources

Instrumentation and data sources for this study included the Highly Sensitive Child Scale (self report), academic performance data, the Behavior Assessment System for Children: Third Edition. (BASC-3), and a semi-structured teacher interview. The Highly Sensitive Child Scale is a 12 question,7-point Likert scale to test for high, medium, and low sensitivity in children and adolescents ages 8 to 18 (Pleuss et al., 2018). The scale is provided by the researcher for other research projects. Pleuss et al. conducted a series of studies to confirm consistency of the scale. Study 1was conducted with 11 to 14 year-old children to pair 38 items down to 12 with the correct psychometric properties. The students completed the scale of 38 items in their classrooms. Internal consistency for this scale was acceptable at $\propto$ =.79. Study 2 was conducted with 11 and 12 year-old children on a computer in a classroom environment to attempt to replicate the results of study 1with the 12-item scale. Internal consistency in study 2 was $\propto$ =.72 which was acceptable in capturing the psychometric properties. Study 3 looked at test-retest reliability with children ages 8-11 who completed the scale in a classroom on a computer. Internal consistency in study 3 was $\propto$ =.74 and test-retest reliability (r = .68). A small pilot study of the Highly Sensitive Child Scale for use in the present study showed confusion on the provided answer scale which asks the child to rate 1, not at all to 7, extremely. For example, one question reads “I don’t like when things change in my life” and the child was asked to rate on the 7-point Likert scale. The word “don’t” in this and other questions was confusing in how the

rating scale was to be applied. Due to this confusion, the revised scale added the words “like me” to the rating scale for clarity where 1= not at all like me and 7= extremely like me. Data from this scale was used as the independent variable for RQ1, RQ2 and RQ3.

STAR benchmarking assessment data in both reading and math was provided by the school district as the dependent variable data for academic achievement (RQ1). The STAR assessment system is a group of computer-adaptive tests that take students about 15-20 minutes to complete (per test) and provides a scaled score based on national norms (Renaissance, 2020). The STAR Math assessment is an achievement test that looks at development in the areas of numbers and operations, algebra, geometry and measurement, and data analysis, statistics, and probability. The STAR Reading assessment is an achievement test for reading comprehension and skills. It specifically tests achievement in word knowledge and skills, comprehension strategies and constructing meaning, analyzing literacy text, understanding author’s craft, and analyzing argument and evaluating text (Renaissance, 2020). STAR Benchmarking assessment data was chosen as the measure of academic achievement because students in the school district are benchmarked three times annually in both reading and math. This provided timely academic achievement data to compare high sensitivity students to their general peers. Due to the timing of this study, standardized achievement tests and student’s grades were not an accurate measurement of current knowledge. Academic achievement data were used as the dependent variable for RQ1.

Teachers were asked to rate four children in their classroom with an electronic version of the Behavioral Assessment System for Children- 3rd Edition using a stratified random sample. The BASC-3 is published by Pearson and is widely used throughout the district to understand behavior and emotions in elementary students. The teacher rating scale for children ages 6-11

includes 156 questions per student (Reynolds & Kamphaus, 2019). Questions have either a true and false answer or a 4-point Likert scale (N for Never, S for Sometimes, O for Often, or A for Almost always). Internal consistency for the teacher rating scale for children ages 8-11 is excellent with $\propto$ =.90 or greater for all scales. Test-retest reliability for this scale is also good (*r*=.85-.87*)*. The BASC provided raw data for comparison to high, medium, and low sensitivity students to answer RQ2. More specifically, probability indexes on ADHD, Autism, Functional Impairment, Executive Functioning, Emotional Disturbance are yielded from the results of this measure as well as individual behavioral and emotionality items.

The final data source was an interview questionnaire developed by the researcher. The purpose of the interview was to answer the research questions and understand if teachers noticed any differences in their groups of students based on the presence of the personality trait. Interviews impart necessary qualitative data to give color and depth to the knowledge acquired through quantitative measures. The semi-structured interview was primarily used to understand how teachers perceive highly sensitive students (RQ3) but also supplemented quantitative data for RQ1 and RQ2. The following interview questions were written based on the theoretical framework of Sensory Processing Sensitivity and based in the tradition of grounded theory:

1. What is your current understanding of Sensory Processing Sensitivity, also known as High Sensitivity? (RQ3)
2. Did the students in the high sensitivity category surprise you? If so, how? (RQ3)
3. How do you think your high sensitivity students perform academically as compared to their peers? (RQ1, RQ3)
4. What behavioral patterns do you notice in your high sensitivity students as compared to their peers? (RQ2, RQ3)

5. What aspects of the SPS personality trait do you see as beneficial in the classroom environment? (RQ3)
6. What aspects of the SPS personality trait do you find to be challenging in the classroom environment? (RQ3)
7. Have you noticed any strategies that seem to work best with your high sensitivity students? (RQ3)
8. Is there anything else you want to share about your experience with high sensitivity students?

Research question one looked at academic performance in students with high sensitivity. Interview question two adds descriptive information to the statistics achieved through quantitative methods. Research question two was written to understand if there was a prevalence in any emotional or behavior issues among high sensitivity students. Interview question four gave insights on how teachers understand this relationship. The remaining questions were written to answer research question three which is qualitative in nature to learn about teacher's perceptions of highly sensitive students. Sensory Processing Sensitivity is not well understood from the school perspective so the interview allowed for commentary on how the presence of the trait in students affects their outcomes in both academics and behaviors at school. Further, it gave teachers a resource for working with students with the trait.

Data Collection Procedures

Permission from the school district superintendent was granted to do research in the district first. This approval included access to student academic data if parental permission was given as well. Once the University IRB approved the research proposal, an invitation to participate was sent to third grade teachers in the district. The invitation included a letter

explaining the background of the study and participation requirements. Finally, an informed consent was shared with the teachers for agreement to participate in providing benchmark assessment data, completion of the BASC-3 and participation in an interview. Teachers were also asked to send a provided letter and informed consent both via email and/or through other parent communication tools to the parents of all students in their classrooms. The informed consent gave an opt out and offered each parent two-weeks to deny their student's participation in the study. Opt-out consent was approved by the district. This study met the four criteria for opt out consent which includes involving no more than minimal risk to the subjects, the waiver will not adversely affect the rights and welfare of the subjects, the research cannot be practically carried out without the waiver, and subject selection is based on classroom membership. No data was given to the researcher prior to the completion of this two-week period. Teachers could choose to administer the Highly Sensitive Child Scale to their students or have the researcher administer. Each child was asked for assent to participate in filling out this questionnaire.

Data Analysis

The Highly Sensitive Child Scale items were scored by taking the average across the twelve items. Pluess et al. (2018) suggests cutoff scores of 4.2 between low and medium sensitivity groups and 4.8 between medium and high sensitivity groups for children in the United Kingdom. The studies by Pluess et al. were conducted in a classroom environment with English speaking students of the same or similar ages so these suggested cutoff scores were utilized in this study. Research suggests that there are three sensitivity groups (high, medium, low), however the purpose of this study was to determine differences between high sensitivity and the general population which includes both the low and medium sensitivity groups (Pluess et al., 2018). Thus, the low and medium sensitivity groups were combined into one group. The effects

of high sensitivity on academic performance between highly sensitive students the general population were measured utilizing independent samples two-tailed t-test ($\propto$=.10). For each BASC category, a two-tailed t-test ($\propto$=.10) was performed with a Bonferroni correction to compare the high sensitivity students to their general peers' raw data behavioral measures (externalizing problems, internalizing problems, behavioral symptoms index, adaptive skills, ADHD Probability Index, Autism Probability Index, EBD Probability & Functional Impairment). In addition, data on whether the student's behavior is at risk or clinically significant was analyzed. Scores in the clinically significant range suggest a high level of maladjustment while at risk scores suggest either a developing problem or a problem that does not currently require formal intervention (Reynolds & Kamphaus, 2019)

Table 1

Descriptions of BASC Indices

Grouping Name	Skills/Issues
Externalizing Problems	Aggression – verbal or physical actions that are threatening to others, Hyperactivity – overly active, act without thinking, rush through work, Conduct problems – destroying property, rule breaking, antisocial Hyperactivity, aggression, conduct problems
Internalizing Problems	Anxiety – nervous, worried or fearful Depression – unhappiness, sadness, and stress that impact daily activities or suicidal thoughts Somatization – overly sensitive, complaints of physical problems
Behavioral Symptoms Index	Atypicality – odd or psychotic behaviors, Withdrawal – avoid social contacts
Adaptive Skills	Adaptability – ability to manage changes in the environment Social skills – skills needed to interact with others Leadership – ability to work with others and to accomplish goals Study skills – organization and good study habits Functional communication – ability to express ideas and communicate so others can understand
ADHD Probability Index	Similarity of obtained rating and those of children with ADHD
Autism Probability Index	Similarity of obtained rating and those of children with autism spectrum disorder

EBD Index	Similarity of obtained rating and those of children with an emotional or behavioral disturbance/disability
Functional Impairment	Indication that the child has trouble engaging in age-appropriate behavior

Interview data was transcribed by the researcher with the help of SpeedScriber, an application to assist with the process. The application took the audio file from the interview and converted it to text. The transcribed data was then checked against the audio file for accuracy. Finally, each transcript was read start to finish for understanding. Once transcribed, the data was uploaded into MAXQDA for coding. An open coding process was utilized to code meaning the codes were generated as they emerged from the data (Mirriam & Tisdell, 2016). The codes were then separated into categories for sorting from the lens of trying to answer the specific research questions. Finally, the categories were clustered and sorted into themes to give language to the ideas discussed by the participants. Triangulation, the process of checking the data against other data sources, was utilized to add to the reliability and validity of the data. Specifically, the information from interviews was checked against quantitative data on high sensitivity, academics, and behavior to clarify and confirm the ideas converge.

Assumptions

In conducting this research study, the following assumptions were made:

1. It was assumed that all participants could read and understand the questions asked of them.
2. It was assumed that all participants would provide honest answers to the questions asked of them.
3. It was assumed that participating teachers would have the best interests of their students at all times.

Trustworthiness

To analyze the qualitative data, this research utilized triangulation. This process helped to ensure that the themes generated matched the data given by the participants. Data from this study should be able to be transferrable to aid future researchers and provide insights into working with students with high sensitivity in the school environment.

Chapter IV. Results

In this chapter, the findings of research on highly sensitive children in the classroom environment are presented. A mixed-method approach was utilized to understand whether the presence of the Sensory Processing Sensitivity (SPS) trait has any implications for academic and behavioral outcomes in elementary students. Quantitative data was collected first followed by qualitative data to dive deeper into the potential differences between students. This followed an explanatory sequential design procedure (Creswell, 2008). Relationships between sensitivity level, academic achievement, and behavioral patterns were explored via correlations and t-tests. A coding process identified emergent themes to further review the patterns between high sensitivity, academics, and behaviors. The perceptions and knowledge of teachers aided in clarifying if additional trait knowledge would be necessary in today's classrooms.

Instrument Validity and Reliability

The validity and reliability of the instruments were considered in the development of this study. The Highly Sensitive Child Scale developed by Pleuss et al. is a 12 question, 7-point Likert scale to test for the Sensory Processing Sensitivity trait in children (2018). Pluess et al. conducted a series of studies to establish reliability (r = .68) and internal consistency ($\propto$ =.79, $\propto$ =.72 , $\propto$ =.74) of the scale. A small pilot study was conducted and showed some confusion on the provided answer scale. The scale was revised to include the words "like me" to each end of the rating scale for clarity. The revised scale had the ratings of 1= not at all me and 7= extremely like me for all twelve questions asked. This small clarification does not change the established validity or reliability. The Highly Sensitive Child Scale data was utilized in analysis of all three research questions.

The STAR benchmarking assessment system was utilized as the measure for academic achievement in RQ1. These assessments are widely utilized in classrooms, and in the sample district, students are assessed at least three times per year in both reading and math. Each student is given a scaled score based on national norms for each testing area (Renaissance, 2020). Due to the frequent use of the STAR system in both reading and math, this data provided timely academic data to understand if and how the presence of the high sensitivity trait would affect academic achievement.

The five participating teachers each rated four of their students using the Behavioral Assessment System for Children- 3rd Education with a stratified random sample. This teacher rating scale asks a total of 156 questions per student with either true/false response or a 4-point Likert scale ranging from never to almost always (Reynolds & Kamphaus, 2019). The internal consistency is $\propto$ =.90 or greater for all scales (excellent) and test-retest reliability is *r*=.85-.87 (good). Raw scores from eight items were compared to high sensitivity data to look at how the trait may influence behaviors in the classroom setting. The semi-structured interview was developed by the researcher to add depth of understanding to the quantitative data and based in the ideas of grounded theory. Triangulation was done to add to the reliability and validity of the data.

Characteristics of the Sample

All third-grade teachers (17) from a Midwestern school district were asked to participate via a direct email from the researcher using a purposing convenience sampling method. A total of four third-grade teachers and one fourth-grade teacher opted to participate in the study. Data from the district website was from a prior school year and data from the fourth-grade class were included in two of the three research questions. Eighty-seven (87) students from the five

classrooms opted to complete the Highly Sensitive Child Scale. Of these students, 69 were third-grade students and 18 were fourth-grade students. Seven of these students did not complete all survey questions, invalidating their results. Of the 80 students who completed the HSCS, 39 students fell into the highly sensitive range utilizing the cutoff of 4.8 suggested by Pluess et al. (48.75%) (2018). Teachers provided STAR reading and math scores from the fall scoring period (September). Six students had missing data from these assessments. All five teachers participated in the interview. Students and teacher names were redacted from the interviews to protect the identities of the participants. Four teachers participated in in-person interviews that were recorded and transcribed. The fifth teacher was unable to participate in-person but answered interview questions via email. The five teachers each completed four BASC-3 assessments on students in their classrooms for a total of 20 BASC assessments on 20 different students. The HSCS revealed that 12 of these students were not highly sensitive while 8 were highly sensitive.

Research Question 1

The first question asked: How do highly sensitive elementary students perform academically as compared to their low sensitivity peers? The aim of this question was to see if having the high sensitivity trait would impact reading and math achievement. Correlation tests were run to determine whether there was any relationship between these two variables. There were no statistical correlations between the high sensitivity trait and academic achievement scores in reading or math. Reading achievement scores and math achievement scores did show a positive correlation.

Table 2

Correlations between HSC, STAR Math, & STAR Reading

Variable 1	Variable 2	Correlation	Lower C.I.	Upper C.I.
HSC	STAR Reading	-.166	-.377	.062

	STAR Math	-.139	-.353	.089
STAR Math	STAR Reading	.579	.406	.712

n=76, ∝=.05

Teachers were asked to discuss student achievement overall in high sensitivity students as compared to others in the classroom. The theme that emerged from this qualitative research was *dichotomy.* Of the five teachers, one did not notice any patterns academically, one teacher said her students were all very high performing students, two said their students were generally lower performing students and another said her students were either high or low. If the students excelled, they were described as "gifted" or "above grade level". At the other end of the spectrum, some teachers expressed that high sensitivity students were "low compared to their peers", were average or below average students, particularly lower in math, sometimes struggling with staying on task, and more often being unwilling to ask for help. "I wish [student name] would speak up a little bit sometimes…say I have no idea what we're doing. I'm really lost." "[Student name] is probably one of the lowest students in my class, but like never asks for help." Another teacher noted that a student in her class was unwilling to receive help. "If you try to offer help, she shuts down, she'll yell at you." Others mentioned lack of problem-solving abilities and potential with a lack of drive in academics.

To understand the data further, z-scores were calculated for each student to see if the dichotomous academic pattern of high or low scores was present quantitatively. This data does not show a clear pattern of high and low scores from the mean in either math or reading indicating that perhaps teachers do not use STAR scores as their measure of achievement, which was suggested by one teacher who used the words "straight A students" to describe how her students perform academically. Other terms such as low do not give guidance for how teachers "measure" academic achievement when describing their students. Collectively, teachers note that

students are either strong in academics or weak in academics qualitatively, but statistical data does not strongly agree. More and/or different data is needed to understand if and how the trait manifests in academic achievement.

Research Question 2

The second question asked: What are the behavioral patterns of highly sensitive students as compared to their low sensitivity peers? The aim of this question was to learn if and how children in the high sensitivity group differ from those who are not highly sensitive. An independent samples two-tailed t-test ($\propto$=.10) with a Bonferonni correction was performed to compare the groups (HSC, Non-HSC) to eight behavioral indexes from the BASC-3 (externalizing problems, internalizing problems, behavioral symptoms index, adaptive skills, ADHD probability index, autism probability index, EBD index, and functional impairment index). There we no significant differences between the two groups for any of the indexes. However, the EBD index had a p-value of .041 and Cohen's d of 1.002 indicating the possibility of high effect size. Retesting with a larger sample size would be appropriate.

Table 3

Independent Samples T-Test (BASC Categories and HSC)

	Group Means				
	HSC	Non-HSC	*t*	*df*	Two-Sided *p*
Externalizing Problems	177.25	153.33	1.483	18	.155
Internalizing Problems	163.13	158.58	.538	18	.205
Behavioral Symptoms	342.25	314.67	1.148	18	.226
Adaptive Skills	222.88	251.83	-1.228	18	.235
ADHD Probability Index	25.25	20.83	.819	18	.424
Autism Probability Index	21.5	18.25	.732	18	.474
EBD Index	17.75	8.17	2.196	18	.041
Functional Impairment	44.88	35.67	.852	18	.405

**$p < .10$

While there were no statistically-significant differences between groups, the percentage of at-risk and clinically significant students was noticeably different for highly sensitive students for most areas (see table 2). With a larger sample size, these ratios may be statistically significant. The current sample indicates there is a trend that needs further research.

Table 4

Presence of Behavioral Patterns in HSC vs. Non-HSC Students

	Group 1: Non-HSC *n=12*		Group 2: HSC *n=8*	
	At Risk	Clinically Significant	At Risk	Clinically Significant
Externalizing Problems	8.3%	8.3%	12.5%	37.5%
Internalizing Problems	16.67%	0%	37.5%	0%
Behavioral Symptoms Index	8.3%	8.3%	25%	25%
Adaptive Skills	16.67%	0%	25%	12.5%
ADHD Probability Index	8.3%	16.67%	37.5%	12.5%
Autism Probability Index	8.3%	16.67%	37.5%	0%
EBD Index	25%	0%	25%	25%
Functional Impairment Index	33.33%	8.3%	50%	0%

Behaviors were the primary discussion item for all five teachers regarding their students who were high sensitivity versus those were not. Through coding and then clustering, the following two themes emerged relating to behavioral patterns in the classroom environment.

Theme 1: Hidden Struggles

Teachers were surprised to see the names of some of their students classified as highly sensitive. These students tended to be described as “calm”, “quiet”, “shy”, and in the classroom. In some cases, the students showed no behavior patterns at all. Simply these students appear to be very well-adjusted children who follow the classroom rules, thus completely hiding potential struggles. These students often were described as leaders in the classroom as they are those who do their work and follow directions well without any behavioral struggles that can be seen. They

were also described as easy to be friends with and kind to others. “He has a soft heart and often comforts another boy who is his friend by putting his arm around him and empathizing with him.”

Alternatively, others while still quiet and well-behaved, had patterns of pushing down their feelings until suddenly they might cry or have physical symptoms with no warning to the teacher. “I don't know [student name] is struggling until he's crying, you know, until it's already past that point.” “He gets nervous, he like, shakes.” They also might show a bit of anxiety (internalizing problems), perfectionism/unsure of oneself, and the tendency to read the emotions in the room. Several teachers mentioned somatization such as stomach aches/nausea or headaches in addition to crying. These students seem to try to keep everything inside until suddenly the feelings are too big and then present externally through the physical symptoms.

Theme 2: Overwhelm

While somatization could be grouped with overwhelm, it was themed with hidden struggles because it appears to occur in the children who attend to the teacher and do their work and are rule followers. Student overwhelm was the most mentioned idea throughout all the interviews. One form of overwhelm discussed was auditory. When students felt the classroom was too loud, it may cause a meltdown or other behavior. “She just can't tune the noise out.” Similarly, these students tended to react to the overall environment or changes to the environment. “I put the boot on my door the first month of school and she would hit and kick me and bite me because she wanted to leave school.” “If he feels very overwhelmed, he'll flip his chair over or scream or pull his hair. He's very sensitive to his environment.” Overwhelm was also described through the lens of the need for control. This could mean wanting to be in control

of the situation, needing to be right, or speaking over others to make sure their point was well heard.

Research Questions 3

The third research question asked: What are teacher's perceptions of working with highly sensitive students? This aim of this question was to understand what teachers know about the trait, how teachers work with students with the trait, and any other perceptions that may evolve from open discussion. The following themes emerged from coding interviews with teachers:

Theme 1: Unfamiliarity

The data indicated that teachers were unfamiliar with the idea of high sensitivity and the personality trait Sensory Processing Sensitivity. Teachers immediately gravitated to thinking it meant a student was dealing with sensory processing disorders. One teacher had some knowledge of high sensitivity in terms of being emotional and having reactivity to the environment. Another mentioned sensory issues like tactile, lighting, and sounds. In a sense, teachers had heard of high sensitivity/SPS as it relates to students who traditionally fall somewhere on the autism spectrum or present autistic tendencies.

Theme 2: Supportive Strategies

Teachers were asked to describe what strategies they utilize to help children who have behavioral or academic issues, including those with high sensitivity, if the student showed maladaptive skills due to the presence of the trait. Several teachers mentioned the use of calming techniques to aid the overall environment or individual students such as soft music, dimmed lighting, fidgets, or breaks when a child needed them. Additionally, the use of choices, even in small situations was described. "Giving them choices…like feel free to come on the carpet with

your right foot first or your left foot first. Feel free to write your name on the top or the bottom of your paper. That seems to work a lot." Another used calm down card with four choices.

Communication was another supportive strategy used by teachers interviewed. One way this was shared was through consistent communication by the teacher on classroom expectations and daily structure. It was shared that communicating one-on-one was another way to help with classroom success. "I first talk with the students to determine how I can help them be more successful. The students (and families) fill out surveys to express their needs and wants." "I use a lot of "let's have a meeting in the hallway, just you and I." Just give them a second to sort of… you know, talk about what they're feeling right in that moment. I try to give them a couple of minutes and then I say, "okay, and you get a drink of water, calm yourself down and come back in when you are ready." Though differing in their approaches, these teachers all had a specific method to allow students to talk through any issues and hear what would be expected of them in their environment.

Theme 3: Family Background Knowledge

Teachers had extensive knowledge about the background of each of their students. With home-life potentially contributing to the positive or negative aspects of the trait, teacher knowledge of background could contribute to the supports they might provide to SPS students at school. Without prompts, every teacher could share who a child lives with, whether there were any home challenges with the student, documented behavioral challenges, and students general academic standing (high, average, low). Moreso, most could share how the family dynamics affected their students on a daily basis. "She's not mean, but she's not always super nice to everybody. And she has a pretty rough home life, although I think she's very loved." "He doesn't

come from a hardworking family." Teachers could take the circumstances of their students and apply them to how it may impact a child's academics or their behaviors.

Summary

Overall, the results indicate there is not a clear correlation between academics and the SPS trait. Statistically, there is no correlation between the two. Qualitatively, students tended to be either gifted or struggling but generally not average students, according to teacher perception. This suggests high sensitivity students may be either very strong students or those who struggle academically but the data does not converge with the statistical analysis to definitively answer the research question. Perhaps STAR testing is not the best measure of academic achievement in the classroom to adequately measure differences. The data shows patterns that suggest that SPS students have more behavioral issues than their peers. While there were no statistically significant differences between groups, the percentage of students at-risk or with clinically significant ranges for behavioral problems was higher for the high sensitivity group. In addition, teachers noticed patterns of overwhelm and the tendency to tamp down feelings/needs or avoid showing any feelings at school. Teachers illustrated that they have a strong knowledge of familial backgrounds and general supportive strategies to help students in the classroom regardless of whether the student identified as highly sensitive or not. While not versed in SPS or high sensitivity as a personality trait, they had tools and knowledge.

Chapter V. Conclusions And Recommendations

Knowledge of personality theory is an area that can be helpful for teachers and school psychologists to better assist students who may have differing traits from their peers (Crespi & Politikos, 2012). The trait Sensory Processing Sensitivity has been shown to be in 20% of children yet minimal research has been done to see how the trait may affect children in the school setting (Aron, 2002). In a supportive environment, students can present as leaders but with a poor environment (poverty, lack of parental support), the trait can adversely affect how a child reacts to stimuli (E.N. Aron & A. Aron, 1997). A child may show varying levels depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtle stimuli but their personality will include all four areas to be considered highly sensitive (Aron, 2002). Due to the increase in special education services in the United States and the focus on supporting students through response to intervention, this study looked at how the SPS trait affects academic achievement and behaviors and sought to understand the knowledge and perceptions of teachers in relation to the trait.

Review of the Study

The purpose of this study was to explore how the presence of the SPS trait affects academic achievement and behavioral outcomes of elementary students and to explore the perceptions of teachers working with high sensitivity children. A mixed-methods design was implemented for this study to investigate the following research questions:

1. How do highly sensitive elementary students perform academically as compared to their low sensitivity peers?
2. What are the behavioral patterns of highly sensitive students as compared to their low sensitivity peers?

3. What are teacher's perceptions of working with highly sensitive students?

Eighty-seven students (87) from five classrooms completed the Highly Sensitive Child Scale (HSCS). Using a cutoff point of 4.8 out of 7, as indicated by Pluess et al. (2018), 39 of the 87 students fell into the range of highly sensitive students. Teachers provided STAR reading and math data from the fall of 2022. This data was compared utilizing correlations to see if any patterns emerged. Each teacher responded to four-156-question protocols from the Behavioral Assessment System for Children – 3rd Edition which was compared with HSCS data utilizing t-tests. Finally, all five teachers were interviewed to learn about their current understanding of the term high sensitivity. The interview asked teachers to discuss how they see the trait presenting in their students who identified themselves as highly sensitive. The interviews were transcribed and coded to explore emergent themes from the data. This chapter provides interpretation of the results from Chapter 4, a discussion of the application of the findings, limitations of the study, and recommendations for future research.

Discussion

The Highly Sensitive Child Scale was published in 2018 while the adult scale and research on the trait has been on-going since 1997 (Aron & Aron, 1997, Pleuss et al. 2018). Research on similar personality traits began with Carl Jung over 100 years ago but none of these traits fully explained the personality of someone who is highly sensitive (Jung & Godwyn Baynes, 1921 as cited in E.N Aron & A. Aron, 1997). This personality research suggests that the trait, Sensory Processing Sensitivity (SPS) can increase negative affectivity, particularly in an unsupportive environment or with low quality parenting. Negative affectivity can lead to increased internalizing problems, externalizing problems, disordered sleeping and eating, and somatization (Aron et al. 2005;Bakker & Moulding, 2012; E.N. Aron & A. Aron, 1997; Aron,

2002; Brindle et al., 2015; Boterberg & Warreyn, 2016). However, studies show people with the SPS trait have quicker and more positive responses to intervention (deVillers et al., 2018). To date, knowledge of how the trait affects children is primarily anecdotal. Research in the school setting has only considered school-wide prevention and intervention programs and their efficacy (Iimura & Kibe, 2020; Pleuss & Boniwell, 2017; Pleuss et al., 2018). This study sought to understand how the trait affects elementary aged children. There is a gap in research on high sensitivity children, particularly in the school environment. With an increase in special education diagnoses and emphasis on response to intervention, knowledge of the trait and how to assist a struggling high sensitivity students could be important for anyone on the RTI team or special education teams. Further, we cannot ignore the growing number of children who struggle unassisted with mental health issues, particularly as there is a high correlation to internalizing problems in people with the SPS trait (Boterberg & Warreyn, 2016; Crespi &Politikos, 2012; Greven et al, 2020).

Research Question 1

The first research question asked: How do highly sensitive elementary students perform academically as compared to their low sensitivity peers?

Statistically, there were no correlations between high sensitivity students and academics. Looking further into the data, z-scores were calculated for individual students, which also did not reveal any specific patterns between academics and SPS. In interviews with teachers, the data indicates that high sensitivity students generally either excel or struggle in academics however, the five teachers collectively did not indicate any achievement patterns. Some teachers indicated high performing students, others low performing students, another high and low performing while another could not name any pattern at all. The only quality mentioned by most teachers is

that their students with high sensitivity who have academic struggles tend to be hesitant to ask for assistance or indicate that they are not comprehending the lesson being taught.

There is no published data on the correlation between academic achievement and the SPS trait, so it is possible that there is no direct link. However, it is also plausible that the STAR reading and math benchmarks are not the most accurate way to look at academic achievement in elementary students. Teachers described achievement with phases like “straight A” or “really low”. Perhaps state testing, homework, quarter, grades would more accurately predict patterns between SPS and academic achievement.

Descriptors of the trait include overstimulation and depth of processing which would explain teacher perceptions that a struggling high sensitivity student struggles alone and fails to ask for assistance (Aron, 2002). If a high sensitivity child is taking in all details of a lesson or worksheet along with the sights, sounds, and smells of their environment, their brain has a significant number of inputs to work through. This can result in overstimulation or overwhelm which may lead to the child completely shutting down rather than attempting to ask for assistance to complete the work.

Further, data indicates that high sensitivity children are very susceptible to their environment (Slagt et al, 2018). If a child perceives a supportive teacher or classroom environment, they are more likely to have positive affectivity but perceived negative affectivity from a peer or the environment can cause a child to have negative affectivity. Thus, the emotions of the teacher and peers could easily skew the perception of the child making them less willing to ask for help when needed.

Research Question 2

The second research question asked: What are the behavioral patterns of highly sensitive students as compared to their low sensitivity peers?

Data on behaviors was examined both statistically and wholistically to try to understand if there were any differences between highly sensitive students and their peers. T-tests did not indicate any significant difference between groups for any of the indices. The EBD index which looks at a potential emotional disturbance or disability had a p-value of .041 and Cohen's d of 1.002 indicating the possibility of a difference between groups with a larger sample size. IDEA includes anxiety/depression disorders in the emotional disturbance category when the behavior impacts educational performance (2004). Previous research on SPS strongly suggests that the presence of the SPS trait is tied to issues with internalizing problems, emotion regulation, stress, and somatization (E.N. Aron & A. Aron, 1997; Aron, 2002; Boterberg & Warreyn, 2016; Brindle et al., 2015). Anxiety and depression are the most common internalizing problems associated with high sensitivity so it would make sense that the EBD category showed the most difference in between groups.

In addition to the EBD category, more students were at risk or had clinically significant results in all of the categories tested which included: externalizing problems, internalizing problems, the behavioral symptoms index, adaptive skills, ADHD probability index, autism probability index, and functional impairment index. A study by Boterberg and Moulding (2016) indicated that high sensitivity individuals tend to have lower externalizing problems however, the externalizing problems BASC-3 category includes ADHD, an area tested separately and as part of this index. This means that the potential ties to ADHD may be increasing the likelihood of externalizing problems and should be noted. Adults with high sensitivity can be emotionally

reactive, a behavior that is often seen in children with ADHD, particularly in response to a negative stimuli (Acevedo et al., 2017; Panagiotidi et al., 2020). Data also indicates that adults with SPS may struggle with adaptive functioning skills and children with SPS may struggle with daily functioning skills (Acevedo, 2017; Boterberg & Warreyn, 2016). These qualities have similar qualities to some executive functioning skills that are lacking in students with ADHD and externalizing problems so it could be why there are more students with SPS who also fall into the at-risk or clinically significant range for both ADHD and externalizing problems.

Qualitative data revealed two themes from teachers in regard to behaviors: hidden struggles and overwhelm. Aron (2002) describes a well-adjusted child in her book as being a leader in the classroom and someone who is kind and empathetic to peers. This is very similar to how teachers described students who performed well academically with no behavioral issues. Many used the words shy or quiet to describe these students. Several studies illustrated that introversion is common in high sensitivity individuals, linking the perceptions of teachers to the data (Aron, 2002; Smolewska et al., 2006; Pleuss et al., 2018). Alternatively, students whose SPS was more obvious to teachers appeared anxious, cried easily, and/or had somatizations like stomach aches and headaches. As aforementioned, anxiety is a common correlation to high sensitivity. Medically unexplained symptoms have also been shown in people with the SPS trait (Boterberg & Warreyn, 2016). This can be tied with disordered eating or sleeping which may remain undetected to a teacher so a parent may be a better respondent to detect these behavioral patterns. Together high numbers in the EBD category, and internalizing problems along with accounts from teachers show that these behaviors are more common in students with SPS.

Overwhelm is one of the four areas included in the acronym D.O.E.S. that describes people with SPS and was an emergent theme (Aron, 2002). Teachers used the word overwhelm

to describe the physical environment of the classroom and internal overwhelm which could be attributed to the depth of processing that students are working though. Sounds were the most commonly mentioned physical overwhelm symptom. Many children can drown out the chatter of 20 other students interacting, or hundreds in a school assembly, but for a few students the noise is too much and causes overwhelm. Teachers said the common behavioral responses to physical overwhelm were melting and anger. Overwhelm was discussed as a change in environment or a need for control as well. The HSCS specifically looks for overwhelm in terms of the environment and changes to it (Pluess et al., 2018). It does not specifically ask questions about a need for control, but it can be ascertained that control is a way to reduce the level of overwhelm. Overwhelm and the need for control are qualities that come up on rating scales for autism and functional impairment explaining why more SPS students would be at risk in these BASC-3 category. Interestingly, no high sensitivity students were rated clinically significant for either autism or functional impairment, just as risk, which could be explained by the similarities of the SPS overwhelm to autism, but also the differences that separate them.

Through the process of triangulation, the data indicates that there is a link between internalizing problems and high sensitivity. It is also possible for a high sensitivity child to have behaviors that mimic autism (overwhelm/need for control), ADHD (emotional regulation), social-emotional issues, functional behavioral issues, or somatization. Teachers were surprised when a high performing student rated themselves high in sensitivity which shows that even the best-behaved students could be dealing with emotions that have yet to erupt, at least in the school setting. Those who were less shocking could easily be part of an RTI process wherein the teacher needs assistance to reduce problematic behaviors. The tie of many behaviors to SPS should not

be ignored when considering the best approach for navigating behavioral interventions with these students.

Research Questions 3

The third research question asked: What are teacher's perceptions of working with highly sensitive students?

Not surprisingly, interviews with teachers revealed no prior knowledge of SPS before participating in the current study. Teachers knew of sensory processing issues like those that present in children on the autism spectrum and originate in the central nervous system but not of the personality trait (SPD Foundation, 2020). The name sensory processing sensitivity made every teacher think of sensory processing disorders which is concerning as one is a disorder and the other a personality trait (Aron, 2002). Without specific knowledge on the trait, teachers do have a depth of knowledge on the unique backgrounds of each of their students. The ability to empathize and understand the home life of each student can greatly improve the outlook for children with difficult home lives or those with uninvolved/low-quality parenting skills. Previous research studies have indicated that family life and parenting quality are the biggest predictors of increased negative affectivity in adults with SPS (E.N. Aron & A. Aron, 1997). Conversely, Iimura and Kibe (2020) found that perceived teacher support, school climate, and peer optimism increase positive affectivity in children. Even more, high sensitivity people are more responsive to positive stimuli than others. Therefore, a good teacher and school environment can have a significant impact on a child with the SPS trait and teacher knowledge of the child's background is important to increase this impact.

Supportive strategies were another theme that emerged from the qualitative research. Calming techniques such as soft music, dimmed lighting, fidgets, breaks, or a calm down card,

choices, and open communication were the strategies implemented by teachers in the study. With one or multiple of these tools, teachers felt they were able to effectively help their students have more successful days in the classroom. These techniques helped teachers to calm students and reframe the environment so the student was more ready to learn. Brindle et al. (2015) indicated that emotion regulation and self-efficacy strategies aided adults with the trait to deal with negative moods. It makes sense that the strategies employed by teachers to help with emotion regulation and learning how to communicate would work for children in the classroom environment. Finally, as mentioned previously, interventions appear to be more successful for children and adults with SPS than those without high sensitivity.

Conclusion

Teachers and school psychologists may consider common personality traits such as introversion vs. extroversion when teaching, but based on this research, it is unlikely that many will know or completely understand the meaning of Sensory Processing Sensitivity. This study illustrates that there may not be direct academic effects from presence of the trait but there are patterns of behavior that differentiate highly sensitive students in the classroom environment. These students are more likely to show signs of overwhelm, anxiety, and depression than their peers who are not highly sensitive. This study illustrated that students with the trait are likely to have internalizing behaviors and appear overwhelmed. At times, lack of emotion regulation due to the trait can mimic more serious problems or present as co-morbidities with ADHD, autism, and emotional disturbances (Bakker & Moulding, 2012; E.N. Aron & A. Aron, 1997; Aron, 2002; Brindle et al., 2015; Boterberg & Warreyn, 2016). We also know that the home environment and parenting quality have a strong potential to help or hurt children with SPS (Pluess et al., 2018; Aron, 2002; Acevedo et al., 2018). Special education services are more

commonly needed for children in poverty, children that are also more affected by the presence of high sensitivity (Bornstein & Bradley, 2014). Thus, it is an important trait to consider when working with all children, but especially those whose lives are not easy outside of school. Lack of support for a student with SPS can have lifelong effects, a misdiagnosis, or the need for special education services, particularly in the emotional disturbance category. With 14% of students in the US receiving services for special education, a better approach is supportive strategies in the classroom or through the RTI process (National Center for Education Statistics, 2020). Teachers in this study demonstrated that they already have supportive strategies to help highly sensitive students and have depth of knowledge on their students. At least 1 in 5 students in a classroom will have the Sensory Processing Sensitivity trait. Educators should know and understand what this means to provide the best possible outcomes educationally, and more importantly behaviorally, to improve the lifelong trajectory of these students.

Recommendations

Several things are recommended based on the outcomes of this study. First, the highly sensitive child scale (self-report) may need additional validation for children as young as eight years old. Alternatively, a new scale may need to be developed for children to report their own feelings independently without any assistance. Many children in this study needed adult assistance to understand the meanings of words in the questions or needed an adult to read the questions aloud. This means that the comprehension is skewed by the definitions of words given by adults. The child should be able to make their own interpretations of the meanings of the questions. In this sample population, 48.75% of students rated themselves as highly sensitive which differs significantly from the range of 10-35% as given by previous research (E. Aron et al, 2012; Aron, 2002). It is unclear whether this difference is due to issues with the scale itself,

comprehension, or the sample population, so more work needs to be done to be sure the scale accurately represents what is intended to.

The second recommendation is to raise awareness of the term Sensory Processing Sensitivity in the school environment. Personality research comes out of the field of psychology but when it directly impacts education (achievement or behavior), teachers, school psychologists, and administrators need to learn about it too. In education, emphasis for continuing education is placed on federal and state mandates for changes to service delivery. However, we can do better as teachers and school psychologists to also continue to advance in learning about new research in personality and interventions, particularly when these traits affect child development and life-long outcomes. One way to do this is better collaboration between the fields of psychology and school psychology. While school psychologists are a small branch under the American Psychological Association, the National Association of School Psychologists is the main source of information and continuing education for school psychologists. Better collaboration and information sharing among the groups would allow for psychology research like the latest research on Sensory Processing Sensitivity to be utilized in school psychology practice. Likewise, clinical psychologists can learn from the daily lessons of those practicing in the school setting. Ego has no place when it interrupts positive outcomes for children. Another way to share information is through professional development to teachers or inclusion of the SPS in undergraduate teacher curriculum. Aides could benefit from education on SPS as well given that they are often the first adults to give individualized interventions to children in schools.

The final recommendation is for teachers to provide students with tools to aid in emotion regulation and self-efficacy in the classroom environment. These should include options for children to help themselves calm down, choices, and open communication between the teacher

and his or her students. Communication could also include peer communication channels as peer support improves outcomes for highly sensitive students (Iimura & Kibe, 2020). If all children are taught how to use tools to improve their behaviors rather than to simply "choose" to behave, outcomes could improve for everyone, not just the 10-35% of the population with SPS. The suggested strategies were implemented by teachers in this study, not for the benefit of SPS students, but because for struggling students, whether with ADHD, autism, or emotional disturbance or not, the strategies improve the classroom environment. SPS students have higher incidences of internalizing problems like anxiety and the incidences of mental health in children are growing not shrinking (Marino, 2019; Greven et al, 2020; Boterberg & Warreyn, 2016). Teaching is relationship building. School psychology practice should be relationship building through consistent student support.

Limitations

This study did have its limitations. Research indicates that the SPS trait is found in approximately one in five people, or 10-35% of samples (E. Aron et al, 2012; Aron, 2002). In this sample population, 48.75% were classified as highly sensitive. A cutoff score of 4.8 was utilized as described by Pluess et al. (2018) due to the similar populations utilized in their study and the present study. Due to the abnormally high number of students whose scores put them in the high sensitivity range, latent class analyses may have more accurately classified students (Pluess et al., 2018). However, manipulation of the statistical data with different cutoff scores did not statistically affect the results. This study was completed with 8- ,9-, and 10-year-old students for which the scale has been validated. However, many students needed to have the questions read to them or asked clarifying questions on the meaning of specific words. Given this, it is possible that students were unable to fully comprehend the questions as asked by the scale.

The number of participants was another limitation to this study. While themes and helpful information were garnered from this research, a larger sample of students would have provided more data to understand the implications of the trait more fully. A larger group of teachers would also have provided more rich data to see trends in how academics and behaviors may be impacted by high sensitivity. Further, this study looked only at children ages 8-10 so the data does not include all elementary students who could be tested using the self-report HSCS.

Due to the convenience and purposive sampling used, this study may not allow for generalizability outside the scope of this study. This sampling method may not represent that national population of students across the United States and certainly not worldwide.

Another limitation was the novelty of the SPS trait among teachers. None of the teachers had a true understanding of the trait so they were given a brief definition during the interview and then asked to reflect on the students who identified with the trait immediately. Perhaps teachers should have been given a definition or brief training on the trait prior to the interview process so they could have more time to comprehend and absorb the information. This may have provided further insights into SPS students.

Future Research Opportunities

Based on the results of this study, there are many areas for future research to clarify how Sensory Processing Sensitivity presents in the classroom environment. There was no known research prior to this study on SPS and academics. Some potential behavioral traits such as perfectionism were suggested by Aron (2002), but no formal studies included the impact the trait might have on academics. In school psychology practice, the underlying concern is whether the issue impedes the student's educational performance. This study used the STAR reading and math benchmark as a measure of academic achievement. It is recommended that more research

be completed by looking at homework, quarter grades and/or standardized tests as the measure of academic achievement. While this study did not reveal any statistical correlations between SPS and STAR measures, it did show behaviors that can affect academic achievement and some differences based on teacher accounts.

The second recommendation is to repeat the study with a larger sample size. Due to the small sample size, the likelihood of statistical significance is lower. In combing through the data, if the same percentages of students were at risk/clinically significant for behavioral issues but the number of students was doubled (see table 4), the differences would have been statistically significant. While we know that there are behavioral differences by looking at the numbers, and through teachers accounts, the data would be stronger with a larger sample size. A larger sample size of teachers and students would be helpful to answer all three research questions. Repeating the same study with a larger sample size would provide more data, make the data more accurate, and increase the generalizability because a larger portion of the population would be represented.

The third recommendation would be to look at a different age groups, ages 11-18. This was a small study with a small age range. It would be interesting to look at the SPS trait in older children and adolescents to see whether age is yet another factor to consider when trying to understand behavior and academic performance of students.

The fourth recommendation is to look further into the reliability and validity of the HSCS self-report version with eight, nine and ten-year old children. The language could be changed to make the scale clearer for young children. Perhaps children could self-report and parents could also complete the parent report version of the scale to see how much children's perceptions of their sensitivity levels agree or disagree with the accounts of parents. Another level could come into play by surveying parents for socioeconomic and parenting information to further

investigate the differences between groups with the added factors of parenting quality and home life.

The final recommendation is to formally study teacher strategies for working with highly sensitive students. The strategies suggested by teachers in this study appear to be effective at classroom management but we do not know how effective each individual strategy is for reducing the negative qualities of the SPS trait. It would be helpful to study the methods to see how they improve behaviors in individual students and if they improve academic achievement. This would allow for formal recommendations to be published as a resource for schools.

There are still significant gaps in the research on how SPS presents in the school environment that could be addressed by working through these future recommendations. Knowledge about the trait in the school setting can only benefit children, parents, teachers, and school psychologists.

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Appendix A: IRB Approval Letter

University of Findlay.

Institutional Review Board

Date: **October 25, 2022**

To: Kara Parker

CC: Linnea DiBerardino

RE: The Highly Sensitive Student: The Relationship Between Sensory Processing Sensitivity and Academic and Behavioral Outcomes

Project Expiration date: October 25, 2023

The University of Findlay Institutional Review Board (IRB) has completed its review of your project utilizing human subjects and has granted authorization. This study has been approved for a period of one year only. The project has been assigned the number **1680**.

In order to comply with UF policy and federal regulations, human subject research must be reviewed by the IRB on at least a yearly basis. If you have not completed your research within the year, it is the investigator's responsibility to ensure that the **Progress Report** is completed and sent to the IRB in a timely fashion. The IRB needs to process the re-approval before the expiration date, which is printed above.

Please note that if any changes are made to the present study, you must notify the IRB immediately. Understand that any proposed changes may not be implemented before IRB approval, in which case you must complete an **Amendment/Modification Report**.

Following the completion of the use of human subjects, the primary investigator must complete a **Certificate of Compliance form** indicating when and how many subjects were recruited for the study.

Please refer to the IRB policy and procedures manual for additional information. Please include the project number on any other documentation or correspondence regarding the study.

Thank you very much for your cooperation. If you have any questions, please feel free to contact IRB at (419) 434-4640 or email irb@findlay.edu.

Sincerely,

Landon Bellavia

Landon Bellavia, Ph.D.
Co-Chair, Institutional Review Board

Cc: IRB Office

Appendix B: Recruitment Email Template

Dear xxxxx,

I am a school psychology graduate student at the University of Findlay. I am currently looking for participants for my research study. I have been given permission to do this research with Findlay City Schools by the superintendent's office, and am sending you an email as a 3rd grade teacher in the district. The purpose of this study is to explore whether the presence of the high sensitivity personality trait (Sensory Processing Sensitivity) has any implications to academics or behavior in elementary aged students, and to understand the perceptions of teachers who work with high sensitivity students.

As a participant in the study, you will be asked to do the following:

- Send home the parent consent form with your students in their folders and send electronically to parents (if email is available)
- Provide the researcher with access to STAR reading and math data on the students in your class
- Provide the researcher with 5 minutes to administer the Highly Sensitive Child Scale in your classroom.
- Complete 4 Teacher Rating Scales of the Behavior Assessment System for Children (3rd Edition)
- Complete an interview with the researcher.

It is estimated that your involvement in the study will take a total of 90-120 minutes over a 1-2 month period.

For more information on this study, please reply to this email or contact Dr. Kara Parker at kara.parker@findlay.edu.

Would you be willing to be a part of this study?

Thank you so much for your consideration.

Dr. Kara Parker

Principle Investigator

Study Title: The Highly Sensitive Student: The Relationship between Sensory Processing Sensitivity and Academic and Behavioral Outcomes

Appendix C: Interview Questions

1) What is your current understanding of Sensory Processing Sensitivity, also known as High Sensitivity? (RQ3)
2) Did the students in the high sensitivity category surprise you? If so, how? (RQ3)
3) How do you think your high sensitivity students perform academically as compared to their peers? (RQ1, RQ3)
4) How behavioral patterns do you notice in your high sensitivity students as compared to their peers? (RQ2, RQ3)
5) What aspects of the personality trait do you see as beneficial in the classroom environment? (RQ3)
6) What aspects of the personality trait to you find to be challenging in the classroom environment? (RQ3)
7) Have you noticed any strategies that seem to work best with your high sensitivity students? (RQ3)
8) Is there anything else you want to share about your experience with high sensitivity students?

Appendix D: Highly Sensitive Child Scale

Highly Sensitive Child Scale (HSC)

Instructions: Please answer each question according to how you personally feel, using the scale from 1 = *Not at all* to 7 = *Extremely*. Cross the circle that describes you best.

1. I notice when small things have changed in my environment.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

2. Loud noises make me feel uncomfortable.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

3. I love nice smells.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

4. I get nervous when I have to do a lot in little time.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

5. Some music can make me really happy.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

6. I am annoyed when people try to get me to do too many things at once.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

7. I don't like watching TV programs that have a lot of violence in them.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

8. I find it unpleasant to have a lot going on at once.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

9. I don't like it when things change in my life.

Not at all — Moderately — Extremely

(1) (2) (3) (4) (5) (6) (7)

→ Please turn to next page for more questions

10. I love nice tastes.

Not at all 1 2 3 Moderately 4 5 6 Extremely 7

11. I don't like loud noises.

Not at all 1 2 3 Moderately 4 5 6 Extremely 7

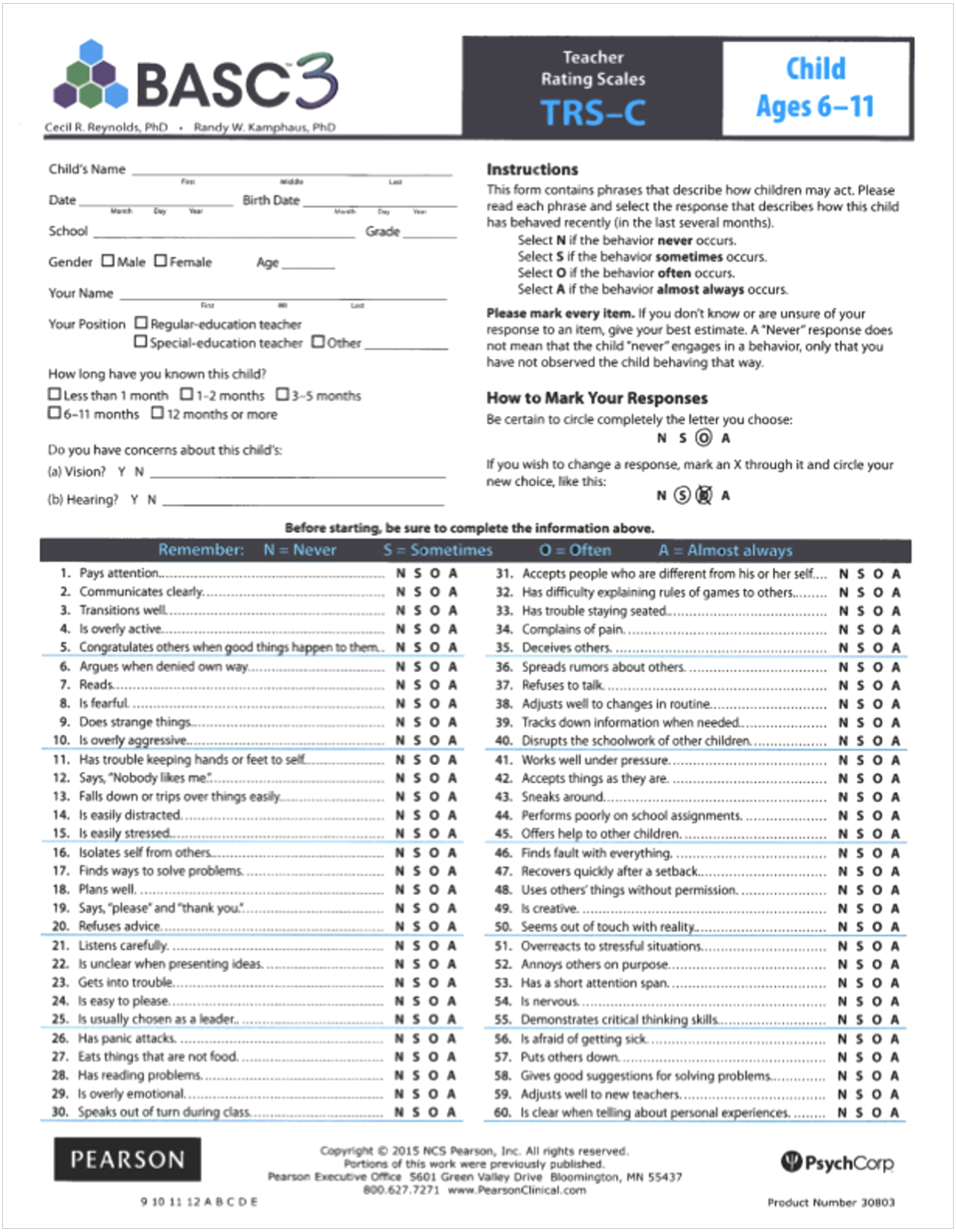
12. When someone observes me, I get nervous. This makes me perform worse than normal.

Not at all 1 2 3 Moderately 4 5 6 Extremely 7

Reference: Pluess, M., Assary, E., Lionetti, F., Lester, K. J., Krapohl, E., Aron, E. N., & Aron, A. (2018). Environmental sensitivity in children: Development of the Highly Sensitive Child Scale and identification of sensitivity groups. *Developmental Psychology, 54*(1), 51-70. doi:10.1037/dev0000406

Contact: Prof Michael Pluess, Department of Biological and Experimental Psychology, Queen Mary University of London, London E1 4NS, United Kingdom, Email: m.pluess@qmul.ac.uk.

Appendix E: BASC-3 Teacher Rating Scale



BASC3

Cecil R. Reynolds, PhD • Randy W. Kamphaus, PhD

Teacher Rating Scales
TRS–C

Child
Ages 6–11

Child's Name _____ (First, Middle, Last)

Date _____ (Month, Day, Year) Birth Date _____ (Month, Day, Year)

School _____ Grade _____

Gender ☐ Male ☐ Female Age _____

Your Name _____ (First, MI, Last)

Your Position ☐ Regular-education teacher
☐ Special-education teacher ☐ Other _____

How long have you known this child?
☐ Less than 1 month ☐ 1–2 months ☐ 3–5 months
☐ 6–11 months ☐ 12 months or more

Do you have concerns about this child's:
(a) Vision? Y N _____
(b) Hearing? Y N _____

Instructions

This form contains phrases that describe how children may act. Please read each phrase and select the response that describes how this child has behaved recently (in the last several months).

Select **N** if the behavior **never** occurs.
Select **S** if the behavior **sometimes** occurs.
Select **O** if the behavior **often** occurs.
Select **A** if the behavior **almost always** occurs.

Please mark every item. If you don't know or are unsure of your response to an item, give your best estimate. A "Never" response does not mean that the child "never" engages in a behavior, only that you have not observed the child behaving that way.

How to Mark Your Responses

Be certain to circle completely the letter you choose:

N S (O) A

If you wish to change a response, mark an X through it and circle your new choice, like this:

N (S) ⊠ A

Before starting, be sure to complete the information above.

Remember: N = Never S = Sometimes O = Often A = Almost always

1.	Pays attention	N	S	O	A	31.	Accepts people who are different from his or her self	N	S	O	A
2.	Communicates clearly	N	S	O	A	32.	Has difficulty explaining rules of games to others	N	S	O	A
3.	Transitions well	N	S	O	A	33.	Has trouble staying seated	N	S	O	A
4.	Is overly active	N	S	O	A	34.	Complains of pain	N	S	O	A
5.	Congratulates others when good things happen to them	N	S	O	A	35.	Deceives others	N	S	O	A
6.	Argues when denied own way	N	S	O	A	36.	Spreads rumors about others	N	S	O	A
7.	Reads	N	S	O	A	37.	Refuses to talk	N	S	O	A
8.	Is fearful	N	S	O	A	38.	Adjusts well to changes in routine	N	S	O	A
9.	Does strange things	N	S	O	A	39.	Tracks down information when needed	N	S	O	A
10.	Is overly aggressive	N	S	O	A	40.	Disrupts the schoolwork of other children	N	S	O	A
11.	Has trouble keeping hands or feet to self	N	S	O	A	41.	Works well under pressure	N	S	O	A
12.	Says, "Nobody likes me."	N	S	O	A	42.	Accepts things as they are	N	S	O	A
13.	Falls down or trips over things easily	N	S	O	A	43.	Sneaks around	N	S	O	A
14.	Is easily distracted	N	S	O	A	44.	Performs poorly on school assignments	N	S	O	A
15.	Is easily stressed	N	S	O	A	45.	Offers help to other children	N	S	O	A
16.	Isolates self from others	N	S	O	A	46.	Finds fault with everything	N	S	O	A
17.	Finds ways to solve problems	N	S	O	A	47.	Recovers quickly after a setback	N	S	O	A
18.	Plans well	N	S	O	A	48.	Uses others' things without permission	N	S	O	A
19.	Says, "please" and "thank you."	N	S	O	A	49.	Is creative	N	S	O	A
20.	Refuses advice	N	S	O	A	50.	Seems out of touch with reality	N	S	O	A
21.	Listens carefully	N	S	O	A	51.	Overreacts to stressful situations	N	S	O	A
22.	Is unclear when presenting ideas	N	S	O	A	52.	Annoys others on purpose	N	S	O	A
23.	Gets into trouble	N	S	O	A	53.	Has a short attention span	N	S	O	A
24.	Is easy to please	N	S	O	A	54.	Is nervous	N	S	O	A
25.	Is usually chosen as a leader	N	S	O	A	55.	Demonstrates critical thinking skills	N	S	O	A
26.	Has panic attacks	N	S	O	A	56.	Is afraid of getting sick	N	S	O	A
27.	Eats things that are not food	N	S	O	A	57.	Puts others down	N	S	O	A
28.	Has reading problems	N	S	O	A	58.	Gives good suggestions for solving problems	N	S	O	A
29.	Is overly emotional	N	S	O	A	59.	Adjusts well to new teachers	N	S	O	A
30.	Speaks out of turn during class	N	S	O	A	60.	Is clear when telling about personal experiences	N	S	O	A

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Remember: N = Never	S = Sometimes	O = Often	A = Almost always

61.	Threatens to hurt others.	N	S	O	A	121.	Hurts others on purpose.	N	S	O	A
62.	Has trouble making new friends.	N	S	O	A	122.	Stays on task.	N	S	O	A
63.	Acts strangely.	N	S	O	A	123.	Avoids making friends.	N	S	O	A
64.	Listens to directions.	N	S	O	A	124.	Teases others.	N	S	O	A
65.	Loses control when angry.	N	S	O	A	125.	Acts confused.	N	S	O	A
66.	Engages in repetitive movements.	N	S	O	A	126.	Cannot wait to take turn.	N	S	O	A
67.	Handles winning and losing well.	N	S	O	A	127.	Shows interest in others' ideas.	N	S	O	A
68.	Says, "I get nervous during tests" or "Tests make me nervous."	N	S	O	A	128.	Says things that make no sense.	N	S	O	A
69.	Is easily calmed when angry.	N	S	O	A	129.	Completes homework.	N	S	O	A
70.	Breaks the rules.	N	S	O	A	130.	Gets failing school grades.	N	S	O	A
71.	Responds appropriately when asked a question.	N	S	O	A	131.	Complains of physical problems.	N	S	O	A
72.	Has problems with mathematics.	N	S	O	A	132.	Babbles to self.	N	S	O	A
73.	Hits other children.	N	S	O	A	133.	Is pessimistic.	N	S	O	A
74.	Provides home address when asked.	N	S	O	A	134.	Has fevers.	N	S	O	A
75.	Gets angry easily.	N	S	O	A	135.	Disobeys.	N	S	O	A
76.	Has headaches.	N	S	O	A	136.	Shows basic emotions clearly.	N	S	O	A
77.	Turns in work on time.	N	S	O	A	137.	Is in constant motion.	N	S	O	A
78.	Reacts negatively.	N	S	O	A	138.	Gets back at others.	N	S	O	A
79.	Says, "I'm afraid I will make a mistake."	N	S	O	A	139.	Has trouble getting information when needed.	N	S	O	A
80.	Gets sick.	N	S	O	A	140.	Is resilient.	N	S	O	A
81.	Cries easily.	N	S	O	A	141.	Encourages others to do their best.	N	S	O	A
82.	Defies teachers.	N	S	O	A	142.	Is irritable.	N	S	O	A
83.	Worries about things that cannot be changed.	N	S	O	A	143.	Is well organized.	N	S	O	A
84.	Has good coping skills.	N	S	O	A	144.	Quickly joins group activities.	N	S	O	A
85.	Lies.	N	S	O	A	145.	Seems odd.	N	S	O	A
86.	Makes decisions easily.	N	S	O	A	146.	Seems lonely.	N	S	O	A
87.	Picks at things like own hair, nails, or clothing.	N	S	O	A	147.	Has spelling problems.	N	S	O	A
88.	Is easily distracted from class work.	N	S	O	A	148.	Analyzes the nature of a problem before starting to solve it.	N	S	O	A
89.	Is able to describe feelings accurately.	N	S	O	A	149.	Cheats in school.	N	S	O	A
90.	Bullies others.	N	S	O	A	150.	Makes positive comments about others.	N	S	O	A
91.	Is easily upset.	N	S	O	A	151.	Speech is confused or disorganized.	N	S	O	A
92.	Is good at getting people to work together.	N	S	O	A	152.	Makes careless mistakes.	N	S	O	A
93.	Has poor self-control.	N	S	O	A	153.	Says, "I can't do anything right."	N	S	O	A
94.	Has good study habits.	N	S	O	A	154.	Acts out of control.	N	S	O	A
95.	Complains of stomach pain.	N	S	O	A	155.	Tries to do well in school.	N	S	O	A
96.	Avoids other children.	N	S	O	A	156.	Says, "I don't have any friends."	N	S	O	A
97.	Says, "I hate myself."	N	S	O	A						
98.	Makes friends easily.	N	S	O	A						
99.	Is distracted by smartphone (or similar device) during class.	N	S	O	A						
100.	Avoids eye contact.	N	S	O	A						
101.	Overcomes problems.	N	S	O	A						
102.	Is highly motivated to succeed.	N	S	O	A						
103.	Acts without thinking.	N	S	O	A						
104.	Makes others feel welcome.	N	S	O	A						
105.	Complains about health.	N	S	O	A						
106.	Worries.	N	S	O	A						
107.	Has trouble concentrating.	N	S	O	A						
108.	Takes a step-by-step approach to work.	N	S	O	A						
109.	Picks on others who are different from his or her self.	N	S	O	A						
110.	Disrupts other children's activities.	N	S	O	A						
111.	Loses temper too easily.	N	S	O	A						
112.	Appears tense.	N	S	O	A						
113.	Compliments others.	N	S	O	A						
114.	Is sad.	N	S	O	A						
115.	Prefers to play alone.	N	S	O	A						
116.	Tries to help others be their best.	N	S	O	A						
117.	Has trouble keeping up in class.	N	S	O	A						
118.	Is negative about things.	N	S	O	A						
119.	Starts conversations.	N	S	O	A						
120.	Does not complete tests.	N	S	O	A						

General Comments

What are the behavioral and/or emotional strengths of this child?

Please list any specific behavioral and/or emotional concerns you have about this child.

Appendix F: Teacher Consent Form

Institutional Review Board
Adult Research Consent Form

DATE: October 1, 2022

PROJECT TITLE: The Highly Sensitive Student: The Relationship between Sensory Processing Sensitivity and Academic and Behavioral Outcomes

PRIMARY INVESTIGATOR(S) AND CO-INVESTIGATORS: Dr. Kara Parker, 419-434-6025, kara.parker@findlay.edu, Linnea DiBerardino, 847-420-3128, diberardinol@findlay.edu

PURPOSE OF THE STUDY: The purpose of this study is to explore whether the presence of the high sensitivity personality trait (Sensory Processing Sensitivity) has any implications to academics or behavior in elementary aged students, and to understand the perceptions of teachers who work with high sensitivity students.

DESCRIPTION OF STUDY PROCEDURES: As a participant in the study, you will be asked to do the following:

- Send home the parent consent form with your students in their folders and send electronically to parents (if email is available)
- Provide the researcher with access to STAR reading and math data on the students in your class
- Provide the researcher with 5 minutes to administer the Highly Sensitive Child Scale in your classroom.
- Complete 4 Teacher Rating Scales of the Behavior Assessment System for Children (3rd Edition)
- Complete an interview with the researcher.

DURATION/TIME ASSOCIATED WITH YOUR INVOLVEMENT: It is estimated that your involvement in the study will take a total of 90-120 minutes over a 1-2 month period.

POTENTIAL RISKS OR DISCOMFORTS: It is not anticipated that this study will have any additional risks than you would encounter daily in your job as a teacher. However, it may be uncomfortable discussing student behaviors or challenges.

POTENTIAL BENEFITS: The findings of this study may be useful for school districts, teachers, school psychologists, parents, and students. The personality trait is not well understood in the school setting so this research may help to provide insights as to if/how the trait affects student academics and behaviors and how school personnel can provide the best instruction for students with the trait.

PROJECT ALTERNATIVES TO PARTICIPATION IN THE STUDY: Individuals may decline to participate in the interview portion of the study or the study entirely. Individuals who agree to participate will be asked to sign consent and release forms.

CONFIDENTIALITY OF DATA: Academic and behavioral data will be stored in a password protected Google Drive folder on a password protected computer. The Highly Sensitive Child Scale questionnaires will be stored in a locked cabinet in a locked house. Your name and identifying data will not be used when disseminating information. All information obtained in this study is strictly confidential unless disclosure is required by law.

COSTS AND/OR COMPENSATION FOR PARTICIPATION: Participants will not be compensated.

CIRCUMSTANCES FOR DISMISSAL FROM THE STUDY: If the teacher leaves the school district and/or is no longer a teacher within the district, they will not be eligible for participation and data will be excluded.

COMPENSATION FOR INJURY: There is no threat of injury from completing the questionnaires or interview. Therefore, no compensation for injury is offered.

CONTACT PERSONS: For more information concerning this research, please contact Dr. Kara Parker, 419-434-6025, kara.parker@findlay.edu. If you believe that you may have suffered a research related injury, contact Dr. Kara Parker, 419-434-6025, kara.parker@findlay.edu. If you have further questions about your rights as a research subject, you may contact:

IRB Chairperson
The University of Findlay
Findlay, OH 45840
419 434-4640
irb@findlay.edu

VOLUNTARY PARTICIPATION: Participation in this study is voluntary. You are free to participate or to withdraw at any time, for whatever reason. In the event that you do withdraw from this study, the information you have already provided will be kept in a confidential manner.

NEW FINDINGS: You will be notified of any new information that may change your decision to be included in this study, should any new information become available.

CONSENT: Federal regulations require precautionary measures to be taken to insure the protection of human subjects on physical, psychological, social, and other issues. This includes the use of "informed consent" procedures. Please read carefully.

I, _____ (PRINTED NAME OF SUBJECT) have been adequately informed regarding the risks and benefits of participating in this study. My signature also indicates that I can change my mind and withdraw my consent to participate at any time

without penalty by contacting the study contact person designated above. Any and all questions I had about my participation in this study have been fully answered.

SUBJECT SIGNATURE:_____

DATE

I have witnessed the consent process and believe the subject has been fully informed, understands the research study, and has agreed to participate in the study.

WITNESS PRINTED NAME:_____

WITNESS SIGNATURE:_____

DATE

YOU WILL BE GIVEN A SIGNED COPY OF THIS FORM TO KEEP.

Appendix G: Student Assent Form

RESEARCH ASSENT FORM

Required for children 7-17 years old

Project Title: **The Highly Sensitive Student: The Relationship between Sensory Processing Sensitivity and Academic and Behavioral Outcomes**

IRB #:

Principal Investigator: Dr. Kara Parker

Date:

We want to tell you about a research study we are doing. A research study is a way to learn information about something. We would like to find out more about kids that are highly sensitive. You are being asked to join the study because you are a child who might be highly sensitive.

If you agree to join this study, you will be asked to answer 12 questions by circling how much something is like you or not. It will take you less than 5 minutes to finish it.

Some of the questions may be a little hard to answer or uncomfortable to you. You do not have to answer any questions that make you too uncomfortable.

We do not know if being in the study will help you. We may learn something that will help other children with who have the personality trait some day.

You do not have to join this study. It is up to you. You can say yes now, and you can change your mind later. All you have to do is tell us. No one will be mad at you if you change your mind.

Before you say **yes** to being in this study, we will answer any questions you have.

If you want to be in this study, please say yes.

Appendix H: Parent Consent Form

OPT- OUT CONSENT FOR A MINOR TO ACT AS A HUMAN PARTICIPANT
Parent/Legal Guardian permission form

Project Title: The Highly Sensitive Student: The Relationship between Sensory Processing Sensitivity and Academic and Behavioral Outcomes

Principal Investigator: Dr. Kara Parker
Student Researcher: Linnea DiBerardino

Participant's Name:

What is the study about?
The purpose of this study is to explore whether the presence of the high sensitivity personality trait (Sensory Processing Sensitivity) has any implications to academics or behavior in elementary aged students, and to understand the perceptions of teachers who work with high sensitivity students.

Why are you asking my child?
This research study is working with third grade students because the scale used to identify high sensitivity starts at age 8. All children in your child's class will be asked to complete the 12-item questionnaire.

What will you ask my child to do if I agree to let him or her be in the study?
Your child will be asked to complete the Highly Sensitive Child Scale (self-report version). This scale is used to identify a personality trait that is seen in about 20% of people. All children in the class will be asked at the same time to complete the questionnaire in class. It will take 2-5 minutes to complete the questionnaire. The questionnaire will ask your child to tell how much something is like them. For example: "I don't like loud noises." A statement will be given and your child will circle a number between 1 and 7 to say how much the statement is or is not like them. Your student's academic progress data will be shared with the researcher and your student may be randomly selected to have his/her teacher complete a behavioral rating scale about your child.

Is there any audio/video recording of my child?
Your child will not be video or audio recorded.

What are the dangers to my child?
The risks of participation are minimal and no more than they would encounter in daily life.
If you have any concerns about your child's rights, how they are being treated or if you have questions about this project or benefits or risks associated with being in this study can be answered by Dr. Kara Parker who may be contacted at 419-434-6025.

Are there any benefits to my child as a result of participation in this research study?

There are no direct benefits to your child for participating in this study.

Are there any benefits to society as a result of my child taking part in this research?
The findings of this study may be useful for school districts, teachers, school psychologists, parents, and students. The personality trait is not well understood in the school setting so this research may help to provide insights as to if/how the trait affects student academics and behaviors and how school personnel can provide the best instruction for students with the trait.

Will my child get paid for being in the study? Will it cost me anything for my child to be in this study?
There are no costs to you or payments to you or your child as a result of participation in this study.

How will my child's information be kept confidential?
Academic and behavioral data on your child will be stored in a password protected Google Drive folder on a password protected computer. Your child's Highly Sensitive Child Scale will be stored in a locked cabinet in a locked house. Your child's name and identifying data will not be used when disseminating information. All information obtained in this study is strictly confidential unless disclosure is required by law.

What if my child wants to leave the study or I want him/her to leave the study?
You have the right to refuse to allow your child to participate or to withdraw him or her at any time, without penalty. If your child does withdraw, it will not affect you or your child in any way. If you or your child chooses to withdraw, you may request that his/her data which has been collected be destroyed when possible.

What about new information/changes in the study?
If significant new information relating to the study becomes available which may relate to your willingness allow your child to continue to participate, this information will be provided to you when possible.

If you have any questions about your child's participation in the study, please contact Dr. Kara Parker at 419-434-6025.

If you would prefer that your child does not participate in this study, please email your child's teacher or Dr. Kara Parker at 419-434-6025 within the next two weeks.