

The Literature Review of Sensory Processing Sensitivity

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Abstract: Sensory processing sensitivity (SPS) is a personal characteristic that significantly affects a series of individual behaviors, which makes SPS has long been widely concerned and studied by scholars. However, although scholars have carried out a lot of research on SPS, the existing research has not systematically and comprehensively sorted out and explored SPS, which is not conducive for scholars to have a comprehensive understanding of SPS. Based on this research status, firstly, this study teases out the existing SPS research, systematically introduces the concept of SPS, expounds its differences and connections with similar constructs, and discusses different measurement scales of SPS. Secondly, this study reviews the antecedents and consequences of SPS. Antecedents include innate factors and acquired environmental factors, while consequences are reviewed and sorted out from both positive and negative aspects. Finally, this study proposes directions for future research on SPS, thus providing ideas and directions for scholars to continue to explore SPS. This study aims to provide a comprehensive academic foundation for further exploration of SPS.

Keywords: Sensory Processing Sensitivity, Definition, Measurement Scale, Antecedent, Consequence.

1. Introduction

Early studies have demonstrated the variability in people's sensitivity levels, with approximately 30% exhibiting low sensitivity, 40% medium sensitivity, and 30% high sensitivity [1]. Subsequent research has consistently confirmed that a significant portion of individuals have high sensitivity [2,3]. Sensory processing sensitivity (SPS) is a trait characterized by the deep processing of stimuli and information [4,5]. Individuals with high SPS are known as highly sensitive persons (HSPs) [4]. HSPs often display strong empathy, a sense of justice, ethical thinking, and a profound appreciation for beauty and art [6]. Despite these positive traits, SPS can also have negative consequences. HSPs are more prone to experiencing depression and anxiety, particularly during adolescence [4,6,7]. Due to its significant impact on well-being, SPS has garnered substantial research attention.

Numerous studies among university students have demonstrated a strong link between SPS and depressive symptoms [8]. Emotionally, highly sensitive individuals often experience heightened fear and can easily become upset, negative, or defiant due to difficulty managing their emotions [9]. This hypersensitivity can also impact social interactions, leading to behaviors such as social withdrawal, isolation, and communication difficulties. Additionally, those with high sensory sensitivity may struggle with academic or work performance and participation in leisure activities [10]. Despite these challenges, some studies emphasize the positive effects of SPS. For instance, Lionetti et al. [2] found

that SPS is associated with greater positive emotions in children. Furthermore, research suggests that individuals with high SPS may exhibit fewer behavioral problems and better social and emotional well-being when they experience supportive environments, such as positive parenting or intervention programs [3]. This underscores the importance of understanding how SPS and various environmental factors interact to influence individual outcomes.

Despite the substantial amount of research on SPS and its effects on individuals [8,11], there remains a significant lack of comprehensive systematic reviews in this area. This gap hinders scholars' understanding of the current state of SPS research and slows the progress of future studies. Therefore, it is crucial to conduct a systematic review of relevant studies to address this issue. The primary goal of this study is to provide a thorough and systematic review of the existing literature on SPS. It aims to elucidate the definition, measurement scales, and factors influencing SPS, as well as its effects on individuals. By doing so, the review seeks to provide scholars with a solid foundation for future research on SPS. Additionally, this study intends to identify potential directions for future research based on insights from the existing literature, thereby helping to advance the research field in this growing area.

In summary, this systematic review aims to consolidate existing knowledge on SPS, offering valuable insights into its definition, measurement, and impact on individuals. Furthermore, it seeks to outline future research paths to deepen our understanding of SPS and its implications in various domains.

2. Definition and Measurement Scale

2.1. Definition

Sensory Processing Sensitivity (SPS), first introduced by Aron and Aron [4], posits that a person's choices are closely linked to how their brain processes sensory information. SPS is considered a genetically determined trait where individuals process stimuli more deeply, driven by strong emotional reactions and sensitivity to subtle environmental cues. Individuals with SPS often take time to carefully consider new situations [4].

Various scholars have interpreted SPS differently. Benham [12] describes SPS as a heightened sensitivity to subtle stimuli and a tendency to become easily overwhelmed by external sensory input. Smolewska et al. [13] view SPS as a trait characterized by high emotional, physical, and social sensitivity. Generally, SPS is seen as a feature of heightened sensitivity, where individuals are particularly adept at noticing subtle environmental changes and are more likely to feel overwhelmed by strong sensory inputs compared to others. Research suggests that approximately 15%-20% of the population are highly sensitive individuals.[14]

In our research, SPS is perceived as an innate trait associated with heightened sensitivity and responsiveness to environmental and social stimuli [4,5]. This perspective underscores the complex nature of SPS and its significant effects on personal experiences and interactions with the world. Recognizing SPS as a multifaceted trait with substantial impacts on personal and social functioning provides a vital framework for exploring how highly sensitive individuals navigate their environments. This understanding also highlights the need for tailored support mechanisms to enhance the well-being and adaptability of individuals with high SPS.

2.2. Similar Concepts

Furthermore, SPS has been found to correlate with concepts from various fields. While SPS is linked to social introversion and neuroticism, it remains distinct from these constructs [4]. Notably, SPS has been established as independent of both introversion and neuroticism, as well as their combined effects [4]. Aron and Aron [4] argued that SPS has often been confused with neuroticism, fearfulness,

or general reactivity because both highly sensitive individuals and those high in neuroticism or fearfulness may exhibit hesitation in new situations. However, the authors stated that highly sensitive individuals are not inherently more likely to experience negative emotional states; rather, they may simply be more aware of negative parental environments.

This distinction highlights the need for a nuanced understanding of the different constructs underlying SPS and related psychological traits. By distinguishing SPS from neuroticism and introversion, researchers can more accurately study its unique implications for behavior and emotional experiences. Recognizing that highly sensitive individuals are not necessarily more prone to negative emotions but are more perceptive of environmental subtleties underscores the importance of supportive and positive contexts in reducing potential stressors. This clearer understanding of SPS facilitates the development of more targeted interventions and support strategies, ultimately leading to a better quality of life for highly sensitive individuals.

2.3. Measurement Scale

2.3.1. Highly Sensitive Person Scale

Aron and Aron [4] developed the Highly Sensitive Person Scale (HSPS), a 27-item scale aimed at measuring SPS. They concluded that the scale assesses a “one-dimensional concept of high sensory sensitivity and associated arousal capacity, partially independent of internality and emotionality.” However, Smolewska et al. [13] presented a different perspective, reporting that the HSPS is better understood as a three-factor structured scale, despite its initial one-dimensional conceptualization by Aron and Aron. This three-factor structure encompasses Ease of Excitation (EOE), Aesthetic Sensitivity (AES), and Low Sensory Threshold (LST), indicating a more nuanced understanding of the components contributing to SPS. The EOE factor pertains to the ease with which individuals become overwhelmed by external stimuli and the associated arousal. AES reflects the appreciation for and sensitivity to aesthetic stimuli, such as art and nature. LST captures the tendency to experience discomfort or overstimulation from sensory inputs that others might find tolerable. This variance in conceptualization highlights the ongoing discourse surrounding the measurement and interpretation of SPS, emphasizing the need for further research to elucidate its multifaceted nature.

2.3.2. Adult Temperament Questionnaire

Evans and Rothbart [15] reexamined the findings of Smolewska et al. [13] using their temperament model and factor analysis. They identified two highly correlated factors, Ease of Excitation (EOE) and Low Sensory Threshold (LST), which they interpreted as reflecting common negative emotions and feelings of discomfort. Additionally, they observed that not all items in the Highly Sensitive Person Scale (HSPS) clearly align with Aesthetic Sensitivity (AES). In response, Evans and Rothbart [15] proposed an alternative subscale within the framework of the Adult Temperament Questionnaire, which they termed “orientation sensitivity.” This subscale encompasses perceptual sensitivity, associative sensitivity, and affective perceptual sensitivity, offering a refined understanding of the various dimensions of SPS. This reinterpretation underscores the complexity of SPS and highlights the importance of considering multiple perspectives and frameworks in its assessment and interpretation.

2.3.3. Personality Adjective Check List

The Chinese version of the Personality Adjective Check List [16] comprises 153 items, covering nine subscales: powerful, social, sensitive, inhibited, confident, cooperative, respectful, introverted, and a clinical trial scale. Among these subscales, the “sensitive” subscale serves as a potential measurement

tool for assessing SPS. This subscale gauges individuals' propensity for heightened sensitivity to environmental stimuli, thus contributing to the understanding of SPS within the Chinese cultural context. Utilizing established instruments such as the Personality Adjective Check List facilitates cross-cultural research and enables comparisons across diverse populations. Specifically, the "sensitive" subscale allows researchers to capture nuances in sensory processing that may be influenced by cultural factors. By incorporating this tool, researchers can gain insights into how SPS manifests in different cultural settings and identify any unique cultural determinants of sensory sensitivity.

3. Antecedents and Consequences of Sensory Processing Sensitivity

3.1. Antecedents of Sensory Processing Sensitivity

The literature on sensory processing sensitivity (SPS) includes various factors contributing to its development, ranging from inherent to environmental influences.

In terms of inherent factors, gender plays a pivotal role. Research by Aron and Aron [4] initially established that women tend to score significantly higher on the Highly Sensitive Person Scale (HSPS) compared to men. Subsequent studies have consistently reaffirmed these gender disparities, showing that females typically exhibit higher levels of SPS across different age groups and demonstrate a degree of cross-cultural consistency [6]. Additionally, investigations into genetic predispositions have garnered attention. Notably, Belsky and Pluess [17] proposed that specific genes or genetic variations might modulate the impact of environmental factors on individuals. Those with sensitive genotypes are found to be more susceptible to environmental influences, displaying greater behavioral plasticity in their developmental trajectories.

Environmental factors also exert a significant influence on the development of SPS. Family dynamics, in particular, emerge as a crucial determinant. Individuals with heightened SPS are especially susceptible to the effects of both negative and positive familial environments. This adaptability underscores the intricate interplay between environmental stimuli and SPS. Although individuals with SPS share a common temperament, the expression of this trait is heavily contingent upon environmental contexts, particularly within the family setting. Some studies emphasize that adverse family environments can exacerbate the negative consequences associated with SPS during developmental stages.[18]

In summary, expanding our understanding of SPS requires acknowledging the multifaceted interplay between inherent predispositions—such as gender and genetics—and environmental influences, particularly familial dynamics. Recognizing these intricate relationships is pivotal in elucidating the nuanced mechanisms underlying the development and expression of SPS.

3.2. Consequences of Sensory Processing Sensitivity

SPS can lead to both advantageous and detrimental outcomes, reflecting its complex impact on individuals.

On the positive side, several studies have highlighted the cognitive benefits associated with SPS. For instance, Jagiellowicz et al. [19] found that individuals with heightened SPS exhibit enhanced cognitive abilities, particularly in detecting changes within the visual environment. Similarly, Gerstenberg [20] observed that such individuals demonstrate quicker reaction times and make fewer errors in visual inspection tasks. Additionally, Lionetti et al. [2] identified a positive correlation between SPS and children's positive affect. Scholars have also shown that individuals with elevated SPS tend to experience fewer behavioral issues and enjoy improved socio-emotional well-being when supported by positive parenting practices or intervention programs [3].

Conversely, the negative repercussions of SPS have received significant attention in prior research. Liss et al. [21] reported a heightened prevalence of depression and anxiety among individuals with SPS. Additionally, SPS has been associated with various anxiety disorders, including social anxiety disorder [22] and avoidant personality disorder [23]. Components of SPS have also shown positive correlations with neurotic personality traits [13,24]. Benham [12] demonstrated associations between SPS and increased levels of perceived stress, as well as more frequent physical symptoms such as body aches, fainting, and nausea.

By recognizing both the positive and negative ramifications of SPS, researchers can develop more nuanced interventions and support systems tailored to the diverse needs of individuals exhibiting SPS.

4. Conclusion

4.1. Research Conclusion

In this study, the existing literature on sensory processing sensitivity (SPS) have been thoroughly reviewed to provide a comprehensive understanding of this trait. Our analysis aimed to help scholars grasp the complexities of SPS by offering an extensive overview of its definition, measurement, causes, and effects.

It began by exploring the classical definitions of SPS and differentiating it from related concepts, emphasizing the unique characteristics that define this trait. Our review covered various measurement tools used to assess SPS, including the Highly Sensitive Person Scale (HSPS) and the Adult Temperament Questionnaire, and discussed their respective strengths and limitations. Additionally, it examined the factors contributing to the development of SPS, identifying both genetic and environmental influences. This study highlighted how gender differences, genetic predispositions, and family dynamics play crucial roles in shaping SPS.

Furthermore, the outcomes of SPS were examined, categorizing them into positive and negative effects. Positive outcomes include enhanced cognitive abilities and improved socio-emotional well-being in supportive environments, whereas negative outcomes involve increased susceptibility to stress, anxiety, and social challenges. By synthesizing these insights, our study offers a robust foundation for future research on SPS. It proposes several areas for further investigation, such as exploring the neural mechanisms underlying SPS, examining cultural differences, and developing targeted interventions to support individuals with high SPS.

The findings of this study make a significant contribution to the understanding of SPS, providing valuable support for both scholars and practitioners. This comprehensive review not only deepens our understanding of SPS but also lays the groundwork for future research aimed at uncovering the intricate dynamics of this trait and its impact on individual well-being and functioning.

4.2. Future Research Directions

4.2.1. Expanding Research on Adult Populations

Most research on SPS has focused on adolescents, with less attention given to adults, particularly in professional settings. Future studies should explore how SPS affects job performance and well-being in the workplace. Understanding SPS in adult populations can help organizations better support highly sensitive employees.[25]

4.2.2. Exploring Environmental Influences on SPS

Future research should emphasize the environmental factors influencing SPS to better inform intervention strategies. While genetic predispositions are well-documented, the impact of various

environmental conditions—such as family dynamics, educational settings, and workplace environments—requires further investigation. Identifying these factors can lead to targeted interventions that mitigate negative outcomes and enhance positive experiences for individuals with high SPS.

4.2.3. Investigating Boundary Conditions of SPS Impacts

Further research should examine the boundary conditions of SPS impacts. This includes understanding how SPS interacts with different variables to influence outcomes, such as the role of coping mechanisms, social support, and cultural contexts. Investigating these conditions can provide a more nuanced understanding of how SPS affects individuals in various contexts and contribute to developing more effective support strategies.

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