

# *The Mechanism Through Which Highly Sensitive Persons Traits Are Related to Depression*

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**Abstract:** This paper investigates the intricate mechanisms through which traits associated with Highly Sensitive Persons (HSP) are linked to depression. It delves into Sensory-Processing Sensitivity (SPS), a core feature of HSPs, characterized by deep cognitive processing, heightened emotional reactivity, and acute sensitivity to subtleties. The study explores how these traits, while often advantageous, can predispose HSPs to depression, particularly when they are exposed to adverse environments. Additionally, the research examines the pivotal role of childhood environments, both positive and negative, in moderating the relationship between SPS traits and depression. The influence of genetic and epigenetic factors is also considered, highlighting how these elements may amplify sensitivity and susceptibility to depressive symptoms. The findings underscore the importance of targeted therapeutic approaches, such as mindfulness-based interventions, tailored specifically for HSPs. By offering a comprehensive analysis of the sensitivity-depression link, this work aims to enhance our understanding of the complex relationship between SPS and mental health, providing valuable insights for clinical practice and the development of effective therapeutic strategies.

**Keywords:** Sensory-Processing Sensitivity, Highly Sensitive Persons, Depression, Childhood Environment, Gene and epigenetic

## 1. Introduction

According to [1], Sensory-Processing Sensitivity (SPS) is a temperamental feature marked by increased sensitivity to social and environmental stimuli, increased emotional reactivity, and deeper cognitive processing of sensory information. Individuals exhibiting high levels of SPS, commonly defined as Highly Sensitive Persons (HSPs), represent approximately 15-20% of the population [2]. While conferred advantages like greater empathy and detailed perception [1], HSP individuals have higher risks of being associated with atypical development and the symptoms of later mental health problems, including anxiety and depression [3]. Therefore, understanding the mechanisms through which HSP traits are related to depression is crucial for developing effective therapeutic interventions. This study explores how the key traits of HSPs—depth of processing, emotional reactivity, susceptibility to overstimulation, and sensitivity to subtleties—contribute to depression. Additionally, the interaction between these traits and childhood environments will be analyzed, followed by the genetic and epigenetic factors. By integrating theoretical and empirical evidence, the essay aims to

provide a comprehensive understanding of the relationship between HSP traits and depression, offering insights into targeted therapeutic approaches.

## **2. Mechanisms Linking SPS Traits to Depression**

### **2.1. Core Traits of HSP and Depression**

As the personality trait that is primarily observed in Highly Sensitive Persons (HSP), Sensory-Processing Sensitivity plays a complex role in individual adaptability and susceptibility to environmental influences. Specifically, SPS was found to be different from introversion and neuroticism [1]. From the organism perspective, SPS is argued to be a strategy for survival that, by closely observing every circumstance and then contrasting it with previous observations, may enable behaviors to gather resources, give others appropriate care, and escape threats. However, due to its cognitive and physiological disadvantages, traits of high sensitivity are not adaptable among all organisms [4]. Similarly, the theory of differential susceptibility proposes that individuals vary in their responsiveness to environmental stimuli. It highlights the dual responsiveness that individuals who are highly susceptible to positive environments are also more responsive to negative environments, leading to the interaction that they gain more benefits from positive influences and are more adversely affected by negative ones [5]. HSPs represent the concept of differential sensitivity, as their increased reactivity makes them more likely to be stressed and depressed in adverse circumstances. On the other hand, in supportive and nurturing environments, they can flourish and display greater levels of well-being [6]. Hence, SPS is conceptualized as a personality trait rather than a disorder. However, when individuals with high SPS are exposed to negative environments, their risk for maladaptive behaviors and negative developmental outcomes increases [3]. Research has shown that SPS is associated with various negative mental health issues, such as higher levels of psychopathology traits and internalizing problems [7], depression [8,9], and anxiety [8]. Therefore, it is of significance to analyze the mechanism of how SPS traits are related to depression.

HSPs are more susceptible to depression due to several interrelated factors of cognitive process. According to [1], The core traits of SPS include depth of processing, overstimulation, emotional reactivity and empathy, and sensitivity to subtleties. One primary factor is their depth of cognitive processing, in which HSPs show a preference for processing information more thoroughly [1]. This rumination process involves a repetitive focus on negative thoughts and feelings, significantly increasing the risk of depression [10]. Similarly, HSPs experience heightened emotional reactivity and empathy, which may interact with their ability to deep processing. The heightened reactivity and depth of cognitive processing cause them to feel emotions more intensely and absorb the stress and negative emotions around them more easily [1]. The emotional intensity can also lead to emotional exhaustion, which can serve as a precursor to depression [11]. In addition, HSPs also show an awareness of subtleties in environments, which keeps them alert and aware of any changes that could be threatening. The heightened awareness may exacerbate mental exhaustion, which raises the risk of depression [2]. Hence, due to their heightened sensitivity to sensory stimuli such as light, noise, and social interactions, HSPs are more likely to experience overstimulation. This constant overload of stimuli can lead to chronic stress and fatigue, which are closely linked to depressive symptoms [12]. The combination of these traits—deep processing, emotional reactivity, empathy, overstimulation, and sensitivity to subtleties—creates a fertile ground for the development of depression, especially when HSPs are exposed to adverse environments.

### **2.2. Role of Childhood Environments**

The social environment, particularly during childhood, plays a pivotal role in the development and mental health outcomes of individuals with Sensory-Processing Sensitivity (SPS). According to [13],

HSPs who grow up in adverse environments are at a higher risk for developing depression and other negative psychological outcomes. This is because highly sensitive individuals process negative experiences more thoroughly, making them more susceptible to the effects of their surroundings. Negative childhood environments, such as those involving neglect, abuse, or lack of emotional support by parents, can amplify stress responses in HSPs, leading to long-term psychological challenges. Meanwhile, in another analysis of childhood experiences of HSPs, those who reported to have experienced objective childhood difficulties—such as alcoholism or mental illness—were more likely than those who were not to have experienced difficult childhoods. [1]. In this study, compared to those HSPs who recalled happy childhood memories, the group of HSPs who had troubled childhoods were more introverted and emotional. Besides, [14] have indicated that SPS is strongly related to depression, as well as contributed to unique variance with parental over-protection. Highly sensitive people remember their parents trying to make them dependent on them because they thought they couldn't take care of themselves, making them more sensitive and stressed to be protected. Therefore, it is suggested that there is a pattern of interactions between sensitivity and a childhood background filled with multiple stressors that result in long-term negative effects, which may lead to depression.

However, as suggested by the differential susceptibility theory, while HSPs are more adversely affected by negative environments, they can also benefit more from positive and nurturing environments. According to [5], effective parental guidance such as proper provision, limited settings, clear instructions, and supporting presence can significantly reduce the risks of disorders associated with high sensitivity, fostering resilience and enhancing mental health. For instance, a caring and understanding family environment can help HSPs develop healthy coping mechanisms and emotional regulation skills. This dual responsiveness highlights that negative emotionality is not the only personality trait that alleviates the impact of parenting, in a way that is consistent with differential susceptibility, thereby highlighting the plasticity of individual differences [5].

### **2.3. Genetic and Epigenetic Influences**

In addition, the relationship between SPS and depression is significantly influenced by genetic and epigenetic factors. The genetic correlates help explain why individuals with high SPS are more susceptible to developing depression. The DRD4 gene, particularly the 7-repeat allele, has been linked to increased sensitivity to environmental stimuli. This genetic variation contributes to the heightened emotional reactivity observed in Highly Sensitive Persons (HSPs). Dopamine dysregulation, associated with these genetic variations, has been linked to mood disorders, suggesting that these genetic factors contribute to the increased risk of depression in HSPs [15]. It is argued that given the complex nature of the dopamine system, behavioral variations among individuals would be influenced by variations in several subsystems, therefore contributing to variation in sensitivity. Furthermore, epigenetic factors—variations in gene expression without alterations to the sequence of DNA—also contribute to the sensitivity and depression link. Environmental factors, particularly during early development, can result in epigenetic changes that affect the expression of genes linked to the stress response and emotional control. Adverse childhood experiences, for instance, can result in epigenetic changes that increase the reactivity of the hypothalamic-pituitary-adrenal (HPA) axis, making individuals more susceptible to stress and depression in their later years [16,17].

## **3. Therapeutic Approaches**

### **3.1. Mindfulness-Based Interventions**

In terms of therapeutic approaches for HSPs with depression, recent studies have found some methods to address the depression symptoms considering the SPS traits. It is suggested that HSPs often

struggle to tolerate both internal and external stimuli, which can interfere with their ability to regulate emotions effectively, leading to negative mood states [18]. Specifically, a reliable intermediary between SPS and negative affect is reduced acceptance of negative emotions, since depression and stress symptoms can exacerbate if a person is unable to accept their emotions of distress [19]. In this sense, depression was partially mediated by the restricted access to emotional regulation strategies. As indicated by [18], Therapeutic interventions for HSPs with depression can focus on enhancing emotional regulation skills to mitigate these negative psychological symptoms. In particular, interventions might focus on improving a person's self-efficacy in managing their emotions [20].

### 3.2. Acceptance-Based Approaches

Moreover, the significance of the acceptance of negative emotional states also suggests the application of therapeutic approaches like acceptance-based approaches and mindfulness. According to [8], although HSPs tend to experience higher levels of psychological distress, mindfulness and acceptance can reduce these negative effects. The study has found that higher levels of mindfulness and acceptance weaken the relationship between SPS and depression, among those individuals who process sensory information deeply and are more emotionally reactive. By increasing the acceptance of HSPs, mindfulness-based interventions, such as Acceptance and Commitment Therapy (ACT) and Mindfulness-Based Stress Reduction (MBSR), could be beneficial for individuals with high SPS.

## 4. Discussion

Despite the mechanism that contributes to SPS traits and depression, additional variables that impact the association could be examined. Studies have found that interaction with cultural differences during visual judgment tasks might influence the personality outcomes of SPS. According to [21], late-stage attentional processing is the main period when cultural influences on brain processes involved in perceptual tasks of judgment-making. It has been discovered that highly sensitive people are less impacted by cultural context since they process information more deeply [22]. However, due to the sample size limitations, the applicability of these cultural elements in the research of depression and SPS therapies remains to be discussed [23]. Besides, considering the measurement scales of depression among HSPs, more norms of standard scales are necessary to be considered. For instance, given the stronger emotional responses of HSPs, the average scores on the measures of feelings and behaviors might be higher than expected. Furthermore, it has yet to be determined if the recognition of SPS features can affect the outcomes of assessments in mental conditions like depression. It is argued that psychoeducation about SPS is required before conducting a random assignment longitudinal study of HSPs, including measurements of reduced stress, health problems, burnout, or higher self-esteem [23].

## 5. Conclusion

In conclusion, Sensory-Processing Sensitivity (SPS), defined by [1], describes Highly Sensitive Persons (HSPs) who exhibit increased sensitivity to stimuli, deeper cognitive processing, and heightened emotional reactivity. These traits, while conferring advantages like empathy and detailed perception, also predispose HSPs to depression. The interaction between SPS traits and adverse social environments, particularly during childhood, also increases the risk of depression significantly by generating the chronic negative impact of SPS. Conversely, supportive environments can mitigate these risks, concerning the importance of differential susceptibility. In addition, genetic and epigenetic factors also contribute to this sensitivity, with specific variations heightening emotional reactivity and stress responses. Based on these mechanisms behind the correlation of HSP and depression, effective therapeutic interventions for HSPs should focus on enhancing emotional

regulation and acceptance of negative emotions, with mindfulness-based approaches like Acceptance and Commitment Therapy (ACT) and Mindfulness-Based Stress Reduction (MBSR) showing promise. Furthermore, future research is needed to explore cultural influences on SPS outcomes and refine measurement scales for accurate assessments, with the significance of psychoeducation about SPS emphasized for effective therapeutic outcomes. This study provides a comprehensive understanding of the relationship between HSP traits and depression, offering valuable insights for targeted therapeutic approaches for specific temperaments and minority groups of clients.

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