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Relationship between Sensory Processing Sensitivity and Mental Health †

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Abstract: Sensory processing sensitivity, characterized by deeper cognitive, sensory and emotional information processing, has been previously related to several mental health problems. However, the studies are rare, and an integration of the obtained findings needs to be addressed. We conducted a systematic review of studies using scientific databases in order to integrate the available information about sensory processing sensitivity and its consequences in mental health. Thirteen studies were included and analyzed in the review. According to these studies, high levels of sensory processing sensitivity might be related to the appearance of several mental health disturbances, such as anxiety or depression.

Keywords: sensory processing sensitivity; individual differences; personality; mental health

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1. Introduction

Sensory processing sensitivity (SPS) has been described from a vast variety of studies as an underlying phenotypic trait characterized by the ability to register and process environmental stimuli and its association to deeper cognitive, sensory and emotional information processing, probably due to a more sensitive central nervous system [1,2].

According to the assumptions developed within the framework of the theory of environmental sensitivity [3], humans are programmed to perceive, process, and react in a certain way to environmental stimuli. This way of processing the environment's stimuli has a necessary function for survival, since it allows adaptation to context [2]. However, despite the fact that there is a neurobiological predisposition for the development of this adaptive function in human beings, significant differences have been observed in the way in which individuals react to environmental stimuli. Hence, it has been identified that some people exhibit a greater sensitivity to environmental stimuli [3]. In this sense, different studies have identified how some individuals process the cognitive, sensory and emotional information of the environment in a more intense and profound way, which leads to a greater emotional reactivity, a greater awareness of environmental subtleties and a greater propensity to over-stimulation [2,4].

Thus, these individual differences that may be found in this sensitivity trait could have an impact on mental health, affecting children through to adulthood [5]. Previous studies in this sense have shown how a high environmental sensitivity trait is associated with greater difficulties in different areas of people lives, such as family, school and personal and social lives, having been related to a significant deterioration of health and quality of life of them [5]. In this sense, highly sensitive people may experience an increase in mental health problems, including mainly anxiety and depression. In fact, according to recent studies, about 40% of highly sensitive people present mental health problems [5,6]. Therefore,

the objective of this study was to analyze the association between sensory processing sensitivity and mental health implications.

2. Methodology and Quality Assessment

A systematic review study that applied the recommendations in the Preferred Reporting Items for Systematic reviews and Meta-Analysis declaration for these types of studies was carried out [7].

2.1. Data Sources

A systematic search was carried out in the PubMed, ScienceDirect and Scopus databases, using the keywords "sensory processing sensitivity" and "mental health" as MeSH descriptor.

2.2. Search Strategy

The Boolean indicator AND was used (*sensory processing sensitivity* AND *mental health*). The search for documents was limited to publications that appeared in scientific journals and books from January 2015 to January 2021.

2.3. Selection of Articles

Abstracts identified through the bibliographic search were independently evaluated by two authors to confirm the inclusion criteria. The quality of each study was independently evaluated by two authors, using the Crombie criteria adapted by Petticrew and Roberts [8]. Disagreements were resolved by a third author.

2.4. Inclusion and Exclusion Criteria

Inclusion criteria were: (1) articles that were available in full text and written in English or Spanish; (2) articles in which sensory processing sensitivity was reported with numerical values; (3) articles in which mental health implications were reported with numerical values.

The exclusion criteria were: (1) articles not related to sensory processing sensitivity; (2) articles that do not present mental health implications related to sensory processing sensitivity; (3) documents that were summaries for conferences; (4) articles that were reviews or meta-analyses.

2.5. Extracted Data

Data extraction was carried out by the lead author of the review, taking into account the year of publication (2015–2021), design and objective of the study, sample size, participants' mean age, country of origin and relationship between sensory processing sensitivity and mental health implications.

3. Results

In total, 767 studies were identified. After the duplicates were removed (n = 12), the titles and summaries were read, and the other 742 were deleted according to the different exclusion criteria. Finally, 13 articles were included in this review (Figure 1).

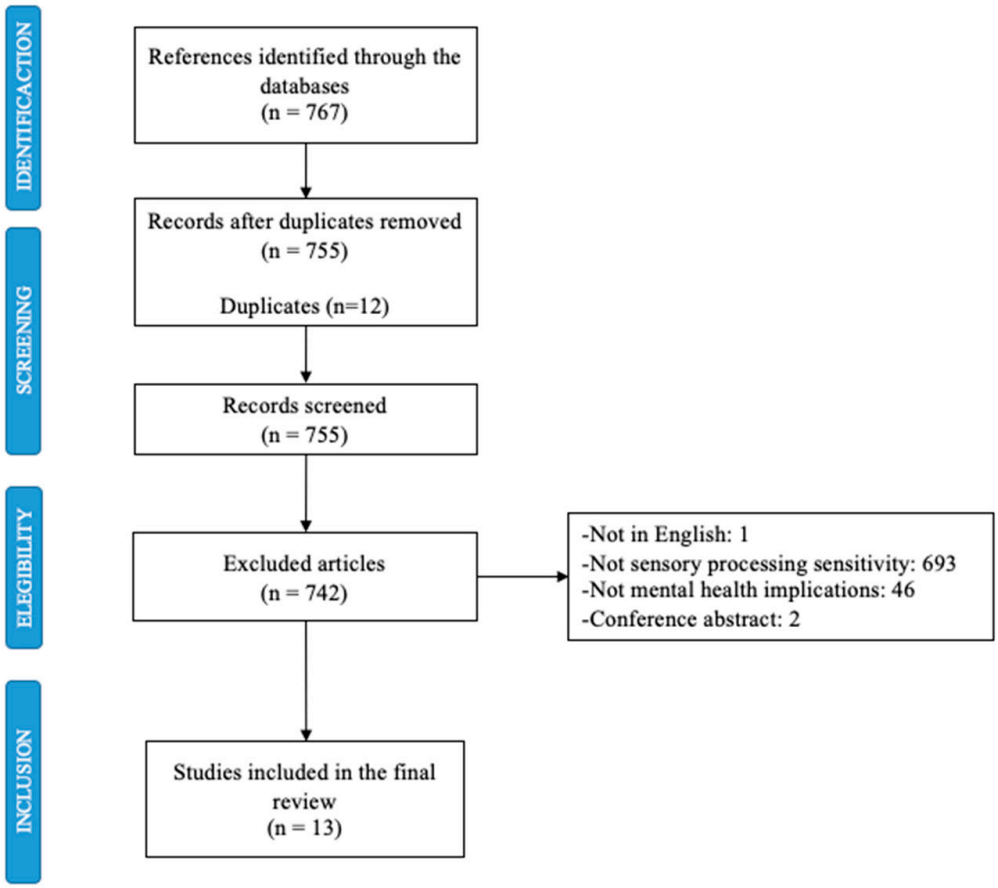

Figure 1. Selection of the studies.

3.1. Description Data and Types of Studies

Table 1 shows the characteristics of the studies included. Of the participants, 54.57% were women and the remaining 45.43% were men, with a mean participant age of about 35.95 years.

As for the country of origin, three of the studies were conducted in Japan [10,12,17], two in the United States [9,15], and the other two in the United Kingdom [14,19]. One article was carried out in each of the following countries: Malaysia, Sweden, Denmark, Iran, Israel and China [11,13,16,18,20,21].

Table 1, which also presents the design of the studies, shows that 11 of the 13 of them were cross-sectional studies [10–15,17–21]. One was a cohort study [9] and another one was a longitudinal and seasonally counterbalanced study [16].

Table 1. Description of the studies included in the review.

Authors [Reference]	Country	Year	Mean Age (SD)	Sample Size	Gender	Objective(s)	Study Type	Relationship between SPS and Mental Health
1. Stern, Strober and Goverover [9]	USA	2020	50.0 (9.2)	N = 94 Multiple sclerosis (MS) participants	Men = 15 Women = 79	1. To compare trait anxiety among persons with MS with different levels of sensory processing patterns 2. To identify the associations between sensory processing patterns, trait anxiety, and physical and mental health-related quality of life	Cohort study	Moderate correlations between trait anxiety and SPS (r = 0.57)
2. Kibe, Suzuki, Hirano and Boniwell [10]	Japan	2020	15.5 (-)	N = 395 Adolescents	-	To investigate the moderation effects of gender and individual sensitivity on well-being and mental health	Cross-sectional study	Positive association between SPS and depression (r = 0.22)
3. Khodabakhsh, Loh and Rosli [11]	Malaysia	2020	29.68 (5.42)	N = 354 Adults	Men = 244 Women = 110	To explore the relationship between neurological threshold in sensory profile, depression, and anxiety	Cross-sectional study	Positive association among SPS subscales and depression (r = 0.295) and anxiety (r = 0.381)
4. Yano, Kase and Oishi [12]	Japan	2020	20.5 (0.9)	N = 430 Students	Men = 221 Women = 209	To investigate the moderation effect of sense of coherence on the relationship between sensory-processing sensitivity and depressive symptoms in university students	Cross-sectional study	Moderate correlations between depression and SPS (r = 0.45)
5. Andersson, Sutton, Bejerholm and Argentzell [13]	Sweden	2020	-	N = 14 People with psychiatric disorders	-	To investigate the experience of sensory input and strategies used in daily occupations among people with serious mental illness	Cross-sectional study	Experienced sensory inputs as stressful
6. Carr, Matthews, Williams and Blagrove [14]	UK	2020	33.66 (16.90)	N = 137 Students	Men = 33 Women = 104	To analyze the correlations among SPS, mental well-being and nightmare frequency	Cross-sectional study	High SPS is positively correlated with trait nightmare distress (r = 0.32)
7. Harrison, Kats, Williams and Aziz-Zadeh [15]	USA	2019	-	N = 51; People with obsessive compulsive disorder (OCD) N = 496; General population	-	1. To describe the neurobiological basis of sensory processing sensitivity 2. To examine the links between sensory processing sensitivity and psychopathology	Cross-sectional study	People with OCD indicate higher scores in SPS ($p < 0.001$; $\delta = 1.16$)

Table 1. *Cont.*

Authors [Reference]	Country	Year	Mean Age (SD)	Sample Size	Gender	Objective(s)	Study Type	Relationship between SPS and Mental Health
8. Hjordt and Stenbæk [16]	Denmark	2019	People with SAD 23.9 (12.4)	N = 31 People with Seasonal Affective Disorder (SAD)	Men = 12 Women = 19	To investigate the association between trait SPS in remitted phase (summer) and depression severity in symptomatic phase (winter) in individuals with SAD	Longitudinal and seasonally counterbalanced study	Individuals with SAD and high levels of SPS reported higher scores in depressive symptoms in winter than in summer phase (p = 0.024)
9. Takahashi, Kawashima, Nitta and Kumano [17]	Japan	2019	21.1 (1.95)	N = 563 Students	Men = 283 Women = 280	To analyze the mediation role of mindfulness on the relationship between SPS and trait anxiety, well-being and psychosomatic symptoms	Cross-sectional study	Positive associations among SPS subscales and anxiety (r = 0.51–0.62)
10. Khrosravani, Ganji, Bastan, Samimi and Amirinezhad [18]	Iran	2019	34.62 (9.67)	N = 80 People with obsessive compulsive disorder (OCD)	Men = 35 Women = 45	1. To evaluate psychometric properties of the Persian version of the 25-item Highly Sensitive Person Scale with a three-factor structure: ease of excitation, low sensory threshold, and aesthetic sensitivity 2. To assess the relations of the HSPS factors to obsessive compulsive (OC) symptom dimensions in patients with OCD by controlling for depression, anxiety, and OCD severity	Cross-sectional study	Positive associations among SPS subcomponents and OCD (r = 0.30–0.40)
11. Panagiotidi, Overton and Stafford [19]	UK	2019	33.16 (13.5)	N = 274 General population	Men = 71 Women = 203	To examine the relationship between SPS and symptoms of attention deficit hyperactivity disorder (ADHD) in adults	Cross-sectional study	Positive association between SPS and both Inattention (r = 0.40) and Hyperactivity (r = 0.30)
12. Wu, Zhang, Li, Feng and Yan [20]	China	2021	20.0 (1.67)	N = 244 Students	Men = 63 Women = 181	1. To explore whether SPS or its sub-dimensions would moderate the impact of stress on depression 2. To examine whether the neural correlates of SPS or its sub-dimensions moderate the impact of stress on depression as well	Cross-sectional study	Positive association between SPS and perceived stress (r = 0.24)
13. Meyerson, Gelkopf, Eli and Uziel [21]	Israel	2019	46.05 (11.32)	N = 243 Dentists	Men = 136 Women = 107	To analyze the influence of SPS on burnout and professional quality of life among Israeli dentists	Cross-sectional study	Moderate correlations between burnout and SPS (r = 0.40)

3.2. Relationship between SPS and Mental Health

Table 1 indicates the relationship between sensory processing sensitivity and mental health implications in each of the studies included. A positive association between SPS and mental health problems is observed in every study [9–21]. Specifically, five articles point out adaptative disorders (anxiety and depression) as a result of high levels of SPS [9–12,16,17]. Four of these studies indicate that high levels of SPS is related to stress [13,14,20,21]. Two of them mention the influence of SPS in obsessive thoughts and compulsive behaviors [15,18].

4. Conclusions

Sensory processing sensitivity seems to be a personality trait that facilitates the appearance of mental health problems, such as anxiety, depression, sleep disturbances or stress. More and more current studies are demonstrating the mental health consequences of presenting high levels of SPS. However, research on this issue should continue, since more knowledge of this trait is needed in order to understand its functioning and its health implications in order to create assessment and intervention protocols to improve the quality of life of the highly sensitive population.

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