

# A review of the impact of sensory processing sensitivity on mental health in university students

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**How to cite:** Mac A, Kim M-K, Sevak RJ. A review of the impact of sensory processing sensitivity on mental health in university students. *Ment Health Clin* [Internet]. 2024;14(4):247-52. DOI: 10.9740/mhc.2024.08.247.

**Submitted for Publication:** June 30, 2023; **Accepted for Publication:** April 4, 2024

## Abstract

**Introduction:** The concept of sensory processing sensitivity (SPS) was first introduced by Aron and Aron (1996) as an innate trait characterized by heightened processing of sensory, emotional, and physical stimuli. Since the concept's introduction in 1996, high SPS has been shown to be associated with poor physical and mental health. It is possible that this is especially true in university students, who are frequently faced with numerous stressors, such as intense workloads and test anxiety.

**Methods:** This article is a systematic literature review conducted through EBSCOHost using the following databases: Academic Search Complete, APA PsycArticles, APA PsycInfo, Education Research Complete, ERIC, MEDLINE Complete, and SocINDEX. Search terms included terms regarding high sensory processing sensitivity, university or professional students, and mental health.

**Results:** A total of 6 studies were included. University students with high SPS experienced heightened reactions to sensory, emotional, and physical stimuli. The studies demonstrate correlations of high SPS with outcomes such as depressive tendencies and difficulty adjusting to college.

**Discussion:** These findings highlight that SPS is associated with poor mental health outcomes. The results underscore the importance of developing support methods for students with high SPS. Future studies should further explore SPS in university students to develop targeted support methods and programs.

**Keywords:** sensory processing sensitivity, students, coping, mental health

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**Disclosures:** The authors declare no relevant conflicts of interest or financial relationships to disclose.

## Introduction

The concept of sensory processing sensitivity (SPS) was first introduced by Aron and Aron<sup>1</sup> as an innate trait characterized by heightened processing of sensory, emotional, and physical stimuli. Rather than a trait that is developed over time, this innate trait is presented by the researchers as something that individuals are born with.<sup>1</sup> Individuals with more pronounced SPS may react more strongly to loud noises or become less comfortable in crowded spaces than those with less pronounced SPS.<sup>1</sup> Individuals with high SPS are considered highly sensitive persons (HSPs), and the researchers estimate that approximately 15% to 20% of the population falls under this category.<sup>1</sup>

The Highly Sensitive Person Scale (HSPS) is a self-reported questionnaire that is currently the only instrument developed to measure this trait. A higher score indicates a greater level of SPS. There are no official cutoffs for the HSPS. Of the articles included in this review, only 2 clearly define the cutoffs used to classify individuals as having “high” or “low” SPS. In the absence of this information for the other articles, it can be arbitrarily conceived that scores closer to the maximum score can be considered high and scores closer to the minimum can be considered low.<sup>1</sup> Literature surrounding the HSP demonstrates that high SPS is positively correlated with frequent symptoms of both poor physical health, such as racing heart or heartburn, and mental health, such as anxiety and depression.<sup>2,3</sup> This is especially true in environments with an abundance of stimuli that may easily overwhelm HSP, and its chronic exposure may lead to burnout.<sup>4,5</sup> University students, who are constantly exposed to stressors such as high workload and test anxiety, may similarly experience an impact on their mental health if they have high SPS. Although no study has been conducted to report the prevalence rate of mental illness in college students with high SPS, SPS has shown significant correlations with anxiety in multiple sclerosis patients ( $r = 0.57$ )<sup>6</sup> and in Malaysian adults ( $r = 0.381$ ).<sup>7</sup> Additionally, SPS scores are significantly correlated with depression in Japanese adolescents ( $r = 0.22$ ),<sup>8</sup> and in Malaysian adults ( $r = 0.295$ ).<sup>7</sup> Interestingly, it is also reported to show a significant correlation with medication sensitivity ( $r = 0.34-0.36$ ). This review aims to investigate the relationship between SPS and the mental health of university students. Currently, there are only a few published articles exploring this relationship. This is an emerging field in education. To our knowledge, no article has summarized the implications of SPS on mental health of college students. For these reasons, this article seeks to summarize the strengths, limitations, and future directions of research in this field. Identifying the variables affecting this relationship would assist institutions and educators in developing targeted support systems for students with high SPS.

## Methods

### Search Methodology

This review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.<sup>9</sup> To identify articles to be considered for inclusion in this systematic review, a search was conducted through EBS-COHost using the databases Academic Search Complete, APA PsycArticles, APA PsycInfo, Education Research Complete, ERIC, MEDLINE Complete, and SocINDEX. Results were limited to academic journals, and the language was limited to publications in English. No limitations were placed on the publication year. Search terms included highly sensitive person OR sensory processing sensitivity, connected by

the Boolean operator “AND” with a term for university, tertiary, or professional students, then connected by another Boolean operator “AND” with the terms mental health OR burnout OR stress OR fatigue OR exhaustion. Terms for university or tertiary students included “university student,” “college student,” and “tertiary learning.”

### Data Extraction

Articles were excluded if their study participants were not university-level students or did not address SPS, stress, burnout, anxiety, or depression in their outcomes. Once articles were selected, data were extracted into a form that included authors, publication year, details regarding the subject population (ie, country, university level, language spoken), methodology, instruments used, main outcomes, and conclusion.

## Results

The initial literature screen identified 203 articles. The titles and abstracts of those articles were then examined for duplication or nonrelevance. Relevance was defined as a study that was conducted in university students and explored the relationship between SPS and an outcome of mental health, such as anxiety, burnout, stress, or unipolar depression. After 65 exclusions due to nonrelevance, 6 articles were included that associated SPS with different aspects of mental health in university students. Of these, 5 studies were conducted with undergraduate students, and 1 study was conducted with master’s students. A summary of findings from these studies is presented in the Table.

Gearhart and Bodie<sup>10</sup> investigated the correlation among SPS, communication apprehension, and stress levels in university students ( $n = 304$ ) in the United States by using the Personal Report of Communication Apprehension (PRCA-24) scale and the College Stress Inventory (CSI) scale.<sup>8</sup> The PRCA-24 is a widely used self-assessment tool in the field of communication and uses 24 items to examine an individual’s perceived apprehension in various communicative contexts through 4 distinct subsections.<sup>11</sup> The CSI is a 21-item scale that asks respondents how frequently they have encountered various stressors in the past month. The CSI encompasses 3 dimensions: 7 items relate to academic stress, 8 items address social stress, and 6 items pertain to financial stress.<sup>12</sup> Results of a correlated fit model demonstrated students who self-identify with high SPS had higher scores of communication apprehension ( $+0.33$ ,  $P < .001$ ) and college-related stress ( $+0.29$ ,  $P < .001$ ).<sup>10</sup>

Yano and colleagues<sup>13</sup> examined the impact of SPS on the relationship of life skills such as emotional coping or decision-making skills with Japanese university students with

**TABLE: An overview of articles exploring sensory processing sensitivity (SPS) and mental health**

| Study                             | Study Design                       | Population   | Sample Size | Instruments  | Investigated Outcome  | Highlighted Results   |
|-----------------------------------|------------------------------------|--|-------------|--|---|---|
| Gearheart and Bodie <sup>10</sup> | Cross-sectional survey study       | Undergraduate students enrolled in a communications course at a US university  | 304         | HSPS (modified to 18 items)<br>Personal Report of Communication Apprehension (PRCA-24)<br>College Stress Inventory (CSI)                       | Influence of SPS on communication apprehension scores and self-reported stress levels                           | Students with high SPS reported more anxiety surrounding communication and greater levels of college-related stress than students without high SPS.   |
| Yano et al <sup>13</sup>          | Cross-sectional survey study       | Undergraduate students at a Japanese university                                | 868         | HSPS (Japanese, 19-item)<br>Center for Epidemiologic Studies Depression Scale (CES-D)<br>Big Five Inventory                                    | Influence of SPS on the relationship between life skills and depressive tendencies                              | In students with high SPS, greater emotional skill was correlated with lower depressive tendencies. Conversely, in students with low SPS, those with lower decision-making skills had greater depressive tendencies. It is possible that those with high SPS tend to think through their decisions more thoroughly and subsequently experience fewer negative emotions. |
| Yano et al <sup>14</sup>          | Cross-sectional survey study       | Undergraduate students at a Japanese university                                | 1065        | HSPS (Japanese, 19-item)<br>Kessler 10<br>Open-ended question to report coping strategies  | Relationship between SPS and mental health and coping strategies used by students with low, medium, or high SPS | Students with high SPS use strategies that focus more on the regulation of emotion, such as emotional expression and positive thinking, to better manage their stress.  |
| May and Pittman <sup>16</sup>     | Cross-sectional Survey Study       | First-year psychology undergraduate students in South Africa                   | 744         | HSPS<br>Student Adjustment to College Questionnaire<br>Parental Bonding Instrument<br>Big Five Inventory<br>Resistance to Peer Influence Scale | Influence of SPS on university adjustment   | Students with high SPS may have a more difficult time adjusting to university.  |
| Cater <sup>15</sup>               | Mixed method (survey & interviews) | Undergraduate students in Whitireia, New Zealand                               | 134         | HSPS<br>Open-ended interviews  | Utility of understanding HSP for students to help manage their learning   | Most students identified as HSP. Of the 25 who completed follow-up interviews, 100% deemed understanding HSP as useful.   |
| Amemiya et al <sup>20</sup>       | Pre/post interventional study      | Master's students enrolled in an elective yoga course at a Japanese university | 20          | HSPS<br>Profile of Mood States<br>Attention Control Scale  | Relationship between SPS, attention control, and mood regulation, and the impact of yoga on these outcomes      | Yoga appears to have helped with attention control and mood regulation in those with high SPS.  |

HSPS = Highly Sensitive Persons Scale.

depressive tendencies ( $n = 868$ ). The study used a Japanese version of the HSPS (HSPS-J19). The HSPS-J19 differs from the original HSPS only in translated language. The result of their hierarchical multiple regression analysis indicated that among students with high SPS, those with higher emotional coping skills showed less depressive tendencies ( $\beta = -0.38$ ; 95% CI,  $-0.46, -0.30$ ;  $P < .001$ ). This tendency was not seen in students with low SPS ( $\beta = -0.18$ ; 95% CI,  $-0.14, -0.05$ ;  $P = .34$ ). Decision-making skills were not linked with depressive tendencies in the high SPS group, whereas lower decision-making skills were associated with greater depressive tendencies in the low SPS group ( $\beta = -0.19$ ; 95% CI,  $-0.27, -0.10$ ;  $P < .001$ ).<sup>7</sup>

In a separate study, Yano and colleagues (2021) analyzed the efficacy of different coping strategies used by university students in Japan ( $n = 692$ ) in 3 sensitivity groups—low-SPS ( $n = 241$ ), medium-SPS ( $n = 266$ ), and high-SPS ( $n = 185$ )—based on cutoff scores of the HSPS-J19, with scores of 16 to 69 classified as low, 70 to 86 classified as medium, and 87 to 133 classified as high.<sup>14</sup> These cutoffs are different from the cutoffs of high and low SPS seen in other studies. The study included Japanese versions of the HSPS to measure SPS, the Kessler-10 questionnaire (a 10-item questionnaire assessing anxiety and depressive symptoms an individual has recently experienced) to assess psychologic distress, and an open-ended question (“When you face a stressful event, how do you usually deal with it?”) to explore the various coping strategies that respondents use. Students with low SPS were found to cope with stress by primarily employing strategies involving problem solving, avoidance, positive thinking, and sharing one’s concern with others. Positive thinking was more specific to those with more positive mental health scores (as measured by the Kessler-10) than poorer mental health scores in the medium-SPS group. Students with high SPS used all the previously mentioned strategies, as well as emotional expression and regulation. In the high-SPS group, there was more focus on strategies related to control of negative emotion. The HSP group demonstrating better mental health (as measured by the Kessler-10) adopted coping skills such as positive thinking, emotional expression, emotional regulation, and emotional support seeking to others. On the other hand, the HSP group with struggling mental health relied on coping skills that included distraction, temporary escape, cause analysis and information gathering, and endurance. All groups used the strategy of sharing one’s concerns with others.<sup>14</sup>

A study by Cater<sup>15</sup> sought to analyze whether a sample of undergraduate students from Whitiereia, New Zealand ( $n = 134$ ), found awareness of SPS useful in managing their learning. A written questionnaire was used to evaluate SPS, and those who were identified as having HSP were interviewed. Sixty percent of students who completed the questionnaire were classified as having high SPS, using a cutoff score of 12 or higher on the HSPS. Of the 25 students who

completed both interviews, all felt that information on the SPS was useful and that it should be made available to all students.<sup>15</sup>

One study explored the association between the SPS and university adjustment in South African students, while also taking parental environment into account.<sup>16</sup> How well a student adjusts to university can influence a student’s academic performance and mental wellness.<sup>17</sup> The modified 55-item Student Adjustment to College Questionnaire comprises 9-point Likert scale items to provide insight on student adjustment in academic, personal, social, and institutional adjustment categories.<sup>18,19</sup> The authors also investigated whether early parental environment could be a possible confounding variable affecting studying outcomes in those with high SPS. In their sample of first-year psychology-class students ( $n = 744$ ), hierarchical linear modeling found that SPS was overall a significant predictor for explaining adjustment in these students ( $\beta = 0.08$ ,  $P = .02$ ). The students with high SPS had more difficulty in university adjustment. Additionally, levels of adjustment for those with high SPS were similar regardless of their early parental environment.

Lastly, a study by Amemiya et al<sup>20</sup> evaluated the impact of yoga on mental health and attention regulation in students with high SPS. Students enrolled in a master’s program at a university in Japan ( $n = 20$ ) participated in an elective yoga course as part of their master-level education course and completed an anonymous questionnaire consisting of Japanese versions of the HSPS (HSPS-J19), Attention Control subscale (AC) of the Effortful Control Scale for Adults, and Profile of Mood States (POMS2). The AC subscale was used to assess attention control and the POMS2 scale was used to assess stress and mood before and after the yoga classes. The POMS2 is a questionnaire comprising 22 five-point Likert scale items that assess 6 dimensions of mood states over a period of time.<sup>21</sup> The results demonstrated that AC and POMS2 scores improved after the yoga class ( $d = 2.55$ ,  $P < .01$ ). Amemiya et al<sup>20</sup> concluded that these results indicate that students with high SPS could benefit from calming methods, such as yoga, that help to regulate mood.

## Discussion

The aforementioned studies shed light on the impact of high SPS on university students’ mental health, the importance of SPS awareness, and possible management methods for those with high SPS. Results of this review demonstrate that students with high SPS are more likely to have greater university-related stress and anxiety surrounding communication compared with those with low SPS.<sup>10</sup> However, although those with high SPS may have a lower threshold for negative emotions, they may also have greater emotional coping skills.<sup>14</sup>



SPS is a relatively emerging topic of research in the educational field. Currently, the 27-item HSPS is the only validated scale assessing the level of SPS. There is no established brief screening tool or questionnaire available for large-scale college campus screening of SPS. Given the limited literature evidence to support screening all students, future systematic studies should evaluate the extent to which screening instruments help identify students with varying SPS levels.

This literature presented in this review does support increasing awareness of SPS, because Cater<sup>15</sup> has suggested that increased awareness of SPS, particularly in the student population, may enable students to better understand their own thresholds for processing negative stimuli.<sup>9</sup> The literature also supports the development and adoption of techniques for supporting students with high SPS who have difficulties adjusting to university settings or managing their mental health.

The evidence presented in this review is limited. Because the concept of SPS is relatively new, little research has been conducted on the topic in university students, and thus limited literature is available. Additionally, the studies discussed were conducted in universities across various countries. Differences in cultural and education practices across these geographic regions make it difficult to extrapolate their results to other countries. Additionally, these studies were limited to small samples of undergraduate students and may not accurately represent the general university student population. As a result, the review presented is limited. To better understand the impact of SPS in postgraduate or professional students, further studies in those populations are warranted.

This review does not present any data analysis or quantitative synthesis of the published findings. Because the study design, measures used, and outcomes of each study differ markedly, it is difficult to directly compare their results. Although the results cannot be compared, it is valuable to see the relationship of HSPS with a variety of different outcomes reflecting the mental health of university students.

## Conclusion

Several lines of evidence indicate that SPS is associated with poor mental health outcomes. Future studies should further explore SPS in university students to develop targeted support methods and programs.

## Acknowledgment

We thank the Thomas J. Long School of Pharmacy administration for their kind support for this project.

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