

Doctoral Dissertation in 2021

(Digest)

Submitted to the Graduate School of Community and Human Services
for the Degree of Doctor of Philosophy in Sport and Wellness

**Role of Sensory Processing Sensitivity in Improving Mental Health:
A Fundamental Study for Preventive Interventions in University Settings**

(メンタルヘルス向上における感覚処理感受性の役割
—大学での予防的介入に向けた基礎的検討—)

Rikkyo University

Graduate School of Community and Human Services

19WD002L

Kosuke Yano

Dr. Kazuo Oishi—Supervisor

Professor, Graduate School of Community and Human Services

Dr. Mikinobu Yasumatsu—Subadvisor

Professor, Graduate School of Community and Human Services

Dr. Takayuki Ishiwata—Subadvisor

Professor, Graduate School of Community and Human Services

Table of Contents

Chapter 1. Introduction	1
1.1. Mental Health Problems in University Students	2
1.2. Preventive Interventions in University Settings	2
1.3. Role of Environmental Sensitivity (ES) in Psychological Interventions	3
1.4. Sensory Processing Sensitivity (SPS): A Marker of Environmental Sensitivity	5
1.5. Purpose of the Present Dissertation	7
1.6. Issues in Previous Studies and Outline of the Current Dissertation	7
References	9
Chapter 2. Discrimination of SPS from the Big Five Personality Traits (Study 1)	18
2.1. Background and Purpose	19
2.2. Methods	21
2.3. Results	23
2.4. Discussion	26
2.5. Conclusion	29
References	29
Chapter 3. Replication of the Three Sensitivity Groups and the Cut-Off Scores (Study 2)	33
3.1. Background and Purpose	34
3.2. Methods	35
3.3. Results	38
3.4. Discussion	44
3.5. Conclusion	46

References	47
Chapter 4. <i>Effective Coping Strategies Employed by Each Sensitivity Group</i>	
(Study 3)	50
4.1. Background and Purpose	51
4.2. Methods	52
4.3. Results	55
4.4. Discussion	62
4.5. Conclusion	68
References	68
Chapter 5. <i>Development of the Japanese Version of the Highly Sensitive Person Scale 10-Item Version (HSP-J10) (Study 4)</i>	
5.1. Background and Purpose	74
5.2. Development of Brief Version of the Highly Sensitive Person Scale (Study 4.1)	76
5.3. Psychometric Properties of HSP-J10 (Study 4.2)	79
5.4. Replication of Low-, Medium-, and High-SPS groups (Study 4.3)	87
5.5. Conclusion	94
References	95
Chapter 6. <i>Longitudinal Associations of Cognitive Emotion Regulation and Social Support with Mental Health in Three Sensitivity Groups (Study 5)</i>	
6.1. Background and Purpose	102
6.2. Methods	104
6.3. Results	108
6.4. Discussion	120
6.5. Conclusion	125

References	125
Chapter 7. General Discussion	130
7.1. Summary of Findings	131
7.2. Implications for Preventive Interventions	134
7.3. Limitations and Future Directions	138
7.4. Conclusion	139
References	139
<i>Supplementary Materials</i>	<i>144</i>
<i>Acknowledgement</i>	<i>154</i>

Dissertation Digest

Chapter 1. Introduction

University students tend to have more mental health problems than the general population in Japan and other countries (e.g., Auerbach et al., 2016; Nippon Foundation Suicide Prevention Project, 2019). Studies have conducted universally designed intervention programs in university settings (e.g., Oikawa & Sakamoto, 2007); however, the small effect sizes have been reported (Werner-Seidler et al., 2017). To enhance the efficacy of intervention programs, researchers should consider the existence of potential moderators that would affect the outcomes of a universally-designed preventative approach (Bakermans-Kranenburg & Van IJzendoorn, 2015). Recently, a growing number of studies have focused on Sensory Processing Sensitivity (SPS) as a moderator of psychological interventions (e.g., Kibe et al., 2020; Pluess & Boniwell, 2015). SPS is a temperament trait, characterized by deeper processing of information, stronger emotional reactivity, greater awareness to subtle stimuli, and being easily overstimulated (Aron et al., 2012; Homberg et al., 2016). Studies have identified the existence of three sensitivity groups, i.e., high-, medium-, and low-SPS groups and set the preliminary cut-off scores between each group (e.g., Lionetti et al., 2018; May et al., 2020; Pluess et al., 2020). Given that an intervention conducted in school settings (including universities) often targets many students at the same time, the efficacy of intervention programs could be enhanced by classifying participants into three sensitivity groups based on the cut-off scores and implementing intervention programs considering the characteristics of each group (Kase et al., 2017; Yano et al., 2021).

This dissertation aimed to investigate the factors related to mental health in Japanese university students considering individual differences in SPS. The results are expected to have implications for constructing intervention programs. However, to achieve the objective, two issues in previous studies should be addressed. First, there are limited findings among Japanese samples; specifically, it is unclear whether the findings in Western research (i.e., the discrimination of SPS from the other psychological concepts, the existence of three sensitivity groups) could be replicated in Japanese university

students. Second, the Japanese version of Highly Sensitive Person Scale (referred to as HSPS-J19), which can assess one's SPS level, has been reported to have lower reliability (e.g., Takahashi, 2016). It could be improved by removing the items with low factor loadings (Pluess et al., 2020). Therefore, this dissertation is comprised of five studies (and seven chapters). In Chapter 2, to emphasize the need to focus on SPS, the author confirmed the discrimination of SPS from the Big Five personality traits in Japanese university students (Study 1). After Chapter 3 confirmed the existence of three sensitivity groups in Japanese university students (Study 2), the mental health-related factors in each sensitivity group were explored using an open-ended questionnaire survey in Chapter 4 (Study 3). In Chapter 5, a brief version of HSPS-J19 was developed by reducing the number of items and its psychometric properties were examined (Study 4). Chapter 6 aimed to investigate the associations between mental health and the factors identified in Study 3 using longitudinal and quantitative data (Study 5). Finally, in Chapter 7, the author reviewed the findings and proposed an intervention plan considering individual differences in SPS for improving mental health among university students.

Chapter 2. Discrimination of SPS from the Big Five Personality Traits (Study 1)

The first study of this dissertation aimed to investigate the relationships between SPS and the Big Five personality traits in Japanese university students. The 868 Japanese university students participated in a cross-sectional questionnaire survey and responded to the HSPS-J19 (Takahashi, 2016) and the Japanese Big Five Scale short form (Namikawa et al., 2012). The author conducted correlation analyses and a canonical correlation analysis. The results have revealed the weak to moderate correlations between the variables. Therefore, the concept of SPS could be discriminated from the Big Five personality traits in Japanese university students.

Chapter 3. Replication of the Three Sensitivity Groups and the Cut-Off Scores (Study 2)

The aim of Study 2 was to investigate whether the results found in Western studies could be replicated, i.e., the existence of the three sensitivity groups, the proportion of and the cut-off scores between each group in the samples of Japanese university students. A total of 1,977 participants responded to the HSPS-J19. A series of latent class analyses

identified the existence of three sensitivity groups found in Western studies, i.e., low-, medium-, and high-SPS groups. Additionally, the cut-off scores used in the HSPS-J19 to distinguish each group were similar to those in Lionetti et al.'s (2018) study. The proportion of individuals in the medium-SPS group in the current sample was somewhat greater than that in the study by Lionetti et al. (2018); conversely, the proportion of individuals in the low- and high-SPS groups in Japanese samples were smaller.

Chapter 4. Effective Coping Strategies Employed by Each Sensitivity Group

(Study 3)

Study 3 explored the characteristics and effectiveness of dispositional coping strategies employed by low-, medium-, and high-SPS university students. The 692 participants responded to the HSPS-J19, the Japanese version of Kessler 10 (K10; Furukawa et al., 2008), and an open-ended question about the coping strategies that they usually employ. Based on the cut-off scores of HSPS-J19, the participants were classified into low-, medium-, or high-SPS groups. Additionally, based on the cut-off scores of K10, two subgroups were created within the three sensitivity groups (i.e., better mental health, poorer mental health). The author conducted co-occurrence network analyses, using the two subgroups as a grouping variable, by each sensitivity group. The results suggested that some strategies were common to all the sensitivity groups, but others were specific to a certain group and/or subgroup. For high-SPS university students, it may be effective to control negative emotions and to think the situation positively. The other two groups commonly reported addressing a situation by asking support and/or advice from their friends. However, there were differences in the ways different groups attempted to control their negative emotions; specifically, taking a moment or emotional support from friends were shown to be potentially effective for low-SPS groups, whereas positive thinking was shown to be potentially effective for medium-SPS groups.

Chapter 5. Development of the Japanese Version of the Highly Sensitive Person Scale 10-Item Version (HSP-J10) (Study 4)

This chapter aimed (a) to develop the brief scale to assess SPS level, based on the existing scale (i.e., HSPS-J19) (Study 4.1), (b) to examine the new scale's psychometric properties (Study 4.2), and (c) to confirm whether the findings of Study 2 could be

replicated using the new scale (Study 4.3). In Study 4.1, the 1,626 Japanese adults responded to the HSPS-J19. The author performed an exploratory factor analysis and the 10-item brief version of the scale (HSP-J10) was constructed. In Study 4.2, the author conducted a two-wave longitudinal survey, the interval of which was about two months (Time 1: $n = 416$; Time 2: $n = 261$). The participants responded to the HSP-J10, the Japanese version of the Ten Item Personality Inventory (Oshio et al., 2012), the 20-item Japanese version of the Behavioral Inhibition System/Behavioral Activation System scales (Takahashi et al., 2007), a 20-item trait anxiety subscale from the Japanese version of the State-Trait Anxiety Inventory (Shimizu & Imae, 1981), the Japanese version of Center for Epidemiologic Studies Depression Scale (Shima et al., 1985), the 16-item Japanese version of the Positive and Negative Affect Schedule (Sato & Yasuda, 2001) at Time 1, and only the HSP-J10 at Time 2. Correlation analyses revealed that the HSP-J10 has high reliability (i.e., Cronbach's alpha, temporal stability) and validity (i.e., bi-factor structure, discrimination from the related concepts). Study 4.3 involved a total of 1,124 Japanese university students, who responded to the HSP-J10. A series of latent class analyses identified the three sensitivity groups similar to those found in Study 2 (i.e., low-, medium-, and high-SPS groups) and the cut-off scores for these groups were found to function well.

Chapter 6. Longitudinal Associations of Cognitive Emotion Regulation and Social Support with Mental Health in Three Sensitivity Groups (Study 5)

Given the results of Study 3, this study aimed to investigate the associations of the concepts of *Cognitive Emotion Regulation* and *Social Support* with mental health in Japanese university students. At the beginning, a total of 1,124 Japanese university students provided their consent to participated in a three-wave longitudinal questionnaire survey; however, data were collected from 585 students at Time 2, and 349 students at Time 3. They responded to the HSP-J10 at Time 1 as well as K10, the Japanese version of Cognitive Emotion Regulation Questionnaire-short (Sakakibara, 2017), and the Social Support scale (Nakamura & Ura, 1999). The participants were classified into the three sensitivity groups based on the cut-off scores of HSP-J10. The relationships between the variables were investigated using a latent change model by each group. Results suggested

that *Positive Reappraisal*, *Positive Refocusing*, *Catastrophizing*, *Emotional Support*, and *Instrumental Support* were significantly associated with mental health for all of the groups. The *Self-Blame* strategy for the low- and medium-SPS groups and *Refocusing on Planning* for the low- and high-SPS groups were associated with mental health. Additionally, frequent use of *Acceptance* for the low-SPS individuals and *Putting into Perspective* for high-SPS individuals might be also effective.

Chapter 7. General Discussion

In this chapter, the author reviewed the aforementioned findings and the existing literature and proposed which sessions should be incorporated into preventive programs for low-, medium-, and high-SPS groups. As shown in Figure 7.1, some sessions can be implemented for all participants at the same time; others should be implemented separately by group. Future studies should explore the characteristics of each sensitivity group and examine the psychometric properties of the HSP-J10.

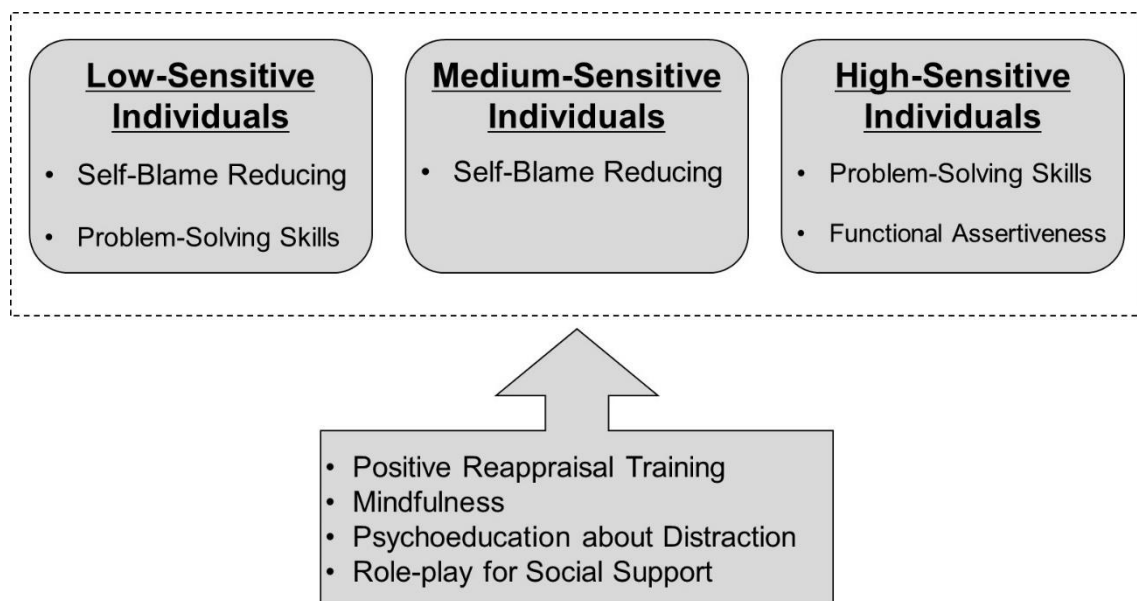


Figure 7.1. A Blueprint for Preventive Intervention