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Research Article

การแปลฉบับภาษาไทยและการวิเคราะห์องค์ประกอบเชิงยืนยันของมาตรบุคคลผู้มีความ
ละเอียดอ่อนสูง

The Translation and A Confirmatory Factor Analysis of Thai Version of Highly
Sensitive Person Scale

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บทคัดย่อ

การศึกษาในครั้งนี้มีจุดประสงค์เพื่อแปลและประเมินทางจิตมิติด้วยการวิเคราะห์องค์ประกอบเชิงยืนยันของมาตรบุคคลผู้มีความละเอียดอ่อนสูง ฉบับภาษาไทยในประชากรไทยวัยผู้ใหญ่ที่พัฒนามาจากมาตรต้นฉบับภาษาอังกฤษของ Aron และ Aron (1997) โดยมุ่งการประเมินความละเอียดอ่อนในการประมวลผลสิ่งเร้าทางประสาทสัมผัสซึ่งเป็นคุณลักษณะของบุคคลผู้มีความละเอียดอ่อนสูง กลุ่มตัวอย่างในการวิจัยคือประชากรไทยวัยผู้ใหญ่จำนวน 411 คน อายุระหว่าง 18 – 65 ปี ซึ่งผู้วิจัยตรวจสอบความตรงเชิงเนื้อหาและความแม่นยำในการแปลด้วยการแปลต้นฉบับจากภาษาอังกฤษเป็นภาษาไทยและแปลย้อนกลับอย่างเป็นระบบ มาตราภาษาไทยที่พัฒนาขึ้นประกอบด้วยข้อกระทงจำนวน 26 ข้อ มีความเที่ยงในระดับสูง ($\alpha = .88$) การวิเคราะห์องค์ประกอบเชิงยืนยันแสดงให้เห็นว่าโมเดลสมการโครงสร้างมีความสอดคล้องกลมกลืนกับข้อมูลเชิงประจักษ์อย่างมีนัยสำคัญทางสถิติ ($\chi^2 = 233.26$, $df = 201$, $p = .059$, CFI = 0.997, GFI = 0.958, AGFI=0.926, RMSEA = .020) ผลการวิจัยสนับสนุนแนวคิดองค์ประกอบสามตัวแปร ได้แก่ เกณฑ์การรับสัมผัสต่ำ การถูกกระตุ้นได้ง่าย และความละเอียดอ่อนต่อสุนทรียภาพ ข้อกระทงที่ถูกคัดออกเนื่องจากค่าน้ำหนักองค์ประกอบของตัวแปรไม่อยู่ในเกณฑ์ที่รับได้ถูกนำมาอภิปรายถึงความเหมาะสมกับวัฒนธรรมและกลุ่มประชากรไทยวัยผู้ใหญ่ซึ่งนำไปสู่ข้อเสนอแนะในการเลือกใช้มาตรที่ได้รับการพัฒนาให้เหมาะกับวัฒนธรรมและแนวทางการศึกษาในอนาคต

คำสำคัญ: การวิเคราะห์องค์ประกอบเชิงยืนยัน; บุคคลที่มีความละเอียดอ่อนสูง; บุคลิกภาพ; ความละเอียดอ่อนในการประมวลผลการรับรู้; ผู้ใหญ่ไทย

Abstract

This study focuses on the translation and psychometric evaluation of Highly Sensitive Person Scale (HSPC) developed by Aron and Aron (1997) using confirmatory factor analysis (CFA) within the Thai adult population. Aimed at assessing Sensory Processing Sensitivity (SPS) – a characteristic found in highly sensitive individuals – the study utilized a diverse sample of 411 adults, ranging in age from 18 to 65. This approach was intended to comprehensively evaluate the scale's relevance and reliability in the Thai cultural context. The translation process involved a systematic forward and back-translation method to ensure content validity and translation fidelity. The Thai version of the HSPC, consisting of 26 items, demonstrated high reliability ($\alpha = .88$). Confirmatory factor analysis demonstrated a good fit between the measurement and the structural model ($\chi^2 = 233.26$, $df = 201$, $p = .059$, CFI = 0.997, GFI = 0.958, AGFI=0.926, RMSEA = .020). The model validated three-factor solution of Low Sensory Thresholds (LST), Ease of Excitation (EE), and Aesthetic Sensitivity (AS). This study additionally examined the cultural relevance of items in Thai version of HSPC leading to the identification and subsequent exclusion of one item due to its unacceptable factor loading, suggesting cultural unsuitability. This refinement underscores the importance culturally modified HSPC as a sensitive tool of assessing sensory processing sensitivity in Thai adults.

Keywords: Confirmatory factor analysis; Highly Sensitive Person; Personality; Sensory Processing Sensitivity; Thai adults

Introduction

Highly Sensitive Person (HSP) is the term used to describe individuals with innate traits called sensory processing sensitivity (SPS), a biological-based personality trait found in approximately 20-30 percent of the population [1]. This innate trait is supported by scientific research as an evolved mechanism that bestowed survival benefits [2-3]. Although the domains and levels of sensitivities are unique from one HSP to another, the four common characteristics of individuals with high sensitivity across all HSPs can be summarized using the acronym DOES. D, or Depth of Processing, indicates the propensity of HSPs to process information deeply and reflect extensively on their experiences. O, representing Overstimulation, highlights how HSPs can easily become overwhelmed by excessive sensory input or complex environments. E stands for Emotional Reactivity and Empathy, emphasizing the strong emotional responses HSPs have to both positive and negative stimuli, along with their heightened capacity for empathy. S, or Sensitivity to Subtleties, signifies the acute awareness HSPs possess towards minor changes in their surroundings, such as subtle shifts in mood, tone, or aesthetics [1]. These characteristics collectively offer a comprehensive understanding of the heightened sensitivity and distinctive psychological and behavioral patterns found in HSPs.

Appearing in different names, early literature related to high sensitivities implied a negative sense of being an HSP. Studies of newborns and infants with lower sensitivity thresholds suggested that it is a 'difficult temperamental trait'. In adulthood, the term 'neuroticism' refers to individuals with tendencies to overthink, or being very particular with their thoughts, which is a trait that is highly correlated with psychological disorders such as anxiety and depression [4]. This is even more convincing when scores derived from HSP scale were found to be closely related to high levels of psychopathology-related traits such as anxiety, depression, and poor physical symptoms due to poor stress management, maladaptive thinking, and negative emotions towards sensory inputs [5].

Considering the anticipated nature of the incident, the insights from Decety and Batson [6] on the neurophysiological aspects of stress regulation provide pertinent support. The human autonomic nervous system, predominantly governed by the limbic system — a group of brain regions acting as a danger sensor, among other vital functions, — plays a crucial role. This system instinctively triggers the sympathetic nervous system in response to stressors, preparing the body for defensive actions like fight, flight, or freeze. Such activation leads to physiological changes including increased heart rate, rapid breathing, and elevated blood pressure, all part of an "energy consumption" process that can drain an individual post-incident. Prolonged exposure to stress keeps the sympathetic nervous system activated, resulting in negative consequences like weakened immunity, sleep disturbances, and a hypersensitive nervous system constantly on the lookout for threats resulting in detrimental mental health [7]. Highly sensitive individuals are particularly susceptible to these effects due to their lower threshold for sensory and emotional stimuli, such as nuanced vocal tones.

Many individuals with high sensory processing sensitivity (HSPs) may, in the absence of awareness regarding their inherent trait, mistakenly perceive themselves as differing negatively from the majority population. This misperception is often reinforced by societal responses, where HSPs are frequently labeled as overly sensitive, less socially adaptive, or as exhibiting excessive emotionality. Research by Aron and Aron [1] indicates that such individuals often internalize these negative societal views, leading to a diminished self-concept. However, employing adaptive strategies such as extended periods of downtime and setting boundaries for sensory exposure can significantly enhance their functioning and well-being. When adults gain insight into their HSP traits, they can better identify environments that align with their sensitivities and develop tailored strategies for managing stress. Such awareness promotes self-acceptance and adaptive functioning, which, in turn, contribute to improved overall well-being. At the societal level, recognizing the diversity in personality traits, including high sensitivity, can enhance performance across various domains, such as workplace strategies, job suitability, and mental health interventions. Furthermore, understanding HSP traits within family systems, particularly in parenting, can inform more effective parenting strategies, ultimately supporting healthier child development [8].

Despite being an inherent characteristic, the psychological outcomes of HSP traits vary significantly, influenced predominantly by environmental factors that shape their responses and tune their perceptions. Married couples with higher genetic sensitivity, as measured by polygenic scores indicative of Sensory

Processing Sensitivity (SPS), demonstrated significantly greater benefits from the relationship education program compared to their counterparts. These effects were observed over several years of follow-up, highlighting the long-term positive impact of the environmental factors such as intervention on individuals with heightened genetic sensitivity [9].

To facilitate the precise identification of individuals exhibiting Sensory Processing Sensitivity (SPS), a personality trait distinguished by enhanced cognitive processing of sensory input, increased emotional responsiveness, and heightened sensitivity to environmental stimuli, the development and application of a scientifically reliable instrument is imperative. This scale is essential for accurately assessing the complex manifestations of SPS, ensuring that it adheres to scientific standards of reliability and validity. The Highly Sensitive Person Scale (HSPS) was first developed by Aron and Aron [1] using a qualitative interview approach with 39 adults (18 - 66 years old) who self-identified as highly sensitive. This sensitivity was characterized by a high degree of introversion or a propensity to be easily overwhelmed by stimulation. The interview by a clinical psychologist, Elaine N. Aron, culminated in the creation of a 206-item quantitative questionnaire, which was subsequently refined to a 27-item scale [1]. The original authors noted the unidimensional nature of the HSPS. This led to further research in numerous languages, aiming to create culturally relevant tools for measuring Sensory Processing Sensitivity (SPS) and to validate the psychometric properties of the HSPS. This has included translations into languages such as Mexican [10], Polish [11], German [12], Turkish [13], and Japanese [14].

A point of contention in the development and validation of the HSPS's psychometric properties is the debate over the number of factors that underlie the sensory processing sensitivity (SPS) construct. While some studies have corroborated Smolewska and colleagues' [15] three-factor model, exemplified by Grimen and Diseth [16], others have proposed alternative factor solutions. For instance, Montoya-Pérez et al. [10] and Malinakova et al. [17] have suggested two-factor models, whereas Şengül-İnal and Sümer [13] put forward a four-factor solution.

In Turkish, researchers used confirmatory factor analysis (CFA) and exploratory structural equation modeling (ESEM), revealing a four-factor solution: sensitivity to external stimuli, aesthetic sensitivity, harm avoidance, and sensitivity to overstimulation [13]. Conversely, in Mexican samples, exploratory factor analysis (EFA) and CFA were applied to two separate groups of adults and yielded a two-factor solution: processed sensitivity (PS) and low sensory threshold (LST), retaining 17 items and excluding [10]. The Polish HSPC were tested with an emerging adult sample by means of EFA and evaluated the psychometric properties using the information value criterion of the item response theory (IRT) model. The results suggested a short form of the HSPS composed of three factors: low sensory threshold (LST), ease of excitation (EOE), and aesthetic sensitivity (AES) [11]. Similarly, in Japan, researchers identified a three-factor model of HSPS but removed eight items due to low factor loadings. Research indicates that the questionnaire items require revision for cultural adaptation. Many studies have translated the original items into different languages and removed those that did not fit well with the model to create a short form. For instance, the German version excluded 13 items, the Japanese version excluded 8 items, and the Mexican

version removed 10 items. These studies show that the HSP scale still faces cultural issues, with some items needing removal based on statistical evidence such as high inter-item correlation and low factor loadings.

Over two decades following the development of the Highly Sensitive Person Scale (HSPS), Smith et al. [18] undertook a comprehensive research review, analyzing 29 scholarly articles that met the criteria for a psychometric synthesis review of the HSPS. This analysis predominantly favored the three-factor model introduced by Smolewska and colleagues [15] which delineated the dimensions as Ease of Excitation (EOE), Low Sensory Threshold (LST), and Aesthetic Sensitivity (AE). Despite this, the authors noted that a unidimensional interpretation of the HSPS remains the most coherent approach for understanding client personality traits in a clinical setting.

Studying Highly Sensitive Persons (HSPs) in Thailand is of significant importance due to several key factors. Research suggests that 20-30% of individuals across different cultures display traits associated with high sensitivity, indicating a potentially similar proportion within the Thai population. Given the substantial number of individuals who may identify as HSPs, understanding and addressing their unique characteristics is essential for increasing societal awareness and promoting positive outcomes. HSPs have the potential to excel in various domains, including the workplace, family dynamics, educational settings, and interpersonal relationships, when these environments are supportive and responsive to their heightened sensitivity. In conducive environments, HSPs are more likely to experience improved well-being and enhanced performance. Conversely, neglecting the specific needs of HSPs can lead to adverse outcomes, such as higher rates of depression, burnout, and diminished productivity in both academic and professional contexts, as well as within familial relationships. [2,4]. Advancing our understanding of Highly Sensitive Persons (HSPs) within the Thai cultural context is crucial for promoting their well-being and optimizing their societal contributions. A critical first step in this process involves the adaptation of appropriate psychometric tools to accurately assess the trait of high sensitivity among Thai individuals. The development of reliable and culturally sensitive instruments is essential for the accurate identification of HSPs, thereby ensuring that assessments are both valid and applicable within this specific cultural framework. This study therefore aimed to develop and measure the psychometric properties of a Thai version of the HSP scale among the Thai population with the aim of increasing awareness of the personality trait and to initiate the research line of HSP in Thailand.

The research has received an approval from the Research Ethics Review System for Research Involving Human Participants of Chulalongkorn University.

Objectives

The objective of this research is to translate and examine the psychometric property of Thai version of the Highly Sensitive Person (HSP) scale using confirmatory factor analysis (CFA). The translation involves a process of thorough translation and back translation, including cognitive interview of ten participants. The cognitive interview was conducted to verify, prior the data collection, whether the translated words were meaningful and comprehensible from the participants' perspectives. A crucial aspect of this project is the

reevaluation of the psychometric properties of the adapted Thai HSP scale, including an assessment of its reliability, validity, and applicability to the Thai population. The goal is to ensure that the scale is a robust, reliable, and effective tool for the identification and comprehensive understanding of high sensitivity in the Thai adult context.

Methods

The current study employs a quantitative, cross-sectional, and exploratory design to validate the items and construct.

Participants

Data were collected from 411 Thai adults, comprising 80 males, 278 females, and 97 refer not to disclose their genders. Their ages ranged from 18 to 65 years ($M = 28.26$, $SD = 7.22$). The inclusion criteria for the participants were as follows: 1) they must possess Thai nationality, and 2) they must be fluent in the Thai language. The sample size for the multivariate analysis was determined using the rule of thumb of 10 to 20 samples per one observed variable, as suggested by Wilson Van Voorhis and Morgan [19].

Instrument

The translation of the original HSP scale was authorized in writing by the authors. The original HSP scale [1] was translated into Thai and back-translated by four experts in psychological field, fluent in both Thai and English but their dominant language are Thai. Two experts were assigned for forward translation, and the other two for back translation. The two forward translations were synthesized by one of the researchers who worked with both forward translators. Afterwards, the synthesized questionnaire was sent to the other two experts for back translation which were combined by the third party afterwards. Each expert's anonymity was kept by assigned IDs to ensure there is no bias in the translation process. This method allows for an objective comparison between the original and translated texts. Three psychology professionals examined the final translation and the content validity, with each item achieving an Item-Objective Congruence (IOC) score of .67.

In the final translation, each item was framed as a statement instead of a question, appeared in the English scale, to reduce the redundancy of using questions words in every item, thus allowing the flow of thinking. For example, "Do you startle easily?" was converted to "I am startled easily." Participants responded to the translated 27-item HSP scale using a 7-point Likert scale (1 = not at all to 7 = extremely).

Cognitive interviews were conducted with ten adult participants, aged between 18 to 60, representing the study sample. The purpose was to ensure that the words translated by professionals were well understood by the participants. The interview required participants to paraphrase each item in the scale using their own words to determine if the meaning matched the researcher's intended message. All of the questions were well understood except those containing the word "overwhelmed" (ท่วมท้น), as it is not commonly used in everyday language. The participants suggested replacing it with "อึดอัด" (uncomfortable). Although the meaning of uncomfortable does not fully capture the whole range of emotions within the word overwhelmed, it was deemed acceptable as it was suggested by the most

participants and implies the state of being stressful and overpowered. This research was approved by Ethical Review Board of Chulalongkorn University before the data collection was initiated.

Data Collection

The data collection employed a snowball sampling method which the online survey link was posted and further forwarded among researcher's social media networks. The link to the online survey was distributed on social media platforms. The link was sent together with one-page infographic containing brief details of the research. Once clicked on the link, participants first read an information page about the project and then chose whether to participate. Those willing to join marked their informed consent at the bottom of this page. A screening page followed, asking two questions: whether they were eighteen years old or above, and whether they held Thai nationality. Participants failing to meet these criteria were directed to the end of the questionnaire. Of the 553 participants who consented to participate, 142 were excluded from the analysis due to not meeting the inclusion criteria or closing the page before completing the questionnaire. Participants who passed the screening criteria provided demographic information (gender, age, and highest educational attainment) and then responded to the Thai version of the 27-item HSP scale. Upon completion, participants received automatic feedback with their total score, a comparison with the scale's maximum score, and suggestions for websites offering additional HSP resources. No diagnosis or determination of an SPS trait was implied in this research.

Data Analysis

Quantitative data analysis was used to analyze demographic data and the scale's factor solution. Descriptive data analysis and exploratory factor analysis (EFA) were conducted using IBM SPSS software. Confirmatory factor analysis (CFA) was conducted using LISREL 8.72. The model's fit was assessed using several indices: the Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Incremental Fit Index (IFI), Root Mean Square Error of Approximation (RMSEA), and the Standardized Root-Mean-Square Residual (SRMR). Hu and Bentler [20] suggest that a model exhibits a good fit when the CFI is greater than .95, the GFI, AGFI, and IFI values are greater than .90, the RMSEA is less than .06 (or approximately .08 for an acceptable fit), and the SRMR is less than .08, indicating minimal unexplained covariance in the model.

Results

The research results provide useful data regarding the distribution of participant demographics and the psychometric properties of the Thai version of the Highly Sensitive Person (HSP) scale. Descriptive statistics showed that, of all 411 participants, there were 80 males (19.5%), 278 females (67.6%), and 97 (12.9%) who prefer not to disclose their genders. For educational attainment, most of the participants had obtained a bachelor's degree ($n = 200$, 48.7%), master's degree or higher ($n = 116$, 28.2%), undergraduate students ($n = 85$, 20.7%), and a few reported their highest educational attainment to be elementary or high school ($n = 3$, 0.7%).

Construct Validity

Confirmatory factor analysis

To assess the psychometric properties of the Thai version of the Highly Sensitive Person (HSP) scale, a confirmatory factor analysis (CFA) was conducted using data from 411 participants on the original 27-item scale. Following the analysis, one item (Item 5: "During busy days, you prefer to retreat to a private space, such as a dark room or bed, to calm your mind") was removed from further consideration due to an unacceptably high factor loading, which indicated poor fit within the model. Cronbach's alpha was used to measure the reliability of the 26-item Thai version of the HSP Scale, resulting in a reliability score of 0.88 (CITC_{All} = .282-.601), The reliability index for the model as a whole ($0.7 \leq \alpha \leq 0.9$) indicates high reliability of the elements analyzed. CFA supported the three subfactors of the HSP Scale: Low Sensory Threshold (LST) ($\alpha = 0.75$, CITC_{factor} = .287-.601), Ease of Excitation (EE) ($\alpha = 0.81$, CITC_{factor} = .317-.614), each demonstrating a high level of internal consistency ($0.7 \leq \alpha \leq 0.9$), and Aesthetic Sensitivity (AS) ($\alpha = 0.67$, CITC_{factor} = .279-.496), demonstrating a moderate level of internal consistency ($0.5 \leq \alpha < 0.7$). [21] The correlational matrix revealed moderate levels of correlations between each subfactor, as shown in Table 1.

Table 1 Correlations coefficients, Means, SDs, and Cronbach's alpha among factors.

Factor	LST	AS	EE	α
Low Sensory Thresholds (LST)	–			0.75
Aesthetic Sensitivity (AS)	0.45**	–		0.81
Ease of Excitation (EE)	0.64**	0.46**	–	0.67
<i>M</i>	4.70	5.08	4.98	
<i>SD</i>	1.09	0.92	0.88	

Note. * $p < 0.05$, ** $p < 0.01$, two-tailed

The Kaiser–Meyer–Olkin (KMO) measured sampling adequacy was .865 which is above the recommended .60 minimum [22], and Bartlett's test of sphericity was significant ($\chi^2(325) = 3,238.78$, $p < .001$), which indicated that the data was factorable. The CFA demonstrated that the developed model fitted with the empirical data ($\chi^2 = 233.26$, $df = 201$, $p = .059$, CFI = 0.997, GFI = 0.958, AGFI = 0.926 RMSEA = .020 SRMR = 0.040) in which each component was highly loaded on the overall HSP score (.98, .96, and .73). Factor loading of the three subfactors of the HSP Scale: Low Sensory Threshold (LST) between 0.30-0.67, Ease of Excitation (EE) between 0.38-0.64, and Aesthetic Sensitivity (AS) between 0.30-0.71. The three-factor model with a second order factor analysis is presented in Figure 1.

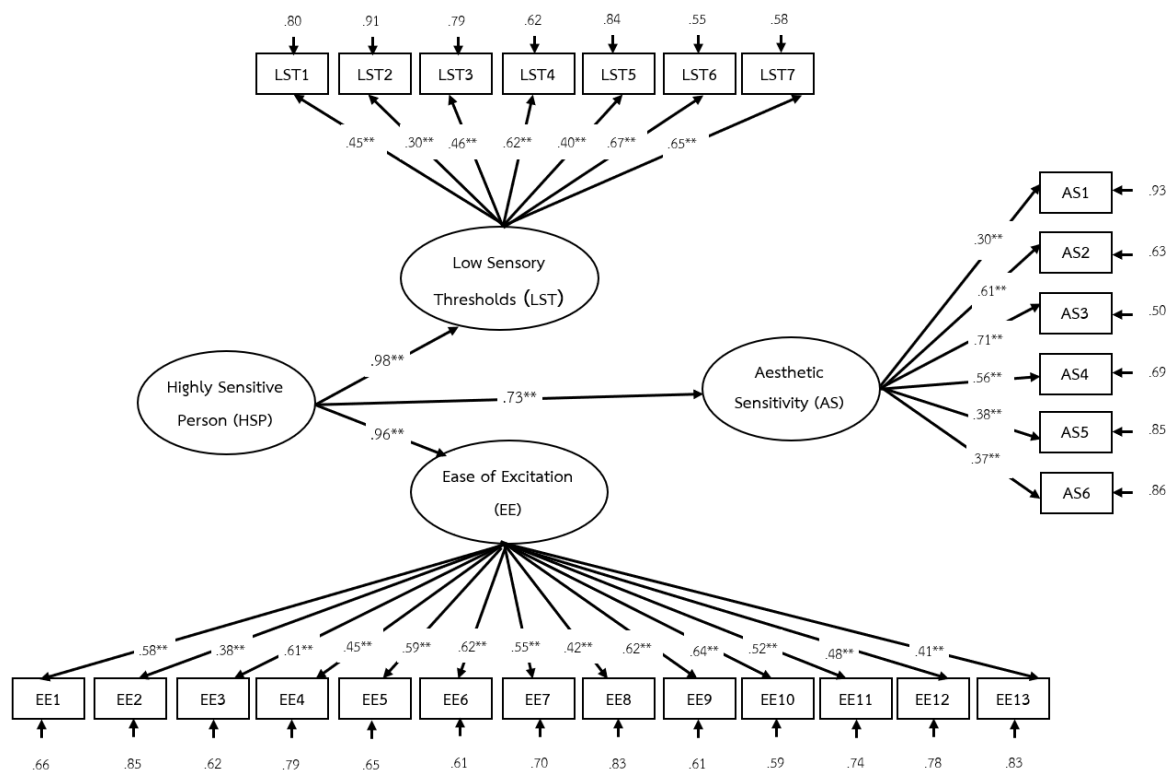


Figure 1 Confirmatory Factor Analysis (CFA) of the Three-Factor Structure of the Thai Version of the Highly Sensitive Person Scale (HSPS).

Exploratory Factor Analysis

To further explore the factorial structure and examine its alignment with previous research models [23], we conducted an exploratory factor analysis (EFA) after the removal of Item 5, leaving a final set of 26 items. Using principal-factor extraction with direct oblimin rotation, the analysis revealed a three-factor solution: Low Sensory Threshold (LST), Ease of Excitation (EE), and Aesthetic Sensitivity (AS). All remaining items loaded onto their respective factors with loadings above 0.30, and no significant cross-loadings were observed. Factor 1 (EE) comprised 12 items (EE1-EE12), Factor 2 (AS) included 6 items (AS1-AS6), and Factor 3 (LST) consisted of 7 items (LST1-LST7), as presented in Table 2. Additionally, the correlation matrix showed low to moderate inter-factor correlations, ranging from 0.189 to 0.566, further supporting the distinctiveness of the three-factor solution

Table 2 Factor loadings of three factors based on the final item list ($n=411$).

Item	Factor 1	Factor 2	Factor 3	Item	Factor 1	Factor 2	Factor 3
LST 1	.30	.19	.72	EE 1	.57	.48	.19
LST 2	.11	.33	.38	EE 2	.32	.24	.26
LST 3	.24	.32	.76	EE 3	.52	.28	.49
LST 4	.42	.28	.72	EE 4	.40	.28	.28
LST 5	.33	.21	.36	EE 5	.73	.05	.21
LST 6	.36	.27	.41	EE 6	.62	.12	.35
LST 7	.50	.07	.68	EE 7	.65	.33	.02
AS 1	.10	.66	.12	EE 8	.51	.14	.45
AS 2	.22	.60	.26	EE 9	.72	.08	.33
AS 3	.39	.56	.51	EE 10	.66	.05	.43
AS 4	.15	.59	.31	EE 11	.52	.34	.09
AS 5	.19	.60	.01	EE 12	.50	.06	.25
AS 6	.01	.60	.38	EE 13	.38	.09	.20

Comparison of Unifactorial and Three-Factor Solutions of the HSP Scale

The confirmatory factor analysis (CFA) of the unifactorial structure, following the exclusion of Item 5, showed that the model fit the empirical data well ($\chi^2 = 224.71$, $df = 201$, $p = .131$, $CFI = 1.00$, $GFI = 0.960$, $AGFI = 0.930$, $RMSEA = 0.017$, $SRMR = 0.039$), with factor loadings for individual items ranging from 0.27 to 0.68. A comparison of fit indices between the unifactorial structure and the three-factor solution indicated that both models provided a satisfactory fit to the data (see Table 3). However, despite the overall fit of the unifactorial model, Items 2, 8, and 11 had factor loadings below 0.30, indicating that these items contributed insufficiently to the model. This suggests that the unifactorial structure may not be as appropriate as the three-factor model, which demonstrated stronger and more consistent item loadings across all factors. The unifactorial model, represented by a first-order factor analysis, is shown in Figure 2.

Table 3 Summary Table of Goodness-of-Fit Indices.

Model	χ^2	df	p	CFI	GFI	AGFI	RMSEA	SRMR
The unifactorial structure	224.71	201	.131	1.00	.960	.930	.017	.039
Three distinct factors	233.26	201	.059	.997	.958	.926	.020	.040

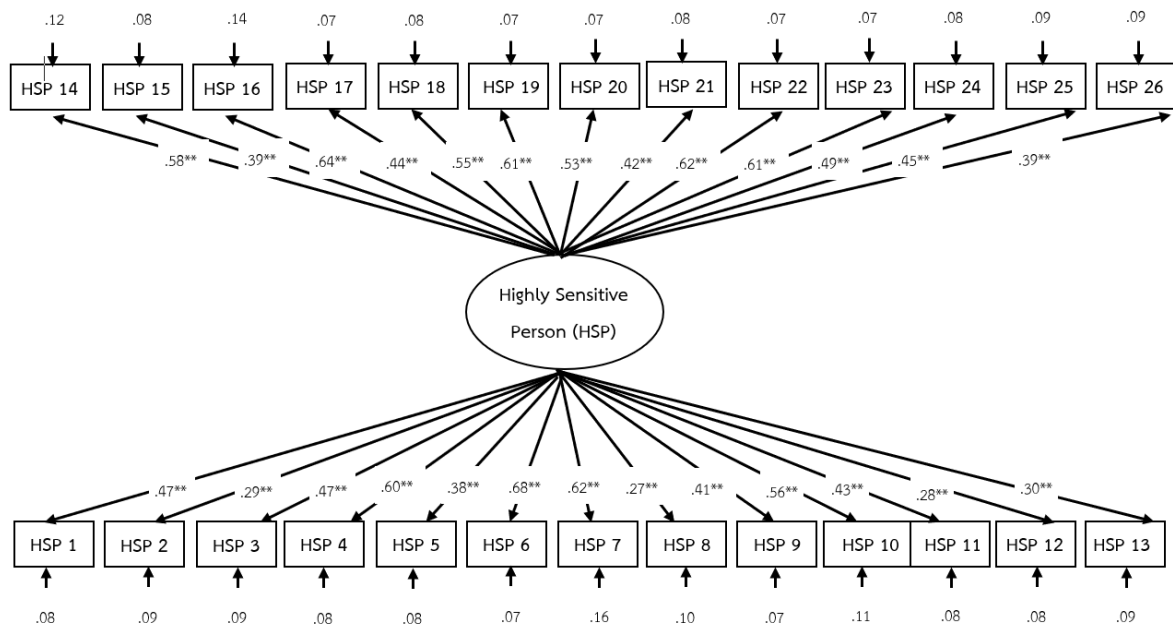


Figure 2: Confirmatory Factor Analysis (CFA) of the Unifactorial Structure of the Thai Version of the HSPS.

Subsequently, we examined the Completely Standardized Solution of the scale, focusing on the three-factor solution of the Highly Sensitive Person (HSP) Scale: Low Sensory Threshold (LST), Ease of Excitation (EE), and Aesthetic Sensitivity (AS), to analyze the construct reliability. The results indicated reliability coefficients of 0.70, 0.84, and 0.66, respectively ($\alpha > .30$, $\rho_c > .60$), as detailed in Table 4. These findings clearly demonstrate that the Thai version of the HSP Scale, as translated and validated in this study, possesses satisfactory psychometric properties in terms of both validity and reliability. Consequently, the scale is suitable for use in psychological research, aligning with its intended purpose.

Table 4 Construct reliability of the three subfactors of the HSP Scale.

The three subfactors of the HSP Scale	λ	R^2	ρ_c
Low Sensory Threshold (LST)	.30-.67	.09-.45	.70
Ease of Excitation (EE)	.38-.64	.52-.74	.84
Aesthetic Sensitivity (AS)	.30-.71	.52-.74	.66

Note: $n = 411$; $\lambda > .30$, $\rho_c > .60$

Conclusions and Discussion

Data analysis indicated that the internal reliability was notably high, demonstrating that, except for one item, it is capable of effectively measuring Sensory Processing Sensitivity (SPS) among Thai adults. The confirmatory factor analysis resulted in the exclusion of one item due to its unsatisfactory factor loading (Item 5: "In busy days, you want to get away to lay on the bed, a dark room or any place that provides privacy to alleviate your mind from chaos"). There are two proposed reasons concerning this item's lack of fit. Firstly, the item's structure, which presents multiple scenarios for coping with overstimulation, might lead to lower ratings by participants who disagree with any one of the scenarios, despite agreeing with others within the same item. Secondly, in light of Aron's [1] observation that approximately 30% of HSPs in US studies are socially extroverted, it is conceivable that Thai adults, shaped by a predominantly collectivist culture, might view behaviors such as 'getting away' or 'withdrawing' negatively, as these actions could be perceived as detrimental to their societal belongingness. To accurately gauge the applicability of this item within the scale, a culturally relevant sample situation specific to Thai adults is necessary for further examination.

The examination of the 26-item Thai version of the HSP Scale uncovered three distinct factors: Low Sensory Thresholds (LST), Ease of Excitation (EE), and Aesthetic Sensitivity (AS). This outcome diverges from the unifactorial structure proposed by the original authors, aligning instead with the findings of Pluess et al. [7] in their development of the HSP Child Report and Parent Report Scale. While there were moderate correlations observed among these factors, the three-factor model appears to offer greater utility in distinguishing the unique characteristics that constitute the overall Sensory Processing Sensitivity trait.

Given the absence of a Thai language scale specifically designed to measure Sensory Processing Sensitivity (SPS) levels in the Thai population, this research represents a pioneering effort in the quantitative assessment of the SPS trait. However, the study's data set displays a noticeable skew, predominantly consisting of female participants and individuals with higher educational backgrounds. This gender disparity aligns with similar trends observed in other studies [10,12] for example where a higher proportion of females are identified as HSPs. Despite these parallels, caution must be exercised in generalizing these findings. The underrepresentation of male participants might be attributed to cultural norms that discourage men from expressing vulnerability, thus impacting their willingness to participate in such assessments, as suggested by Aron [1].

Although this research adheres to the original scale's sample age range by including early adults, middle-aged adults, and early older adults from diverse educational backgrounds, including the inclusion of both students and non-students, such wide range of demographic introduces potential limitations. Future studies should explore potential differences among specific age groups, educational levels, and other demographic such as variables to gain deeper insights. Moreover, the differences between the male and female samples ratio might also affect the overall representativeness of the research population. Achieving a more balanced gender sample could improve the findings.

A compelling avenue for future research would be to investigate the correlations between this psychometrically validated scale and other standardized personality assessments, as well as its predictive value for psychological outcomes such as neuroticism, empathy, depressive disorders, or anxiety disorders within the Thai context. Several practical implications could be initiated using the scale. The availability of a Thai HSP scale has the potential to significantly raise awareness about high sensitivity within Thai society. Following the launch of the questionnaire, the survey received over 300 responses within one week, indicating a high level of interest and engagement among the Thai population. This can reduce stigma and foster greater acceptance and understanding of HSPs. Furthermore, the Thai version of the HSP scale could also enables mental health and public health professionals to accurately identify highly sensitive individuals, allowing for more tailored therapeutic interventions and improved mental health outcomes, and the ability to identify those at risk of developing depression.

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