

Development of the Shortened Version of the Sense of Harmony between Body and Mind Scale (S-SHS)

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ABSTRACT

The purpose of this study was to create a shortened version of the sense of harmony between body and mind scale (S-SHS), which quantifies the sense of integration of body and mind, and study its possible use for healthy individuals. First, in Study 1, Japanese participants (N = 368, 100 men, 267 women, one not specified) completed the S-SHS. We confirmed a five-factor structure, the same as the SHS, through higher-order factor analysis: self-existence of mind and body, relaxation of mind and body, balance of mind and body, sense of independence, and sense of physical stability. In Study 2, for Japanese students (N = 97), the two-week test-retest correlation revealed that the S-SHS had test-retest reliability according to the multiple imputation method. Thus, we confirmed that the S-SHS had sufficient validity and reliability and would make it easier to measure the sense of harmony between body and mind (SH) in healthy individuals than the SHS. Next, in a sample of Japanese students (N = 118), structural equation modeling confirmed that the SH is associated with lower stress responses and a higher sense of authenticity. Therefore, it was suggested that the SH is important in physical and mental health.

Keywords: shortened version of the scale development, the sense of harmony between body and mind, healthy individuals

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In psychology and cognitive science, studies of the self have not yet fully explored body and mind integration. Although mind-body dualism had been mainstream in psychoanalysis, Stern (1985) introduced the mind-body monism perspective, partially to developmental stage theories, and proposed the concept of self-sense, including the body. In philosophy, as concepts that constitute the self, Gallagher (2000) further emphasized the body's role. and also proposed the concept of self-consciousness, which he defined as consciousness of external and internal worlds related to self-awareness. Having taken a mind-body dualistic view of humans, he proposed two concepts in self-consciousness: the sense of self-agency (SoA), i.e., that one is causing actions and thinking, and the sense of self-ownership (SoO), i.e., the sense that contributes to one's sense of self and developmental bias for psychological identity (Thakkar, Nichols, McIntosh, & Park, 2011). These senses are important for us to feel our existence, but previous studies on the rubber hand illusion (RHI) have shown that patients with schizophrenia have difficulty feeling SoO appropriately because of self-disturbance (Kamikura, Okawa, Ide, & Wada, 2020; Peled, Ritsner, Hirschmann, Geva, & Modai, 2000). Botvinick and Cohen (1998) first reported the RHI, that is, subjects gradually perceive

the rubber hand as their own hand by integrating visual and tactile information.

Notably, Japanese body psychotherapy (Dohsa-hou) proposes that movements are body and mind as one, i.e., psychological and physical activities are harmonized. Founded by Gosaku Naruse, Ph.D. (1924–2019), Dohsa-hou has been widely applied to children, elderly people, and those with mental illness. In Japanese, Dohsa refers to a holistic process of movements that include physiological and psychological processing associated with the body's motor activity (Tsuru, 2002). Movements in Dohsa-hou, or Dohsa in Japanese, are witnessed as a psychological process of intention (effort activity). In therapy sessions, Dohsa-hou therapists require patients to perform specific body movement slowly. Body movements in Dohsa-hou have “arm raising,” “shoulder raising,” “shoulder opening,” “bending the upper body forward,” and “standing against gravity” tasks, etc. Dohsa-hou therapists are supportive and place the highest value on clients' self-dialogues. Clients' self-dialogues are interactions between their metacognitive and objective self. Therefore, we regard Dohsa-hou as psychotherapy that aims to harmonize body and mind from the conscious to the preconscious and the nonconscious level.

Although schizophrenia is viewed as a disorder of the sense of self, Dohsa-hou has been shown to ameliorate its symptoms (Kamikura, 2018; Kamikura & Shimizu, 2013; Kamikura & Shimizu, 2015; Kamikura & Shimizu, 2016; Kamikura, 2018; Tsuru, 1995). For instance, Kamikura (2018) examined the efficacy of Dohsa-hou for patients with schizophrenia in comparison to standard care. Dohsa-hou was applied in small groups in addition to standard psychotherapy care (five sessions over four weeks). Participants in the Dohsa-hou group significantly improved their ego disturbance on RHI compared to those receiving only standard care. Therefore, it was suggested that Dohsa-hou promoted their SoO and ameliorated ego disturbance by harmonizing the body and mind.

Thus, the concept of Dohsa-hou, meaning “body and mind as one,” is important for understanding humans. However, few studies have focused on the harmony between body and mind. In fact, most scales have been developed to assess SoA (Flury & Ickes, 2007; Polito, Barniera, & Woody, 2013) and sense of self to measure the conscious perception of one's mind, body, and the environment (Tapal, Oren, Dar, & Eitam, 2017). Although Asai, Kanayama, Imaizumi, Koyama, and Kaganoi (2016) developed the embodied sense of self scale (ESSS) based on Gallagher's concept, it deals with the minimal self; that is, it deals separately with the concepts of SoA, SoO, and the narrative self. It does not focus on the integration of body and mind. Recently, Kamikura (2018) proposed a concept about a sense of body and mind harmony by referring to the theory of sense of self (Stern, 1985), self-consciousness (Gallagher, 2000), and the theory of the mind-body unity

phenomenon (Naruse, 2014). Kamikura (2018) assumed that the concept exists mainly in the preconscious to the unconscious, and that it would connect the sense of self and sensation of self. Kamikura defined “body and mind harmony” as an undifferentiated sense that consists of expanded SoA and SoO, a sense of the subject and existence related to the body and mind, and a sense of self-efficacy and self-acceptance (Kamikura, 2018).

Based on that concept, Kamikura (2021) developed the sense of harmony between body and mind scale (SHS). SHS items were collected and created through interviews with adult patients with schizophrenia who had experienced Dohsa-hou, interviews with a clinical psychologist, and academic literature research. In this study, patients with schizophrenia were interviewed because it was assumed that they would have a low sense of self-existence and inadequate SoA and SoO due to their ego-disturbances. Next, a preliminary SHS version was administered to 368 participants. After analysis, five factors – self-existence of body and mind, relaxation of body and mind, balance of body and mind, sense of independence, and sense of physical stability – and 31 items were retained for the final version.

However, no scale measures the elderly and/or schizophrenia patients' status from the perspective of harmony of body and mind. For the elderly, many scales have been developed to measure cognitive, physical, and psychological function, but no scale has been developed to measure psychological states from the viewpoint of mind-body harmony. Because the original SHS contains 31 items, elderly people and patients with schizophrenia who tire easily or cannot concentrate for long could be overly burdened by answering many questions completely and appropriately. Then, SHS measurements might be inaccurate. Therefore, a shortened version of the SHS (S-SHS) is needed to measure more easily these two populations' level of mind and body harmony.

A sense of harmony between mind and body (SH) might function to ameliorate stress responses and enhance a sense of authenticity (Kamikura, Mashiko, & Shimizu, 2020). In recent years, the World Health Organization has advocated the importance of developing life skills, and stress management has been emphasized in maintaining mental health. In addition, it is assumed that under stressful situations, the sense of authenticity, i.e., one's true self and sense of being oneself, could be easily reduced (Shimizu & Kamikura, 2019). Additionally, Kernis and Goldman (2006) suggested that the sense of authenticity would be enhanced by the following four characteristics: being aware of one's emotions, processing one's emotions and cognitions without distortion, acting on one's intentions, and being one's true self in intimate relationships. We assumed that people with high SH would satisfy the three characteristics of sense of authenticity because they would be more open to the sensations of body and mind. Therefore, they could pay more attention to their emotions through their bodies (awareness), and accept themselves more as they are

(undistorted processing). Additionally, they could decide how to change the sensations they perceive in their bodies and minds (e.g., whether or not they wanted to relax a tense part) (acting).

The primary objectives to develop the S-SHS were to measure body and mind integration and confirm its factor structure. The secondary objective was to examine the retest reliability and investigate the criterion-related validity.

Study 1: Development of the S-SHS

Method

Participants. We used the same samples as Kamikura (2021), who developed the SHS described below. Participants included 368 Japanese individuals (100 men, 267 women, one not specified: mean age = 32.29 years, SD = 14.46 years). The breakdown of affiliation was 12%

for vocational school students, 35% for university students, 4% for graduate students, and 49% for working adults.

Materials. The items of the S-SHS (Table 1) were selected from the original version of the SHS (Kamikura, 2021), which has a five-factor structure: self-existence of mind and body (Factor 1), relaxation of mind and body (Factor 2), balance of mind and body (Factor 3), sense of independence (Factor 4), and sense of physical stability (Factor 5).

The internal consistency and test-retest reliability of the SHS were confirmed by calculating Cronbach's alpha coefficient and correlation coefficients. For each factor, three items with high factor loadings .35 were extracted in the SHS's 31 items, and analyzed with SPSS 24.0 to assess its underlying factors. For Factor 1, we included a fourth item: "I am in control of my own body," which expresses a physical sense of self-existence, because three items for self-existence of mind and body consisted only of a psychological sense of self-presence. Finally, we completed the S-SHS with 16 items that include self-existence of mind and body (Factor 1, e.g., "*I cannot feel my own existence"), relaxation of mind and body (Factor 2, e.g., "I feel carefree and cheerful"), balance of mind and body (Factor 3, e.g., "*I think too much before doing something"), sense of independence (Factor 4, e.g., "I can overcome problems"), and sense of physical stability (Factor 5, e.g., "My body and posture are firmly set"). The S-SHS contained 16 items, each rated on a 4-point scale from 1 (not applicable) to 4 (applicable).

Procedures. Participants completed the SHS using face-to-face or online interaction. Then, using the R software package, we performed higher-order factor analysis to examine the goodness of fit of the S-SHS factor structure. The higher-order factor analysis is a model that assumes the influence of factors of a higher order than those found in ordinary factor analysis. In the higher-order factor analysis, a higher-order factor that combines multiple factors is set up, and factor analysis is performed. Whether the assumption is reasonable can be judged by the goodness-of-fit index, such as *RMSEA* and *BIC*, and the lower the value of *RMSEA* and *BIC*, the more reasonable the assumption.

Ethical considerations. Procedures and policies to manage confidential information in the current surveys were approved by the ethics committee of the University of Tsukuba, Japan. We informed participants verbally about the study's content and procedures, as well as their voluntary cooperation, and the fact that there was no effect of participation on academic grades for vocational school students, university students, and graduate students. We also informed participants who completed the SHS through the internet about the study's content and procedures, and their willingness to participate. Consequently, those who agreed with these conditions completed the questionnaires.

Table 1. The items of the S-SHS

Factor 1: Self-existence of mind and body	
25	* I cannot feel my own existence
24	* I do not know who I am
2	I am keenly aware of my own existence
13	I am in control of my own body
Factor 2: Relaxation of mind and body	
63	I feel carefree and cheerful
39	I am calm
28	My body and mind are relaxed
Factor 3: Balance of mind and body	
60	* I think too much before doing something
41	* I let others influence me too much
29	* I feel anxious when things do not go right
Factor 4: Sense of independence	
58	I can work through difficult situations without giving up
44	I can overcome problems
31	My actions have a sense of purpose
Factor 5: Sense of physical stability	
33	My body and posture are firmly set
32	I am not wobbly when I move around
57	My movements are smooth

* Reversed items

Results. The higher-order factor analysis with the R software package showed that goodness of fit of the scale's factor structure ($RMSEA = .0434 (.026, .059)$, $BIC = -210.165$; Figures 1) was higher than that of the scale without higher-order factors ($RMSEA = .137 (.129, .147)$, $BIC = 196.531$). Moreover, ω coefficients for each factor were satisfactory as follows: $\omega = .83$ for self-existence of mind and body, $\omega = .77$ for relaxation of mind and body, $\omega = .81$ for balance of mind and body, $\omega = .68$ for sense of independence, and $\omega = .77$ for sense of physical stability. The ω coefficient, similar to the α coefficient, is an indicator of the similarity between multiple items, and is expressed between 0 and 1. 1 means that the items are similar to each other. Therefore, we confirmed that the S-SHS has the same five factors as the original SHS and a higher-order structure.

Discussion

The purpose of Study 1 was to develop the S-SHS and examine its validity. First, we specified five factors, as in the SHS (Kamikura, 2021), and compared the model's goodness of fit with and without the assumption of hierarchy. As a result, higher goodness of fit supported the former model and suggested that the S-SHS has a five-factor hierarchical model. The factor structure in the S-SHS is robust because we confirmed the same five factors as in the SHS (Kamikura, 2021). In addition, since the goodness of fit was high when higher-order factors were assumed, it is appropriate to conduct analyses assuming higher-order factors when using S-SHS.

Study 2: Confirmation the Validity of the S-SHS

Objectives

The objectives of Study 2 were to confirm the test-retest reliability and the criterion-related validity of the S-SHS.

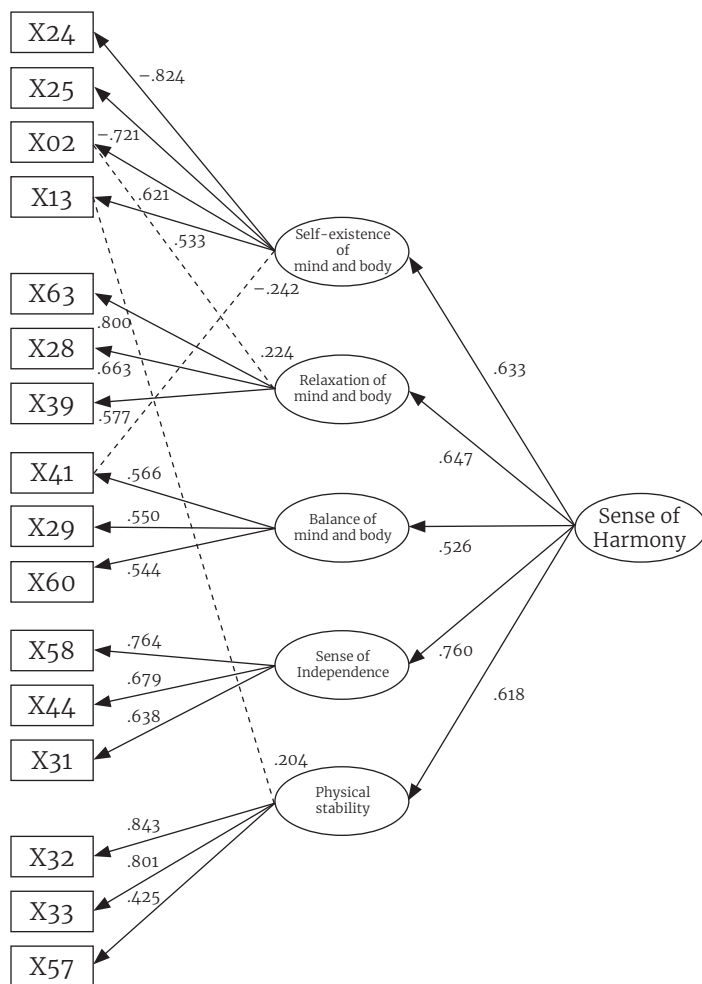


Figure 1. Results of the higher-order factor analysis for the S-SHS

Method

Participants. A total of 97 (26 men, 71 women, mean age = 20.73 years, $SD = 2.02$ years) Japanese university students and professional training college students were involved in the test-retest investigation. Another 118 (12 men, 106 women, mean age = 24.50 years, $SD = 5.50$ years) Japanese university students and professional training college students joined the examination for the validity of the S-SHS.

Materials. The S-SHS: Sixteen items of the S-SHS developed in Study 1 were administered. They were rated on a four-point scale ranging from 1 (not applicable) to 4 (applicable).

The New Psychological Stress Response Scale (SRS-18): SRS-18 measures psychological stress reactions experienced daily, and it includes three factors (Suzuki et al., 1997): depression-anxiety (e.g., "I am feeling

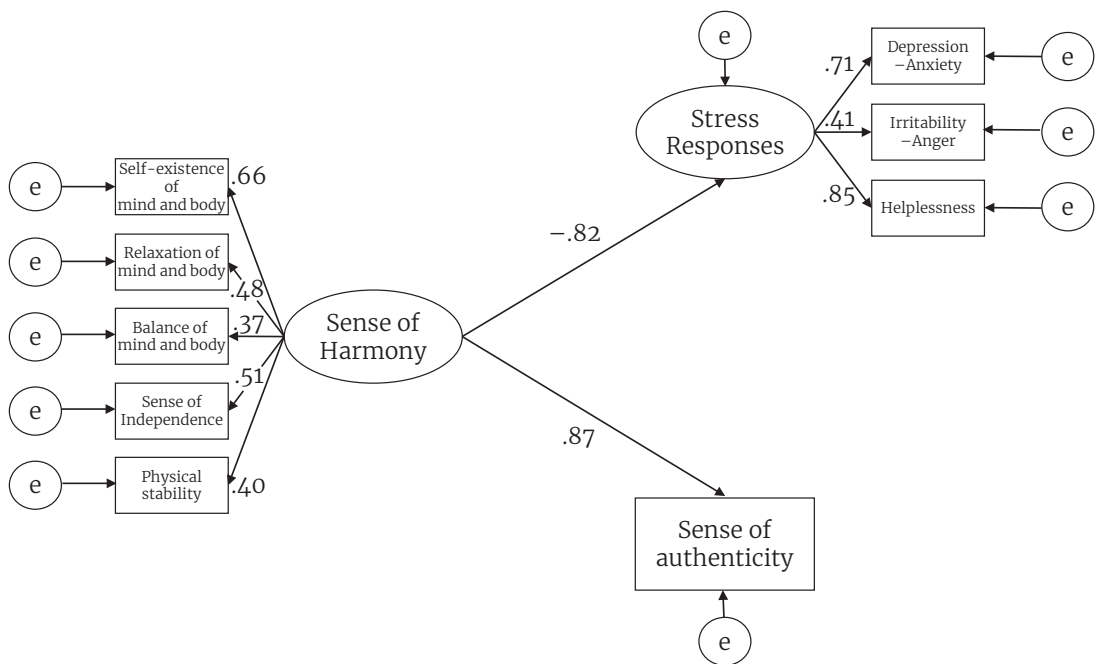


Figure 2. Results of Structural Equation Modeling (SEM) for the S-SHS, the SRS-18, and the sense of authenticity scale

depressed”), irritability–anger (e.g., “I become irritable”), and helplessness (e.g., “I am no longer very active”). Eighteen items were rated on a four-point scale from 0 (strongly disagree) to 3 (strongly agree) (Suzuki et al., 1997). The SRS-18’s reliability was confirmed by the Cronbach’s alpha coefficient, test–retest reliability, and Spearman–Brown’s coefficient and its validity through content validity and discriminant validity between clinical and nonclinical subjects in Suzuki et al. (1997). The Cronbach’s alpha coefficient is an indicator of the similarity between multiple items and is expressed between 0 and 1. 1 indicates that the items are similar to each other. Additionally, Spearman–Brown’s coefficient is a method to examine the reliability of a scale using the split-half method. In this study, Cronbach’s alpha coefficients were, respectively, $\alpha = .876$, $.845$, and $.802$, which suggests that the reliability of the data in this study as measured in previous studies can be ensured.

The sense of authenticity scale measures one’s sense of authenticity, which is the feeling of being genuine to oneself (Ito & Kodama, 2005). It consists of six items, including “I can always be myself,” rated on a five-point scale from 1 (not applicable) to 5 (applicable) (Ito & Kodama, 2005). The higher the score, the higher the sense of authenticity, and in this study, the Cronbach’s alpha coefficient was $\alpha = .850$.

Procedures. First, the S-SHS was performed, and the second survey was conducted with an interval of two

weeks to confirm its test–retest reliability. Other participants answered the S-SHS, the SRS-18, and the sense of authenticity scale to confirm the S-SHS’s validity.

Ethical considerations. Procedures and policies to manage confidential information in the current surveys were approved by the ethics committee of the University of Tsukuba, Japan. We then verbally informed participants about the study’s content and procedures, their voluntary cooperation, and the fact that there was no effect of participation on academic grades. Consequently, those who agreed with these conditions completed the questionnaires.

Results. Test–retest reliability was checked using the multiple imputation method ($M = 100$) for 97 participants. All items measured at the same time were used for estimation to ensure accuracy. The following values were obtained: $r = .744$ ($p < .001$) for self-existence of mind and body, $r = .747$ ($p < .001$) for relaxation of mind and body, $r = .660$ ($p < .001$) for balance of mind and body, $r = .667$ ($p < .001$) for sense of independence, and $r = .789$ ($p < .001$) for sense of physical stability.

On the contrary, with 118 participants, we performed a covariance structure analysis with AMOS 22 to examine relationships among the S-SHS, the SRS-18, and the sense of authenticity scale. Consequently, we confirmed that the model has a good fit ($CFI = .937$, $TLI = .906$, $RMSEA = .067$, Figures 2).

Discussion

The purpose of Study 2 was to confirm the test–retest reliability and the validity of the S-SHS with the external standard scales. First, we confirmed the test–retest reliability, and a high positive correlation was clarified with university and professional training college students after a two-week interval. The S-SHS would be a variable difficult to transform in two weeks. Therefore, the S-SHS's reliability was confirmed as we hypothesized. Second, we conducted a covariance structure analysis of the relationship between the S-SHS and the two predicted variables, stress responses and sense of authenticity. The results showed a strong negative association with stress response, and a strong positive association with sense of authenticity – all in line with the hypothesis.

The negative relation of SH with stress responses suggests this trait's antagonistic effect on the stress response in the following ways. First, S-SHS's items focus on feelings in the body and mind. In general, stressors produce physical and mental changes (e.g., muscle tension and irritation). In contrast, people with high SH are more likely to notice whether they are tense through changes in their bodies, because SH was negatively related to the inability to recognize and express feelings and emotions (Kamikura, 2021). Therefore, coping with their stress responses might be easier for them than for those who do not notice bodily changes. Second, in addition to noticing stress, given that the S-SHS has the relaxation of mind and body factor, relaxation could antagonize the stress response, and reduce stress. According to the path analysis of adolescents by Kamikura, Mashiko, & Shimizu (2020), relaxation factors have been shown to be effective in reducing stress responses. Thus, it is likely that SH was negatively associated with stress response. Furthermore, SH was found to be positively associated with a sense of authenticity, as it satisfies the factors that enhance sense of authenticity.

Consequently, the model fit of the higher-order factor analysis and the test–retest reliability were satisfactory, and the relation with external scales were all as hypothesized in Study 1. We confirmed that the S-SHS has the same five factors as the SHS, along with a higher-order factor structure.

Summary

Stern and Gallagher had begun to examine people by adding bodily factors to the traditional psychological concept. In Japan, Naruse, who established Dohsa-hou did not regard the body and mind as sepa-

rate entities, rather as a “mind-body unity phenomenon”. Based on this theory, the mind and body can be viewed as a harmonious whole. Therefore, this study is a mind-body-oriented study created as a measure to demonstrate that there is no hierarchical relationship between the body and mind.

The purpose of this study was to develop a scale with a small number of items that could easily be applied to healthy individuals. This study examined the validity of the shortened version of the sense of harmony between body and mind scale (S-SHS), a measure quantifying an individual's sense of integration of body and mind, and its possible use for healthy individuals. In Study 1, a total of 368 Japanese people completed the S-SHS. We confirmed a five-factor structure, the same as the SHS, through subsequent analysis: self-existence of mind and body, relaxation of mind and body, balance of mind and body, sense of independence, and sense of physical stability. In Study 2, for a total of 97 Japanese students, the two-week test–retest correlation revealed that the S-SHS had sufficient test–retest reliability. Thus, the S-SHS has sufficient validity and reliability, and could make it easier to measure the sense of harmony between body and mind than the SHS. Next, in a sample of 118 Japanese students, we confirmed through SEM that the S-SHS related negatively to stress responses but positively to sense of authenticity, as we had hypothesized. Therefore, it was suggested that the SH is an important concept related to physical and mental health.

Limitations

In this study, we developed the S-SHS for Japanese individuals, which enabled us to easily measure the effects of psychotherapy, such as Dohsa-hou and body psychotherapy. In the future, it would be desirable to examine the applicability of the S-SHS to the elderly and to patients with schizophrenia. Study 2 suggested that S-SHS is negatively associated with the stress response, and positively associated with a sense of authenticity. However, it remains unclear whether Dohsa-hou interventions to increase SH enhance these effects; thus, future studies are required.

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