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Reliability and validity of a short Japanese version of the UPPS-P Impulsive Behavior Scale

Tomoko Hasegawa [a,*], Ikko Kawahashi [b], Kazuhiko Fukuda [c], Sumio Imada [d], Yuichi Tomita [e]

[a] *Department of Human Sciences, Faculty of Psychology and Sociology, Taisho University, Tokyo, Japan*
[b] *Department of Psychology, Faculty of Psychology, Meiji Gakuin University, Tokyo, Japan*
[c] *Department of Psychology and Humanities, College of Sociology, Edogawa University, Chiba, Japan*
[d] *Department of Psychology, Faculty of Health Sciences, Hiroshima Shudo University, Hiroshima, Japan*
[e] *Department of English Language and Cultures, Faculty of Letters, Gakushuin University, Tokyo, Japan*

ABSTRACT

Objective: This study aimed to verify the reliability and validity of a Japanese version of the S-UPPS-P Impulsive Behavior Scale. This is expected to facilitate comparisons of findings between international and Japanese samples in studies of impulsivity.
Methods: Two surveys were conducted. In the first survey, 632 participants, aged 20–44 years old, completed a translated version of the Japanese S-UPPS-P Impulsive Behavior Scale, the Motor Impulsiveness Scale, a short form of the Big-Five scale, the short Grit scale, and the brief version of the self-control scale. Two weeks later, the second survey containing the S-UPPS-P and the motor impulsiveness scale were completed by 450 participants who had completed the first survey to examine test-retest reliability.
Results: In the first survey, an exploratory factor analysis was performed on the S-UPPS-P responses. A four-factor solution was the most suitable solution, with the factors of "Lack of Perseverance," "Lack of Premeditation," "Sensation Seeking," and "Negative-Positive Urgency." Then, a confirmatory factor analysis was performed. The conformity index of the original five-factor model was slightly better than that of the four-factor model. We also compared the five-factor model's conformity index with three other models that had been examined in the original and other foreign language versions of the S-UPPS-P. The five-interrelated factor model had the best model fit. The reliability of the five scales was confirmed. The scales exhibited internal consistency with α co-efficients ranging from 0.65 to 0.79, in addition to the test-retest reliability ranging from 0.74 to 0.80. The convergent validity of each S-UPPS-P scale was supported by high relationships with the four personality scales, with the highest correlation coefficients ranging from 0.37 to −0.67.
Conclusion: The reliability and validity of the Japanese version of the S-UPPS-P were confirmed, despite the minor limitations of the exploratory factor analysis providing a four-factor solution instead of a five-factor so-lution, and the α reliability coefficients of two scales being acceptable but rather low. Thus, comparisons of findings between international and Japanese studies on impulsivity could be facilitated.

1. Introduction

Impulsiveness involves performing actions that cause undesired consequences due to excessive risk or inappropriateness to a situation (Evenden, 1999). Impulsiveness is a topic of interest to various academic fields such as psychology, psychopharmacology, and neuroscience. Numerous previous studies have indicated that impulsiveness does not have a single dimension, but is rather an "umbrella" concept (Lynam, Smith, Whiteside, & Cyders, 2006), containing multiple characteristics

that can be separated conceptually and empirically. Although the characteristics that make up impulsiveness vary according to the field of research, impulsiveness mainly includes acting without thinking, sensation seeking, risk-taking, and so on (Cyders et al., 2007).

Currently, two major scales are used for measuring impulsiveness: the Barratt Impulsiveness Scale version 11 (BIS-11; Patton, Stanford, & Barratt, 1995) and the UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001). The Barratt Impulsiveness Scale was the first scale developed to measure impulsiveness (BIS; Barratt, 1959). The latest

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version, the BIS-11, has been translated into eight languages and used in many research papers. In Japan, only two studies (Kobashi & Ida, 2013; Someya et al., 2001) have been conducted on the development of the Japanese version of the BIS-11 (Patton et al., 1995). However, the Japanese version of the scale was only published in Kobashi and Ida (2013). Despite meticulous translation, it is problematic to use the current Kobashi and Ida version (2013), because it was not divided into six factors like the original version, and some of the items had been deleted.

More recently, the UPPS (Whiteside & Lynam, 2001) has become popular in research on impulsiveness. The UPPS consists of the following four scales. Urgency represents the tendency to engage in impulsive behaviors under conditions of negative affect. Lack of Perseverance is an individual's inability to remain focused on a task that may be boring or difficult. Lack of Premeditation is the inability to think and reflect on the consequences of an act before engaging in it. Sensation Seeking refers to the tendency to enjoy and pursue activities that are exciting and an openness to trying new experiences that may or may not be dangerous (Whiteside, Lynam, Miller, & Reynolds, 2005). In a later version of the UPPS-P, Urgency was divided into Negative Urgency, the tendency to engage in rash action in response to extreme negative affect, and Positive Urgency, the tendency to engage in rash action in response to extreme positive affect (Cyders et al., 2007). These changes were made in the development of the UPPS-P Impulsive Behavior Scale (Lynam, Smith, Cyders, Fischer, & Whiteside, 2007), which consists of 59 items comprising five scales. Later, Cyders (2013) and Cyders, Littlefield, Coffey, and Karyadi (2014) created the S-UPPS-P consisting of 20 items (five scales with four items each) as a short version of the UPPS-P. The UPPS-P (including the UPPS and S-UPPS-P) correlated with various psychopathologies, such as personality disorders (Bøen et al., 2015), eating disorders (Schell, Brassard, & Racine, 2019), depression (Anestis, Tull, Lavender, & Gratz, 2014), suicide attempts (Bender, Anestis, Anestis, Gordon, & Joiner, 2012), and addictive behaviors, such as alcohol and drug dependence (Dolan, Bechara, & Nathan, 2008), and gambling dependence (Grall-Bronnec et al., 2017; Savvidou et al., 2017). Each of the five scales of the UPPS-P showed different correlations with different psychiatric features (Berg, Latzman, Bliwise, & Lilienfeld, 2015).

There are currently 12 translated versions of the UPPS, UPPS-P, and S-UPPS-P impulsiveness scales, and they have been verified for reliability and validity. Translations of the S-UPPS-P include Arabic (Bteich, Berbiche, & Khazaal, 2017), Italian (D'Orta et al., 2015), Swedish (Claréus, Daukantaitė, Wångby-Lundh, & Lundh, 2017), French (Billieux et al., 2012), Chinese (Xue et al., 2017), Korean (Lim & Kim, 2018), and Hungarian (Zsila, Bőthe, Demetrovics, Billieux, & Orosz, 2020) versions. In the French (Billieux et al., 2012), English (Cyders et al., 2014), Hungarian (Zsila et al., 2020), and Korean versions (Lim & Kim, 2018), four models were examined to clarify the construction of the five scales of the S-UPPS-P, and to determine which model was most suitable. The four models included a single "impulsivity" factor model (Model 1); a five-interrelated factor model (Model 2); a three-interrelated factor model (Model 3) comprising Urgency (both Negative and Positive Urgency), Sensation Seeking, and Lack of Conscientiousness (both Lack of Premeditation and Lack of Perseverance); and a five-factor hierarchical model (Model 4). Model 4 comprises Lack of Premeditation and Lack of Perseverance as two distinct factors both loading on a higher order factor called Lack of Conscientiousness, Positive Urgency and Negative Urgency as two distinct factors both loading on a higher order-factor labeled Urgency, and Sensation Seeking as a separate impulsivity dimension. While Models 2 and 4 had the same degree of fitness in all four language versions, the optimal model was different for each language: Model 4 for the French version (Billieux et al., 2012) and Model 2 for the Hungarian (Zsila et al., 2020) and Korean versions (Lim & Kim, 2018), whereas for the English version (Cyders et al., 2014), Models 2 and 4 had the same degree of fit.

In most countries, addictive behaviors, such as alcohol dependence,

gambling dependence, and drug dependence, have become major problems. In Japan, problematic Internet use or Internet dependence is becoming the prevalent problem (Osaki & Kinjo, 2015), especially amongst younger generations (Mihara et al., 2016).

In other countries, research on impulsiveness, using the BIS-11 or the UPPS, in relation to additive behaviors has been actively conducted. However, in Japan, there has been little research on impulsiveness, although it is becoming a major area of interest, particularly with the increase in Internet dependence. In order to further this research in Japan, a scale of impulsivity must be developed that can be used to compare studies set in Japan and other countries.

The purpose of this study is to develop and then verify the reliability and validity of a Japanese version of the S-UPPS-P, which can be used to compare studies set in Japan and other countries. In the process, the study also examines the compatibility of the four models with the Japanese version of the S-UPPS-P.

2. Method

2.1. Measures

2.1.1. Preparation of the Japanese version of the S-UPPS-P Impulsive Behavior Scale and its composition

First, we obtained permission to translate the S-UPPS-P (Cyders, 2013) into Japanese from one of the original authors, Prof. D. R. Lynam. Next, the translation of the original version, which was conducted by two Japanese psychologists and one Japanese professor of English education, was back translated by an English translation company. We confirmed that the original and back translations were in agreement.

A preliminary survey (Hasegawa, Kawahashi, Fukuda, & Imada, 2018) using the Japanese version of the S-UPPS-P was administered through a web survey company to 550 men and women aged 20–44 years who were registered with the company. Requests were distributed by e-mail to participants who were randomly selected from samples throughout Japan. Results of the preliminary survey revealed that in Questions 4 and 13, problems were found with the connotations of "upset" and "bother" when translated into Japanese. Subsequently, the two items were retranslated by the two psychologists and professor, and then back translated by an English translation company. We confirmed that the new Japanese translation was consistent with the original version, and approved it as the Japanese version of the S-UPPS-P Impulsive Behavior Scale.

The Japanese version of the S-UPPS-P Impulsive Behavior Scale is composed of 20 items comprising five scales with four items each: Negative Urgency, Positive Urgency, Lack of Perseverance, Sensation Seeking, and Lack of Premeditation. The scales were rated on a 4-point Likert scale: *strongly disagree* (1), *disagree somewhat* (2), *agree somewhat* (3), and *strongly agree* (4). In addition, to remove unreliable answers, two false detection items were added to the S-UPPS-P scale items ("I am an elderly person paying 10% of my medical expenses" and "I am an adult, and I am legally allowed to drink").

2.1.2. The scales for the examination of validity

We prepared four scales to examine the validity of the Japanese version of the S-UPPS-P.

2.1.2.1. Motor Impulsiveness Scale (Hasegawa, Fukuda, Kawahashi, & Imada, 2016). A Motor Impulsiveness Scale (MIS; Hasegawa et al., 2016) including items based on those of the Motor Impulsiveness Subscale of the BIS-11 (Patton et al., 1995) was used with a generalized translation with wording more suitable to an everyday Japanese context. The scale has seven items (e.g., I am happy-go-lucky and do things without thinking, I act on the spur of the moment) and was rated on a 5-point Likert scale ranging from 1 (*not applicable at all*) to 5 (*highly applicable*). The Cronbach's α reliability coefficient (α coefficient) of this

study was 0.849.

2.1.2.2. Short form of the Japanese Big-Five Scale (Namikawa, Tani, Wakita, Kumagai, & Nakane, 2012)

A short form of the Japanese Big-Five Scale (Wada, 1996) developed by Namikawa et al. (2012) was implemented to examine the relationship between personality traits. This scale includes the following sub-scales: Extraversion (5 items; e.g., talkative, cheerful), Conscientiousness (7 items; e.g., organized, tidy), Neuroticism (5 items; e.g., tense, anxious), Openness (6 items; e.g., creative, capable), and Agreeableness (6 items; e.g., kind, gentle). All of the items were rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The α coefficients were 0.895, 0.641, 0.878, and 0.873, respectively.

2.1.2.3. Japanese Short Grit Scale (Grit-S; Nishikawa, Okugami, & Amemiya, 2015)

As a counter concept to impulsiveness, we prepared two more scales. The first was the Japanese Short Grit Scale (Duckworth & Quinn, 2009) developed by Nishikawa et al. (2015). Grit is defined as perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). This scale includes two subscales: Perseverance of Effort (4 items; e.g., I finish whatever I begin, Setbacks don't discourage me), and Consistency of Interest (4 items; e.g., I often set a goal but later choose to pursue a different one, New ideas and projects sometimes distract me from previous ones). The Grit-S score is calculated by combining the scores of the two sub-scales (8 items). The scale was rated on a 5-point Likert scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). The α coefficients were 0.840, 0.745, and 0.799, respectively.

2.1.2.4. Japanese-translated version of the Brief Self-Control Scale (Ozaki, Goto, Kobayashi, & Kutsuzawa, 2016)

The second scale was the Japanese-translated version of the Brief Self-Control Scale (Tangney, Baumeister, & Boone, 2004) developed by Ozaki et al. (2016). Self-control refers to the ability to execute goal-orientated behavior (Tangney et al., 2004). The Brief Self-Control Scale measures the degree to which a desirable goal with long-term, abstract, and social values is achieved in a situation involving conflict with goals that are relatively less desirable, as each goal impedes the achievement of the other. Therefore, it can be understood as a measure of the degree to which the pursuit of relatively undesired goals is suppressed. The scale contains 13 items (e.g., I am good at resisting temptation, I refuse things that are bad for me), and was rated on a 5-point Likert scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). The α coefficient was 0.871.

2.2. Procedure

The survey for this research was conducted via the same web survey company employed for the preliminary survey. Participants were randomly selected from samples of men and women aged 20–44 years who had not participated in the preliminary survey (Hasegawa et al., 2018). We conducted the survey twice. In Survey 1, we adopted the Japanese version of the S-UPPS-P Impulsive Behavior Scale, the Motor Impulsiveness Scale, the Big-Five Scale, Short Grit Scale, and the Brief Self-Control Scale. Two weeks later, we conducted Survey 2 using the Japanese version of the S-UPPS-P Impulsive Behavior Scale, and the Motor Impulsiveness Scale to examine retest reliability. The web survey company obtained the data after deleting the following inappropriate response patterns: (1) responses that failed to recognize two items. We added these in the S-UPPS-P scale as false detection items: "I am an elderly person paying 10% of my medical expenses" (All participants should have answered "strongly disagree"), and "I am an adult, and I am legally allowed to drink" (All participants should have answered "strongly agree"); (2) extremely short response times (the quickest 2% average response times); (3) if the rating values of responses of two or more scales showed straightlining in the first survey; and (4) if the rating

values of both questionnaire's responses showed straightlining in the second survey. Prior to the start of this research, all participants provided informed consent after they were informed that responses would be analyzed only as group data, no identifying personal information would be revealed, and the analysis results would be used only in academic research. The Ethics Review Committee of Taisho University approved the research (Approved No. 18-007).

2.3. Participants

The sample of Survey 1 comprised 933 (495 men and 438 women) participants aged 20–44 years. The responses of 301 participants (181 men and 120 women) were deleted due to inappropriate responses, and 632 (314 men and 318 women) participants' responses were analyzed (valid response rate 67.74%). Survey 2 was only completed by 529 respondents (265 men and 264 women) who had participated in Survey 1, and 79 (43 men and 36 women) responses were deleted due to inappropriate responses. The final number of participants analyzed was 450 (222 men and 228 women) with a valid response rate of 85.07%. The average age of the participants was 35.57 years ($SD = 6.74$) in the first survey, and 35.70 years ($SD = 6.54$) in the second survey.

2.4. Statistical analyses

First, an exploratory factor analysis (principal factor method, oblique solution promax rotation) was performed on the S-UPPS-P, and the number of factors was confirmed based on a scree plot and conceptual validity. After that, a confirmatory factor analysis was performed to confirm whether the translation had conformed with the original model (Cyders et al., 2014). In addition, the four models examined in the French version of the S-UPPS-P (Billieux et al., 2012), which is the most appropriate model for the Japanese version of the S-UPPS-P, were examined. Goodness of fit was tested using χ^2, RMSEA, CFI, and SRMR. The acceptable range of fit for each index was as follows. A RMSEA of between 0 and 0.05 indicates a good fit, and between 0.05 and 0.08, an acceptable fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003). A CFI of more than 0.90 is generally interpreted as indicating a good fit, and between 0.85 and 0.90, an acceptable fit.

For reliability, we calculated the internal consistency with Cronbach's α reliability coefficients and test-retest reliability for each scale. For convergent validity, the Pearson's product-moment correlation coefficients (with 5% significance criterion) were calculated between the five scales of the S-UPPS-P and the four personality scales. Data analysis was performed using SAS 9.4 (SAS Institute, Inc., Cary, NC, USA) and M*plus* version 8.2 (Muthén & Muthén, 1998–2017).

3. Results

3.1. Exploratory factor analysis and confirmatory factor analysis

An exploratory factor analysis was performed on the S-UPPS-P responses to the first survey. An examination of the same five-factor solution as the original version showed that Factor 5 had a low factor pattern value and did not hold as a factor. Under the five-factor solution, although only one item had a value of 0.322 (Item 20, 'I tend to act without thinking when I am really excited'), all other item values were between −0.256 and 0.168. Factor 1 was "Negative–Positive Urgency," combining the two scales "Negative Urgency" and "Positive Urgency." Factor 2 ("Lack of Perseverance"), Factor 3 ("Lack of Premeditation"), and Factor 4 ("Sensation Seeking") all comprised the same items as the original. Therefore, as Factor 5 did not hold, the five-factor solution was considered infeasible and a four-factor solution was considered best (Table 1).

Next, we compared the conformity index of the four-interrelated factor model, which was the optimal solution in the exploratory factor analysis and the original five-interrelate factor model (Model2). The

Table 1
Loadings of the exploratory factor analysis and intercorrelations between factors.

No	Items	F1	F2	F3	F4	h^2
F1: Negative-Positive Urgency						
13	When I am upset, I often act without thinking.	0.786	−0.029	0.037	−0.004	0.603
15	When I feel rejected, I will often say things that I later regret.	0.734	−0.082	0.093	−0.054	0.497
6	When I feel bad, I will often do things I later regret in order to make myself feel better now.	0.729	−0.026	0.026	−0.110	0.484
10	I tend to lose control when I am in a great mood.	0.637	−0.047	0.062	0.141	0.463
3	When I am in a great mood, I tend to get into situations that could cause me problems.	0.517	0.041	−0.023	−0.052	0.257
8	Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	0.479	0.287	−0.053	−0.044	0.287
17	Others are shocked or worried about the things I do when I am feeling very excited.	0.467	0.020	−0.081	0.269	0.409
20	I tend to act without thinking when I am really excited.	0.432	0.004	−0.207	0.202	0.391
F2: Lack of Perseverance						
7	Once I get going on something, I hate to stop.	0.149	0.779	−0.088	−0.106	0.545
11	I finish what I start.	−0.099	0.778	−0.026	0.027	0.615
1	I generally like to see things through to the end.	−0.177	0.605	0.115	0.122	0.511
4	Unfinished tasks really bother me.	0.141	0.575	0.229	−0.117	0.458
F3: Lack of Premeditation						
19	I usually think carefully before doing anything.	0.033	−0.007	0.779	−0.052	0.604
5	I like to stop and think things over before I do them.	0.054	−0.032	0.675	0.049	0.416
2	My thinking is usually careful and purposeful.	−0.070	0.108	0.647	0.038	0.507
12	I tend to value and follow a rational, "sensible" approach to things.	−0.025	0.261	0.394	0.148	0.323
F4: Sensation Seeking						
14	I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	0.118	0.094	0.000	0.624	0.485
9	I quite enjoy taking risks.	0.039	0.014	−0.078	0.585	0.385
18	I would enjoy the sensation of skiing very fast down a high mountain slope.	−0.027	−0.057	0.079	0.541	0.263
16	I would like to learn to fly an airplane.	−0.065	−0.077	0.087	0.515	0.227
	F2	−0.045				
	F3	−0.280	0.369			
	F4	0.328	0.216	−0.162		

results for the four-interrelated factor model, which contains the newly combined "Negative–Positive Urgency" factor, was $\chi^2(164) = 648.62$ ($p < .001$), RMSEA = 0.068, CFI = 0.869, SRMR = 0.065, while that of the original five-interrelate factor model (Model2) was $\chi^2(160) = 579.29$ ($p < .001$), RMSEA = 0.064, CFI = 0.886, SRMR = 0.061. This shows that the fit of the five-interrelated factor model was slightly better (Fig. 1).

We also tested the remaining three models that had been examined in the French (Billieux et al., 2012), Hungarian (Zsila et al., 2020), Korean (Lim & Kim, 2018), and English (Cyders et al., 2014) versions of the S-UPPS-P. The conformity index of the one-factor model (Model 1) was $\chi^2(170) = 943.66$ ($p < .001$), RMSEA = 0.138, CFI = 0.447, SRMR = 0.139. For the three-factor model (Model 3), the index was $\chi^2(167) = 2213.00$ ($p < .001$), RMSEA = 0.086, CFI = 0.790, SRMR = 0.079,

indicating a poor fit. Finally, the hierarchical 5-factor model (Model 4) did not converge because the parameter estimation algorithm did not converge.

The main aim of this study was to create a Japanese version of the S-UPPS-P that can be used in subsequent studies to compare impulsivity across samples. Therefore, although the initial exploratory factor analysis provided only four factors, the confirmatory factor analysis confirmed that a five-interrelated factor model was a reliable fit for the Japanese translation.

3.2. Examination of reliability

Table 2 shows the Cronbach's α reliability coefficients, and the test-
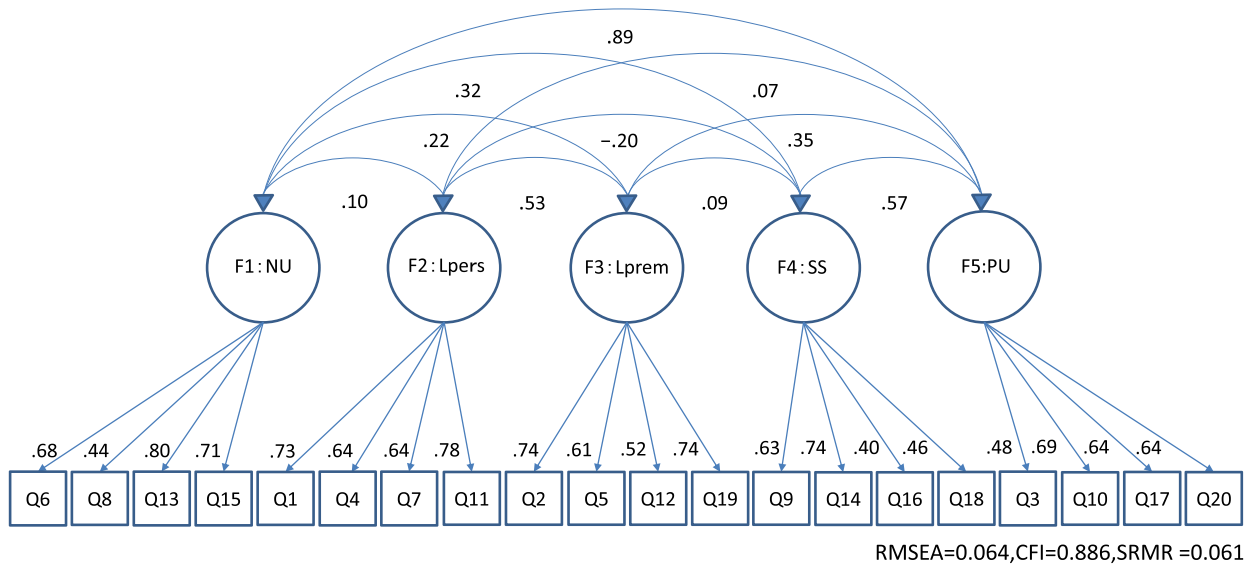

Fig. 1. First-order model of the S-UPPS-P impulsivity dimensions. Ovals reflect latent variables, whereas squares represent manifest variables. Double-headed arrows represent correlations between latent variables, whereas single-headed arrows represent factor loadings. All factor loadings and factor intercorrelations are significant at $p < 0.001$.

Table 2

Descriptive statics, internal consistency, retest reliability, and Pearson correlations among the five scales of the short Japanese UPPS-P.

	Mean	SD	α	retest	1. NU	2. Lper	3. Lpre	4. SS
1. Negative Urgency: NU	8.79	2.53	0.753	0.735***	1.000			
2. Lack of Perseverance: Lper	8.39	2.25	0.791	0.796***	0.014	1.000		
3. Lack of Premeditation: Lpre	8.46	2.08	0.741	0.743***	0.145***	0.437***	1.000	
4. Sensation Seeking: SS	6.62	2.17	0.651	0.743***	0.210***	−0.126**	0.017	1.000
5. Positive Urgency: PU	7.65	2.23	0.696	0.769***	0.658***	0.039	0.237***	0.353***

$n = 632$.
*** $p < .001$
** $p < .01$

retest reliability of the five scales of the S-UPPS-P. Although the α coefficient of "Sensation Seeking" was 0.65, the other four scales were 0.70 or higher. The test-retest reliability was 0.70 or higher for all the scales.

3.3. Examination of convergent validity

Table 3 shows the α coefficients of the four scales used for the study of the convergent validity of the S-UPPS-P. It also shows the Pearson's product moment correlation coefficients between the five S-UPPS-P scales and the four personality scales. First, the highest correlation coefficients between the five S-UPPS-P scales and the short version of the Big Five were Negative Urgency with Conscientiousness ($r = 0.439$, $p < .001$), Lack of Premeditation, Lack of Perseverance, and Positive Urgency with Neuroticism ($r = 0.336, 0.260, 0.477$, respectively, all p's < 0.001), and Sensation Seeking with Openness ($r = 0.452$, $p < .001$). Between the five scales of the S-UPPS-P and the Short Grit Scale, there were correlations exceeding 0.60, especially between Lack of Perseverance and Perseverance of Effort ($r = −0.670$, $p < .001$), and Lack of Perseverance and Grit-S score ($r = −0.604$, $p < .001$). In addition, the correlation coefficients between the four scales of the S-UPPS-P (excluding Sensation Seeking) and the motor impulsivity scale and the Brief Self-Control Scale ranged from 0.321 to 548, and 0.364 to 0.546 (all p's < 0.001), respectively.

4. Discussion

The main purpose of this study was to verify the reliability and validity of the Japanese version of the S-UPPS-P that will allow for comparisons between studies conducted in different languages. First, the factor structure was examined. In the exploratory factor analysis, the optimal solution contained four factors. However, in the confirmatory factor analysis, the original five factors showed a slightly higher fit than the four factors, so we selected the five-factor model as in the original version. It has been suggested that such a factor structure may differ from the factor structures of the S-UPPS-P of other languages. For example, in the Chinese version (Xue et al., 2017), which is the only version among the other language versions where an exploratory factor analysis was performed, a five-factor solution was obtained as in the original version. Additionally, the French (Billieux et al., 2012), English (Cyders et al., 2014), Hungarian (Zsila et al., 2020), and Korean (Lim & Kim, 2018) versions only examined Models 1, 2, 3, and 4. In these versions, for Model 4 (hierarchical model), Positive Urgency and Negative Urgency existed as independent factors, with Urgency established as a higher tier potential factor. In contrast, this did not hold as a model in the Japanese version.

On the other hand, the Japanese version shows some similarities to the other language versions. The Pearson's correlation coefficient between Negative Urgency and Positive Urgency in this study was 0.66, and the pass coefficient between Negative Urgency and Positive Urgency was 0.89 in the confirmatory factor analysis five-interrelated factor model (Model 2). The correlation coefficients between positive and negative urgency in the original and foreign language versions of the S-UPPS-P [original (Cyders, 2013; Cyders et al., 2014), Italian (D'Orta et al., 2015), Swedish (Claréus et al., 2017), Hungarian (Zsila et al., 2020), Arabic (Bteich et al., 2017)] ranged from 0.50 to 0.64. This is not significantly different from the Japanese version. However, the range of the pass coefficients of the five-interrelated factor model of the confirmatory factor analysis of the other countries was 0.19–0.92, with great variations in the values of the pass coefficients depending on the language version. With regard to further research, it is necessary to analyze

Table 3

α reliability coefficients of the four scales used for the study of the convergent validity of the S-UPPS-P, and the Pearson's product moment correlation coefficients between the five S-UPPS-P scales and the four personality scales.

				S-UPPS-P				
				Negative Urgency	Lack of Perseverance	Lack of Premeditation	Sensation Seeking	Positive Urgency
	Mean	SD	α	r	r	r	r	r
Motor Impulsive Scale	19.46	5.39	0.849	0.499***	0.321***	0.466***	0.106**	0.548***
Big-Five								
Extraversion	18.56	6.54	0.895	−0.116**	−0.211***	−0.051	0.262***	−0.011
Conscientiousness	23.41	6.04	0.641	0.439***	0.092*	−0.022	−0.167***	0.313***
Neuroticism	26.83	5.46	0.878	0.430***	0.336***	0.260***	0.130***	0.477***
Openness	23.01	6.16	0.837	0.021	−0.296***	−0.181***	0.452***	0.108**
Agreeableness	22.83	6.19	0.837	0.344***	0.199***	0.248***	−0.076	0.290***
Short Grit Scale								
Perseverance of Effort	12.66	3.42	0.840	−0.194***	−0.670***	−0.369***	0.203***	−0.134***
Consistency of Interest	12.22	2.93	0.745	0.295***	0.295***	0.200***	0.049***	0.306***
Grit-S	24.45	5.23	0.799	−0.292***	−0.604***	−0.354***	0.106**	−0.259***
Brief Self-Control Scale	37.67	8.28	0.871	0.561***	0.364***	0.385***	0.117**	0.546***

$n = 632$.
*** $p < .001$.
** $p < .01$.
* $p < .05$.

the differential item functioning (DIF) to examine not only the differences between the Japanese and other language versions but also between the different language versions. DIF would mean that the correct answer rate varies depending on the test subgroup, even though the characteristics and abilities being measured are equal (Holland & Thayer, 1988; Shealy & Stout, 1993). For the different language versions of the S-UPPS-P, it would be advisable to further verify the validity by examining translation equivalence, etc. through DIF analysis.

Next, reliability of the Japanese version of the S-UPPS-P was examined. In the Japanese version, the five-factor scale's α coefficient ranged from 0.65 to 0.79, with Sensation Seeking and Positive Urgency below 0.70. All five scales have an α coefficient of 0.70 or higher in the Italian, French, and Dutch versions, but the 5-factor scales have α coefficients of <0.70 in the Swedish (0.60–0.78; Claréus et al., 2017), Arabic (0.58–0.72; Bteich et al., 2017), and Chinese (0.67–0.80; Xue et al., 2017) versions. The Japanese version was also in that range. The test-retest reliability of the Japanese version ranged from 0.74 to 0.80, which was lower than the French version (0.85–0.92; Billieux et al., 2012), but higher than the Chinese version (0.63–0.77; Xue et al., 2017). Based on these facts, we were able to confirm the reliability of the Japanese version.

Finally, with relation to the convergent validity, the five scales of the S-UPPS-P were highly correlated with the five scales of the Big Five and the three scales of the Short Grit Scale. In addition, motor impulsive behavior centered on motor impulsiveness of the BIS-11 and the Self-Control Scale was related to all five S-UPPS-P scales. These findings confirm that the S-UPPS-P has convergent validity with the related scales.

This creation of a Japanese version of the S-UPPS-P will allow for the future comparison of Japanese studies on impulsiveness and studies conducted in other languages. As mentioned earlier, the study of impulsiveness in Japan is still at an early stage and in order to develop this research, comparisons with research from other countries to test the reliability and validity of the Japanese research is essential. The most logical way to do this is to have a research tool that is consistent across different languages. The creation of a Japanese version of the S-UPPS-P that follows the same format in other languages is therefore necessary. Furthermore, the five-interrelated factor model tested in this paper is practicable, as it is consistent with the original and other language versions of the S-UPPS-P and can encourage comparisons between Japanese and other countries' studies on impulsiveness.

4.1. Limitations

This study has two limitations. First, the results of the exploratory factor analysis provided a four-factor solution instead of a five-factor solution. The same analysis has not been carried out on other translations except the Chinese version (Xue et al., 2017), so it is not known whether this phenomenon is a feature of only the Japanese version or if it is also present in other language versions. Additionally, although the α reliability coefficients were within an acceptable range, slightly lower scales were included. Future studies must also examine whether the characteristics of impulsiveness in Japan are different from those of other countries due to linguistic and/or social reasons. Therefore, currently, it is not possible to discuss whether the results of the exploratory factor analysis on the BIS Japanese scale (Kobashi & Ida, 2013), as mentioned earlier, are related to differences from the original version or due to linguistic and/or social reasons. This may also reflect on the translated version of the S-UPPS-P developed in this research. Therefore, in the future, it may be necessary to examine whether the characteristics of impulsivity in Japan are different from those of other countries

4.2. Conclusions

We developed the Japanese version of the S-UPPS-P and verified its

reliability. Although a four-factor solution (including "Lack of Perseverance," "Lack of Premeditation," "Sensation Seeking," and "Negative–Positive Urgency") was obtained from an exploratory factor analysis, confirmatory factor analysis revealed that the best model was a five-interrelated factor model, which was the same as the original version. The α coefficients of the five scales ranged from 0.651 to 0.796, and the test-retest reliability was 0.73 or higher for all scales. The convergent validities of the five scales with the four personality scales were satisfactory. Thus, the scales of the Japanese translation of the S-UPPS-P used in this study have been confirmed to be reliable and valid.

CRediT authorship contribution statement

Tomoko Hasegawa: Conceptualization, Formal analysis, Investigation, Writing - original draft, Project administration, Funding acquisition. **Ikko Kawahashi:** Conceptualization, Formal analysis, Writing - review & editing. **Kazuhiko Fukuda:** Conceptualization, Writing - review & editing. **Sumio Imada:** Conceptualization, Writing - review & editing. **Yuichi Tomita:** Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.abrep.2020.100305.

References

Anestis, M. D., Tull, M. T., Lavender, J. M., & Gratz, K. L. (2014). The mediating role of non-suicidal self-injury in the relationship between impulsivity and suicidal behavior among inpatients receiving treatment for substance use disorders. *Psychiatry Research, 218*(1–2), 166–173. https://doi.org/10.1016/j.psychres.2014.03.031.

Barratt, E. S. (1959). Anxiety and impulsiveness related to psychomotor efficiency. *Perceptual and Motor Skills, 9*(3), 191–198. https://doi.org/10.2466/pms.1959.9.3.191.

Bender, T. W., Anestis, M. D., Anestis, J. C., Gordon, K. H., & Joiner, T. E. (2012). Affective and behavioral paths toward the acquired capacity for suicide. *Journal of Social and Clinical Psychology, 31*(1), 81–100. https://doi.org/10.1521/jscp.2012.31.1.81.

Berg, J. M., Latzman, R. D., Bliwise, N. G., & Lilienfeld, S. O. (2015). Parsing the heterogeneity of impulsivity: A meta-analytic review of the behavioral implications of the UPPS for psychopathology. *Psychological Assessment, 27*(4), 1129–1146. https://doi.org/10.1037/pas0000111.

Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A.-C., … Van der Linden, M. (2012). Validation of a short French version of the UPPS-P Impulsive Behavior Scale. *Comprehensive Psychiatry, 53*(5), 609–615. https://doi.org/10.1016/j.comppsych.2011.09.001.

Bøen, E., Hummelen, B., Elvsåshagen, T., Boye, B., Andersson, S., Karterud, S., & Malt, U. F. (2015). Different impulsivity profiles in borderline personality disorder and bipolar II disorder. *Journal of Affective Disorders, 170*, 104–111. https://doi.org/10.1016/j.jad.2014.08.033.

Bteich, G., Berbiche, D., & Khazaal, Y. (2017). Validation of the short Arabic UPPS-P impulsive behavior scale. *BMC Psychiatry, 17*, 244. https://doi.org/10.1186/s12888-017-1407-y.

Claréus, B., Daukantaitè, D., Wångby-Lundh, M., & Lundh, L.-G. (2017). Validation of a Swedish version of the short UPPS-P Impulsive Behavior Scale among young adults. *Addictive Behaviors Reports, 6*, 118–122. https://doi.org/10.1016/j.abrep.2017.10.001.

Cyders, M. A. (2013). Impulsivity and the sexes: Measurement and structural invariance of the UPPS-P Impulsive Behavior Scale. *Assessment, 20*(1), 86–97. https://doi.org/10.1177/1073191111428762.

Cyders, M. A., Littlefield, A. K., Coffey, S., & Karyadi, K. A. (2014). Examination of a short English version of the UPPS-P impulsive behavior scale. *Addictive Behaviors, 39*(9), 1372–1376. https://doi.org/10.1016/j.addbeh.2014.02.013.

Cyders, M. A., Smith, G. T., Spillane, N. S., Fischer, S., Annus, A. M., & Peterson, C. (2007). Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment, 19*(1), 107–118. https://doi.org/10.1037/1040-3590.19.1.107.

Dolan, S. L., Bechara, A., & Nathan, P. E. (2008). Executive dysfunction as a risk marker for substance abuse: The role of impulsive personality traits. *Behavioral Sciences & the Law, 26*(6), 799–822. https://doi.org/10.1002/bsl.845.

D'Orta, I., Burnay, J., Aiello, D., Niolu, C., Siracusano, A., Timpanaro, L., … Billieux, J. (2015). Development and validation of a short Italian UPPS-P impulsive behavior scale. *Addictive Behaviors Reports, 2*, 19–22. https://doi.org/10.1016/j.abrep.2015.04.003.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment, 91*(2), 166–174. https://doi.org/10.1080/00223890802634290.

Evenden, J. L. (1999). Varieties of impulsivity. *Psychopharmacology, 146*(4), 348–361. https://doi.org/10.1007/PL00005481.

Grall-Bronnec, M., Sauvaget, A., Boutin, C., Bulteau, S., Jiménez-Murcia, S., Fernández-Aranda, F., … Caillon, J. (2017). Excessive trading, a gambling disorder in its own right? A case study on a French disordered gamblers cohort. *Addictive Behaviors, 64*, 340–348. https://doi.org/10.1016/j.addbeh.2015.12.006.

Hasegawa, T., Fukuda, K., Kawahashi, I., & Imada, S. (2016). Eating and sleeping in preschool children (5): The effects of the mothers' pattern in cooking behavior and eating behavior on children's health, timing of eating and sleeping, and eating behavior: P0923. *International Journal of Psychology, 51*(S1), 384.

Hasegawa, T., Kawahashi, I., Fukuda, K., & Imada, S. (2018). *Nihongo ban S-UPPS-P shodosei shakudo kaihatsuno kokoromi* [A trial study into the development of Japanese version of S-UPPS-P Impulsive Behavior Scale]. In *Proceedings of the 82nd annual convention of the japanese psychological association.* https://doi.org/10.4992/pacjpa.82.0_3PM-070.

Holland, P. W., & Thayer, D. T. (1988). Differential item performance and the Mantel-Haenszel procedure. In H. Wainer, & H. I. Braun (Eds.), *Test validity* (pp. 129–145). Hillsdale, NJ: Lawrence Erlbaum.

Kobashi, M., & Ida, M. (2013). *Kaiteiban nihongoban BIS-11 no sakusei- shinraisei to datousei no kento-* [Making the revised version of Barratt Impulsiveness Scale 11th in Japanese: A study on reliability and validity]. *Journal of Psychology Rissho University, 4*, 53–61.

Lim, S. Y., & Kim, S. J. (2018). Validation of a short Korean version of the UPPS-P Impulsive Behavior Scale. *Asia-Pacific Psychiatry, 10*(3), e12318. https://doi.org/10.1111/appy.12318.

Lynam, D. R., Smith, G. T., Whiteside, S. P., & Cyders, M. A. (2006). *The UPPS-P: Assessing five personality pathways to impulsive behavior (Technical Report).* West Lafayette, IN: Purdue University.

Lynam, D. R., Smith, G. T., Cyders, M. A., Fischer, N. S., & Whiteside, S. P. (2007). *The UPPS-P questionnaire measure of five dispositions to rash action (Unpublished technical report).* West Lafayette, IN: Purdue University.

Mihara, S., Osaki, Y., Nakayama, H., Sakuma, H., Ikeda, M., Itani, O., … Higuchi, S. (2016). Internet use and problematic Internet use among adolescents in Japan: A nationwide representative survey. *Addictive Behaviors Reports, 4*, 58–64. https://doi.org/10.1016/j.abrep.2016.10.001.

Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.

Namikawa, T., Tani, I., Wakita, T., Kumagai, R., & Nakane, A. (2012). *Big Five shakudo tanshukuban no kaihatu to shinraisei to datosei no kennto* [Development of a short form of the Japanese Big-Five Scale, and a test of its reliability and validity]. *Japanese Journal of Psychology, 83*(2), 91–99. https://doi.org/10.4992/jjpsy.83.91.

Nishikawa, K., Okugami, S., & Amemiya, T. (2015). *Nihongo ban Short Grit (Grit-S) shakduo no sakusei* [Development of the Japanese Short Grit Scale (Grit-S)]. *Japanese Journal of Personality, 24*(2), 167–169.

Osaki, Y., & Kinjo, A. (2015). Isonsho no ekigaku [Epidemiology of addictive disorders and behaviors in Japan]. *Nippon Rinsho, 73*(9), 1459–1464.

Ozaki, Y., Goto, T., Kobayashi, M., & Kutsuzawa, G. (2016). *Serufu kontororu shakudo tanshukuban no hoyaku oyobi shinraisei・datousei no kento* [Reliability and validity of the Japanese translation of Brief Self-Control Scale (BSCS-J)]. *Japanese Journal of Psychology, 87*(2), 144–154. https://doi.org/10.4992/jjpsy.87.14222.

Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology, 51*(6), 768–774. https://doi.org/10.1002/1097-4679(199511)51:6<768::AID-JCLP2270510607>3.0.CO;2-1.

Savvidou, L. G., Fagundo, A. B., Fernández-Aranda, F., Granero, R., Claes, L., Mallorquí-Baqué, N., … Jiménez-Murcia, S. (2017). Is gambling disorder associated with impulsivity traits measured by the UPPS-P and is this association moderated by sex and age? *Comprehensive Psychiatry, 72*, 106–113. https://doi.org/10.1016/j.comppsych.2016.10.005.

Schell, S. E., Brassard, S. L., & Racine, S. E. (2019). Extending the acquired preparedness model of binge eating: Testing the indirect effects of high-risk personality traits on binge eating via positive and negative reinforcement expectancies. *Appetite, 140*, 206–212. https://doi.org/10.1016/j.appet.2019.05.020.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research, 8*(2), 23–74.

Shealy, R., & Stout, W. (1993). A model-based standardization approach that separates true bias/DIF from group ability differences and detects test bias/DTF as well as item bias/DIF. *Psychometrika, 58*(2), 159–194. https://doi.org/10.1007/BF02294572.

Someya, T., Sakado, K., Seki, T., Kojima, M., Reist, C., Tang, S. W., & Takahashi, S. (2001). The Japanese version of the Barratt Impulsiveness Scale, 11th version (BIS-11): Its reliability and validity. *Psychiatry and Clinical Neurosciences, 55*(2), 111–114. https://doi.org/10.1046/j.1440-1819.2001.00796.x.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades and interpersonal success. *Journal of Personality, 72*(2), 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x.

Wada, S. (1996). *Seikaku tokusei yougo wo mochiita Big Five shakudo no sakusei* [Construction of the Big Five Scales of personality trait terms and concurrent validity with NPI]. *Japanese Journal of Psychology, 67*(1), 61–67. https://doi.org/10.4992/jjpsy.67.61.

Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*(4), 669–689. https://doi.org/10.1016/S0191-8869(00)00064-7.

Whiteside, S. P., Lynam, D. R., Miller, J. D., & Reynolds, S. K. (2005). Validation of the UPPS Impulsive Behaviour Scale: A four-factor model of impulsivity. *European Journal of Personality, 19*(7), 559–574. https://doi.org/10.1002/per.556.

Xue, Z., Hu, Y., Wang, J., Huang, L., Liu, W., & Sun, F. (2017). Reliability and validity of the short version of UPPS-P Impulsive Behavior Scale in college students. *Chinese Journal of Clinical Psychology, 25*(4), 662–666.

Zsila, Á., Bőthe, B., Demetrovics, Z., Billieux, J., & Orosz, G. (2020). Further exploration of the SUPPS-P Impulsive Behavior Scale's factor structure: Evidence from a large Hungarian sample. *Current Psychology, 39*, 378–388. https://doi.org/10.1007/s12144-017-9773-7.