



Validity and reliability of the Japanese version of the Temperament and Character Inventory: a study of university and college students[☆]

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Abstract

Objective: The Temperament and Character Inventory (TCI) is a widely used self-report measure of adult personality.

Method: We studied 586 Japanese university and college students with the 125-item version of the Japanese TCI.

Results: The factor structure of the TCI scales was similar to that reported in other languages. Depression was positively correlated with Novelty Seeking and Harm Avoidance but inversely correlated with Persistence, Self-Directedness, and Cooperativeness. Good Self-Image in the framework of adult attachment was correlated positively with Self-Directedness but inversely with Harm Avoidance and Reward Dependence. Good Other-Image in the framework of adult attachment was positively correlated with Reward Dependence and Cooperativeness. The scores of the TCI scales were stable over a time span of 1.5 to 2 months.

Conclusion: The Japanese version of the TCI may be a valid and reliable measure of temperament and character, at least among the adolescent and young adult population.

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1. Introduction

Cloninger [1] proposed that personality consists of temperament and character domains. *Temperament* refers to individual differences in basic emotional responses, and temperament dimensions are traits that are moderately heritable and stable throughout life. On the other hand, *character*, which can mature, reflects an individual's life goals, value system, and self-conscious emotions. Its dimensions are weakly heritable and moderately influenced by social learning. Based on these ideas, Cloninger et al [2] developed the Temperament and Character Inventory (TCI). Temperament consists of 4 scales—Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), and

Persistence (P)—whereas character consists of 3 scales—Self-Directedness (SD), Cooperativeness (C), and Self-Transcendence (ST). The TCI has been translated into many languages including Dutch [3], Belgian [4], Finnish [5], Polish [6], Swedish [7], Italian [8–10], Korean [11], Chinese [12], and Turkish [13]. It was translated into Japanese with Professor Cloninger's permission [14].

For the TCI to be used in clinical and research settings in a Japanese population, we must first demonstrate that the factor structure of the Japanese TCI corresponds to that of the English version, that it has theoretically expected links with other factors, and that the scores of the instrument are stable over a span of period.

The internal consistency and factor structure of the Japanese version of the scale have already been reported [15,16]. However, these were reported in only a few studies. Tomita et al [16] used an entirely male population. Replication of the TCI factor structure in a Japanese population is needed. This is the first aim of this study.

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The links of TCI scores with psychopathology such as depression and anxiety have been reported in a Japanese population [17–20]. Although the replication of the link between the TCI score pattern and depression is indeed another aim of this study, we also considered that the TCI pattern might be associated with the relational styles of adolescents and young adults. This is because the TCI, and particularly its character domains, reflects the personality maturation that underlies the way an individual relates to other people important to them. For example, Tanaka et al [21] studied adult attachment in a Japanese university student population (N = 4226) and obtained 2 discriminate functions. The first discriminate function reflected the good-self model in the framework of the attachment style and was loaded by C, whereas the second discriminate function reflected the good-other model in the framework of the attachment style and was loaded by SD. This implies that the models of self and other in attachment patterns are associated with personality. The study of Tanaka et al [21] was unique in terms of its large number of participants, but it used a very short version of the TCI. Their findings, therefore, should be replicated using a full version of the instrument.

The TCI's test-retest reliability has been reported for the English [2] (p 83) and Swedish versions [7]. However, the test-retest reliability of the Japanese version of the TCI has never been reported.

This is a report of the factor structure, validity, and reliability of the Japanese version of the TCI in a university and college student population.

2. Method

2.1. Participants

Students in 6 introductory psychology courses at 2 universities and 1 college in the Tokyo area participated in this questionnaire survey. These students belonged to Japanese middle class families residing in the Tokyo metropolitan area. A total of 586 students returned the questionnaire. These comprised 106 men and 478 women, whereas the sex of 2 students was not noted. The mean age was significantly ($t = 4.87, P < .001$) older for men (20.2, SD = 2.9) than women (18.8, SD = 18.8).

2.2. Measures

Temperament and Character Inventory: This is a self-report measure of personality based on the theory proposed by Cloninger et al [22]. Each scale of the TCI, including NS, HA, RD, P, SD, C, and ST, has 3 to 5 subscales, except for P, which consists of only 1 subscale (Table 1). The scale has 2 versions, one with 240 items and another with 125 items. Each item is rated with a 2-point scale (“yes” or “no”); but Kijima et al [15] proposed a 4-point Likert scale, ranging from 0 (“very unlikely”) to 3 (“very likely”). Kijima et al [15]

Table 1
Factor structure of the temperament domains

TCI subscales	Mean (SD)	Factors			
		I	II	III	IV
Shyness with strangers (HA3)	8.0 (2.8)	.80	.09	-.25	.02
Fatigability (HA4)	8.3 (2.8)	.73	.08	-.12	-.22
Fear of uncertainty (HA2)	10.5 (2.5)	.71	-.03	.24	-.07
Worry and pessimism (HA1)	8.8 (2.4)	.69	-.11	.17	.08
Extravagance (NS3)	8.4 (3.5)	.18	.77	.17	-.12
Disorderliness (NS4)	8.9 (2.7)	.00	.76	-.02	.05
Impulsivity (NS2)	5.2 (2.2)	-.24	.55	.04	-.31
Attachment (RD3)	9.6 (3.0)	-.31	.05	.82	-.09
Sentimentality (RD1)	12.3 (2.9)	.11	.16	.72	.27
Dependence (RD4)	9.5 (2.1)	.15	-.03	.70	-.08
P	8.4 (2.7)	-.10	-.35	.07	.77
Exploratory excitement (NS1)	5.7 (2.1)	-.08	.54	-.08	.59
% of variance explained		24.7%	16.4%	13.0%	7.6%

Factor loadings of 0.5 or more are in bold.

showed that a 4-point scale was superior to a dichotomous scale in terms of internal consistency as expressed by Cronbach α . In this study, we used the 125-item version with a 4-point scale. Mean values were substituted for missing values only when at least 100 items were answered.

Center for Epidemiologic Studies Depression Scale (CES-D): This is a self-report measure of depression [23] developed for epidemiologic investigations. The CES-D consists of 20 items with a 5-point scale. Four items are positively worded, and these are reverse-scored. Iwata et al [24] added negatively worded items corresponding to these positively worded items and administered the scale to Japanese patients with dysphoric-mood-related symptoms and matched controls. Whereas they found comparable responses between the 2 on the positively worded items, they found a marked difference on the negatively worded items. They concluded that positively worded items could not be used to assess depression in the Japanese population. Iwata et al [25] compared Japanese and American populations using the same methods and found a significantly higher score on the positive affect subscale in the Americans but no differences in terms of the negatively worded items. This supports the hypothesis that Japanese respondents have a tendency to suppress the expression of positive affect. In the present study, we used the negatively worded items as suggested by Iwata et al [24,25]. Each of the CES-D items was rated on a 5-point scale: never (0) to almost always (4).

2.2.1. Relationship Questionnaire

The Relationship Questionnaire (RQ) is a self-report measure about 4 categories of adult attachment style: Secure, Fearful, Preoccupied, and Dismissing [26]. The last 3 categories were grouped together as insecure attachment styles. The RQ consists of 4 paragraphs with a 7-point scale (from “Does not apply to me at all” = 0 to “Applies to me very much” = 6) describing each attachment style. Participants are asked to rate how each description corresponds to their

Table 2
Factor structure of the character domains

TCI subscales	Mean (SD)	Factor		
		I	II	III
Resourcefulness (SD3)	6.4 (2.4)	.78	-.08	.11
Congruent second nature (SD5)	6.9 (2.1)	.78	-.12	.13
Purposefulness (SD2)	8.2 (2.4)	.69	.05	.28
Self-acceptance (SD4)	5.1 (3.0)	.63	-.04	-.29
Responsibility (SD1)	9.3 (2.4)	.59	.25	-.32
Compassion vs revenge (C4)	9.3 (2.8)	.01	-.75	-.05
Integrated conscience (C5)	9.6 (2.0)	-.07	.71	.05
Helpfulness (C3)	9.4 (1.9)	-.10	.66	.13
Social acceptance (C1)	9.6 (2.1)	.02	.65	-.12
Empathy (C2)	8.4 (1.9)	.06	.55	.15
Self-forgetfulness (ST1)	4.2 (2.6)	.05	-.10	.83
Spiritual acceptance (ST3)	5.2 (2.5)	.08	.14	.80
Transpersonal identity (ST2)	6.6 (2.5)	-.08	.06	.79
% of variance explained		23.1%	16.3%	15.1%

Factor loadings of 0.5 or more are in bold.

relationship with their partner. For those participants with no definite partner, the questionnaire requests them to imagine a close opposite-sex person. After obtaining permission from Dr. Bartholomew, T.K. translated the RQ into Japanese. In this study, the Self Model score was calculated by subtracting the scores of Fearful and Preoccupied from the sum of the scores of Secure and Dismissing; the Other Model score was

calculated by subtracting the scores of Fearful and Dismissing from the sum of the scores of Secure and Preoccupied.

2.3. Procedures

The questionnaire was distributed as part of a series whereby students would analyze themselves using the TCI. The first wave of the study occurred between October 22 and November 10, 1999. The second wave took place in the same classes 1.5 to 2 months later. All the questionnaires were filled in anonymously. To enable us to link participants between waves, we asked them to write down their date of birth and the last 4 digits of their home telephone number. To protect privacy, no other personal information (for instance, student ID number) was requested. The present project was approved by the Ethical Committee of the National Center of Neurology and Psychiatry, Konodai Campus.

2.4. Statistical analyses

All subscales of the TCI were subjected to exploratory factor analyses (EFAs) separately for the temperament and character domains. The number of factors was determined by scree plot [27] after confirming that all the eigenvalues used were greater than one. Promax rotation was performed to obtain a diagonal rotation because all TCI

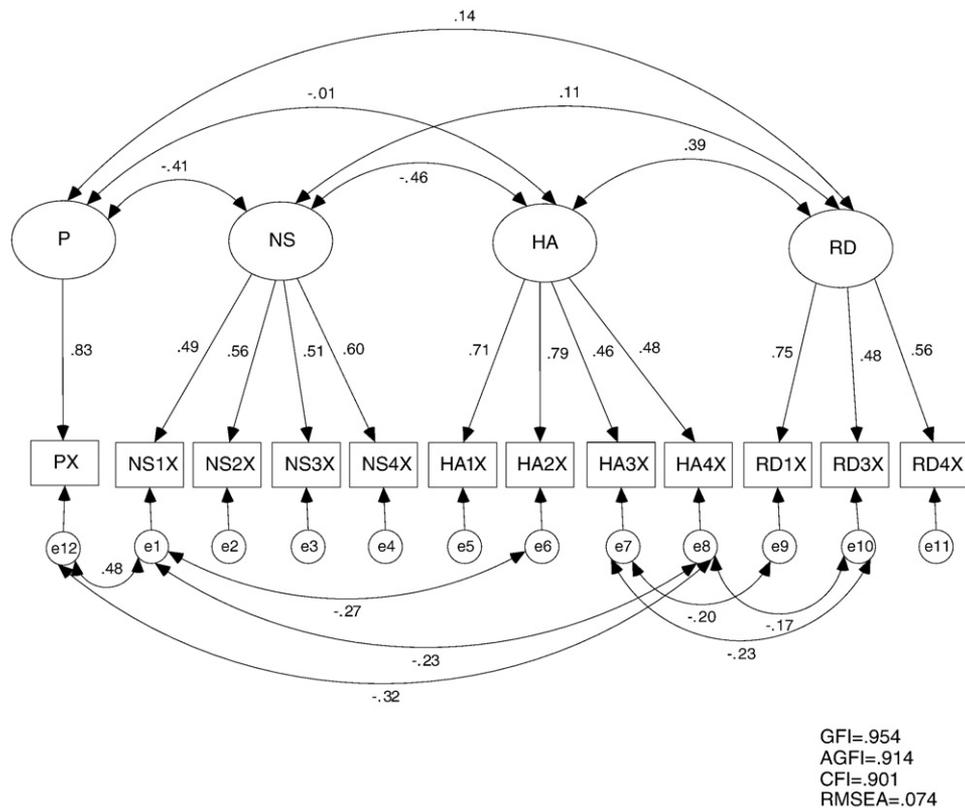


Fig. 1. Confirmatory factor analysis of the TCI temperament subscales. For abbreviations, see Table 1.

subscale factors were thought to be dependent on each other to some extent.

Because the EFAs confirmed that the numbers of temperament and character domain factors were the same as those reported in the original English version, we performed a series of confirmatory factor analyses (CFA), separately for temperament and character subscales, to examine whether the TCI subscales of the Japanese version were composed of the same scales. Thus, we posited that there would be 4 latent variables—NS, HA, RD, and P—for temperament and 3 latent variables—SD, C, and ST—for character; each latent variable would influence TCI subscales theoretically belonging to that variable; and all the latent variables would share covariances. We used as goodness-of-fit indices the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). According to conventional criteria, GFI greater than .90, AGFI greater than .85, CFI greater than .95, and RMSEA less than 0.08 indicate an acceptable fit; and GFI greater than .95, AGFI greater than .90, CFI greater than .97, and RMSEA less than 0.05 indicate a good fit [28]. To improve the model's fit with the data, modification indices were used; and new covariance estimates were consecutively added. We paid most attention to ensuring that the suggested modification by such indices made theoretical or common sense [29] (p 153).

We then correlated the TCI scale scores with the CES-D and RQ scores as means of external validation. As seen later, most of the TCI scale scores were associated with the participants' age and sex (men, 1; women, 2); so we calculated partial correlations of each of the TCI scales with CES-D and RQ scores after controlling for these factors. Finally, the TCI scale and subscale scores were compared and correlated between time 1 and time 2.

Statistical analyses were conducted using SPSS 17.0 and AMOS (SPSS, Chicago, IL).

3. Results

3.1. Factor structure of the TCI

Of 586 students, 585 students returned the questionnaire containing the TCI items. An EFA of the temperament subscales yielded 4 factors (Table 1). Four subscales that originally belonged to HA had factor loadings of 0.5 or more on the first factor; we therefore concluded that this factor represented HA. Another 4 subscales that originally belonged to NS had factor loadings of 0.5 or more on the second factor, indicating that this factor represented NS. Three subscales that originally belonged to RD had factor loadings of 0.5 or more on the third factor; thus, this factor represented RD. Finally, 1 subscale of P and 1 subscale of NS had factor loadings of 0.5 or more

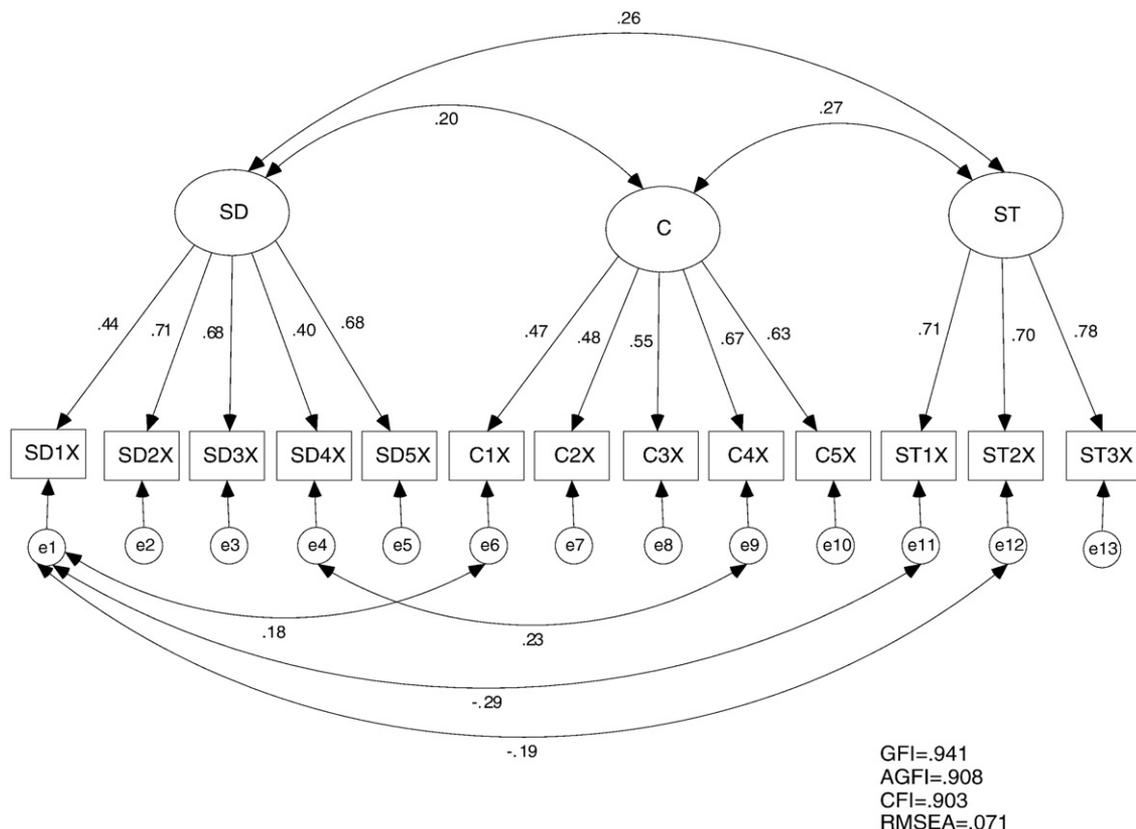


Fig. 2. Confirmatory factor analysis of the TCI character subscales. For abbreviations, see Table 1.

Table 3
Correlations of the TCI scores with depression, adult attachment styles, age, and sex

	CES-D	Self-Image	Other-Image	Age	Sex
NS	.10* (.07)	.05 (.08)	.10 (.11)	-.04	.04
HA	.34*** (.35***)	-.35*** (-.35***)	-.04 (-.06)	-.17***	.10*
RD	.05 (.04)	-.15*** (-.12**)	.47*** (.46***)	-.15***	.22***
P	-.11* (-.09*)	.06 (.04)	-.01 (.01)	.10*	-.06
SD	-.62*** (-.61***)	.35*** (.35***)	-.05 (-.04)	.16***	-.11*
C	-.16*** (-.16***)	-.03 (-.02)	.21*** (.19***)	-.10*	.18***
ST	-.01 (.00)	.06 (.07)	-.00 (.01)	.08	-.00

Partial correlation coefficients controlled for age and sex are in parentheses.

on the fourth factor. We interpreted this factor as reflecting P. In the factor analysis of the character domain subscales, all subscales had factor loadings of 0.5 or more on each factor corresponding to the original theoretical categories (Table 2).

Of the participating students, 550 filled in the TCI items. The TCI item scores for these students were then subjected to 2 CFAs for the temperament and character domains separately. The initial temperament model showed $GFI =$

.918, $AGFI = .869$, $CFI = .810$, and $RMSEA = 0.095$, indicating that it was not acceptable. Modification indices that could be theoretically interpretable suggested covariances of the error variables between P and NS1, P and HA4, and NS1 and both HA2 and HA4. They also suggested covariances of the error variables of HA3 and HA4 with the error variables of RD1 and RD3 (Fig. 1). The revised model showed $GFI = .954$, $AGFI = .914$, $CFI = .901$, and $RMSEA = 0.074$, suggesting a good fit to the data.

Table 4
Test-retest correlations of the TCI subscales and differences between the 2 time points

TCI	Test-retest correlation	Mean (SD)		
		Time 1	Time 2	Difference <i>t</i> test
NS	.84 [‡]	27.5 (7.2)	27.2 (7.2)	1.4
NS1 (exploratory excitement)	.74 [‡]	5.7 (2.1)	5.7 (2.2)	0.6
NS2 (impulsiveness)	.67 [‡]	5.1 (2.2)	5.1 (2.2)	0.1
NS3 (extravagance)	.84 [‡]	8.0 (3.4)	7.9 (3.3)	1.1
NS4 (disorderliness)	.66 [‡]	8.7 (2.7)	8.5 (2.6)	2.1
HA	.82 [‡]	35.7 (7.7)	35.1 (8.1)	2.9 [†]
HA1 (worry and pessimism)	.69 [‡]	8.8 (2.4)	8.7 (2.4)	2.1*
HA2 (fear of uncertainty)	.73 [‡]	10.6 (2.4)	10.5 (2.6)	1.4
HA3 (shyness with strangers)	.73 [‡]	8.1 (2.8)	7.9 (2.8)	2.1*
HA4 (fatigability)	.73 [‡]	8.2 (2.7)	8.1 (2.7)	1.6
RD	.84 [‡]	31.2 (5.9)	31.4 (6.1)	1.4
RD1 (sentimentality)	.77 [‡]	12.2 (2.9)	12.2 (3.0)	0.1
RD3 (attachment)	.79 [‡]	9.5 (2.9)	9.8 (3.0)	3.3 [†]
RD4 (dependence)	.60 [‡]	9.5 (2.0)	9.4 (2.0)	1.0
P	.72 [‡]	8.6 (2.6)	8.7 (2.5)	1.9
SD	.78 [‡]	36.3 (8.2)	36.6 (9.0)	0.9
SD1 (responsibility)	.56 [‡]	9.4 (2.3)	9.7 (2.4)	2.8 [†]
SD2 (purposeful)	.65 [‡]	8.3 (2.4)	8.4 (2.5)	0.6
SD3 (resourcefulness)	.69 [‡]	6.4 (2.4)	6.4 (2.3)	0.3
SD4 (self-acceptance)	.75 [‡]	5.2 (3.0)	5.1 (3.0)	1.4
SD5 (congruent second nature)	.59 [‡]	7.0 (2.0)	7.0 (2.2)	0.0
C	.77 [‡]	46.4 (7.1)	46.9 (7.2)	2.2*
C1 (social acceptance)	.63 [‡]	9.6 (2.1)	9.8 (2.0)	1.7
C2 (empathy)	.55 [‡]	8.4 (1.9)	8.3 (1.9)	1.2
C3 (helpfulness)	.58 [‡]	9.4 (1.9)	9.7 (1.8)	2.8 [†]
C4 (compassion)	.77 [‡]	9.3 (2.8)	9.4 (2.7)	1.5
C5 (integrated conscience)	.54 [‡]	9.7 (1.9)	9.8 (2.0)	1.1
ST	.72 [‡]	16.1 (6.1)	15.4 (6.4)	3.0 [†]
ST1 (self-forgetful)	.69 [‡]	4.2 (2.5)	3.9 (2.5)	4.1 [‡]
ST2 (transpersonal)	.59 [‡]	6.6 (2.4)	6.5 (2.5)	0.4
ST3 (spiritual acceptance)	.63 [‡]	5.3 (2.4)	5.0 (2.5)	2.4*

* $P < .05$.

† $P < .01$.

‡ $P < .001$.

The initial character model showed GFI = .917, AGFI = .879, CFI = .856, and RMSEA = 0.084, indicating an unacceptable fit. Modification indices that could be theoretically interpretable suggested covariances of the error variable of SD1 with the error variables of C1, ST1, and ST2 and covariance between the error variables of SD4 and C4 (Fig. 2). The revised model showed GFI = .941, AGFI = .908, CFI = .903, and RMSEA = 0.071, indicating a fit to the data that was between acceptable and good.

3.2. Construct validity of the TCI

Depression, as measured by the CES-D, was positively correlated with NS and HA but inversely correlated with P, SD, and C (Table 3). Good Self-Image was positively correlated with SD but inversely correlated with HA and RD. Good Other-Image was positively correlated with RD and C. Older age was correlated with SD and lower HA, RD, and C. Female sex was associated with RD and C but inversely associated with SD. Partial correlations after controlling for age and sex showed virtually the same correlation coefficients between the TCI scale scores and CES-D and RQ scores (Table 3).

3.3. Test-retest reliability of the TCI

A total of 464 students participated in the second wave questionnaire survey. All TCI scales and subscales were correlated significantly between times 1 and 2 (Table 4). The mean of each TCI scale and subscale score did not differ between times 1 and 2 except for HA and ST, which were lower in time 2, and C, which was higher in time 2.

4. Discussion

An EFA showed that the factor structure of the Japanese TCI subscales corresponded well with that of the original report in the United States. A similar TCI subscale factor structure was reported [30] in a Japanese outpatient population with major depression. Our findings and those of Sato et al [30] in Japan are in line with studies of the TCI factor structure in other languages such as Swedish [7], Dutch [3], Belgian [4], French [31], Italian [9,10], Korean [11], Chinese [12], and Turkish [13]. An exception was exploratory excitement, an NS subscale, which showed high factor loading both on factor II, on which the other NS subscales had high factor loadings, and factor III, which consisted of P and NS1. People who are high in P tend to be industrious, hard-working, persistent, and stable even in situations that are frustrating [2]. They are less likely to feel fatigue. People who are high in exploratory excitement tend to enjoy exploring unfamiliar places and situations even though others may think that this is a waste of time. They are likely to become excited about new ideas and activities. Thus, people high in P and those high in exploratory excitement may be similar in that they have energy to carry out tasks they are interested in.

Nevertheless, the activity of the former is enduring, whereas the activity of the latter is often short-lived, leading them to shift from one goal to another.

Findings from the EFAs were replicated in the CFAs. The CFAs with revised models showed acceptable fit to the data. The covariance between P and exploratory excitability (NS1) was discussed above. NS1 covaried inversely with fear of uncertainty (HA2) and fatigability and asthenia (HA4). HA4 also negatively covaried with P. These findings were interpretable as indicating the bipolarity between energetic enthusiasm and lack of it. Whereas HA and RD were *positively* correlated, both HA3 and HA4 *inversely* covaried with sentimentality (RD1) and attachment (RD3). People high in worry and pessimism (HA1) and fear of uncertainty (HA2) may be more likely to be involved in affectionate interpersonal relations that lead to sentimentality (RD1) and attachment (RD3). On the other hand, people who are also high in HA, particularly in shyness with strangers (HA3) and fatigability and asthenia (HA4), may be less interested in intimate personal contact and are therefore less likely to be sentimental or to maintain secure attachment. In the domain of character, responsibility (SD1) covaried positively with social acceptance (C1) and inversely with self-forgetfulness (ST1) and transpersonal identification (ST2). People who are high in responsibility are “free to choose what they will do” [2]. They are reliable and trustworthy. Although they recognize their own autonomy, they may be more likely to respect different behaviors, opinions, and values of others (C1). On the other hand, people low in responsibility feel that their attitudes, behaviors, and choices are not their own but are determined by influences outside of their control. They are likely to transcend their self-boundaries (ST1) and feel a strong connection to nature and the universe (ST2). Finally, self-acceptance (SD4) covaried with compassion (C4). People high in self-acceptance (SD4) accept both their strengths and weaknesses. They may be more forgiving, charitable, and benevolent (C4). The CFAs in this study together suggest that although the TCI scales are discrete from one other, they do share covariance, for instance, personality maturation in the case of character. Subscales also share covariance with other subscales. Therefore, the structure described by Cloninger’s 7-factor theory is built on a complicated network of the components that make up the temperament and character domains.

Concurrent depression correlated with HA and low SD and C even after controlling for the students’ age and sex. It slightly correlated inversely with P. This is in line with many clinical and nonclinical studies on the links between depression and TCI personality patterns [1,19,32–36]

Adult attachment, which consists of Self- and Other-Images, is an essential prerequisite for an enduring, reliable, intimate relationship with a partner. This study showed that good Self-Image resulted from high SD as well as low HA and RD, whereas good Other-Image was the product of high C and RD. Because SD refers to a character trait that is mature, self-sufficient, and goal-oriented, people high in this

Table 5
Psychometric properties of the TCI in different languages

Language	Investigators	EFA	CFA	Internal consistency	Test-retest reliability
Belgian	Hansenne et al (2001)	None	CFA identified 4 temperament dimensions and 3 character dimensions.	None	None
Chinese	Parker et al (2003)	Oblique rotation showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .56-.81 for the temperament scales; .73-.83 for the character scales. Not compromised by language as compared with concurrent English version	Test-retest intraclass correlation coefficient (1-mo interval): .66-.83 for the temperament scales; .45-.74 for the character scales
Dutch	Duijsens et al (2000)	Principal component analysis showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Not shown	None
French	Miettunen et al (2004)	Principal component analysis rotated by oblimin showed that the factor structures of the temperament subscales were the same as or similar to the original factors.	None	Cronbach α : .55-.85 for the temperament scales	None
Italian	Fossati et al (2007)	Procrustes analysis showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .79-.91 for the temperament scales; .84-.87 for the character scales	None
	Martinotti et al (2008)	Principal component analysis with varimax rotation showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .78-.89 for the temperament scales; .82-.86 for the character scales	Test-retest intraclass correlation coefficient (1-mo interval): .81-.88 for the temperament scales; .68-.80 for the character scales
Japanese	Kijima et al (2000)	Principal component analysis rotated by oblimin showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .69-.85 for the temperament scales; .81-.82 for the character scales	None
	Tomita et al (2000)	None	CFA identified 4 temperament dimensions and 3 character dimensions.	Cronbach α : .60-.85 for the temperament scales; .72-.83 for the character scales	None
Korean	Sung et al (2002)	Principal component analysis with promax rotation showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	CFA identified 4 character dimensions and 3 character dimensions (details not shown)	Cronbach α : .60-.85 for the temperament scales; .82-.87 for the character scales	Test-retest correlations (3-mo interval): .52-.72 for the temperament scales; .52-.71 for the character scales
Swedish	Brändström et al (1998)	Principal component analysis rotated by oblimin showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .56-.85 for the temperament scales; .75-.84 for the character scales	Test-retest correlations (1-y interval): .69-.85 for the temperament scales; .74-.85 for the character scales
Turkish	Kose et al (2009)	Principal component analysis rotated by oblimin showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	None	Cronbach α : .60-.85 for the temperament scales; .82-.83 for the character scales	Test-retest correlations (1-mo interval): .52-.84 for the temperament scales; .53-.73 for the character scales
Present study	Takeuchi et al (2009)	Principal component analysis with promax rotation showed that the factor structures of the temperament and character subscales were the same as or similar to the original factors.	CFA showed good fit of the 7-factor model		Test-retest correlations (1- to 2-mo interval): .72-.84 for the temperament scales; .72-.78 for the character scales

trait are likely to have a positive image of self in the context of a relationship with an intimate partner. On the other hand, C refers to a character trait that is empathic, tolerate, compassionate, and supportive. People with such a trait are likely to view others in a positive perspective. High HA may be associated with low self-confidence. People high in RD may feel more comfortable when being with other people. Hence, the present findings regarding the links between TCI scores and RQ scores may be an evidence of TCI validity. Using a different adult attachment style measure, Martinotti et al [10] found that secure attachment styles were associated with SD, C, and RD, as well as low HA. Insecure attachment styles were associated with HA and low SD and C. Puzzling is the finding that *low* RD was, though weakly, associated with good Self-Image in our study. The study of Martinotti et al [10] showed that RD was positively associated with secure adult attachment score (ie, confidence). This discrepancy is difficult to interpret. Whereas Martinotti et al [10] studied adults with a mean age of 33 years, the participants in our study were younger with a mean age of around 20 years. In such people in late adolescence and early adulthood, RD may not result in developing good image of self as compared with SD. This issue needs replication focusing on the relationship between age and the effects of temperament domains on interpersonal relationships.

Interpersonal sensitivity, an aspect of adult attachment, was measured in conjunction with the TCI among a Japanese nonclinical population [37]. Interpersonal sensitivity was found to be associated with HA and ST as well as low SD. These studies and our own indicate that high SD coupled with low HA underlies secure attachment styles in adults.

This study showed that the TCI could be used reliably and validly in a Japanese nonclinical population. The TCI has been translated into several languages, and its psychometric properties have been reported (Table 5). Although these reports support the validity and reliability of the TCI in different languages, few used a CFA to examine the factor structure. Future validation studies of personality measurement such as the TCI should use a CFA.

Cloninger et al [2] (p 83) reported test-retest correlations of the TCI scores among psychiatric outpatients with a 6-month interval. They were .79 for NS, .77 for HA, .71 for RD, .72 for P, .72 for SD, .78 for C, and .83 for ST. Brändström et al [7] distributed the scale to a Swedish population twice, with 1 year between measurements. The correlations of the scores on the 2 occasions were .85 for NS, .84 for HA, .76 for RD, .69 for P, .81 for SD, .74 for C, and .85 for ST. Similar results were reported for the Turkish [13] and Italian [10] versions of the TCI. As compared with these figures, our study showed that the Japanese version of the TCI was similarly reliable in a student population.

Limitations of this study should be discussed. First, our study is based only on university and college students who are basically nonclinical. Therefore, generalization to populations of other age ranges or clinical populations

should be done with caution. In addition, because this study has dealt with students of psychological courses only, it could not be concluded that this version can be used generally for Japanese adolescent and young adult population unless the translation is shown to be well accepted by those with low-level education. In fact, items of the TCI are generally not very easy to comprehend. Hence, replication studies should be conducted in a Japanese population with a wide range of educational background. Second, personality assessment was performed via self-report in this study. Whether an individual can reliably assess his or her own personality awaits further study. Third, we used the 125-item version of the inventory. Recent effort to create a short version such as the 56-item version [38] is intriguing. It may be necessary to choose only a few items to represent each temperament and character domain scale used by a Japanese population if the purpose of the research requires more spaces of the questionnaire for items other than personality.

Taking into consideration these drawbacks, this study has shown that the Japanese version of the TCI may be a valid and reliable measure of temperament and character, at least among an adolescent and young adult population.

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