

## Basic Psychological Need Satisfaction and Frustration in Japan: Controlling for the Big Five Personality Traits

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**Abstract:** The present study investigated the function of satisfaction and frustration of the basic psychological needs – autonomy, competence, and relatedness – that contribute to subjective well-being (life-satisfaction, vitality, and depression) through a back-translation procedure of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS). A total of 564 Japanese undergraduates (356 males, 205 females, three unknown;  $M_{\text{age}} = 18.61$  years,  $SD = 1.48$ ) participated in a questionnaire survey. Confirmatory factor analysis showed that the BPNSFS had the same six-factor structure as that found in the original version. Structural equation modeling showed that satisfaction of each of the three needs contributed to the prediction of subjective well-being (life satisfaction and vitality), whereas frustration of each need uniquely contributed to the prediction of ill-being (depressed affect). These results support previous findings found in Belgium, China, the USA, and Peru, confirming that satisfaction of basic psychological needs represents a critical element for healthy functioning across cultures. However, controlling for the effects of the Big Five personality traits indicates the possible over-estimation for the functions of the needs while clarifying these roles.

**Key words:** basic psychological needs, scale development, self-determination theory, subjective well-being, Big Five personality traits.

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Maintaining and enhancing subjective well-being is one of the universal agendas for every individual. Subjective well-being provides future desired outcomes, such as positive social development, healthy functioning, and human growth. The quest for understanding the mechanisms for enhancing subjective well-being still continues even though subjective well-being has been studied for over three decades.

The present study was based on the basic psychological needs theory (BPNT), which is one of the mini-theories of self-determination

theory (Ryan & Deci, 2000) and mostly related to the topic of the current study. The three main purposes of this study were (a) to translate the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) originally developed by Chen et al. (2015) from English into Japanese, (b) to investigate the function of the basic psychological needs of satisfaction and frustration by examining their relationship with indicators of subjective well-being in Japanese samples, and (c) to evaluate their function while controlling for the Big Five personality traits.

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### Well-Being and Two Approaches

There are two approaches for conceptualizing well-being. The first approach, advocated by Diener's group, interprets well-being as a state of high life satisfaction, happiness, positive mood, and a low negative mood (Diener, 1984; Oishi, Diener, & Lucas, 2007). Empirical research has revealed the national level of subjective well-being and the relationship between subjective well-being and economic status at the country and individual level. Presently, much of the research regarding subjective well-being is based on the premise of Diener's group. The second, more recent approach is the self-determination theory perspective that recognizes well-being as multiple functions that foster human growth and healthy functioning. BPNT posits three basic psychological needs as adaptive human functions: autonomy, competence, and relatedness (Ryan & Deci, 2000). This theory claims that if these three needs are fulfilled, the person becomes more functioning, thus achieving well-being. However, as the number of studies using this second approach is smaller than that for the first approach, additional testing and demonstration of the universal role of basic psychological needs should be performed in additional countries and across different cultures.

### Need Satisfaction and Frustration in BPNT

The beginning of BPNT study was to develop a scale to measure the basic psychological need of satisfaction. The scale was adapted so that it could be used in the work environment (Baard, Deci, & Ryan, 2004; Deci et al., 2001; Ilardi, Leone, Kasser, & Ryan, 1993; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008; Vansteenkiste et al., 2007), specific relationships (La Guardia, Ryan, Couchman, & Deci, 2000), daily life in general (Gagné, 2003; Sheldon & Bettencourt, 2002), and sports situations (Gagné, Ryan, & Bargmann, 2003; Jøesaar, Hein, & Hagger, 2011; Reinboth & Duda, 2006; Reinboth, Duda, & Ntoumanis, 2004; Vlachopoulos & Michailidou, 2006). Dozens of studies have indicated that satisfaction of the basic psychological needs is related to indicators of well-being, such as vitality

(Gagné et al., 2003), positive mood (Sheldon & Bettencourt, 2002), self-esteem (Deci et al., 2001), and low anxiety (Baard et al., 2004). In addition, this relationship has been confirmed across cultures (Church et al., 2013).

Although BPNT posits both need satisfaction and frustration, the earlier stage of the research regarding BPNT only focused on need satisfaction. Since 2010, empirical research has begun to measure both satisfaction and frustration of basic psychological needs instead of a paradigm that measures need satisfaction versus its lack. Updated BPNT proposed a distinction between the lack of fulfillment of the needs and the experience of need frustration, and insisted on their asymmetrical relationship (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). Whereas low need satisfaction simply means failing to enhance human growth, the frustration of these needs could educe ill-being and maladjustment (Ryan, Deci, Grolnick, & La Guardia, 2006). According to this recent paradigm regarding need satisfaction versus frustration, autonomy satisfaction refers to the feeling of being the perceived origin or source of one's behavior and the experience of full self-determination when committing to an activity; whereas autonomy frustration involves feeling controlled through externally enforced or self-imposed, coercive pressures. Relatedness satisfaction refers to the experience of intimacy and genuine connection with others, whereas relatedness frustration involves the experience of relational exclusion and feeling of loneliness. Finally, competence satisfaction involves feeling effective in one's ongoing interactions with the social environment and being capable of expressing one's capacities and achieving positive outcomes, whereas competence frustration involves the feelings of incompetence and doubts about one's efficacy and failing to show one's ability (Chen et al., 2015; Deci & Ryan, 2000).

Chen et al. (2015) developed the BPNSFS and examined the distinctive roles of need satisfaction and frustration, in that psychological need satisfaction predicted life satisfaction and

vitality, whereas psychological need frustration predicted depressive symptoms in countries such as China, Belgium, the United States, and Peru. Chen et al. (2015) reported the need for additional evidence of cross-cultural variation regarding the functions of need satisfaction and frustration. However, additional evidence for the universal claim of BPNT was required, in that all persons could benefit from need satisfactions regardless of race or cultural values (Vansteenkiste & Ryan, 2013).

### The Role of Personality Traits

One of the more considerable factors when evaluating the relationship satisfaction and frustration of basic psychological needs and subjective well-being was personality traits. As Diener, Oishi, and Lucas (2003) introduced, personality traits are known to be one of the most consistent predictors of subjective well-being. This finding implies that the personality traits distorted the relationship and required a control for the influence of personality traits on subjective well-being for a more accurate investigation. Some previous research already used the personality traits as a control variable when examining the relationship between only need satisfaction and subjective well-being (e.g., Philippe, Koestner, Beaulieu-Pelletier, & Lecours, 2011; Sheldon & Niemiec, 2006). However, there is no research examining the hypothesis of the updated BPNT while using personality traits as a controlled variable.

### The Present Study

The present study translated the BPNSFS, which was originally developed by Chen et al. (2015), from English into Japanese through a back-translation procedure. To confirm the reliability of the scale, a test-retest method with a 3-week interval was conducted. To evaluate evidence of the scale's validity, we investigated the relationship between satisfaction and frustration of basic psychological needs and indicators of subjective well-being. This study measured subjective well-being by three indicators: life satisfaction, vitality, and depression (in reverse direction) by referring to Chen et al. (2015). Thus, according to the

premise of BPNT, the following hypotheses regarding validity of the scale were proposed: (a) basic psychological need satisfaction (autonomy, relatedness, and competence) is positively correlated with life satisfaction and vitality, and negatively correlated with depression; and (b) conversely, basic psychological need frustration is negatively correlated with life satisfaction and vitality, and positively correlated with depression. Chen et al. (2015) revealed the unique function of the basic psychological need satisfaction and frustration by path analysis, and the present study employed the same path model. This path model contributes to reveal whether the Japanese sample support the premise of BPNT that satisfaction and frustration of the basic psychological needs uniquely contribute to subjective well-being. After that, this study used not only demographic data (i.e., sex, age, living status, family income, and financial satisfaction), as conducted in Chen et al. (2015), but also personality traits as control variables when evaluating the basic path model in BPNT. We used the Big Five personality traits: extraversion, conscientiousness, neuroticism, openness, and agreeableness (McCrae & John, 1992).

## Method

### Participants and Procedure

A total of 564 Japanese undergraduates (356 males, 205 females, three unknown;  $M_{\text{age}} = 18.61$  years,  $SD = 1.48$ ) from four universities in Japan participated in a questionnaire survey. Three universities provide the humanities programs in the Kanto region in Japan where the students' academic levels are rated as being between medium and relatively high. The other university is a science university in the western part of Japan where the students' academic levels are relatively high. For the analysis, we used data of participants who had Japanese nationality. One university, 87 participants, was sampled only for test-retest of the BPNSFS within a 3-week interval to confirm the reliability of the scale. These participants were exempt from responding to

other measures due to equality of cost aspects compared to other samples.

The survey was conducted during a psychology lecture and took approximately 20 min to complete. All participants provided a standard consent after being informed about the purpose of the survey: the absence of a relation with academic grade, participant's basic rights, and that they could refuse participation and quit at any time.

### Measures

All measures and instructions in this survey were in Japanese. Original English instruments were translated into Japanese by the authors under supervision of an English-translation company if the original version in Japanese had not been published.

**BPNSFS.** Participants completed the BPNSFS, which consists of 12 need satisfaction items: four items for each basic psychological need (autonomy, relatedness, and competence); and 12 need frustration items: four items for each of the basic psychological needs. After obtaining permission for the translation into Japanese, the back translation was conducted under the supervision of the first and second author of the original version (i.e., Dr. Chen and Prof. Vansteenkiste). The entire process of back-translation was completed through five exchanges. In the first round, 12 items from the original version met the required conditions of the supervisors. The remaining 12 items were requested by the supervisors with modified points to be revised. Eight items were completed in the second round, one in the third, one in the fourth, and the final two items met the requirements in the fifth round; all 24 items were successfully translated from English into Japanese.

Respondents rated each item on a 5-point rating, indicating the extent to which their psychological needs of autonomy, relatedness, and competence are satisfied or unsatisfied in their lives rated from 1 (*completely disagree*) to 5 (*completely agree*). The internal consistency of each need satisfaction was .77 for autonomy, .74 for relatedness, and .72 for

competence. The internal consistency of each need frustration was .75 for autonomy, .78 for relatedness, and .71 for competence. In addition, the internal consistency was .82 for total need satisfaction and .83 for total need frustration.

**Life satisfaction.** The Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) has five items and measures life satisfaction with ratings from 1 (*strongly disagree*) to 7 (*strongly agree*). The Japanese version of the rating was released on Diener's homepage (<http://internal.psychology.illinois.edu/~ediener/SWLS.html>). The internal consistency of the scale was .84.

**Vitality.** The Subjective Vitality Scale (Ryan & Frederick, 1997) has seven items rated on a 7-point rating from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency of the scale was .84.

**Depression.** The Center for Epidemiological Studies-Depression Inventory (Radloff, 1977; Shima, Shikano, Kitamura, & Asai, 1985) consists of 20-items that are rated using a 4-point Likert scale, ranging from 1 (*rarely or none of the time within a week*) to 4 (*most or all of the time within a week*). The internal consistency of the scale was .85. The Center for Epidemiological Studies-Depression Inventory has four subcategories: Depressed Affect (seven items), Positive Affect (four items), Somatic and Retarded Activity (seven items), and Interpersonal (two items).

**The Big Five personality traits.** The short form of the Japanese Big Five Scale (Namikawa et al., 2012) consists of 29 items and has an adequate reliability and validity. Items are rated on a 7-point rating, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency of each personality trait was .87 for extraversion, .80 for conscientiousness, .84 for neuroticism, .76 for openness, and .76 for agreeableness.

**Table 1** Demographic characteristics of the sample

Category	<i>n</i>	%
University year		
First year	412	86.4
Second year	20	4.2
Third year	20	4.2
Fourth year	7	1.5
Missing data	18	3.8
Living status		
Alone	292	61.2
Parents' home	175	36.7
Missing data	10	2.1
Family income		
Low	102	21.4
Relatively low	139	29.1
Average	134	28.1
Relatively high	65	13.6
High	23	4.8
Missing data	14	2.9
Subjective economic status		
Bad	42	8.8
Relatively bad	74	15.5
Average	142	29.8
Relatively good	122	25.6
Good	83	17.4
Missing data	14	2.9

Note. *n* = 477. This table does not include 87 students for the test-retest sample.

**Background characteristics.** Age, sex, and living status (i.e., living alone or in parents' home) were assessed in the survey. In addition, subjective family income and financial satisfaction were assessed relative to the within-country level with a 5-point rating. Table 1 shows the corresponding information.

### Statistics and Analysis Plan

All analyses were performed using SPSS 21.0 and Mplus Version 7.1.1. The arithmetic mean was used as scale score for each of the observed variables. Among the 564 participants, 23 participants had missing data. The average number of missing responses was 19.52 (*SD* = 21.73; range = 1–64). The missing data were addressed by using the full information maximum likelihood method. To evaluate and compare for model with structure

equation modeling, we used the following indices:  $\chi^2$ , the Tucker-Lewis index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the Bayesian information criterion (BIC).

## Results

### Factor Structure of the BPNSFS and Preliminary Analyses

Confirmatory factor analysis was adapted for the following four models: (a) two-factor model (need satisfaction and frustration), (b) three-factor model (autonomy, relatedness, and competence, including both need satisfaction and frustration as reverse concept), (c) six-factor model (need satisfaction and frustration for autonomy, relatedness, and competence), and (d) higher-order factor model. Table 2 shows the results of the confirmatory factor analysis using maximum-likelihood extraction with promax rotation for the four hypothetical models. Via comparison of the fit indices, the six-factor model and higher-order factor model deserved adaptation compared to the other models. Table 3 shows the factor loading of the six-factor model. Table 4 shows the means, standard deviations, and correlation coefficients among the variables of the basic psychological need satisfaction and frustration. As hypothesized within BPNT, the three need satisfactions were positively correlated to each other. Similarly, the three need frustrations were positively correlated to each other as well. Furthermore, satisfaction of each need was negatively correlated (albeit slightly weaker) with frustration of the corresponding need.

### Test-retest of the BPNSFS

The result of the test-retest indicated a high reliability of the BPNSFS. Correlation of time stability was  $r = .76$  ( $p < .001$ ) for autonomy satisfaction,  $r = .66$  ( $p < .001$ ) for autonomy frustration,  $r = .70$  ( $p < .001$ ) for relatedness

**Table 2** Model fit indices of four hypothetical models

Model	$\chi^2$	df	p	CFI	TLI	RMSEA	90% CI for RMSEA	SRMR	BIC
Two-factor model	1,715.92	251	<.001	.654	.620	.102	.098–.011	.090	37,237.39
Three-factor model	1,504.45	249	<.001	.704	.672	.095	.090–.100	.089	37,038.57
Six-factor model	645.03	237	<.001	.904	.888	.055	.050–.061	.054	36,255.09
Higher-order factor model	821.50	245	<.001	.864	.847	.065	.060–.070	.069	36,380.94

Note. CI = confidence interval.

**Table 3** Factor loadings of confirmatory factor analysis for six-factor model

	Factor loading	95% CI
F1 Autonomy satisfaction		
1. I feel a sense of choice and freedom in the things I undertake	.69	[.64, .75]
7. I feel that my decisions reflect what I really want	.71	[.66, .77]
13. I feel my choices express who I really am	.61	[.54, .67]
19. I feel I have been doing what really interests me	.70	[.65, .76]
F2 Autonomy frustration		
2. Most of the things I do feel like "I have to"	.75	[.69, .79]
8. I feel forced to do many things I wouldn't choose to do	.72	[.67, .77]
14. I feel pressured to do too many things	.52	[.45, .59]
20. My daily activities feel like a chain of obligations	.66	[.60, .72]
F3 Relatedness satisfaction		
3. I feel that the people I care about also care about me	.54	[.47, .61]
9. I feel connected with people who care for me, and for whom I care	.76	[.71, .82]
15. I feel close and connected with other people who are important to me	.71	[.66, .77]
21. I experience a warm feeling with the people I spend time with	.59	[.52, .66]
F4 Relatedness frustration		
4. I feel excluded from the group I want to belong to	.76	[.72, .81]
10. I feel that people who are important to me are cold and distant towards me	.74	[.69, .79]
16. I have the impression that people I spend time with dislike me	.78	[.73, .82]
22. I feel the relationships I have are just superficial	.53	[.46, .60]
F5 Competence satisfaction		
5. I feel confident that I can do things well	.67	[.61, .74]
11. I feel capable at what I do	.53	[.46, .60]
17. I feel competent to achieve my goals	.67	[.61, .73]
23. I feel I can successfully complete difficult tasks	.64	[.58, .70]
F6 Competence frustration		
5. I have serious doubts about whether I can do things well	.54	[.47, .61]
12. I feel disappointed with many of my performances	.55	[.48, .62]
18. I feel insecure about my abilities	.69	[.63, .75]
24. I feel like a failure because of the mistakes I make	.67	[.61, .74]

Note. CI = confidence interval. The Japanese version of the Basic Psychological Need Satisfaction and Frustration Scale is shown in Appendix.

satisfaction,  $r = .73$  ( $p < .001$ ) for relatedness frustration,  $r = .58$  ( $p < .001$ ) for competence satisfaction, and  $r = .68$  ( $p < .001$ ) for competence frustration. In addition,  $r = .73$

( $p < .001$ ) for total need satisfaction, and  $r = .79$  ( $p < .001$ ) for total need frustration. These results indicated the high reliability of the scale.

**Table 4** Means and standard deviations among the variables of BPNSFS

	<i>n</i>	<i>M</i>	<i>SD</i>	2	3	4	5	6
1. Autonomy satisfaction	557	3.40	0.78	-.42***	.38***	-.21***	.48***	-.34***
2. Autonomy frustration	558	2.63	0.82		-.19***	.42***	-.19***	.40***
3. Relatedness satisfaction	558	3.47	0.79			-.37***	.30***	-.25***
4. Relatedness frustration	557	2.17	0.83				-.10*	.45***
5. Competence satisfaction	557	2.84	0.74					-.48***
6. Competence frustration	558	2.99	0.83					

\*\*\* $p < .001$ . \* $p < .05$ .

### Correlations between Need Satisfaction, Frustration, Well-being, and the Big Five Personality Traits

Table 5 shows means, standard deviations, and correlation coefficients among the indicators of subjective well-being (life satisfaction, vitality, and depression) and the Big Five personality traits. Table 6 shows the correlation matrix of satisfaction and frustration of basic psychological needs and the indicators of well-being and the Big Five personality traits. As expected within BPNT, correlations between satisfaction of the basic psychological needs and the three indicators (life satisfaction, vitality, and depression) were significant in the expected direction. Correlations between frustration of the basic psychological needs and the three indicators were also significant in the expected direction. In addition, the result of the correlation analysis revealed positive relationships between satisfaction of the three basic needs and extraversion ( $r = .35$  to  $.41$ ; total =  $.44$ ), conscientiousness ( $r = .07$  to  $.23$ ; total =  $.18$ ), openness ( $r = .20$  to  $.58$ ; total =  $.48$ ), and agreeableness ( $r = .17$  to  $.29$ ; total =  $.30$ ); and a negative relationship with neuroticism ( $r = -.20$  to  $-.24$ ; total =  $-.35$ ). The correlation analysis also revealed negative relationships between frustration of the three basic needs and extraversion ( $r = -.20$  to  $-.28$ ; total =  $-.30$ ), conscientiousness ( $r = -.14$  to  $.28$ ), openness ( $r = .07$  to  $-.26$ ; total =  $-.15$ ), and agreeableness ( $r = -.13$  to  $.22$ ; total =  $-.24$ ); and a positive relationship with neuroticism ( $r = .29$  to  $.43$ ; total =  $.41$ ).

### Structural Equation Modeling for Function of Basic Psychological Need Satisfaction and Frustration

We performed structural equation modeling with the maximum-likelihood method to investigate the function of satisfaction and frustration of basic psychological needs. Before performing this analysis, there was a possibility that the number of observed variables of depression (i.e., 20 items) could undermine the fit index of the model. To avoid this problem, we used the parceling method and seven items representing depressed affect. The upper values in Figure 1 present the result of the hypothetical model,  $\chi^2 (267) = 919.367$ ,  $p < .001$ , TLI =  $.854$ , CFI =  $.870$ , RMSEA =  $.072$  (90% CI =  $[.067, .077]$ ), SRMR =  $.066$ , BIC =  $31345.605$ , which was provided in Chen et al. (2015). As expected within BPNT, need satisfaction was positively correlated with life satisfaction and vitality but was not correlated with depressed affect. Meanwhile, need frustration was positively correlated with depressed affect and negatively correlated with life satisfaction but was not correlated with vitality. These findings emerged after controlling for sex, age, living status, family income, and financial satisfaction.

Next, we evaluated the original model (without demographic data) by controlling for the influence of the Big Five personality traits. The influence from the personality traits was hypothesized for each of the observed variables. The lower values in Figure 1 present the results of the hypothetical model under the control of the personality traits,  $\chi^2 (267) = 811.759$ ,  $p < .001$ , TLI =  $.850$ , CFI =  $.906$ , RMSEA =  $.066$

**Table 5** Means, standard deviations, and correlations among the variables

	<i>n</i>	<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8
Subjective well-being										
1. Life satisfaction	463	3.95	1.25	.73***	-.23***	.46***	.15**	-.43***	.33***	.19***
2. Vitality	461	4.02	1.06		-.22***	.75***	.19***	-.42***	.50***	.23***
3. Depression	458	1.85	0.46			-.15***	-.11**	.26***	-.10***	-.11**
Big Five personality traits										
4. Extraversion	468	4.40	1.23				-.01	-.31***	.44***	.10
5. Conscientiousness	470	3.49	1.00					-.22***	.08	.19***
6. Neuroticism	470	4.91	1.21						-.19***	-.17***
7. Openness	470	3.94	0.98							.20***
8. Agreeableness	471	4.39	0.98							

\*\*\* $p < .001$ . \*\* $p < .01$ .

**Table 6** Correlations between satisfaction and frustration in basic psychological needs and the other variables

	Need satisfaction				Need frustration			
	Aut.	Rel.	Com.	Total	Aut.	Rel.	Com.	Total
Subjective well-being								
Life satisfaction	.50***	.37***	.35***	.53***	-.25***	-.24***	-.41***	-.39***
Vitality	.48***	.45***	.51***	.63***	-.27***	-.21***	-.38***	-.37***
Depression	-.32***	-.29***	-.31***	-.41***	.40***	.52***	.52***	.63***
Big Five personality traits								
Extraversion	.30***	.41***	.30***	.44***	-.20***	-.23***	-.28***	-.30***
Conscientiousness	.07	.13**	.23***	.18***	-.14**	-.18***	-.28***	-.25***
Neuroticism	-.28***	-.20***	-.33***	-.35***	.29***	.24***	.43***	.41***
Openness	.32***	.20***	.58***	.48***	-.09	.07	-.26***	-.15***
Agreeableness	.23***	.17***	.29***	.30***	-.13**	-.22***	-.21***	-.24***

Note. Aut. = Autonomy; Rel. = Relatedness; Com. = Competence.

\*\*\* $p < .001$ . \*\* $p < .01$ .

(90% CI = [.061, .071]), SRMR = .043, and BIC = 30,911.831. These fit indices were improved compared to the original model (see BIC = 31,345.605 in the original model). The controlled model showed that need satisfaction was positively correlated with life satisfaction and vitality, and need frustration was positively correlated with depressed affect and negatively correlated with life satisfaction.

## Discussion

The present study examined the hypothesis of the BPNT. For achieving this, we first developed the Japanese version of the BPNSFS

through a back-translation procedure from English into Japanese. Confirmatory factor analysis showed that the BPNSFS had the same factor structure as that found in the original version, and it was possible to use both the original six-factor model and the higher-order factor model. In addition, the test-retest (within 3 weeks) demonstrated a high reliability of the scale. The results of the correlation analysis, that is, the relationship between (a) need satisfaction and indicators of well-being and (b) need frustration and indicators of well-being, supported the validity of the scale. Finally, structural equation modeling showed that satisfaction of each of the three needs contributed to the prediction of subjective well-



being (life satisfaction and vitality), whereas frustration of each of the three needs uniquely contributed to the prediction of subjective ill-being (depressed affect). These results were confirmed after controlling for demographic factors as well as the Big Five personality traits, and support the premise of BPNT.

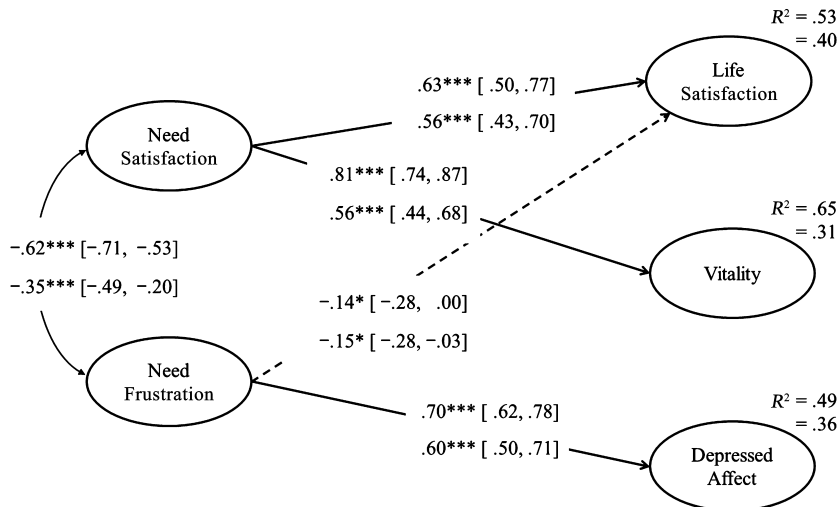
One of the significant contributions of this study is to demonstrate the robustness of the function of satisfaction and frustration of basic psychological needs. Satisfaction of the basic psychological needs contributed to subjective well-being and frustration of the basic psychological needs yielded ill-being; that is, the basic premise of BPNT is uniquely demonstrated not only by Chen et al. (2015) in samples from China, Belgium, the United States, and Peru, but also by the present study in Japan. This finding endorses the universal role of basic psychological need satisfaction and frustration across nations.

Controlling for the Big Five personality traits provides deep consideration of the theoretical hypothesis in BPNT. Although the robustness of the path structure of the model was demonstrated after controlling for the Big Five personality traits, a decrease in the coefficient of

determination ( $R^2$ ) of subjective well-being was found after the control (see Figure 1). The finding indicates that the Big Five personality traits distort the relationship between satisfaction and frustration of basic psychological needs and subjective well-being. Specifically, approximately half the drop rate in the coefficient of determination (i.e., 65% to 31%) was found in vitality when controlling for the Big Five personality traits. This result is reasonable when considering the finding that extraversion and openness, which were positively correlated with need satisfaction (.44 and .48, respectively), were strongly and positively correlated with vitality (.75 and .50, respectively), as shown in Tables 5 and 6. The finding of the present study upholds the need for control of the Big Five personality traits for the accurate evaluation of subjective well-being in order to avoid obtaining a contaminated result and an overestimation.

### Limitations

There are several limitations in this study that require consideration. Chen et al. (2015) obtained data regarding background characteristics that this study did not, such as parental and maternal education level and health



**Figure 1.** The hypothetical model of basic psychological need theory. The 95% confidence intervals are presented within brackets. Upper values correspond to the original model hypothesized by Chen et al. (2015). Lower values represents the model controlling for the Big Five personality traits. \* $p < .05$ . \*\*\* $p < .001$ .

satisfaction. Thus, the results regarding the relationship between basic psychological need satisfaction and frustration and subjective well-being cannot be completely compared to the results of Chen et al. (2015). Moreover, the cross-sectional design limits the conclusions.

### Conclusion

The present study succeeded in developing the Japanese version of the BPNSFS through a back-translation procedure. The Japanese sample of the present study supported the premise of BPNT previously provided in Belgium, China, the United States, and Peru, which states that satisfaction of basic psychological needs represents essential requirements for optimal functioning. However, this study confirmed the need to control for the Big Five personality traits when assessing the relationship between satisfaction and frustration of basic psychological needs and subjective well-being to clarify these roles and to avoid overestimation. Although the hypothesis of BPNT was basically supported in the present study, self-determination theorists should pay attention to the possible overestimation of functions of basic psychological needs on subjective well-being. In future research, the Japanese version of the BPNSFS will be desired to be used in other domains, such as education, interpersonal relationships, sports, work environments, and medical care.

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(Received December 2, 2015; accepted July 5, 2016)

**Appendix****The Japanese Version of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS).**

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## F1 自律性への欲求充足

1. 私は、やりたいことを自由に選んでいると感じている。
7. 私の決定は、自分が本当にしたいことと一致している。
13. 私の選択は、本来の自分らしさを良く表していると感じている。
19. 私は、自分が本当に興味のあることを行っていると感じている。

## F2 自律性への欲求不満

2. 私がしているほとんどのことは、やらされているものだと感じている。
8. 私は、自分が選んでもいないことを、多くさせられていると感じている。
14. 私は、あまりに多くのことをしなければならぬとプレッシャーをかけられていると感じている。
20. 私は、日々、義務的な活動に追われ続けていると感じている。

## F3 関係性への欲求充足

3. 私が気に掛けている人は、私のことも気に掛けてくれていると感じている。
9. 私は、互いに気に掛けている人と、きずなを感じている。
15. 私は、自分にとって大切な人と、親密な関係を築いていると感じている。
21. 私は、いつも一緒にいる人が自分のそばにいて、暖かい気持ちになる。

## F4 関係性への欲求不満

4. 私は、自分が受け入れてほしいと思っているグループから拒否されていると感じている。
10. 私は、大切な人から、冷たくされ、距離を置かれていると感じている。
16. 私は、自分とよく一緒にいる人が、自分のことを嫌っていると感じている。
22. 私は、深い人間関係を築こうとするが、表面的な関係にしかならない。

## F5 有能さへの欲求充足

5. 私は、たいいていのことを、うまく行う自信があると感じている。
11. 私は、自分がしていることに対して、有能さを感じている。
17. 私は、自分の目標を達成することができる確信している。
23. 私は、たいいていは難しい課題でも、成し遂げることができると思っている。

## F6 有能さへの欲求不満

6. 私は、物事をうまく成し遂げられるか自分の能力を疑っている。
  12. 私は、自分がこれまで、やってきた成果について失望している。
  18. 私は、自分の能力に対して自信がない。
  24. 私は、これまで重ねてきた失敗のせいで、今やっていることでも、うまくいかないように感じる。
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