

# **Examining the Validation of a Newly Developed Motivation Questionnaire: Applying Self-determination Theory in the Japanese University EFL Context**

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## **Abstract**

The purpose of this study is to further validate a new questionnaire based on self-determination theory (SDT) in the Japanese EFL context. SDT has frequently been applied in L2 motivation studies in Japan, although most such studies have used or adapted a single questionnaire (Hiromori, 2006a) and yielded mixed results, both in line and out of line with SDT. Such outcomes have highlighted the sample-dependent nature of the questionnaire (Agawa & Takeuchi, 2016a). In an effort to tackle this problem, Agawa and Takeuchi (2016c) sought to develop a new questionnaire. They adopted several measures to examine and ensure the validity and reliability of the new instrument, the results of which suggested success in developing the new questionnaire. Yet the new instrument requires more tests using different samples to examine its validity in the Japanese university EFL context. To this end, this study collected data from a different sample from that used for questionnaire development; 444 Japanese university EFL learners responded to the questionnaire. The results of a confirmatory factor analysis and structural equation modeling indicated that the new questionnaire was valid in a different population, showing that it is less sample-dependent and more versatile than the conventional one.

**Keywords:** L2 motivation, new questionnaire, self-determination theory, the Japanese EFL setting, structural equation modeling

## **Introduction**

In second language acquisition (SLA) research, second/foreign language (L2) learners' motivation is one of the most investigated areas (for a review, see Lasagabaster, Doiz, & Sierra, 2014). One of the most established and influential theories in the field is self-determination theory (SDT) (Deci & Ryan, 1985, 2000, 2002), which was originally a macro theory used to explain human motivation in general. The versatile nature of the theory has enabled researchers in various domains (e.g., sports and physical activity, religion, health and medicine, and virtual environment) to use SDT to look into people's motivation in different situations. In addition to being versatile, SDT is one of the most empirically tested motivational theories and has been verified in various contexts (Deci & Ryan, 2008). One

research domain in which SDT has been applied is the SLA research. Many SLA researchers have applied the framework to the language-learning context, thereby helping to illuminate L2 motivation processes (e.g., Comanaru, & Noels, 2009; Noels, 2003; 2012; Noels, Pelletier, Clément, & Vallerand, 2000). SDT studies have been conducted in many countries, including Japan. The vast majority of such studies conducted in Japan have used or adapted one particular questionnaire (Hiromori, 2006a), yielding results both in line and out of line with the theory. Agawa and Takeuchi (2016a) pointed out that such outcomes may be attributed to the sample-dependent nature of the questionnaire and suggested the need for a new and improved one. Responding to their own suggestion, Agawa and Takeuchi (2016c) undertook the task of developing a new instrument that contained (a) the Psychological Needs Scale, which asked how much participants felt their basic psychological needs (i.e., the needs for autonomy, competence, and relatedness) were fulfilled, and (b) the English Learning Motivation Scale, which aimed to measure the intensity of participants' L2 motivation. Agawa and Takeuchi employed three methods to validate the new questionnaire: expert judgment, exploratory factor analysis, and reliability computation. Their results indicated higher validity and reliability of the new instrument than the conventional one. Yet Agawa and Takeuchi noted that the new questionnaire needed to be further tested with different samples to attain further refinement and verification. To this end, the current study will use a different sample and examine the validity of the newly developed questionnaire. A confirmatory factor analysis (CFA) and structural equation modeling (SEM) analysis will be conducted on response data collected from Japanese EFL learners at academically varied universities.

## **Background of the Study**

### **Self-Determination Theory**

In SDT, different types of motivation reside along a continuum, with intrinsic motivation at one end, extrinsic motivation in the middle, and amotivation at the other end (see Figure 1). Intrinsic motivation refers to the motivation to engage in something because the action itself is enjoyable and satisfying, whereas extrinsic motivation is a drive to do something for an independent outcome (Deci & Ryan, 2000). Deci and Ryan postulated four regulations within extrinsic motivation, depending on the degree of internalization involved in the action: integrated, identified, introjected, and external. As their labels suggest, integrated regulation is the most self-determined form of regulation whereas external regulation is the least autonomous. At the opposite end of the scale from intrinsic motivation is amotivation—a state of no regulation/motivation.

SDT presupposes the existence of three innate psychological needs: the need for autonomy, competence, and relatedness. This theory offers different types of motivation and degrees of regulation to show how human beings can be motivated, depending on the degree of the needs satisfaction; in other words, the more individuals' innate psychological needs of autonomy, competence, and relatedness are fulfilled, the more their behavior is intrinsically motivated. The theory also postulates that the satisfaction of the three basic needs promotes internalization for extrinsically motivated behaviors and thus facilitates the self-determined forms of extrinsic motivation—namely, integrated and identified regulations (Ryan & Deci, 2000).

The need for autonomy is defined as individuals' desire for "being the perceived origin or source of one's own behavior" (Deci & Ryan, 2002, p. 8). Deci and Ryan further explained that autonomy pertains to acting from interest and integrated values; thus, "when autonomous, individuals experience their behavior as an expression of the self, such that, even when actions are influenced by outside sources, the actors concur with those influences, feeling both initiative and value with regard to them" (p. 8). Meanwhile, the need for competence refers to a person's desire to feel "effective in one's ongoing interactions with the social environment" and to experience "opportunities to exercise and express one's capacities" (Deci & Ryan, 2002, p. 7). Finally, the need for relatedness is expressed in the desire to feel connected to other people, to care for and be cared for by those others, and to have a sense of belongingness with others and one's community (Deci & Ryan, 2002, p. 7).

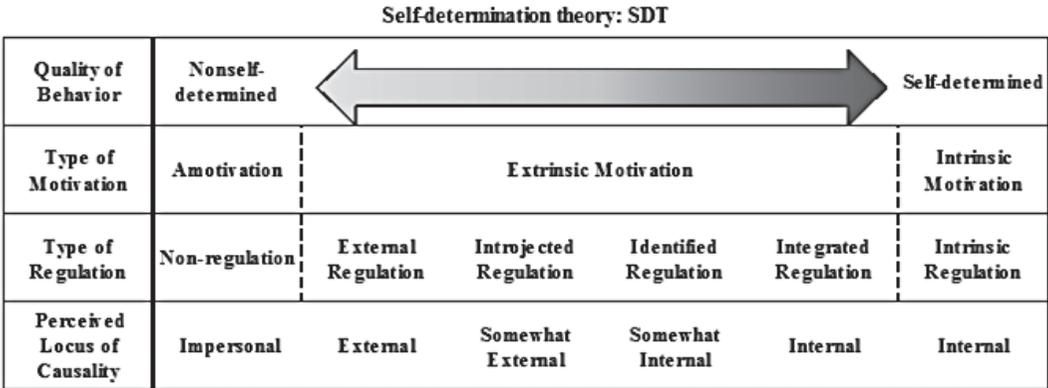


Figure 1. The self-determination continuum, with types of motivation, types of regulation, and locus of causality. Adapted from Deci, E. L., and Ryan, R. M., (Eds.), 2002, *Handbook of self-determination research*, p.16.

**Research Based on SDT in the Japanese EFL Context**

Strong emphasis has been put on English in formal education in Japan; it is one of the three main academic subjects in junior and senior high schools, and almost all universities require compulsory English courses for at least first- and second-year students, regardless of their majors. However, students are not always willing to learn English; some students even experience demotivation when learning English (Agawa & Ueda, 2013; Yamamori, 2004). Under such circumstances, EFL learners' motivation is of great interest to many researchers and practitioners in Japan, and more knowledge on this matter has been actively sought. Several motivational studies have dealt with SDT in the Japanese EFL setting, as this theory is empirically tested widely and has been verified in various contexts (Deci & Ryan, 2008).

Tomohito Hiromori is a pioneering researcher who applied SDT in the Japanese EFL context. He developed a questionnaire to measure EFL learners' psychological needs fulfillment and motivation (Hiromori, 2006a). In the English learning context, both inside and outside the classroom, the three psychological needs are interpreted into more concrete concepts so that they better fit the context. First, autonomy needs generally include learners' need for opportunities to choose and determine various aspects of English classes and

learning (Dörnyei, 2001; Hiromori, 2006a; Otsoshi & Heffernan, 2011). In other words, it has been interpreted as the learners' desire to determine their actions regarding English learning and take responsibility for their own studies. This understanding is reflected in Hiromori's questionnaire items to measure the degree of Japanese EFL learners' autonomy needs fulfillment, which include "I am free to express my ideas and opinions on English learning," "My feelings are taken into consideration in English classes," "My teacher asks for the opinions of students about the content and/or procedure of the class," and "My teacher always decides what to study in the English course" (reversed item) (Hiromori, 2006a, 2006b; Tanaka & Hiromori, 2007).

Second, the competence needs in the Japanese EFL setting are understood as the desire to be able to understand and make themselves understood in English, have the capability and confidence to successfully complete English assignments and tasks, and have opportunities to display competence (Dörnyei, 2001; Hiromori, 2006a; Otsoshi & Heffernan, 2011). The definition is the basis of Hiromori's questionnaire items used to measure the degree of competence needs satisfaction of Japanese EFL learners, such as "I think I can get a good grade in English," "I am satisfied with my effort in English classes," and "I feel a sense of achievement in the English course" (Hiromori, 2006a, 2006b; Tanaka & Hiromori, 2007).

Finally, relatedness needs include wanting to connect with other classmates and the instructor, have a sense of unity, and be liked and respected (Dörnyei, 2001; Hiromori, 2006a; Otsoshi & Heffernan, 2011). Questionnaire items reflecting this definition include "I work hand-in-hand with my friends on a group activity" and "I get along with my friends during an English class" (Hiromori, 2006a, 2006b).

Using his questionnaire, Hiromori (2006a) collected data from university students. He then used a SEM analysis to confirm the causal relationship between the fulfillment of innate needs and motivation as hypothesized in the theory. Yet the model's goodness of fit was relatively poor (GFI = .75, AGFI = .70, CFI = .82, RMSEA = .90). In another study, Otsoshi and Heffernan (2011) collected data from business and English majors at two universities. The results yielded a somewhat acceptable level of fit indices of the model; however, the sufficiency of autonomy needs did not display a causal relationship with intrinsic motivation, as SDT posits. Moreover, Agawa and Takeuchi's (2016b) study, in which 317 participants from academically varied universities responded to a questionnaire, found that autonomy needs fulfillment has a negative impact on the intrinsic motivation of Japanese L2 learners and, furthermore, might even demotivate them. The model's fit indices reached an acceptable level in their study.

From a more pedagogical point of view, some studies have sought to determine if interventions to fulfill English learners' three basic needs improve their intrinsic motivation. A few studies, such as Dei (2011), Hiromori (2006a, 2006b), and Tanaka and Hiromori (2007), have demonstrated that satisfying the innate needs could generally enhance English learners' motivation. Conversely, Maekawa and Yashima (2012) did not observe an increase in their participants' self-determined regulations in their L2 study, although their psychological needs were successfully satisfied.

The mixed results presented by previous research are confusing for researchers and practitioners and do not provide conclusive suggestions on how to successfully motivate Japanese EFL learners. To probe the cause of the inconsistency, Agawa and Takeuchi (2016a)

conducted an interview study in which they re-examined the meanings of satisfying Japanese university EFL learners' need for autonomy, competence, and relatedness. Eighteen participants were chosen from academically varied universities (i.e., University As, extremely competitive schools; University Bs, middle-range schools; and University Cs, easy-to-get-into schools) to ensure that participants represented the population of Japanese university EFL learners. The participants' majors also varied (i.e., English, law, Japanese, medicine, and psychology), as did their English proficiency levels, reflecting the different degrees of academic and English proficiency demanded by their universities and/or majors, with the most proficient student falling in the B2 (Independent User) level of the Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR) (Council of Europe, 2001) and the least proficient falling in the A2 (Basic User) level of CEFR.

The analysis of the data revealed two points that are worth mentioning: (i) whereas the fulfillment of autonomy—meaning freedom of choice—might motivate some L2 learners, it can demotivate others; and (ii) a good relationship with the instructor may motivate learners, while a good relationship with other classmates can have a positive or marginal impact on L2 motivation, depending on the learner. Drawing on these results, the researchers pointed out that the mixed results in previous studies may have been due to some items in the commonly used questionnaire based on the assumption that autonomy fulfillment equates to giving learners a choice and that relatedness fulfillment is brought about only by a good student-to-student relationship. Based on that argument, Agawa and Takeuchi (2016c) reviewed the definitions of constructs included in the questionnaire and, subsequently, redefined the definitions of the needs for autonomy and relationship. Then, with the revised definitions of the constructs, they developed a new version of the questionnaire.

### **Development of the New Questionnaire**

In Agawa and Takeuchi's (2016c) study, the development of the new questionnaire followed three main steps. First, as previously described, the definitions of the constructs (i.e., autonomy, competence, relatedness, intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation) used in the Japanese EFL context were reviewed and compared with those originally put forth by Deci and Ryan (2002). Through this process, a new set of working definitions for the constructs was proposed. Among the new definitions, the one for autonomy needs required a major revision, followed by the one for relatedness. The rest called for little adjustment.

Second, a new questionnaire was drafted. As with the conventional one, the new questionnaire contained two scales: the Psychological Needs Scale and English Learning Motivation Scale. The question items for the draft were taken from an item pool, which was developed by collecting items from the relevant literature and creating new ones based on the interview study conducted by Agawa and Takeuchi (2016a). Before the questionnaire draft was written, an expert scrutinized the pooled items in order to ensure the content validity of the constructs. Then, 42 items were selected: 12 items for the Psychological Needs Scale and 20 for the English Learning Motivation Scale. The questionnaire draft was piloted by several EFL students, whose feedback was used to make revisions.

Third, by using the revised draft of the questionnaire, a field test was conducted with 203

Japanese university EFL learners. Agawa and Takeuchi (2016c) intentionally collected data from students with various characteristics, such as academic interests and English proficiency level, because testing a questionnaire with a homogenous sample might result in producing a highly sample-dependent instrument (Agawa & Takeuchi, 2016b). To avoid such a problem, the questionnaire was administered at five academically varied universities; the participants' majors also varied (e.g., business administration, economics, English, engineering, Japanese, medicine, nursing, sociology, and sports science).

Using the collected data, an exploratory factor analysis (EFA) was conducted to empirically illustrate the construct-related validity of the instrument. The EFA revealed that a couple of items originally designed to measure the instructor-to-student relationship were clustered together with autonomy ones to form an autonomy factor. Explaining the result, Agawa and Takeuchi (2016c) pointed out that supporting learner autonomy is closely linked to a good instructor–student relationship because, when an instructor wants to support students' autonomy, the instructor needs to trust them and respect their feelings and thoughts, which inevitably entails a good relationship between the instructor and students. Therefore, the autonomy subscale of the new questionnaire included items asking students how approachable and open their instructor is to their viewpoints, which reflects the degree of the instructor's autonomy supportiveness. On the other hand, the relatedness subscale in the new questionnaire, as with the conventional one, only included questions about student-to-student relationships. After the EFA was conducted, the Cronbach's alpha index was computed, which confirmed a high internal reliability of each construct in the scales.

The results of the expert judgment, EFA, and reliability computation showed that the new questionnaire had higher validity and reliability than the questionnaire widely used in the field. However, examining the instrument one time is not enough to conclude that the new questionnaire is valid in the Japanese EFL setting. Rather, the new instrument requires more tests using different samples to further check its validity. Thus, the current study examines the newly developed instrument using a different sample to verify it.

## **Purpose of the Study**

The objective of this study is to validate the newly developed questionnaire by using a different sample from the preceding study (i.e., Agawa & Takeuchi, 2006c). The fit of the model to the actual data will be evaluated using a varied population. On the model's local level, the causal relationships between the innate psychological needs and motivation will be investigated. Special attention will be placed on the relationship between autonomy needs satisfaction and Japanese EFL learners' motivation, because the autonomy subscale was the majorly revised one in the process of developing the new questionnaire.

## **Method**

### **Sample Size**

Before collecting data, the number of participants for a desirable sample size for the analyses planned later (i.e., factor analysis and SEM) was determined. First, an a priori power analysis using *G\*power* 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) was conducted to calculate the minimum number of participants required for SEM. The results showed that at

least 231 participants would be required. Then, a required sample size for factor analysis was determined based on previous studies. Hair, Black, Babin, and Anderson (2008) indicated that, as a general rule, the sample size should be 10 times (or greater) the number of variables, which makes 200 the minimum number of participants for this study (i.e., 10 times the number of items in English Learning Motivation Scale). Hirai (2012) claimed that a sample size of 300 or more is preferable for a reliable calculation of the correlation coefficient. To be safe, the authors made sure to collect data from at least 300 participants; the final number was 486.

## Participants

The questionnaire was administered to 486 students in Japan, with their written consent. The consent form included an explanation of the study and one of the authors' contact information. Also, at the beginning of the questionnaire, it clarified that the questionnaire was not a test, nor would it be included in participants' course grades.

We intentionally collected data from students with various characteristics as testing a questionnaire with a homogenous sample may not indicate whether or not the instrument is a highly context-dependent one (Agawa & Takeuchi, 2016b). In order to ensure participants' diversity, data were collected from several different departments at five academically varied universities (for details, see Table 1). Of the 486 participants, 280 were males and 202 females, with the gender of the remaining 4 not being indicated and, therefore, marked as unknown. Reflecting the varieties of the students, their English levels (self-reported) varied as well, with the most proficient student falling in the B2.2 or higher level of the CEFR-based framework for EFL in Japan (CEFR-J)<sup>1</sup> and the least proficient falling in the A1.1 level of CEFR-J.

Table 1  
*Participants*

Level ( <i>Hensachi</i> ) of University	Department	<i>N</i>
High (63-)	Economics	71
	Literature	23
	Medicine	57
	Science and Engineering	104
Middle (51-62)	Agriculture	41
	Nursing	63
	Sports Science	32
Low ( - 50)	Information Technology	41
	Literature	12
Total		444

*Note.* *Hensachi* = A scale that gives a measure of the difficulty for entering a university. It is an indicator that shows a university's position among others; the 50 of *Hensachi* means average; above 50 means higher than average; and below 50 means lower than average. *Hensachi* has been most commonly used for university ranking in Japan. The *Hensachi* values for this table were taken from Benesse® Manavisjon: <http://manabi.benesse.ne.jp/>.

## Questionnaire

This study used the questionnaire developed by Agawa and Takeuchi (2016c), which included two parts: the English Learning Motivation Scale and the Psychological Needs Scale. At the beginning of the questionnaire, a brief explanation was given about the questionnaire. Participants were informed that the questionnaire was not a test and, thus, there were no “right” or “wrong” answers; the participants’ responses would not affect their course grades, and they did not even have to write their names. Then, instructions and an example were provided to illustrate how to respond to the questions; participants were asked to rate each item on a five-point Likert scale by selecting the point that most closely matched their feelings (1 = strongly disagree; 5 = strongly agree). The following subsections describe the questionnaire in detail.

**English Learning Motivation Scale.** Immediately following the explanation of the questionnaire, the English Learning Motivation Scale asked participants to indicate their intensity of motivation to learn English. As the questionnaire was based on SDT, it asked about the intensity of participants’ motivation in four regulations (i.e., intrinsic, identified, external, and amotivation/non-regulations). The scale contained 20 items, with three to six question items under each regulation/subscale. The regulations and their corresponding items are as follows.

***Intrinsic motivation (six items).*** People with this type of motivation perform a certain task because of their internal desire. Thus, these English learners are intrinsically motivated to study English because they enjoy it. The following items were included in this subscale:

- I study English because I like to get exposed to English itself.
- I study English because I get a feeling of satisfaction when finding out new things.
- I study English because I get stimulated by learning English.
- I study English because I feel happy when I understand something that I did not before.
- I study English because listening to someone speaking English makes me feel good.
- I study English because speaking the language makes me feel good.

***Identified regulation (six items).*** Introjected regulation was not included in the questionnaire because, in Agawa and Takeuchi (2016c), items originally prepared for identified and introjected regulations were clustered to form one subscale and the combined subscale was named identified regulation. This was because five out of six items were originally intended as an identified regulation subscale. According to Deci and Ryan’s (2002) definition, identified that regulation is categorized in extrinsic motivation, but it is the highly self-regulated form of it. English learners with identified regulation understand and accept the importance of learning English. Introjected regulation, according to Deci and Ryan (2002), involves external regulation with internalization to a lesser extent than identified regulation. English learners regulated through introjection would study English to avoid guilt or attain self-esteem. The identified subscale used in this study included the following items:

- I study English because I think it will be useful in various situations.
- I study English because I want to become a person who can use English.
- I study English because a lack of mastery of English can get me in trouble in the future.
- The reason why I study English is that I think English ability will benefit my growth.

- I study English because it is important for my future.
- I study English because it is an important subject for my career path.

**External regulation (three items).** This regulation is the least autonomous form of extrinsic motivation and is closely related with an external demand. English learners with this type of regulation study English to obtain rewards (e.g., academic credits) or avoid punishments (e.g., failing a class). The subscale consisted of the following question items:

- If I did not need to learn English, I would not.
- I study English out of a necessity to pass exams.
- I study English because I am told to do so.

**Amotivation (five items).** This is a state of no motivational regulation. Amotivated English learners do not study English at all or go through the action of “studying” without intending to learn anything. The amotivation items are as follows:

- I feel that learning English is a waste of time.
- I see no point in learning English.
- I don’t understand why I need to study English.
- I simply don’t want to study English anymore.
- I don’t understand the purpose of learning English.

**Psychological Needs Scale.** This part of the questionnaire asked how much the participants felt that their basic psychological needs were fulfilled. The scale has 12 items with three subscales. As with the English Learning Motivation Scale, a five-point Likert scale (1 = strongly agree; 5 = strongly disagree) was used. The subscales and items are as follows.

**Autonomy.** Six items measured the degree to which learners thought they act from integrated values toward English learning. One can reasonably argue that, in order to help learners understand and accept the value of tasks implemented in English class, the instructor needs to respect students’ feelings and thoughts, which inevitably entails a good relationship between the instructor and students. In other words, when an instructor wants to support learners’ autonomy, the instructor needs to have a good relationship with them. For this reason, the autonomy subscale includes items related to instructor–student relationships. The autonomy items were:

- I think my English teacher respects our opinions about class.
- My English teacher explains the value and/or meaning of activities and assignments.
- I think my English teacher understands students’ feelings.
- My English teacher supports us in learning English.
- My teacher takes students’ viewpoints into consideration in class.
- I think my English teacher’s demeanor makes it easy for students to ask questions.

**Competence.** Three question items assessed participants’ perceived sense of confidence and efficacy in English learning:

- I think I sometimes gain a sense of fulfillment when my efforts bear fruit in English class.
- I think I sometimes feel a sense of achievement in English class.
- I think I can get a satisfying grade in English.

**Relatedness.** Three items measured how participants perceive their relationship with other classmates:

- I think there is a cozy atmosphere in my English class.

- I get along with my friends who are in the same English course.
- I think my English class has a cooperative atmosphere during pair and group work.

### **Data Cleaning**

Before the collected data were subjected to any analyses, each response was checked. Some participants chose one and five on the scale in turn; others chose five on the scale throughout the questionnaire. These responses were considered invalid and therefore excluded from analyses; 42 cases were excluded, leaving 444 responses.

### **Data Analyses**

Two types of analyses were conducted in this study: a CFA and a SEM analysis.<sup>2</sup> Unlike the previous research (i.e., Agawa & Takeuchi, 2016c), where EFA was used, this study used a CFA because it is effective in evaluating the factor structure of a psychometric instrument and therefore is appropriate for use during the scale validation process (Brown, 2006). A SEM analysis deals with the relationship between latent variables; it evaluates how the latent factors/constructs are interrelated (Brown, 2006) and, thus, is often used to verify theory against measured data.

Brown (2006) argued that a CFA should be conducted prior to a SEM analysis, because the poor fit of a SEM model is more likely to stem from misspecification in the measurement model (i.e., in the manner of how question items and latent factors are related) than from that in the regression model (i.e., in the manner of how latent factors are interrelated). In this study, a CFA was run on the collected data to validate the factor structure. Then, with the polished factor structure, a SEM analysis was conducted to verify the regressive relationships among factors.

**Confirmatory factor analysis.** Before conducting a CFA (maximum likelihood method with Promax rotation), a couple of prerequisites (Brown, 2006) were checked. First, a good number of participants (i.e., more than 200, as indicated by Hair et al., 2008) were available for the analysis. Second, the normality of distribution was examined by checking Mardia's multivariate kurtosis. Bentler (2006) suggested that values greater than 5.00 indicate that data are non-normally distributed. The data for this study had the standardized estimate of 48.22, suggesting a high level of non-normality in the sample. To tackle the problem, the maximum likelihood robust option of Structural Equation Modeling Software (EQAsionS: EQS) was used, as it allows for coping with non-normal data and reliably infers the model (Bentler, 2006). In CFA, we used a number of fit indices to evaluate the goodness of fit of the model. Following Brown (2006), we used three indices provided in EQS: (1) comparative fit index (CFI); (2) root mean square error of approximation (RMSEA); and (3) standardized RMR (SRMR).

Based on SDT and previous SDT studies (e.g., Agawa & Takeuchi, 2016b; 2016c), a three- and a four-factor structures were assumed in the Psychological Needs Scale and the English Learning Motivation Scale, respectively. The validation of the factor structure was performed in gradual increments. First, a CFA was run to evaluate the structure of each factor/subscale (e.g., how well autonomy items are related to the autonomy factor). After the initial run on the data, the goodness of fit was checked. If the model had a poor fit, items with low loading and/

or high residual were eliminated. The analysis was repeated until the model of each subscale presented a decent to good fit. Then, a CFA was run again on the overall structure of each scale (i.e., the four-factor structure in the English Learning Motivation Scale and the three-factor structure in the Psychological Needs Scale). The fit was examined one last time, and any additional elimination or exchange of items was done as necessary.

**SEM analysis.** As with the CFA, some major prerequisites (In'nami & Koizumi, 2011; Takeuchi & Mizumoto, 2012) were checked before conducting the SEM analysis. First, a good number of participants (i.e., more than 231, as indicated by the power analysis) were available for the analysis. Second, no value was missing in any of the participants' data. Finally, multicollinearity was checked by computing variance inflation factors (VIF), whose values ranged from 1.99 to 2.36, confirming that no strong correlation existed among the predictor variables. We then conducted the SEM analysis using the maximum likelihood method. As previously mentioned, the sample collected for this study was non-normal; therefore, the maximum likelihood robust option of EQS was used. In order to evaluate the goodness of fit of the model, we used CFI, RMSEA, and SRMR, referring to Asano, Suzuki, and Kojima (2005), In'nami and Koizumi (2011), and Takeuchi and Muzumoto (2012).

## Results and Discussion

### Confirmatory Factor Analysis

**English Learning Motivation Scale.** Table 2 shows the selected fit indices of the CFA model of the English Learning Motivation Scale. All indices are acceptable, indicating that the sets of question items within each factor/subscale well represent the construct's concept and the set of factors/subscales are well structured to form the scale. Figure 2 depicts the CFA model of the English Learning Motivation Scale. In the process of the CFA, four question items were eliminated, leaving 16 items in the scale (for the detailed analytical procedure, refer to the confirmatory factor analysis subsection under Data Analyses). As Figure 2 shows, factors/subscales supposed to have similar characteristics have positive correlations. For example, intrinsic and identified, both of which are self-determined forms of motivation/regulation, have moderate positive correlations ( $r = .52$ ). On the contrary, factors supposed to have different characteristics have negative correlations. For instance, identified, a self-determined form of motivation, and external, the least autonomous form of extrinsic motivation, had a strong negative correlation to each other ( $r = -.71$ ). In addition, the factors located further from each other have negative correlations. These results are in line with SDT, in which different types of motivation/regulations are placed on a continuum depending on the degree of self-determination involved in actions.

Table 2  
*Selected Fit Indices for the CFA Model of English Learning Motivation Scale*

Index	Obtained value	Evaluation
CFI	.91	Adequate
RMSEA	.07	Adequate
SRMR	.06	Adequate

*Note.* CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized RMR. The fit evaluation is based on Brown (2006).

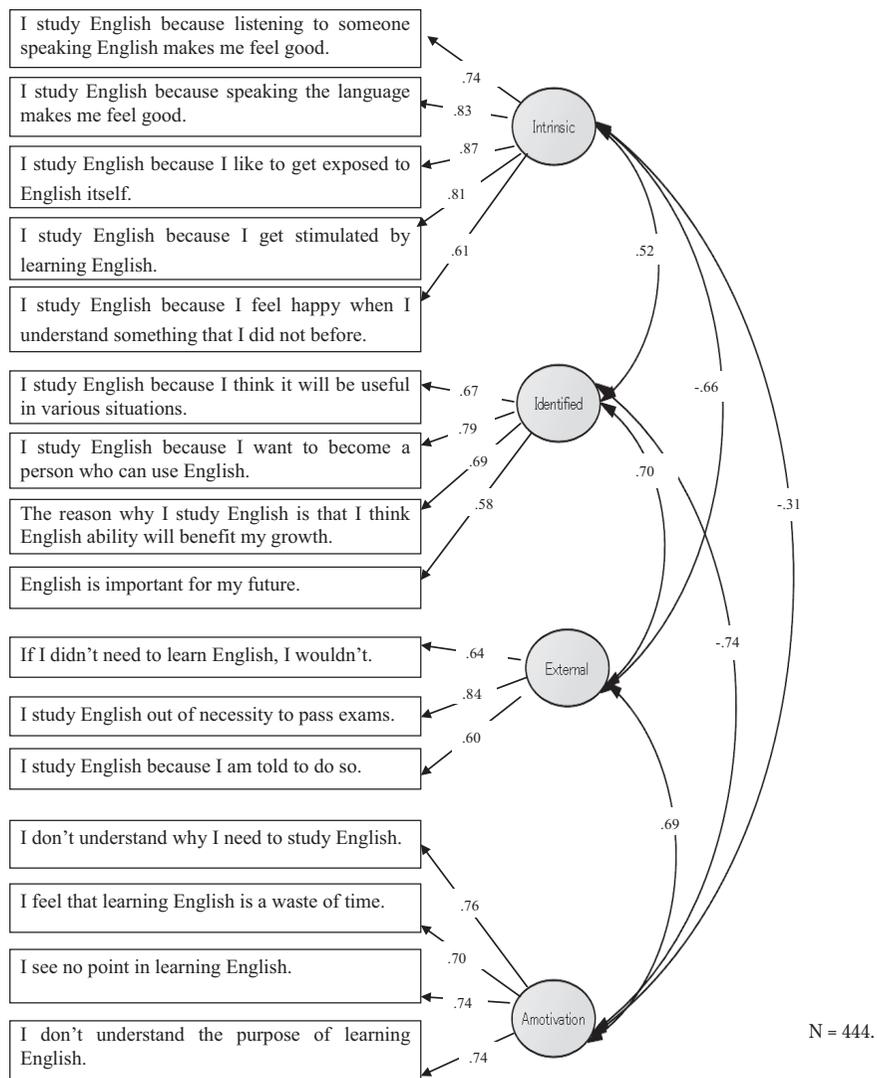


Figure 2. CFA model of the English Learning Motivation Scale.

**Psychological Needs Scale.** Table 3 shows the selected fit indices of the CFA’s Psychological Needs Scale model (hereafter referred to as the Needs Scale). All indices are acceptable, indicating that the sets of question items within each factor/subscale well represent the construct’s concept and the set of factors/subscales are well structured to form the scale.

Figure 3 illustrates the CFA model of the Needs Scale. During the CFA process, two question items were excluded, leaving 10 items in the scale (for the detailed analytical procedure, refer to the confirmatory factor analysis subsection under Data Analyses). The figure shows that the factors/subscales had moderate to strong positive correlations to each other. For example, the correlation coefficient between autonomy and competence showed a moderate correlation ( $r = .62$ ). One can easily understand that it is difficult to feel a sense of achievement in English class (i.e., competence need fulfillment) without understanding the value of learning activities and assignments (i.e., autonomy need fulfillment).

Autonomy and relatedness presented a strong correlation ( $r = .71$ ). This may be because, when students perceive the instructor as approachable and open rather than authoritative (i.e., autonomy supportive), the class atmosphere tends to be perceived as cozy and pleasant. Also, in cooperative classrooms where students are expected to work in cohesive groups to learn together, students tend to feel greater autonomy because cooperative learning is more learner-centered in nature than an instructor-fronted lecture (Crandall, 1999).

A cooperative classroom is closely related to students’ higher sense of competence as well, because the peer acceptance and support that exist in a cooperative atmosphere tend to enhance learners’ self-efficacy (Johnson, Johnson, & Taylor, 1993; Nichols & Miller, 1994).

Similar to the findings in this study, Hiromori (2006a) found a strong correlation among the three needs. He pointed out that these three needs may be closely related to each other to form EFL learners’ perception toward their learning environment.

Table 3  
*Selected Fit Indices for the CFA Model of the Psychological Needs Scale*

Index	Obtained value	Evaluation
CFI	.94	Adequate
RMSEA	.06	Adequate
SRMR	.05	Adequate

*Note.* CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized RMR. The fit evaluation is based on Brown (2006).

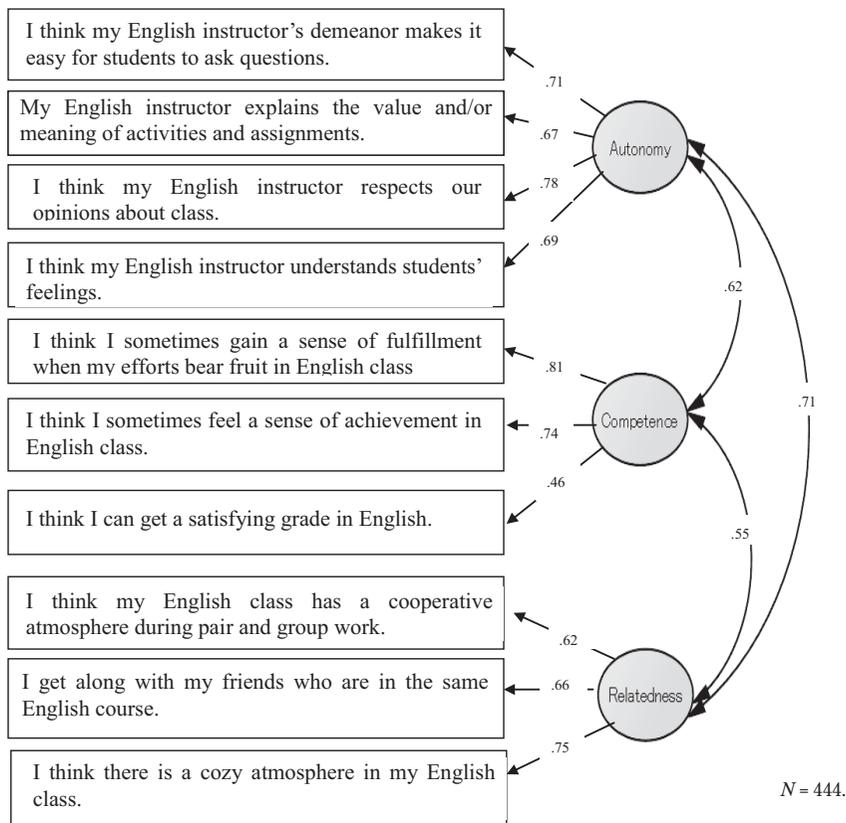


Figure 3. CFA model of Psychological Needs Scale.

### SEM Analysis

Using the factor/subscale structure obtained from the CFAs, the SEM analysis was conducted to validate the SDT model (i.e., the regressive relationships between independent and dependent factors based on SDT). This section discusses the outcome of the SEM analysis.

**General outcome.** Table 3 shows the selected fit indices of the SDT model. All of them were at an adequate level, indicating that the SEM model is an acceptable representation of the data collected for this study. Provided that the theory can be applied in the Japanese EFL setting, the results support the validity of the newly developed questionnaire.

Table 4  
*Selected Fit Indices for the SEM Model*

Index	Obtained value	Threshold value	Evaluation
CFI	.93	$\geq .90$	Adequate
RMSEA	.06	$\leq .10$	Adequate
SRMR	.10	$\leq .10$	Adequate

*Note.* CFI = Comparative fit index; RMSEA = Root mean square error of approximation; SRMR = Standardized RMR. The threshold levels are based on Asano, Suzuki, and Kojima (2005).

**Sense of competence and motivation.** Figure 4 depicts the model with standardized path coefficients. All paths starting from competence were significant at .05 or below, indicating that the satisfaction of needs for competence has a substantial and desirable impact on English learners' intrinsic motivation (.71), identified regulation (.73), external regulation (-.94), and amotivation (-6.5). These results, combined with those from previous studies (e.g., Agawa & Takeuchi, 2016a, 2016b; Dei, 2011; Hiromori, 2006a; Tanaka & Hiromori, 2007), confirmed that competence needs fulfillment is a powerful motivator of Japanese EFL learners.

From a pedagogical perspective, the result underscores the importance of enhancing learners' sense of competence in English classes. Teachers can take approaches to heighten learners' sense of competence, such as giving informative—as opposed to judgmental—feedback (Reeve & Jang, 2006), repeating the same kinds of tasks (Maekawa & Yashima, 2012), and implementing cooperative group work (Johnson & Johnson, 2003).

**Sense of autonomy and motivation.** The same tendency for competence was found in autonomy, except that the coefficient values indicated a substantially smaller impact of need satisfaction on intrinsic motivation (.16), identified regulation (.26), external regulation (-.09), and amotivation (-.19). All the paths except for external regulation reached a statistically significant level.

It is worth mentioning that the autonomy needs fulfillment exerted a stronger influence on identified regulation than intrinsic motivation. This result concurs with SDT, which postulates that the fulfillment of autonomy needs (as well as competence and relatedness) promotes the development of self-determined forms of extrinsic motivation. This may be due to some questionnaire items added to the new scale, such as “My English teacher explains the value and/or meaning of activities and assignments” and “I think my English teacher's demeanor makes it easy for students to ask questions.” These items reflect the new working definition of autonomy needs (i.e., learners' desire to engage in English learning upon understanding and concurring on the value of learning the language). This new definition reflects the Japanese university learners' perception of autonomy needs better than the definition used for the last 10 years, which focused exclusively on students' choices (for a detailed discussion, see Agawa & Takeuchi, 2016a, 2016c). It should be natural, if not obvious, to understand that when learners' autonomy needs are being fulfilled, they learn English because they understand and accept the importance of doing so (i.e., identified regulation).

The discussion on identifying the value of English learning raises another important point: Many Japanese university students enroll in an English course because they need the credit to graduate. English classes are often compulsory at Japanese universities (MEXT, 2005); therefore, many students need to enroll in an English course whether they want to or not. Thus, some students may end up learning English without understanding or even considering the value of it. This situation further supports the result of this study, where autonomy needs fulfillment, including instructors' efforts to help learners internalize the value of learning English, exerted a more significant impact on the identified regulation of participants than on intrinsic motivation.

Together with the reactive nature of autonomy that Japanese EFL learners tend to have (Azuma, 1994; Littlewood, 1999), helping learners understand and accept the value of learning English is a reasonable and practical starting point to enhance their self-determined form of motivation. Some approaches that English instructors can take for this purpose include explaining the value of tasks and activities (Reeve, 1996; Reeve & Jang, 2006), creating opportunities whereby students can express their feelings and opinions by, for example, filling out a reflection sheet (Murphey & Jacobs, 2000; Reeve & Jang, 2006), using materials that suit the students' interests and values, and having students create a learner portfolio (Murphey & Jacobs, 2000; Nakata, 2007, 2010).

**Sense of relatedness and motivation.** With respect to the paths starting from relatedness, the path to intrinsic motivation was significant (.16), albeit limited, considering the value of the path coefficient. The other paths starting from relatedness did not reach a statistically significant level, signaling that the relatedness has a marginal impact on Japanese EFL learners' motivation. This result was expected because a marginal impact of the relatedness satisfaction has been indicated in past studies (Agawa & Takeuchi, 2016a, 2016b; Hiromori, 2006b). As explained in the Development of the New Questionnaire section of this paper, items in the new relatedness subscale focused on learners' relationships with others in the English class. The learner-to-instructor relationships were gauged by items under the autonomy factor because the instructor-student relationships are closely linked with the instructor's autonomy supportiveness (Agawa & Takeuchi, 2016c). As a result, the new relatedness subscale, as with the conventional one, covers student-to-student relationships, which account for an important part of the needs for relatedness but not all of them.

Another reason for the trivial influence of relatedness needs satisfaction on L2 motivation may be the sample's mixed population. Although some EFL learners' motivation increases by having a good relationship with other classmates, other learners do not see the necessity or value of collaborating with other classmates when learning English (Agawa & Takeuchi, 2016a; Hiromori, 2006b). Hiromori, whose study revealed a negative correlation between relatedness and intrinsic motivation among highly motivated learners, claimed that learners who have already developed motivation can engage in learning on their own and, thus, do not need to collaborate with others (p. 10). Agawa and Takeuchi (2016a) pointed out that some Japanese university EFL learners have already developed their own learning styles that involve working alone. For such students, having a good relationship with others is not appealing as an effective way of learning English and, consequently, does not influence their

L2 motivation. As such, instructors should use different types of learning activities (i.e., individual and group work) to accommodate students with different motivation and/or learning styles.

The results and discussion call for a microscopic rather than macroscopic approach to examine the relationship between relatedness needs satisfaction and motivation of Japanese EFL learners. Investigating the characteristics of different clusters of L2 learners may be useful for shedding light on the complex interplay among classroom group dynamics, learning styles, and motivation.

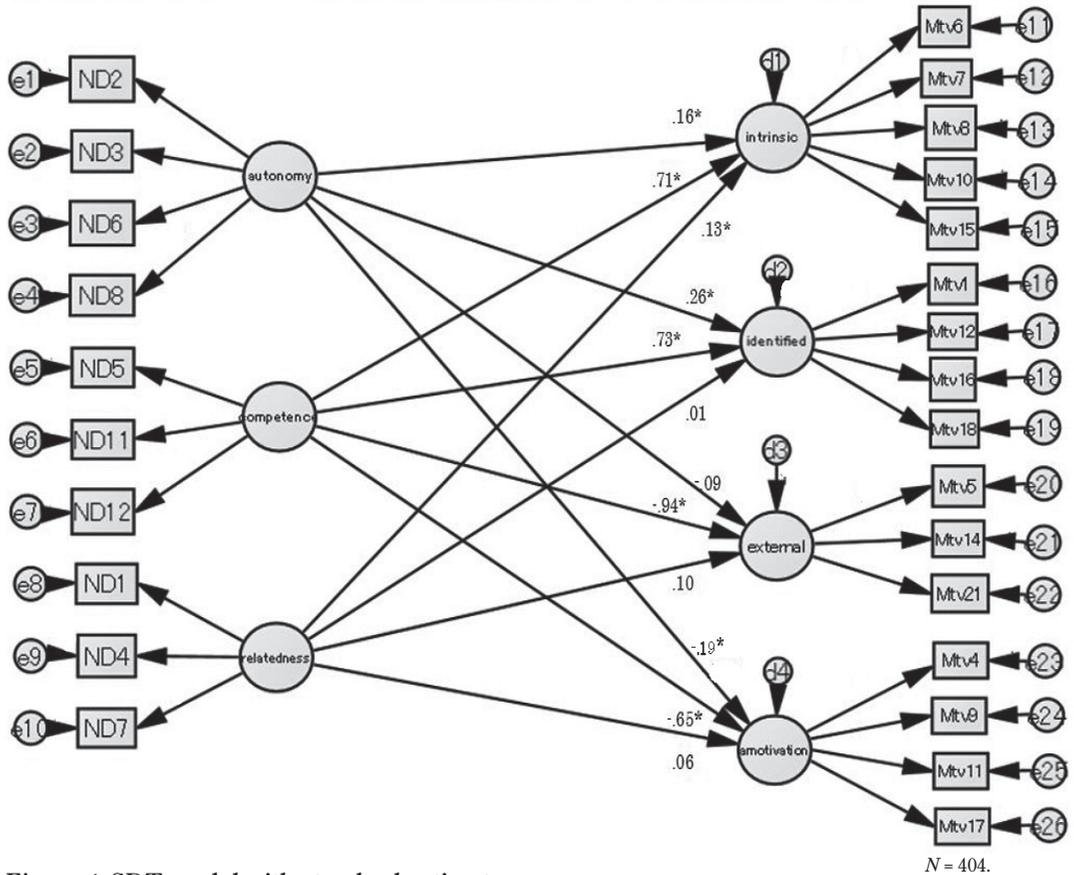


Figure 4. SDT model with standard estimates.  
 Note. The path coefficients with an asterisk are significant at  $p < .05$ .

### Conclusion

This study aimed to verify a newly developed questionnaire based on SDT using a mixed sample in the Japanese university EFL context. The results of the CFA and SEM analyses indicated that the new questionnaire was valid in a different sample from the one used for developing the instrument, showing that it is less dependent on the population than the conventional questionnaire. Therefore, the new questionnaire may better gauge L2 motivation of learners with various characteristics. In addition to the findings that showed the

instrument's versatility, the investigation of the regressive relationship between independent and dependent variables brought some insightful results. First, the fulfillment of competence needs strongly indicated higher intrinsic and identified motivation as well as lower external motivation and amotivation, confirming that competence needs satisfaction is a powerful motivator for Japanese EFL students. The model also demonstrated that the relationship between autonomy and motivation was in line with the theory, which suggests that the amendment of the definition of autonomy needs and questionnaire items for the subscale was successful. However, the influence of the autonomy needs satisfaction on motivation was not as large as that of competence needs satisfaction. The link between the relatedness needs fulfillment and motivation was trivial, showing a limited effect of the needs fulfillment on Japanese EFL motivation. One of the reasons for this result is that relatedness fulfillment and L2 motivation may have different relationships with each other, depending on the learner's characteristics, such as learning styles and motivational intensities. As the current study focused on Japanese EFL motivation at a tertiary level in general, it inevitably failed to shed light on the complex relationships between relatedness needs fulfillment and L2 motivation. For future research, the authors suggest conducting microscopic investigations to reveal the intricate links between these factors.

### Notes

<sup>1</sup>CEFR-J Wordlist Version 1.1 (2013). Tono Laboratory, Tokyo University of Foreign Studies.

<sup>2</sup>A type of analysis that evaluates the regressive relationships among the latent variables is commonly called SEM. To avoid confusion, CFA, which is also a type of SEM, is simply called CFA in this paper.

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