Validation of the Japanese Version of the Multidimensional Stress Questionnaire for Couples: Factor Structure, Validity and Reliability

Tai Kurosawa, Ibaraki Christian University

Kenji Yokotani, Niigata Seiryo University

This work was supported by JSPS KAKENHI Grant Numbers 16K17315 and 17K04338.

Acknowledgements. We are grateful to Dr. Guy Bodenmann for his permission to translate the MSQ and his insightful comments. We also thank Dr. Kentaro Komura and Dr. Keiko Ejiri for their advice regarding statistical analysis and Sydney Koke, MFA, from Edanz Group (www.edanzediting.com/ac) for editing a draft of this manuscript.

Correspondence concerning this article should be addressed to Tai Kurosawa, Department of Psychology and Welfare, Ibaraki Christian University, Ohmika 6-11-1, Hitachi, Ibaraki 319-1295 Japan, Email: tai@icc.ac.jp

Abstract

We validated the Japanese version of the Multidimensional Stress Questionnaire for Couples (MSQ, Multidimensionaler Stressfragebogen für Paare) and examined construct validity and reliability. We conducted an online longitudinal survey of 300 husbands and 300 wives in 2017. The Japanese version of the MSQ had a two-factor structure centered on internal and external stressors. The internal-stressor factor showed sufficient validity and reliability making it suitable for measuring marital stressors and the external-stressor factor also did show acceptable validity in both husbands and wives. The MSQ-J will be useful not only for the research but also for the clinical practice.

Keywords: *Couple, MSQ, Internal Stressors, External Stressors, Marital satisfaction*

Adults faces various types of stress in daily life. Some clash over differences in values with their partner, others may have difficulty interacting with colleagues in their workplace. Stressors associated with an intimate partner are inevitable (Gordon & Chen, 2013), however, they are major source of stress in individuals (e.g. Geiss & O'Leary, 1981). Indeed, stressors within marital relationships have been associated with depression and depressive symptoms (Whisman, 2001). Stressors that originate from outside of the couple are also important (Randall & Bodenmann, 2017) becauseintimate relationships cannot be understood without reference to the contexts in which couples reside (Neff & Karney, 2004).

Several studies have examined the stressors that originate within and outside couples (Falconier, Nussbeck, Bodenmann, Schneider, & Bradbury, 2015; Merz, Meuwly, Randall, & Bodenmann, 2014). Previous studies conducted in Europe and the United States defined these stressors as internal stressors and external stressors and assessed their effects on intimate relationships (Bodenmann, Ledermann, & Bradbury, 2007; Merz et al., 2014; Totenhagen, Randall, Cooper, Tao, & Walsh, 2016).

Stress within a relational framework

The relational framework (Randall & Bodenmann, 2017) includes three aspects of stress: the *locus* of control, the *intensity* of stress, and the *duration* of stress. The locus of stress refers to the source of stress. Stress that comes from within a relationship called "internal stressors". Marital conflict with a partner is considered to be an internal stressor. Conversely, stress that originates outside the relationship (e.g. work, neighborhood) is considered to be an "external stressors".

Stressors that originate within a couple (internal stressors)

In previous studies, internal stressors that originated within a couple were related to higher neuroticism, lower marital satisfaction and lower sexual satisfaction (Bodenmann et al, 2007; Merz et al., 2014). In addition, internal stressors were related

to sexual problems (Bodenmann, Ledermann, Blattner, & Galluzzo, 2006). Overall, these empirical findings suggest that there is a negative association between stress and relationship satisfaction (Randall & Bodenmann, 2017).

Stressor that originate from outside a couple (external stressors)

The Life Experiences Survey (Sarason, Johnson, & Siegel, 1978) was developed to evaluate responses to the life changes such as the death of spouse, change in work situation, and trouble with in-laws. The survey measured not only negative changes but also positive changes (i.e. engagement).

In addition, external stressors were related to higher levels of neuroticism (Merz et al., 2014). External stressors have been found to affect individuals differently depending on gender. In husbands, external stressors were significantly correlated with lower relationship satisfaction, however, no significant correlations were observed in wives (Merz et al., 2014).

Relational framework

Relational framework has been used to two additional ways of categorizing stressors (Randall & Bodenmann, 2017). Specifically, major stressors are considered to be critical life events, such as the experience of a severe illness or the death of a close friend. Conversely, minor stressor is ‘common’. In other words, it is ‘daily stress’. Theoretically, the duration of stress is also important. In relational framework, stress that lasts only a few days can be called “acute”, and that lasting several months or more can be called “chronic”.

The experience of stress in one domain of life can spillover into another domain, in other words, it is interinfluence. This is called the stress spillover process (Grzywacz & Marks, 2000). For example, workplace stress can sometimes negatively impact the mental balance of an individual when they are at home (Grzywacz & Marks, 2000) and cause stress within intimate relationship (Randall & Bodenmann, 2017). In Merz et al.

(2014) reported that external stressors showed spillover effects to internal stressors and relationship satisfaction. External stressors also directly affect intimate relationships. For example, money problems reported by husbands and wives were linked with a higher number of disagreements within the relationship (Jackson et al., 2016).

Characteristics of the MSQ

According to the relational framework, simultaneous measurement internal and external, major and minor, and the acute and chronic stress is essential because these aspects have different effects on psychological state in adult (Randall & Bodenmann, 2017).

The Multidimensional Stress Questionnaire for Couples (MSQ, Multidimensionaler Stressfragebogen für Paare) (Bodenmann, 2007) was developed to measure multidimensional aspects of stress. The MSQ can measure these three aspects (the *locus* of control, the *intensity* of stress, and the *duration* of stress) simultaneously. Using the MSQ, internal stressors were positively correlated with neuroticism and negatively correlated with marital satisfaction, wellbeing, and physical wellbeing in intimate relationship (Falconier et al., 2015; Merz et al., 2014).

The MSQ has several advantages with respect to the measurement of stressors that affects individuals in intimate relationships. First, the MSQ can be used to assess stress in not only married heterosexual couple but also individuals in other types of close relationships (i.e. individuals who are in committed relationships but have chosen not to get married, homosexual couples). Second, the MSQ can clarify the presence or absence of significant life events and the extent to which these life events' affect the psychological state of individuals in an intimate relationship.

Limitations of previous studies

Despite the utility of the MSQ, previous studies using this questionnaire have been limited in several ways. First, life stage factor has not been focused. A study

sampled newlywed couples (Merz et al., 2014), the other study sampled from community sample (Falconier et al., 2015). Couples have various back grounds and may be in different stages of life. For instance, some couples have children while others do not. The MSQ study would benefit from assessing couples from various backgrounds and stage of life.

The second limitation is that previous studies have used paired data from couples (e.g. Falconier et al., 2015; Merz et al., 2014). This may indicate that the data are biased towards couples with higher marital satisfaction, as the two members of the couple must both agree to complete the questionnaire. Obtaining paired data from couples enables researchers to use multivariable analysis techniques such as Actor Partner Interdependence Model (Kenny, Kashy, & Cook, 2006). However, couple-based research sometimes suffer from a relatively low response rate (e.g. 38% reported by Hinnen, Hagedoorn, Ranchor, & Sanderman, 2008). Furthermore, when one of the partners decides to withdraw participation, data from both participants is lost (Dagan & Hagedoorn, 2014).

Third, although some studies have reported a gender difference, the effect of gender on the MSQ score has not been fully characterized. For example, chronic external stressors were related to higher relationship satisfaction in women, while this was not the case in men (Merz et al., 2014). To clarify the similarities and differences of the MSQ with respect to other psychological measures, validation of the MSQ by gender is required.

Fourth, most research regarding the MSQ sampled the couple in Europe and the United States (Merz et al., 2014; Totenhagen et al., 2016). Validation of the MSQ in Eastern culture such as Japan and China is required. For example, Japan’s marriage rate was 5.1 (per 1000), and divorce rate was 1.75 (per 1000). This statistics mean that Japan has around average rate of marriage rate and relatively low rate of divorce rate in

principal countries in the world (National Institute of Population and Social Security Research, 2018). To validate the MSQ in the country which has the characteristic is valuable for future international comparative research. Furthermore, thorough their practice of family therapy, Tamura and Lau (1992) found that the Japanese people prefer the connectedness while British people prefer the separateness and clear boundaries in relationships. Their implication was more than twenty years ago and based on their clinical practice. The MSQ focused on the stressors inside and outside the intimate relationship. To summarize, it will be meaningful to validate the MSQ in Japanese culture which has preference the connectedness.

Aims of the present study

We sought to determine whether a Japanese version of the MSQ (MSQ-J) would have similar factor structure with respect to the previous research (Merz et al., 2014), and to assess the validity and reliability of the MSQ-J. First, we created a Japanese version of the MSQ. Second, to validate the MSQ-J, we did confirmatory factor analysis and assessed the correlations between neuroticism, marital satisfaction, psychological well-being and physical well-being based on the findings of previous studies (Falconier et al., 2015; Merz et al., 2014) in Japanese couple across gender.

To investigate the construct validity of the MSQ-J, we created the following hypothesis: (1) MSQ-J data generated by a sample of Japanese participants will fit a two factor structure with internal and external stressors as factors, (2) neuroticism will be positively correlated with both factors (internal and external stressors) of MSQ-J, (3) marital satisfaction will be negatively correlated with both factors in the MSQ-J and will be strongly associated with lower internal stressors, (4) Psychological wellbeing and Physical wellbeing will be negatively correlated with both factors in the MSQ-J, (5) MSQ-J's scores will be stable one month after the original assessment in terms of both factors.

Statistical approach

First, we used the confirmatory factor analysis to validate the MSQ-J with respect to other psychological constructs based on the previous study (Merz et al., 2014). Then, we conducted and compared the results of the model of previous studies (Falconier et al., 2015; Merz et al., 2014) and the model based on the EFA of a previous study (Name of first author, 2018, March). Then, we conducted multiple group analysis (Xu & Tracey, 2017) for the MSQ-J across gender with respect to life stage and socioeconomic status.

For the purposes of this study, we considered acute stressors to be those that occurred within the last seven days, and the chronic stressors to be those that occurred within last year. We choose the acute stressors and minor stressors in our factor analysis for two reasons. First, it is easier to remember events that took place within the last seven days (acute perspectives) compared with those that took place within the last year (chronic perspectives). Second, some participants may not have experienced a major life event. Thus, we felt it adequate to focus on minor (daily) stress.

Goodness-of-fit indices including Model chi-square (χ^2), the Goodness-of-fit (GFI), Adjusted the Goodness-of-fit (AGFI), Comparative Fit Index (CFI), Root mean square of approximation (RMSEA), Standardised root mean square of approximation (SRMR) were examined to determine how well the model fit our data. Following the existing recommendations (Hooper, Coughlan, & Mullen, 2008), indices such as Higher GFI and AGFI, CFI > .90 (CFI > .95 is regarded as good fit) and SRMR < 0.08. In addition, Brown and Cudeck (1993) indicated that a value of the RMSEA of about 0.05 or less would indicate a close fit of the model in relation to the degrees of freedom. However, they also showed their opinion that a value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation and would not want to employ a model with a RMSEA greater than 0.1. Based on the Brown and Cudeck

(1993), we made a value standard of RMSEA as follows. Good: RMSEA smaller than 0.05, reasonable: RMSEA from 0.05 to 0.08, acceptable: RMSEA from 0.08 to 0.1, not acceptable: RMSEA greater than 0.1.). These values of Goodness-of-fit were used to compare the MSQ-J models.

Method

Ethics Statement

This study was conducted after receiving approval from the ethical review board at the university with which the first author is affiliated (approval number: 2017-001). Participation in this research project was voluntary, and participants had the option to stop participating in the survey at any time.

Statistical Analysis

As we planned to conduct a longitudinal study with two measurement points (Time 1 and Time 2), we expected a certain percentage of participants to drop out prior to study completion. Thus, we decided to recruit300 husbands and 300 wives for the Time 1 Survey. All data were analyzed using SPSS ver 23 (SPSS Inc., Tokyo), R (R version 3.4.4), lavaan (0.6-2), semTools (0.5-0), semPlot (1.1) and HAD ver 16_012 (Shimizu, 2016).

Participants

The participants were recruited in 2017 using a research company based in Japan. Participants were married individuals living in Japan who were registered with the research company. As per a previous study (Merz et al., 2014), we set the conditions for inclusion as follows: (1) individuals aged from 20 to 45 years old and, (2) individuals in a heterosexual couple that had been together for at least one year (Merz et al., 2004). The participants received an explanation about the research and provided informed consent by clicking "*I agree"*.

The research company distributed the online questionnaire to the participants in

June (Time 1) and July (Time 2). The company stored the personally identifiable information (e.g. name, mailing address) associated with the participants and assigned identification numbers to enable the researchers to match the data from Time 1 to that of Time 2. Thus, the researchers know only identification numbers and the data without personal identifiable information. In addition, first author and the research company agreed the personal information protection policy.

The participants received shopping credit (about 100 yen) for their participation of the present study. Eight participants gave single answers (e.g. a rating of 1 for all questions) and completed the questionnaire too quickly to have reasonably considered their responses. Therefore, we used data from 592 participants for analysis.

The collected demographic data include age, gender, work style, type of work, number of children, marital status, and marital duration of the participants (see Table 1). The final sample consisted of 592 individuals (294 husbands and 298 wives). The mean age of the husbands was 39.95 years (*SD* = 4.36) and the mean age of the wives was 37.10 years (*SD* = 5.29). The average marital duration was 9.5 years (*SD* = 5.25). Approximately 66.4 % of the participants had at least one child. Five hundred and eighty-nine participants stated that their nationality was Japanese, and three stated that their nationality was Chinese.

<Insert Table 1>

The participants provided information about their family income. Eleven participants (1.9%) stated that their family income is *two million yen (about twenty thousand Us dollars) or less*, 22 participants (3.7%) stated that *from two to three million yen,* 43 participants stated that *from three million yen to four million yen*, 89 participants stated that *from four million yen to five million yen*, 91 participants stated that *from five million yen to six million yen*, 127 participants stated that *from six million yen to eight million yen*, 72 participants stated that *from eight million yen to ten million yen*, 52

participants stated that *above ten million yen* as their family income. In addition, 43 participants answered "*I don't want to answer*" and 42 participants answered "*I don't know*" to the items concerning family income.

Measures

MSQ The MSQ is the English version of the Original German Version (Multidimensionaler Stressfragebogen für Paare (MSF-P). In this study, we used a Japanese version of the MSQ (MSQ-J) that we translated from the English version of the Multidimensional Stress Questionnaire for Couples (MSQ).

Translation of the MSQ into Japanese was permitted by the first author of the original MSF-P (Bodenmann et al., 2006) (Original researcher). We conducted translation and back-translation to confirm equivalence between the English version and the Japanese translated version.

The procedure has a number of steps. First, a Japanese clinical psychologist (researcher A) who has been previously published an article in English journal translated the MSQ into Japanese. Second, another Japanese psychologist who is fluent in both Japanese and English checked the translation. The outcome was the first version of the MSQ-J. Third, a native English speaker translated our version of the MSQ-J from Japanese into English. Fourth, the original researcher of the MSF-P checked the back translation and gave comments regarding the meaning and quality of our translation. Fifth, based on the comments of the original author of MSF-P, researcher A modified our translation of the MSQ-J. Sixth, the translator again translated our modified MSQ-J into English. Seventh, the modified MSQ-J was sent to the first author of the original MSF-P. After receiving comments from the original author, we developed a provisional version of the MSQ-J. Consequently, we concluded that the translation accuracy of the MSQ-J was acceptable and thus made the decision to use this version of the MSQ-J in the present study.

The MSQ-J was translated with consideration of the following points. First, it was important that the translation was appropriate for use in a Japanese cultural context. For example, in the original versions of the MSQ item # 5 states “difficult behavior of the partner (e.g. smoking, consumption of drugs or alcohol, excessive TV watching or eating, etc.”. However, we removed the word of drugs from the MSQ-J. Use of drugs is illegal in Japan, therefore we considered that including this word (drugs) might have effect on response variance. Second, we did not limit the wording of the MSQ-J such that it could be used only with married heterosexual couples. The MSQ is meant to assess intimate relationship, regardless of the gender of the individuals and types of intimate relationships. Therefore, we used the Japanese word that indicates “partner” instead of spouse.

To examine internal stressors, participants were asked “How stressful are the following issues in the relationship between the two of you? The following types of stress are involved with your partner or in the relationship with your partner.” in instruction. The items included “Differences in opinions from your partner (conflicts, arguments, etc.)” “Strong control in the relationship (no freedom, too strong relationships such as being tied down, etc.)”. The participants rated their choice from 1(*not at all*) to 4 (*very often*).

To examine external stressors, participants were asked “How stressful are the following issues outside the relationship between the two of you?” “The following types of stress and not being involved with your partner or in the relationship with your partner.” in instruction. Items included “Social relationships (conflicts with neighbors, colleagues, and acquaintances, trouble in participating in activities and gossips)”, ” Dwelling environment (size of the house, noise, location) ”. The participants rated their choice from 1 (*not at all*) to 4 (*very often*).

Neuroticism Prior research has shown that self-reported data can be influenced

by participant emotional instability, especially when evaluating relationship satisfaction (Karney & Bradbury, 1997). In addition, neuroticism was positively correlated with scores of the MSQ (Merz et al., 2014). In this study, we used the Neuroticism component of the Japanese version of the Big-Five Scale (Namikawa et al., 2012). This short form scale was constructed according to Item Response Theory and was found to have sufficient reliability and validity compared with the original version of the NEO Five Factor Inventory (FFI). The scale regarding neuroticism consists of five items (e.g. be discouraged). These items were scored using a scale rating from 1 (*very untrue of me*) to 6(*very true of me*). Higher scores indicated that higher levels of neuroticism.

The participants were asked to complete the neuroticism scales at Time 1 only (Husbands $M = 3.44$, $SD = 1.55$; Wives $M = 4.19$, $SD = 1.54$). Cronbach's alpha was .96 for husbands and .94 for wives.

Marital Satisfaction Participants provided answer on Japanese version of the Kansas Marital Satisfaction Scale (KMSS: (Schumm et al., 1986; Sugawara & Takuma, 1997). The KMSS consists of three items (e.g. "How satisfied are you with your relationship with your wife/husband?"). The KMSS has been found to be highly reliable in the United States, Europe, and Asia (Sorokowski et al., 2017).

The original KMSS scale consists of a fully anchored 7-point Likert scale. However, the mid-point of the original version of the KMSS is 'mixed' while the mid-point of Japanese version of KMSS is 'neither agree nor disagree'. Because the meaning differs in the two versions of the scale, we removed the mid-point in the present study. The item scores were averaged to produce a score on a scale ranged from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*). A higher score indicated that they feel higher marital satisfaction.

The participants were asked to complete the KMSS at both Time 1 (Husbands $M = 4.22$, $SD = 1.24$; Wives $M = 4.12$, $SD = 1.23$) and Time 2 (Husbands $M = 4.32$, SD

= 1.24; Wives *M* = 4.18, *SD* = 1.20). Cronbach's alpha at Time 1 was .97 for husbands and .96 for wives.

Psychological wellbeing We used the WHO-Five Well-Being Index (WHO-5) to measure psychological wellbeing. The WHO-5 contains items that are phrased in a positive way and is considered to be a measurement of general well-being (Bech, 1999; Topp, Ostergaard, Sondergaard, & Bech, 2015). The scale has been used for both elderly adult (Awata et al., 2007) and married couples (Kurosawa, Kato, & Kamiya, 2015)

The WHO-5 has five items including "I have felt cheerful and in good spirits" and "I have felt calm and relaxed". The participants rated how often they felt the feeling described on a scale from 0 (*at no time*) to 5 (*all of the time*). A higher score indicates a higher level of wellbeing.

We asked the participants to complete The WHO-5 at both Time 1 (Husbands *M* = 13.33, *SD* = 6.04, Wives *M* = 12.80, *SD* =5.44) and Time 2 (Husbands *M* = 14.14, *SD* = 5.64; Wives *M* = 12.67, *SD* = 5.74). Cronbach's alphas were .95 for husbands and .91 for wives.

Physical Wellbeing We used the Public Health Research Foundation Stress Check List (PHPR-SCL) to measure physical well-being (Imazu et al., 2006). This stress checklist was previously validated based on data from approximately three thousand adults. The PHPR-SCL has been found to have high internal consistency and sufficient construct validity. We used the subscale regarding tiredness/physical (body) responses to assess physical wellbeing. The participants rated their choice from 0 (*never*) to 2 (*very often*). A higher score indicated a higher level of tiredness (lower physical wellbeing).

We asked the participants to complete the six items at Time 1 only (Husbands *M* = 5.02, *SD* = 3.40; Wives *M* = 6.50, *SD* = 3.10). We found that the wives obtained higher tiredness scores than the was higher than the score of husbands (t = -5.51, df =

590, $p < .001$, $d = 0.46$). Cronbach's alphas were .89 for husbands and .83 for wives.

Result

Two-Factor Structure of the MSQ-J

To confirm the two-factor structure of the MSQ-J, we conducted a confirmatory factor analysis using Maximum Likelihood estimation for all data (data for both husbands and wives). As shown in Table 2, the confirmatory analysis revealed that two factor model (10 internal items/8 external items) was statistically acceptable (GFI =.87, AGFI = .83, CFI = .91, RMSEA = .086, SRMR =.05). A two-factor model (10 internal items/8 external items) was statistically acceptable for husbands (GFI = .84, AGFI = .79, CFI = .92, RMSEA = .096, SRMR = .05) and for wives (GFI = .85, AGFI = .81, CFI = .89, RMSEA = .084, SRMR = .06).

<Insert Table 2 here>

The factor structure produced by confirmatory factor analysis is as follows.

Factor 1 was constructed from items such as "Inadequacies of your partner's behaviors (poor conversation, low problem solving skills, poor stress coping methods)" and "Difficult personality of your partner (temper, honesty, reliable or not, etc.)". At these items were similar to those found for the original version of the MSQ in a previous study (Merz et al., 2014), we named this factor "internal stressors".

Factor 2 constructed from items such as "Social relationships (conflicts with neighbors, colleagues, and acquaintances, trouble in participating in activities and gossips) and "dwelling environment (size of the house, noise, location)". At these items were similar to those found for the original version of the MSQ in a previous study (Merz et al., 2014), we named this factor "external stressors".

A previous study found that the eight items regarding external stressors did not have a simple factor structure in wives (Name of first author, 2018, March), In the exploatoryfactor analysis, item #7 ,item #6, item #5, and item #8 were excluded because

the factor loadings for these items were under .40.

We again conducted a confirmatory factor analysis based on the exploratory factor analysis of a previous study (Name of first author, 2018, March). At two-factor model based on the results of exploratory factor analysis (10 internal items/4 external items) showed better goodness of fit (for husbands: GFI = .88, AGFI = .84, CFI = .93, RMSEA = .098, SRMR =.05; for wives; GFI = .88, AGFI = .84, CFI = .91, RMSEA = .09, SRMR =.06) compared with the two-factor model (10 internal items, 8 external items) used by Merz et al. (2014).

<Insert Table 3>

Multiple group analysis

A multiple group analysis was computed to examine group invariance across the parameters in the measurement structure of the MSQ-J. Guidelines of the previous study (Hirschfeld & von Brachel, 2014) for testing invariance using lavaan ware followed. The starting point is an unconstrained (configural) model, which is identical across gender; in constrained model, three conditions (weak, strong, strict) were prepared. Weak invariance implies that the magnitude of the loading is similar across the groups; Strong invariance implies that not only the item loadings but also the item intercepts are similar across the group; Strict invariance implies that in addition to the loadings and intercepts, the residual variances are similar across groups (Hirschfeld & von Brachel, 2014).

These four models were compared by using analysis of variance (see Table 4). In the present study samples, the difference between configural ($\chi 2 = 908.97$) and weak ($\chi 2 = 942.92$) was significant. Therefore, the measurement structure of MSQ-J does vary as a function of gender.

<Insert Table 4>

Relevance of the MSQ-J with neuroticism, marital satisfaction, and

psychological/physical well being

Falconier et al. (2015) proposed that external stressors could not be considered a psychometric scale because the measure covers various life domains. Therefore, we mainly focus on internal stressor aspect. Table 5 shows the correlations among the MSQ-J, neuroticism, marital satisfaction and psychological/physical wellbeing. In husbands, acute internal minor stressors were significantly correlated with higher levels of neuroticism (r = .26, p <.001), lower marital satisfaction (r = -.62, p <.001), their lower psychological wellbeing (r = -.34, p <.001). In addition, acute internal minor stressors were correlated with marital satisfaction (r = -.42, p <.001, n = 225) and well-being (r = -.33, p < .001, n = 225) one month later. Furthermore, acute external minor stressors were significantly correlated with higher levels of neuroticism (r = .40, p <.001), lower marital satisfaction (r = -.48, p <.001), and lower psychological well-being (r = -.33, p <.001).

In wives, acute internal minor stressors were significantly correlated with higher scores of neuroticism (r = .25, p <.001), lower marital satisfaction (r = -.62, p <.001), lower psychological wellbeing (r = -.43, p <.001) and higher tiredness (r = .13, p = 0.026). In addition, acute internal minor stressors were correlated with lower marital satisfaction (r = -.65, p <.001, n = 206) and lower psychological wellbeing (r = -.35, p <.001, n = 206) one month later. Furthermore, acute external minor stressors were significantly correlated with higher neuroticism (r = .38, p <.001), lower marital satisfaction (r = -.44, p <.001), their lower psychological wellbeing (r = -.45, p <.001) in wives.

<Insert Table 5 here>

We found that acute internal minor stressors (those that took place within the last seven days) were strongly positively correlated with chronic internal stressors (those that took place within the last year) (In Husbands, r = .93, p <.001; In Wives, r

= .89, p <.001).

Reliability

In husbands, Cronbach's alpha for internal stressors (10 items) was .949 and that for external stressors (eight items) was .922. To clarify the test-retest reliability, we calculated the correlation between the data collected at Time 1 and Time2. We found that acute internal stressors (r =.64, p < .001, n = 225), chronic internal stressors (r = .67, p < .001, n = 225), acute external stressors (r = .58, p < .001, n = 225), chronic external stressors (r = .59, p < .001, n = 225) collected at the two time were strongly positively correlated.

In wives, Cronbach's alpha for internal stressors (10 items) was .913. Cronbach's alpha for external stressors was .844 when there were eight items and .790 when there were four items. We found that the data regarding acute internal stressors (r =.63, p < .001, n = 206), chronic internal stressors (r = .72, p < .001, n = 206), acute external stressors (r = 60, p < .001, n = 206), chronic external stressors (r = 62, p < .001, n = 206) collected at the two time points were strongly positively correlated.

Comparison of the MSQ-J by socio-economic situation and family structure

In terms of acute internal stressors, we found no significant differences in the participants from different socio-economic situations. For example, there was no significant difference in internal stressors (t = 0.13, df = 585, p = .90, Cohen's d = 0.01) between the working participants (M = 2.05, SD = 0.72, n = 423) and non-working participants (M = 2.04, SD = 0.69, n = 164).

In contrast, whether the participants had children or not had a significant effect on the score of acute internal stressors. The participants with one or more children (M = 2.11, SD = 0.72, n = 393) felt stronger internal stressors (t = 3.54, df = 590, p < .001, Cohen's d = 0.31) compared with the participants without children (M = 1.90, SD = 0.65, n = 199).

Discussion

This study aimed to validate the Japanese version of the Multidimensional Stress Questionnaire for Couples. To validate the MSQ-J, we specified two factors from the previous study (Merz et al., 2014) and evaluated the construct validity and reliability of these factors. We found two subscales that termed “internal stressors” and “external stressors”. However, the values of model of fit became better when we removed the items of external stressors based on the factor structure of a previous study using an exploratory factor analysis (Name of first author, 2018, March).

Our multiple group analysis indicates that the MSQ-J showed configural invariance and did not show measurement invariance across gender. In other words, even the two-factor structure is common by gender (husband and wife), the loadings of items significantly differed by gender.

Internal Stressors

Our findings indicated that higher internal stressors was correlated with higher neuroticism and lower marital satisfaction. These findings were similar to the findings of previous studies (Falconier et al., 2015; Merz et al., 2014). Thus, the structural of internal stressors in the MSQ-J for Japanese participants is similar to that previous studies that were conducted in Europe. In addition, the structure was similar between husbands and wives.

Our data identified as the component part of internal stressors in intimate relationships. Stressors in intimate relationship are known to influence negative psychological outcomes such as depression (Whisman, 2001). The ten items that we identified may be helpful as components of psychological assessment for the practitioners and researchers investigating stressors in intimate relationship. Family therapists may benefit from paying special attention to internal stressors, because these are associated with lower marital satisfaction and decreased psychological well-being.

Our findings indicated that individuals with one or more children had higher internal stressors. Literature regarding coparenting has shown that two or more adults work together to raise a child for whom they share responsibility (e.g. Talbot & McHale, 2004). Childrearing is a shared task in intimate relationships, and so can draw out conflict in the personality and the behavior of partners as they work together. As a result, having a child/children is expected to promote the internal stressors.

External Stressor

External stressors were also associated with higher neuroticism and lower marital satisfaction and these findings were consistent with the previous study (e.g. Merz et al., 2014). Our confirmatory factor analysis indicated that eight items were in one factor, external stressors. Our findings showed that external stressors factor also had acceptable construct validity.

However, a previous the MSQ study (Merz et al., 2014) reported a relatively low Cronbach's alpha regarding external stressors (alpha = .66). A recent study by Falconier et al. (2015) did not calculate the Cronbach's alpha of the external stressors. The researchers proposed that external stressors could not be considered a psychometric scale because the measure covers various life domains (Falconier et al., 2015). Even our findings suggests that external stressors had acceptable validity, it may have the problem regarding good construct validity.

Our findings regarding external stressors might reflect differences in life stage and social situation of the participants. In other words, external stressors might be considered as their "context". In summary, the items of MSQ-J that are associated with external stressors maybe segmentalized with respect to differences in the participants.

Contribution

The first contribution of our characterization of the MSQ-J is the assessment of similarities and differences between this and the previous studies (e.g. Falconier et al.,

2015; Merz et al., 2014). For example, although the duration of stress (acute versus chronic) is theoretically important, the correlations between acute and chronic stress were quite high in our study. Our empirical findings indicate that these two aspects were not independent, rather they are related. Our second contribution relates to international comparative research. We confirmed the two factor structure of the MSQ-J by multiple group confirmatory factor analysis. In addition, through the translation and back-translation process, the we maintained equivalence between the English and the Japanese translated version of the MSQ. As the original version of the MSQ was written in German, our study adds to the possibilities for international comparative research regarding stressors in intimate relationships, such that comparisons can now be made between Japan, the United States, and Europe. Third, comparison of the MSQ-J by socio-economic situation showed that having children impacted the level of internal stressors.

Implications for future research

First, the MSQ was constructed to measure stressors within and outside the intimate relationships. Although the MSQ has generally been used to assess stressors in heterosexual relationships, a recent study regarding the MSQ focused on the daily stress and relationship satisfaction of individuals in same-sex relationships (Totenhagen et al., 2016). In future research, it may be possible to use the MSQ-J to examine stressors in same-sex relationship as well.

The second implication of our validation of the MSQ-J is that this scale may be able to predict maladaptive marital life events. A recent the MSQ study examined the effect of minor stressors on major stressors using logistic regression analysis (Kurosawa, 2018, Augsut). The logistic regression analysis revealed that lower marital satisfaction and higher internal stressors (e.g., inadequacies of partner's behaviors) in a couple predicted the experience of unfaithfulness in that couple. It may be possible to predict

other types of maladaptive marital life events (e.g. domestic violence) using the MSQ-J.

Limitation

Our study has several limitations. First, our data were not pair data. Our research examined the validity of MSQ-J with individual data and found the associations among marital satisfaction, psychological well-being. However, a previous study using pair data revealed that internal stressors were positively correlated between husbands and their wives while external stressors were not significantly correlated (Bodenmann et al., 2007). Collecting and analyzing pair data is also helpful to further examine the validity of the MSQ-J. Second, we focused on the individuals in heterosexual couples who were legally married. Future research should include other intimate relationships such as homosexual couples and common-law marriage. Third, we did not examine coping behavior. Coping and stress management may be useful targets for intervention programs designed to prevent and treat relationship distress (Bodenmann et al., 2007). Future studies should examine coping factors such as individual coping (Kramer, Ceschi, Van der Linden, & Bodenmann, 2005), relationship-focused coping (Coyne & Smith, 1991) and dyadic coping (Bodenmann, Meuwly, & Kayser, 2011). Fourth, our study did not show preferable values regarding models of fit. For example, our scores of AGFI were not over 0.95, and the scores of RMSEA was near to 0.10 in some analyses. Only our research, we could not determine these results are due to the characteristics of the MSQ-J, the characteristics of our sample, or the characteristics of culture. Further research regarding this point is required.

Conclusion

Based on relational framework, we confirmed the two-factor structure of the Japanese version of the MSQ across gender. The two main factors were internal stressors and external stressors. The internal stressors factor showed sufficient validity

and reliability and its suitable for measuring marital stressors in both husbands and wives. However, we suggested that the external-stressor factor might be segmentalized to account for couples with various backgrounds and stages of life.

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Table 1

Demographic data of the Participants

	Husbands				Wives			
Variables	N	%	*M*	*SD*	N	%	*M*	*SD*
Age	294		39.95	4.36	298		37.1	5.29
Nationalty								
Japan	293	99.66			296	99.33		
China	1	0.34			2	0.67		
Marital Duration (years)			10.02	5.36			8.99	5.10
Child								
Yes	198	67.35			195	65.44		
number of children								
one	73				80	26.85		
two	95				91	30.54		
three	24				23	7.72		
more than four	6				1	0.34		
No	96	32.65			103	34.56		
Work style								
full-time	280	95.24			69	23.15		
part-time	5	1.70			69	23.15		
homemaker	6	2.04			154	51.68		
unemployed	1	0.34			2	0.34		
other	2	0.68			4	1.34		
nuclear family	266	90.48			281	94.30		
expanded family	28	9.52			17	5.70		

Table 2

Confirmatory factor analysis using Maximum Likelihood estimation for the MSQ-J (N = 592)

	Backtranslation of our Japanese version items	*M*	*SD*	F1	F2
q1_1	Differences in opinions from your partner (conflicts, arguments, etc.)	2.16	0.93	**.770**	.000
q1_2	Differences in perspective of the relationship and views of life (goals, what one needs, view of things, etc.)	2.14	0.92	**.812**	.000
q1_3	Annoying habits of your partner(manners, thoughtlessness, carelessness, etc)	2.26	0.95	**.792**	.000
q1_4	Difficult personality of your partner (temper, honesty, reliable or not, etc.)	2.07	0.91	**.797**	.000
q1_5	Unfavorable behaviors of your partner (smoking, drinking, watching too much TV, eating too much, etc.)	2.14	0.91	**.766**	.000
q1_6	Inadequacies of your partner's behaviors 'poor conversation, low problem solving skills, poor stress coping methods)	2.11	0.91	**.813**	.000
q1_7	Strong control in the relationship(no freedom, too strong relationships such as being tied down, etc.)	1.69	0.85	**.627**	.000
q1_8	Feeling a distance from your partner (not showing intimacy, hardly having time for each other, hardly having time to communicate, no common hobbies or interests, etc.)	1.91	0.87	**.765**	.000
q1_9	Unfair role-sharing related to work, housework, and child-rearing	1.99	0.89	**.691**	.000
q1_10	Indifference towards the partner (little interest in the partner, lack of love, lack of sexual interest, among others.)	1.98	0.89	**.728**	.000
q2_1	Job, education (excessively busy, pressure of deadlines, high level commitments, or not worth challenging, low evaluation by others, few opportunities for promotion/job change)	1.97	0.91	.000	**.691**
q2_2	Social relationships(conflicts with neighbors, colleagues, and acquaintances, trouble in participating in activities and gossips)	1.89	0.85	.000	**.708**
q2_3	Free time(pressure of deadlines, too many things to do, unsatisfied with leisure activities or hobbies, no private time, pressure for producing results)	1.94	0.89	.000	**.753**
q2_4	Issues related to children (child rearing, discipline, communication with children, children's dependence, restrictions owing to children, worries about children, etc.)	1.89	0.94	.000	**.686**
q2_5	Home where you were born and raised (psychologically too far, or psychologically too close, many quarrels, difficult to maintain)	1.83	0.84	.000	**.742**
q2_6	Dwelling environment (size of the house, noise, location)	1.79	0.82	.000	**.632**
q2_7	Family finances (debts, short of money, no promotions)	2.16	0.98	.000	**.653**
q2_8	Daily irritations(losing things, putting something in a different place from usual, frequent problems, train delays, traffic jams, etc.)	2.08	0.87	.000	**.757**

Table 3

Summary of model fit indices for the MSQ-J

	χ^2	GFI	AGFI	CFI	RMSEA	SRMR	AIC
Both husbands and wives (N = 592)							
Internal 10 items/external 8 items	718.31	.869	.833	.909	.086	.049	792.31
Internal 10 items/external 4 items	442.33	.897	.858	.920	.090	.050	500.33
Husbands (N =294)							
Internal 10 items/external 8 items	492.04	.836	.791	.915	.095	.050	566.04
Internal 10 items/external 4 items	292.13	.878	.832	.932	.098	.048	350.13
Wives (N =298)							
Internal 10 items/external 8 items	416.93	.853	.813	.892	.084	.056	490.93
Internal 10 items/external 4 items	259.29	.882	.836	.913	.090	.056	317.29

GFI: Goodness of Fit Index, AGFI: Adjusted Goodness of Fit Index, CFI: Comparative Fit Index, RMSEA: Root mean Square Error of Approximation, SRMR: Standardized Root-Mean Residual, AIC: Akaike's Information Criterion

Table 4

Series of model comparisons

Model	χ^2	Df	*p*	CFI	RMSEA
M1 Configural	908.97	268	$p < .001$	0.906	0.090
M2 Weak invariance (loadings)	942.92	284	$p < .001$	0.903	0.089
M3 Strong invariance (loadings, and intercepts)	1115.12	300	$p < .001$	0.880	0.096
M4 Strict invariance (loadings, intercepts and residuals)	1117.64	302	$p = 0.28$	0.880	0.096

Note. CFI: Comparative Fit Index, RMSEA: Root mean Square Error of Approximation

Table 5

Zero-order correlations of MSQ-J and other psychological constructs

	Correlations																*M*(*SD*)	
	1		2		3		4		5		6		7		8		Husbands	Wives
1. Internal Stressor (seven days) (T1)	—		.67	***	.26	***	-.62	***	-.34	***	.08		-.42	***	-.33	***	2.00(0.73)	2.09(0.69)
2. External Stressor (seven days) (T1)	.68	***	—		.40	***	-.48	***	-.33	***	.19	**	-.30	***	-.36	***	1.92(0.70)	1.97(0.62)
3. Neuroticism (T1)	.25	***	.38	***	—		-.17	**	-.36	***	.42	***	-.23	***	-.32	***	3.43(1.55)	4.19(1.54)
4. Marital Satisfaction (T1)	-.62	***	-.44	***	-.23	***	—		.55	***	.04		.61	***	.44	***	4.22(1.24)	4.12(1.23)
5. Psychological Wellbeing (T1)	-.43	**	-.45	***	-.45	***	.45	***	—		-.30	***	.29	***	.59	***	13.33(6.04)	12.80(5.44)
6. Physical Wellbeing (Tiredness) (T1)	.13	*	.33	***	.43	***	-.17	**	-.34	***	—		-.08		-.26	***	5.02(3.40)	6.50(3.11)
7.Marital Satisfaction (T2) (b)	-.65	***	-.50	***	-.25	**	.82	***	.47	***	-.20	**	—		.54	***	4.32(1.24)	4.18(1.20)
8. Well-Being (T2) (b)	-.35	***	-.39	***	-.44	***	.50	***	.70	***	-.43	***	.52	***	—		14.14(5.64)	12.67(5.74)

Note. Correlations of variables measured in husbands appear above the diagonal. Correlations of variables measured in wives appear below the diagonal.

* $p < .05$, ** $p < .01$, *** $p < .001$ (a) 225 husbands completed the questionnaires both in T1 and T2(b) 206 wives completed the questionnaires both in T1 and T2