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BRIEF REPORT

Constructing the Japanese version of the Maslach Burnout Inventory–Student Survey: Confirmatory factor analysis

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Abstract

Aim: To examine the factorial validity of the Maslach Burnout Inventory–Student Survey, using a sample of 2061 Japanese university students majoring in the medical and natural sciences (67.9% male, 31.8% female; M_{age} = 19.6 years, standard deviation = 1.5). The back-translated scale used unreversed items to assess inefficacy.

Methods: The inventory's descriptive properties and Cronbach's alphas were calculated using SPSS software. The present authors compared fit indices of the null, one factor, and default three factor models via confirmatory factor analysis with maximum-likelihood estimation using AMOS software, version 21.0.

Results: Intercorrelations between exhaustion, cynicism, and inefficacy were relatively higher than in prior studies. Cronbach's alphas were 0.76, 0.85, and 0.78, respectively. Although fit indices of the hypothesized three factor model did not meet the respective criteria, the model demonstrated better fit than did the null and one factor models. The present authors added four paths between error variables within items, but the modified model did not show satisfactory fit. Subsequent analysis revealed that a bi-factor model fit the data better than did the hypothesized or modified three factor models.

Conclusion: The Japanese version of the Maslach Burnout Inventory–Student Survey needs minor changes to improve the fit of its three factor model, but the scale as a whole can be used to adequately assess overall academic burnout in Japanese university students. Although the scale was back-translated, two items measuring exhaustion whose expressions overlapped should be modified, and all items measuring inefficacy should be reversed in order to statistically clarify the factorial difference between the scale's three factors.

Key words: academic burnout, bi-factor model of the Maslach Burnout Inventory–Student Survey, confirmatory factor analysis, Japanese university students, Maslach Burnout Inventory–Student Survey.

INTRODUCTION

"Burnout" is defined as a chronic response to job-related stress caused by various emotional and interpersonal strains (Maslach, Schaufeli, & Leiter, 2001), and is composed of three main factors: emotional exhaustion, cynicism, and reduced efficacy (Maslach & Goldberg, 1998). Emotional exhaustion, which entails feelings of continuous emotional fatigue and deprivation of emotional resources owing to work-related stress (Maslach & Goldberg, 1998), has been attributed to causes such as work overload and interpersonal stress. Cynicism, an insensitive and evasive attitude toward others at work, often entails a loss of idealism (Maslach & Goldberg, 1998). This state buffers against emotional exhaustion and often leads to indifference toward others, while reduced efficacy involves an increasing awareness of unproductivity and incompetency at work (Maslach & Goldberg, 1998).

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The root cause of burnout is a lack of resources such as control, coping, social support, autonomy, decision involvement, and skill use, when workers face work overload or stressful interpersonal relations (Maslach, Jackson, & Leiter, 1996). In this sense, burnout is closely related to symptoms such as anxiety and depression (Maslach *et al*., 2001), which can lead to turnover or absenteeism in the workplace. Human services workers (e.g. nurses and social workers) are especially prone to burnout (Freudenberger, 1975), as are those employed in equally stressful fields such as management, the military, and entrepreneurship (Hu & Schaufeli, 2009). In the 1990s, the concept of burnout was expanded to include work in non-human service domains, including clerical jobs and factory work (Maslach *et al*., 2001). To assess burnout in a host of occupations, Maslach *et al*. (1996) developed the Maslach Burnout Inventory–General Survey (MBI-GS), whose construct validity has been confirmed in Japan (Kitaoka-Higashiguchi, Ogino, & Masuda, 2004).

The notion of academic burnout in students is based on the understanding of burnout in the workplace. Research has shown that studying at school or university comprises the same elements involved in causing burnout states in other occupations (Alarcon, Edwards, & Menke, 2011; Balogun, Hoeberlein-Miller, Schneider, & Katz, 1996; Bernhard, 2007; Chang, Rand, & Strunk, 2000; Fimian, 1988; Gold & Michael, 1985; Jacobs & Dodd, 2003; Koseke & Koseke, 1991; Shin, Puig, Lee, Lee, & Lee, 2011; Yang & Farn, 2004; Zhang, Gan, & Cham, 2007). To assess burnout in students, Schaufeli, Martinez, Pinto, Salanova, and Bakker (2002) developed the Maslach Burnout Inventory–Student Survey (MBI-SS), a psychometric scale based on the MBI-GS (Schaufeli, Leiter, Maslach, & Jackson, 1996), in which terms like "work" were replaced with "study". Like the MBI-GS, the MBI-SS comprises the factors exhaustion, cynicism, and inefficacy. Its three factor validity has been confirmed in Spain, Portugal, the Netherlands (Schaufeli *et al*., 2002), China (Hu & Schaufeli, 2009), and South Korea (Shin *et al*., 2011). However, this scale has yet to be utilized and validated among Japanese university students. The present study is the first to do so. The present authors' primary aim was to determine whether its three factor structure is also valid in Japan, using confirmatory factor analysis.

METHODS

Participants

To avoid bias associated with assessing burnout in students from only one university, undergraduates ($N = 2745$) from seven universities in two major cities (Tokyo and Nagoya) and a rural area (Shikoku) were recruited after agreement was secured from the deans of targeted departments and lecturers of targeted classes. Of the 2745 students approached, approximately 500 declined to answer or did not complete the questionnaire due to time constraints at the end of their class lectures. Additionally, cases of extreme outliers (e.g. where all items contained a "0" or showed significant Mahalanobis distance) were excluded, leaving a final sample of 2061 (valid response rate = 75%; 1399 male, 655 female, seven whose sex was unreported; $M_{age} = 19.6$ years, standard deviation [SD] = 1.5). Student majors were categorized into either science/engineering (biology, computer science, architecture, mechanical science) or medical sciences (nursing, physical therapy, occupational therapy, clinical engineering). Table 1 shows additional demographic characteristics of the sample analyzed.

Measures

The MBI-SS was used. The three factors comprising the MBI-SS (Schaufeli & Salanova, 2007) are "exhaustion" (five items; e.g. "I feel emotionally drained by my studies"), "cynicism" (four items; e.g. "I have become less enthusiastic about my studies"), and "inefficacy" (six items; e.g. "I can't effectively solve the problems that arise in my studies"). All 15 items are scored on a 7

Table 1 Major, sex, and scholastic year ($n = 2061$)

	Sex*	First year	Sophomore	Junior	Senior	Holdover
Science and engineering ($n = 1117$)	Male	427	263	204	120	18
	Female	32	31	15	3	0
Medical sciences ($n = 944$)	Male	90	106	95	72	4
	Female	139	139	178	116	2

*Seven unknown.

point Likert-type scale ranging from 0 ("never") to 6 ("always"). In the original form of MBI-SS, efficacy is assessed using six reversed items (e.g. "I can effectively solve the problems that arise in my studies") to prevent response bias (Hu & Schaufeli, 2009; Shin *et al*., 2011). However, Schaufeli and Salanova (2007) concluded that measuring inefficacy using unreversed items would be "a good strategy to capture the 'real' meaning of burnout" (p. 192); thus, the present authors used unreversed items to assess inefficacy. In the present study, item 13 was removed from the cynicism dimension in the original version of the MBI-SS because of its ambiguity and inadequacy for the purpose of the present study (see also Hu & Schaufeli, 2009; Schaufeli *et al*., 2002). The Japanese version of the MBI-SS used in this study was constructed by using the back-translation technique.

Procedures

Students were recruited in class by their instructors, who assured them (verbally and in writing) of the following: participation was voluntary, refusal to participate would in no way impact them negatively, and they would remain anonymous. All participating universities were also assured anonymity. The questionnaires required approximately 15 min to complete. Those who did not agree to participate were asked to submit blank questionnaires. This research was approved by the institutional review board of Chubu University.

Analysis

The present authors tested the original three factor model of the MBI-SS (Schaufeli & Salanova, 2007) using confirmatory factor analysis with maximum-likelihood estimation. In the first step, the fit indices of the original (M2) and null (M0, in which no latent factors were assumed) models, and a one factor model (M1, in which only one latent factor influenced the observed variable) were calculated and evaluated. If the original three factor model demonstrated the best fit to the data, the present authors would adopt it. To estimate each parameter, the present authors constrained one of the coefficients of paths from latent variables to observed variables to 1.00. In addition, all coefficients of paths from error variables to observed variables were constrained to be 1.00. After calculation of all parameters, the present authors converted parameter estimates to standardized estimates by standardizing their means and variances as 0.00 and 1.00, respectively.

The following fit indices were employed: (i) comparative fit index (CFI; Goffin, 1993); (ii) root mean square error of approximation (RMSEA; Browne & Cudeck, 1989); and (iii) Akaike information criterion (AIC; Toyoda, 1998). CFI values of more than 0.90 indicate acceptable model–data fit (Schaufeli *et al*., 2002; Zhang *et al*., 2007). RMSEA values of less than 0.08 indicate satisfactory fit, while those of more than 0.10 signify that the model should be rejected (Hoyle, 1995; Schaufeli *et al*., 2002; Toyoda, 2007). Confirmatory factor analysis was performed using AMOS software version 21.0 (SPSS, Chicago, IL, USA).

RESULTS

Descriptive statistics

Means and standard deviations for the MBI-SS are shown in the Appendix. No floor or ceiling effects were observed. Lower scores were found for items 6 (mean [M] = 1.63, SD = 1.57) on exhaustion, 14 (M = 1.78, SD = 1.65) on cynicism, and 12 (M = 2.00, SD = 1.64) on inefficacy. However, higher scores were observed for items 2 (M = 3.58, SD = 1.65) on exhaustion, 9 (M = 2.97, SD = 1.61) on cynicism, and 10 (M = 3.37, SD = 1.57) on inefficacy.

Cronbach's alphas per factor ranged 0.76–0.85, satisfying Nunnally's criterion of 0.72 (Nunnally, 1978). Pearson's correlation coefficients within each subscale ranged 0.60–0.72, indicating significant positive correlations within each factor (Table 2).

Confirmatory factor analysis of the three factor model of the MBI-SS

Fit indices of the hypothesized three factor (M2), null (M0), and one factor (M1) models are summarized in Table 3. The CFI (0.824) of M2 did not satisfy respective criteria, although M2 fit the data better than M0 or M1 according to their AIC values (M0 = 13,814.84, M1 = 3028.60, M2 = 2559.11).

The present authors made slight modifications to M2 using modification indices provided by AMOS, as several prior studies have done (e.g. Hu & Schaufeli, 2009). Four paths were added between error variables

Table 2 Means, standard deviations, Cronbach's indices of internal consistency, and intercorrelations

	M	SD	α	1	2
1. Exhaustion	13.91	5.91	0.76		
2. Cynicism	9.74	5.54	0.85	0.60**	
3. Inefficacy	17.07	6.59	0.78	0.63**	0.72**

M, mean; SD, standard deviation. $^{**}P < 0.01$.

Table 3 Fit indices of four different models of the MBI-SS ($n = 2061$)

Model	χ^2	*df*	CFI	RMSEA	AIC
M0: null model	13,784.84	105	0.000	0.251	13,814.84
M1: one factor model	2968.6	90	0.790	0.125	3028.60
M2: three factor model	2493.11	87	0.824	0.116	2559.11
M3: modified three factor model	1472.30	83	0.898	0.090	1546.30

AIC, Akaike information criterion; CFI, comparative fit index; MBI-SS, the Maslach Burnout Inventory–Student Survey; RMSEA, root mean square error of approximation.

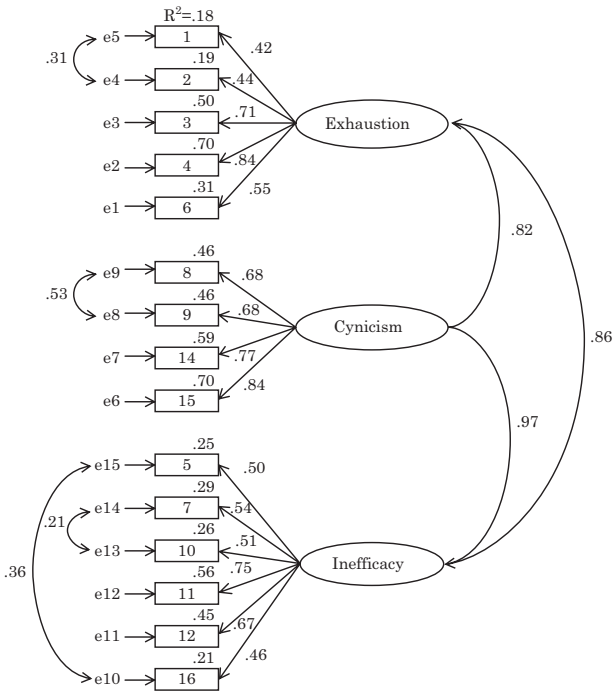

Figure 1 Standardized parameter estimates of the modified three factor model of the Maslach Burnout Inventory–Student Survey (MBI-SS) in Japan. All parameter estimates, $P < 0.01$.

within factors (Fig. 1). These modifications (M3) improved model–data fit to the least acceptable degree (CFI = 0.906, RMSEA = 0.089), albeit not satisfactory degree.

DISCUSSION

The default model's mal-fit was explained by relatively low factor loadings from the latent factor to items 1, 2, 4, 6, 12, and 16, and the low R^2 for these items.

In M3, the error variables of items 1 and 2 were correlated, improving the model's fit. Relatively higher inter-item correlations were observed between these items (0.438), which may be explained by their use of the same Japanese word, "tsukare". Therefore, their translations need to be revised so that different words are used as in the original English version ("drained" and "used up").

In this study, inefficacy was assessed with unreversed items, perhaps leading to higher inter-factor correlations. Thus, future studies should also use reversed items to assess efficacy in order to further clarify the inventory's three factor structure.

Besides wording issues, structural incongruity of the hypothesized three factor model might have accounted for the higher inter-factor correlations observed in this study and the mal-fit of M2 and M3. An exploratory factor analysis could be performed to examine the latter in greater depth, although it could alter the hypothesized three factor structure in a drastic way, resulting in ex post facto research on this topic deviating from the traditional theoretical implications. In fact, the present authors' result of the exploratory factor analysis revealed that items 4 and 6 on exhaustion, item 14 on cynicism, and items 5, 7, and 10 on inefficacy moved to other factors. However, these results did not ensure the robustness of the newly constructed model for other samples.

The present authors therefore installed an additional latent factor (that was supposed to influence all items on the scale, but not correlate with the three factors) within the default model. This "bi-factor model" (Toyoda, 2007) demonstrated acceptable fit to the data ($\chi^2 = 846.89$, degrees of freedom [d.f.] = 72, CFI = 0.943, RMSEA = 0.072, AIC = 942.89) in confirmatory factor analysis, indicating that it was better than the modified model (M3) and that the default model's factorial validity could be theoretically reconsidered without the need to drastically modify that model. However, the new general factor in question is yet to be explained, and should therefore be ascertained, a posteriori, in future research.

Overall, the hypothesized three factor model did not demonstrate satisfactory fit to the present authors' data according to the confirmatory factor analysis performed in this study. However, the modified model with additional paths and the model with an additional general factor both demonstrated better fit than did the default model.

LIMITATIONS

In this study, the present authors conducted confirmatory factor analysis using a sample of Japanese university students majoring in natural and medical sciences, including nursing students. To the present authors' knowledge, this is the first research on MBI-SS in nursing science. The sample will contribute to future research on the nature of academic burnout in smaller samples, especially in nursing students whose burnout could hold more serious ramifications than in other majors.

There are a few limitations of this work, which provide opportunities for further study. First, the academic lifestyles of students in this sample may differ from those of students majoring in the humanities and social sciences. The present authors recommend that future research test the factorial model of the MBI-SS in these students. Second, the fit indices of the modified three factor model for this sample were relatively low, albeit within acceptable boundaries. However, this result does not indicate that the Japanese version of the MBI-SS is invalid. The present study analyzed only the factorial validity and internal consistency of the Japanese version of the MBI-SS. Therefore, the present authors recommended that future research addresses other aspects of the assessment tool, such as construct validity, test–retest reliability and so on, in order to gain a full understanding of its practical use for Japanese university students. Finally, survival bias should be considered: students who were especially burned out might have dropped out or changed majors before the authors administered the survey. A longitudinal design would ensure that such students are included in the study sample.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS

T. T. was responsible for study design, analysis, and drafting and completing the paper. K. S. was responsible for data collection and completing the paper.

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APPENDIX

MEANS (M) AND STANDARD DEVIATIONS (SD) OF ITEMS OF THE MASLACH BURNOUT INVENTORY–STUDENT SURVEY

$n = 2061$

Items	M	SD
Exhaustion	13.91	5.91
Item 1	3.29	1.57
Item 2	3.58	1.65
Item 3	3.17	1.79
Item 4	2.24	1.69
Item 6	1.63	1.57
Cynicism	9.74	5.54
Item 8	2.78	1.70
Item 9	2.97	1.61
Item 14	1.78	1.65
Item 15	2.22	1.72
Inefficacy	17.07	6.59
Item 5*	3.10	1.48
Item 7*	3.28	1.39
Item 10*	3.37	1.57
Item 11*	2.08	1.72
Item 12*	2.00	1.64
Item 16*	3.23	1.71

*Unreversed items.