

Development And Validation Of The Japanese Coping Scale Administered Over The Internet

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Abstract

Objective: Coping can be categorized into active-behavioral coping, active-cognitive coping, and avoidant coping. The psychometric properties of the Japanese version of the Method of Coping Scale supported the three coping categories. The present study reported on the validity and the utility of the Internet format of the Japanese version of the Method of Coping Scale. **Methods:** The Internet format and paper format of the Japanese version of the Method of Coping Scale were administered to female university students (N = 526). Three months later, participants also responded in a classroom setting to the Japanese version of the Hopkins Symptom Checklist which was measured as a variable of future psychological stress. **Results:** Confirmatory factor analysis revealed that the internal structure of method of coping categories: active-behavioral coping, active-cognitive coping, and avoidant coping were replicated for the Internet format. Correlations between the means in the three coping categories and in the 17 items of the Method of Coping Scale obtained with the Internet format and those obtained with the paper format were high and statistically significant. Reliability estimates of internal consistencies of the three coping categories of the Internet format were acceptable. Avoidant coping predicted psychological stress, and active-cognitive coping negatively predicted psychological stress. **Conclusions:** The implications of the findings on the Internet format of the Method of Coping Scale for an individual-level predictor measure for assessment of psychological stress and its use in the development of more effective stress coping strategies are discussed.

INTRODUCTION

The use of computers and the Internet are revolutionizing psychological testing and assessment. There are several ways in which computers and the Internet have expanded psychological assessment, including computer-administered tests, computer scoring and reporting, and direct testing via the Internet (1). Such testing has a number of advantages, including increased cost-effectiveness, greater convenience for test users, and more accurate and efficient scoring (2). The reliability and validity of Internet-assisted psychological tests appear to be comparable to those of traditional tests (3, 4), and there is the additional advantage that participants may feel less embarrassed when reporting sensitive information.

In support of Internet based assessment procedures, one study (5) reported that the psychometric properties of the online version of the General Health Questionnaire 28 (GHQ-28) were similar to the paper-and-pencil version. Similarly, comparisons between Internet-based and paper-and-pencil questionnaires measuring psychological stress (the Perceived Stress Scale and the Center for

Epidemiological Studies-Depression Scale) showed no evidence of bias for the Internet approach over that found for paper-and-pencil versions (6). Thus, the current scientific evidence suggests that Internet-based and paper-and-pencil formats produce virtually equivalent results in measures of psychological stress.

Assessment of coping strategies (7, 8, 9) is another area that could be applied to Internet testing. Lazarus and Folkman (7) classified coping strategies by function as either problem-focused or emotion-focused, therefore describing coping as dealing mainly with the problem or with its emotional outcomes. Carver, Scheier, and Weintraub (8) reported that several problem-focused coping strategies are considered adaptive. By contrast, emotion-focused strategies are positively correlated with higher levels of psychological stress and less perceived control over stress (10). Moreover, emotion-focused coping is reported to increase during depressive episodes (11). However, some emotion-focused coping strategies such as cognitive management, positive reinterpretation, and self-regulation of emotional responses are reported functional and are sometimes helpful in

alleviating the stressful circumstance (12, 13). It seems that some emotion-focused strategies are functional, while others such as avoidant coping, which is engaging in activities or mental states to withdraw from the stressful event, are considered dysfunctional (7, 14).

Conceptualizations of the nature and role of coping and related measurement strategies have been quite often studied (15, 16, 17, 18). There have been several efforts to develop descriptive classification schemes for coping. One formulation of coping is the focus of coping: problem-focused coping and emotion-focused coping (7). Billings and Moos (19) developed another formulation referring to the method of coping which is composed of active-behavioral coping, active-cognitive coping, and avoidant coping. Active behavioral coping includes overt behavioral attempts to deal directly with the problem and its effects. Active-cognitive coping refers to attempts to manage one's appraisal of the stressfulness of the event. Avoidant coping includes attempts to avoid actively confronting the problem or to indirectly reduce emotional tension by unrelated activities. The method of coping divided active attempts to resolve the stressful event into cognitive and behavioral strategies, while separately clustering avoidant responses which attempt to avoid the problem or to indirectly reduce the emotional tension associated with the stressful event (9). The method of coping (19) is a multidimensional measure in which avoidant coping includes not only emotional effort but also behavioral effort to deal with stressful events.

One area in which these concepts have been applied pertains to the psychological health of university students. A high prevalence of depression, anxiety, and psychosomatic symptoms in this population (20) suggests a need for primary and secondary prevention techniques and support services. Moreover, female students tend to experience more psychological stress than their male counterparts (21, 22).

The purpose of the present study was to develop the Internet format of the Japanese version of the Method of Coping Scale and to examine the validity and reliability of the scale, since good psychometric properties of a paper format of a scale do not guarantee those of an Internet format (23). Internet-administered scales offer advantages such as administering and scoring them remotely. Internet-administered scales could become brief screening instruments and be used in pre-treatment assessments of clients. Coping strategies are one of the most important factors to predict and prevent psychological stress. An Internet assisted coping inventory would help individuals to

understand how they deal with stress and improve their way of coping stress. The Internet format of the scale might become a strong tool of primary prevention of mental health in universities. Such a measure could increase cost-effectiveness by reducing contact time and even prove useful in preventing the psychological and social malfunctioning of university students. By investigating how one's coping style may be related to psychological stress, it would be possible to produce evidence of validity of the Internet format of the Japanese version of the Method of Coping Scale.

METHODS

Participants and Procedure

The sample consisted of 526 female undergraduate students ($M = 19.29$ years, $SD = 1.97$) who were enrolled in introductory psychology classes in a women's university. Participants were asked to volunteer for this study and were given a username and password so they could access and self-register on the website of this study. A password-protected website provided the platform for administering the Japanese version of the Method of Coping Scale. Before starting the data collection procedure, participants were informed on the procedure of this study using ethical considerations. This study was conducted in accordance with the ethical guidelines of the Declaration of Helsinki. Participants voluntarily answered the scale, the data of participants were recorded only using ID numbers, and the data analyses procedure did not identify participants. Participation was voluntary and involved completing Internet-based items of the Japanese version of the Method of Coping Scale (24). Three months later, the paper format of the Japanese version of the Method of Coping Scale and the Japanese version of the Hopkins Symptom Checklist (25) were administered to the participants in a classroom setting.

Measures

The 17 items of the Method of Coping Scale were reported in the study of Billings and Moos (19). The 17 items were selected from previous inventories on coping responses in a variety of situations (26). The items were grouped into one of three categories: active-behavioral coping (6 items; e.g. "Tried to find out more about the situation"), active-cognitive coping (6 items; e.g. "Tried to see the positive side"), and avoidant coping (5 items; e.g. "Prepared for the worst"). The 17 items of the Japanese version of the Method of Coping Scale (24) were also grouped into one of three categories. The paper format of the Japanese version of the Method of Coping Scale had satisfactory internal consistency. Evidence of concurrent validity has also been

found with respect to other psychological variables. The Internet format of the Japanese version of the Method of Coping Scale rated on a 4-point Likert scale ranging from 1 (not used) to 4 (used often).

The Hopkins Symptom Checklist (HSCL, 27, 28) is widely regarded as a reliable and valid measure of neurotic symptoms. The items of the HSCL have demonstrated sensitivity to low levels of symptoms in normal populations (29). It is scored on five underlying symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, anxiety and depression. The Japanese version of the Hopkins Symptom Checklist [Japanese HSCL, 25] consists of five symptom dimensions. Each symptom dimension has satisfactory internal consistency and construct validity (25). The paper items of somatization, interpersonal sensitivity, and depression were administered to participants in a classroom setting. These HSCL items were used to evaluate the psychological stress of the participants.

Statistical analyses

All statistical analyses except confirmatory factor analysis were performed using SPSS version 18.0. The confirmatory factor analysis was performed using Amos 18.0. A p-value of <0.05 was considered to be statistically significant. The analysis was divided into three parts. First, the confirmatory factor analysis was conducted to investigate whether the internal structure of three categories of the Method of Coping Scale of the Japanese paper format (24) could be replicated for those of the Internet format. Cronbach's alpha coefficients were also calculated to determine internal consistency reliability. Secondly, Pearson correlations between the mean values obtained with the Internet format and those obtained with the paper format were calculated to analyze convergent validity of the Internet format. Finally, relationships between three categories of the Method of Coping Scale of the Internet format and future psychological stress were analyzed. Pearson correlations were calculated among three coping categories of the Internet format and the paper format and three symptom dimensions (somatization, interpersonal sensitivity, and depression). A multiple regression model predicting future psychological stress measured by three symptom dimensions was conducted, with three coping categories of the Internet format as predictor variables.

RESULTS

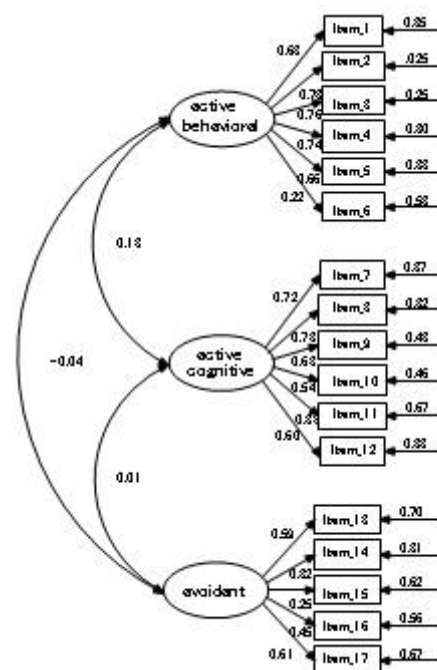
Confirmatory Factor Analysis

Confirmatory factor analysis was used to investigate whether the internal structure of three categories of the Method of

Coping Scale of the Japanese paper format (24) could be replicated for those of the Internet format. The Goodness of the fit index (GFI), the Normed Fit Index (NFI), the Comparative Fit Index (CFI), and the root mean square error of approximation (RMSEA) were examined. The values of the GFI, the NFI, and the CFI ranged from zero to 1.00, with higher scores indicating a better fit (30). For the RMSEA, values of less than 0.08 are considered an adequate fit (31). Scores for the various fit indices were as follows: GFI = 0.90, NFI = 0.81, CFI = 0.87, RMSEA = 0.08. The results obtained from the Confirmatory factor analysis are presented in Figure 1. In the results, the latent variable (active-behavioral coping, active-cognitive coping, and avoidant coping) analyses to the observed variables of each items were significant (from 0.22 to 0.78, $p \leq 0.05$). Avoidant coping was not significantly correlated with the other latent variables ($p = 0.19$ and $p = 0.27$), while active-behavioral coping and active-cognitive coping were slightly significantly correlated ($r = 0.18$, $p \leq 0.05$).

Figure 1

A three-factor model for the Internet format of the method of coping obtained from confirmatory factor analysis (N = 526)



Reliability

The reliability analyses of the Internet format of the Japanese version of the Method of Coping Scale showed acceptable reliabilities. Estimates of internal consistency (Cronbach's alpha) on the Internet format were coefficient alpha of 0.81, 0.80, and 0.77 for active-behavioural coping, active-cognitive coping, and avoidant coping, respectively.

Correlations between Internet and Paper Formats

Pearson correlations between the means of three coping categories obtained with the Internet format and those obtained with the paper format are high and statistically significant (Table 1).

Table 1

Means and correlations between the Internet and paper formats of categories

Coping	Internet format		Paper format		Internet-paper
	Mean (SD)	α	Mean (SD)	α	
Active-behavioral	16.54 (3.25)	0.74	16.04 (3.47)	0.81	0.72*
Active-cognitive	16.21 (3.64)	0.82	15.68 (3.69)	0.80	0.72*
Avoidant	12.54 (2.33)	0.79	12.52 (2.36)	0.77	0.80*

* $p < 0.05$

Consequently, to show convergent evidence of the Internet format, the item scores of the Internet format were compared with those of the paper format. For all 17 items, Pearson correlations between the scores obtained over Internet and those obtained on paper were high and statistically significant (Table 2).

Table 2

Items, means, and correlation coefficients between the Internet and paper formats

Method of coping	Coping items	M(SD)		r
		Internet	Paper	
active-behavioral coping	1. Tried to find out more about the situation	2.82 (0.75)	2.54 (0.75)	0.85*
	2. Talk with professional person about the situation	2.99 (0.76)	2.83 (0.83)	0.89*
	3. Took some positive action	2.81 (0.89)	2.71 (0.91)	0.78*
	4. Talk with relative about the problem	2.67 (0.80)	2.65 (0.79)	0.73*
	5. Talk with friend about the situation	2.41 (1.14)	2.46 (1.05)	0.83*
	6. Exercised more	3.04 (0.84)	2.83 (0.95)	0.67*
active-cognitive coping	7. Tried to see positive side	2.64 (0.82)	2.59 (0.82)	0.72*
	8. Tried to step back from the situation and be more objective	2.82 (0.85)	2.81 (0.84)	0.79*
	9. Prayed for guidance or strength	2.77 (0.90)	2.69 (0.80)	0.74*
	10. Took things one step at a time	2.71 (0.88)	2.84 (0.88)	0.77*
	11. Considered several alternatives for handling the problem	2.89 (0.93)	2.52 (0.93)	0.78*
	12. Drew on my past experiences; I was in a similar situation before	2.78 (0.72)	2.65 (0.75)	0.89*
avoidant coping	13. Prepared for the worst	2.59 (1.09)	2.69 (1.07)	0.83*
	14. Took it out on other people when I felt angry or depressed	2.35 (1.01)	2.21 (0.94)	0.66*
	15. Tried to reduce the tension by eating more	2.66 (0.91)	2.71 (0.87)	0.74*
	16. Kept my feelings to myself	2.31 (1.03)	2.37 (1.03)	0.76*
	17. Got busy with other things	2.63 (1.07)	2.67 (1.06)	0.77*

* $p < 0.05$

Prediction on Future Psychological Stress

Pearson correlations were calculated among the three categories of the Method of Coping Scale administered over the Internet, three categories of the Method of Coping Scale in the paper format and three symptom dimensions

(somatization, interpersonal sensitivity, and depression).

Pearson product-moment correlations [Table 3] revealed that avoidant coping of the Internet format was significantly correlated with the three symptom dimensions (somatization, interpersonal sensitivity, and depression). Significant negative correlations were found between active-cognitive coping of the Internet format and the three symptom dimensions (somatization, interpersonal sensitivity, and depression). Active-behavioral coping of the Internet format was not significantly correlated with the three symptom dimensions. The values of the significant correlation coefficients between the categories of the Method of Coping Scale of the Internet format and the three symptom dimensions were similar to those between the categories of the Method of Coping Scale of the paper format and the three symptom dimensions (Table 3).

Table 3

Pearson correlation coefficients of variables (N = 526)

	1	2	3	4	5	6	7	8	9
1 Internet active-behavioral	1.00								
2 Paper active-behavioral	0.72*	1.00							
3 Internet active-cognitive	0.51*	0.44*	1.00						
4 Paper active-cognitive	0.43*	0.60*	0.72*	1.00					
5 Internet avoidant coping	0.07	-0.20*	0.08	0.08	1.00				
6 Paper avoidant coping	-0.17*	-0.15*	0.08	0.11*	0.80*	1.00			
7 Somatization	0.03	0.08	-0.25*	-0.21*	0.29*	0.29*	1.00		
8 Sensitivity	-0.03	0.07	-0.28*	-0.24*	0.37*	0.31*	0.57*	1.00	
9 Depression	-0.01	0.04	-0.29*	-0.38*	0.34*	0.32*	0.60*	0.78*	1.00

* $p < 0.05$

A multiple regression analysis was conducted to test the relationship between psychological stress and the three categories of the Method of Coping Scale of the Internet format. The combination of avoidant coping, active-cognitive coping, and active-behavioral coping accounted for significant variation in psychological stress based on the total scores of somatization, interpersonal sensitivity, and depression, $R\text{-square} = 0.28$, $F(3, 522) = 37.41$, $p < 0.05$. Avoidant coping, active-cognitive coping, and active-behavioral coping explained 14.4%, 11.5% and 1.9% of variance in psychological stress. The results obtained from the multiple regression analysis are presented in Table 4.

Table 3

Pearson correlation coefficients of variables (N = 526)

	1	2	3	4	5	6	7	8	9
1 Internet active-behavioral	1.00								
2 Paper active-behavioral	0.72*	1.00							
3 Internet active-cognitive	0.51*	0.44*	1.00						
4 Paper active-cognitive	0.43*	0.60*	0.72*	1.00					
5 Internet avoidant coping	0.07	-0.20*	0.09	0.08	1.00				
6 Paper avoidant coping	-0.17*	-0.15*	0.08	0.11*	0.80*	1.00			
7 Somatization	0.03	0.08	-0.25*	-0.21*	0.29*	0.29*	1.00		
8 Sensitivity	-0.03	0.07	-0.28*	-0.24*	0.37*	0.31*	0.57*	1.00	
9 Depression	-0.01	0.04	-0.29*	-0.38*	0.34*	0.32*	0.60*	0.78*	1.00

* $p < 0.05$

DISCUSSION

The Internet format of the Japanese version of the Method of Coping Scale measures three coping categories: active-behavioral coping, active-cognitive coping, and avoidant coping (19). The present study reports findings regarding the reliability and the validity of the Internet format of the Japanese version of the Method of Coping Scale. Estimates of internal consistency of the Internet format of the Japanese version of the Method of Coping Scale showed that the Internet format had acceptable reliability. Confirmatory factor analysis revealed that the internal structure of three coping categories (19, 24) were replicated for the Internet format of the Japanese version of the Method of Coping Scale. Correlations for both the three coping categories and the individual 17 items between the Internet and paper formats of the Method of Coping Scale were significantly high. The evidence, based on correlation analyses supported the convergent validity of the Internet format of the scale. A multiple regression analysis conducted to test the relationship between future psychological stress and the three categories of the Method of Coping Scale revealed a potential for the Internet format in predicting psychological functioning and supported the predictive validity of the Internet format of the scale.

The general pattern of correlations between two coping categories (avoidant coping and active-cognitive coping) and psychological stress (somatization, interpersonal sensitivity, and depression) is consistent with the theoretical expectations. The results of the multiple regression analysis further indicated that avoidant coping contributed to psychological stress, and that active-cognitive coping showed a negative association with psychological stress.

These results are consistent with those of previous studies (32, 33, 34, 35).

The previous finding (36) that problem-focused coping was not correlated with psychological stress is noteworthy. A recent study on Japanese male workers (37) points to the possible benefits of problem-focused coping. Problem-focused coping might relate to subsequent healthier psychological functioning. However significant correlations were not found between active-behavioral coping and psychological stress in the present study, so controversy remains. Some studies indicate that problem-focused coping does not significantly contribute to predictions of psychological health status (36, 38). Others suggest that only passive coping strategies might be associated with psychological stress (34), and that specific problem-focused coping strategies might not predict lower levels of psychological stress (36). Takaya and Hasegawa (39) suggest a somewhat more complex relationship in that problem-focused coping at first reduced psychological stress but then finally increased psychological stress. Moreover, it is possible that when individuals mainly utilize avoidant coping as a stable coping style, their active-behavioral ability is gradually diminished. In the long run, individuals might become passive toward environmental challenges rather than remaining active. Various explanations could be offered for the results on active-behavioral coping, and further research would be needed to find the health-related role of active-behavioral coping.

Internet-based cognitive behavior therapy or stress management has advantages (5). The treatment can be obtained at any time and any place and individuals can work at their own pace. Internet-administered psychological scales can play an important role in Internet-based treatment (23). With its high reliability and validity, the 17 items of the Internet format of the Method of Coping Scale might become a very good Internet-administered screening instrument for psychological stress and can promote potential uses for Internet technologies to extend mental health services in university settings.

LIMITATIONS

The results of this study must be viewed in light of several limitations on the generalizability of the results. First, although the items were translated carefully and accurately in Nakano's 1989 study, the Japanese items of the Method of Coping Scale might not measure the same constructs with precise meaning (40). Second, the multiple regression

analysis used the paper-based HSCL while the Method of Coping Scale used the Internet-based Method of Coping Scale. This difference in the measurement methods might have induced a measurement error in the analysis and might have affected the results. Further investigation might be needed to provide the predictive evidence of the Internet-based Method of Coping Scale on psychological stress. Third, the analyses were conducted only on female college students as female students tend to experience more psychological stress. The homogeneity of the participants of the present study limits its generalizability to male college students. Further studies with more diverse samples should be conducted to analyze the psychometric properties of the Internet format of the Japanese version of the Method of Coping Scale. Despite these limitations, the results of this research provided support for the use of Internet scales examined herein, for measurement and assessment uses for prediction and prevention of psychological stress.

CONCLUSIONS

The Internet format of the Japanese version of the Method of Coping Scale measures three categories: active-behavioral coping, active-cognitive coping, and avoidant coping. The present study reports findings regarding the validity and the reliability of this scale. Confirmatory factor analyses revealed that the internal structure of the Japanese version of the Method of Coping Scale were replicated for the Internet format of the scale. The evidence, based on correlation analyses, supported the convergent validity of this Internet format of the scale. A multiple regression analysis supported the predictive validity of the Internet format of the scale and indicated that avoidant coping directly predicted psychological stress, and active-cognitive coping negatively predicted psychological stress. The findings revealed a potential for the Internet format of the Japanese version of the Method of Coping Scale as an individual-level predictor measure for assessment of psychological stress and its use in the development of more effective stress coping strategies.

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