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Dimensions of the Chinese Beck Depression Inventory-II in a University Sample

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ABSTRACT - The Chinese Beck Depression Inventory-II (BDI-II) was administered to 1154 Chinese college students. Exploratory factor analysis was performed to examine the dimensions of the Chinese BDI-II and produced a two-factor solution representing cognitive-affective and somatic dimensions whose factor compositions were comparable to those previously reported with college students in North America. The data were also analyzed for sex differences in the factor structure. The results showed that the two-factor solution representing cognitive-affective and somatic dimensions was present in both sexes. These findings generally suggest that the Chinese BDI-II possesses acceptable reliability and the factor analytic data tend to support Beck, Steer, and Brown's (1996) two-dimensional view of depression as a construct.

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is one of the most widely used self-report instruments in measuring depressive symptoms around the world. It has been translated into many different languages, including Chinese. The Chinese BDI has attained great popularity among Chinese clinicians and researchers. Examinations of the psychometric properties of the Chinese BDI have yielded favorable results (for a review see Leong, Okazaki, & Tak, 2003). In general, most studies have described this inventory as having acceptable internal consistency, test-retest reliability, adequate convergent validity with other self-report measures of depression, and moderate discriminant validity with respect to self-report anxiety in non-clinical Chinese college students and adolescents. Factor analytic studies found that the BDI data were best described by a two-factor solution, representing general depression and somatic disturbance symptoms.

Despite its popularity, the BDI has been criticized for its lack of congruence with the current diagnostic criteria of depressive disorders. The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996), a recent revision of BDI, was developed to address the specific diagnostic criteria of major depressive

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disorder (MDD) in the fourth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV; American Psychiatric Association, 1994). Although the psychometric properties of the Chinese BDI has been extensively examined with a variety of Chinese samples, evidence of reliability and factorial structure of the Chinese BDI-II have yet to be established.

Review of previous studies utilizing the BDI-II has suggested that this inventory displays reliable psychometric properties across a broad spectrum of both clinical and non-clinical samples. In general, the BDI-II data show high internal consistency with coefficient alpha ranging from .88 (Leigh & Anthony-Tolbert, 2001) to .92 (Beck, Steer, & Brown, 1996) in nonclinical college student samples. Factor analytic studies have frequently resulted in two highly intercorrelated factors, representing cognitive-affective and somatic symptoms (e.g., Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998; Steer & Clark, 1997; Storch, Roberti, & Roth, 2004; Whisman, Perez, & Ramel, 2000). While the two-factor structure proposed by Beck et al. (1996) was replicated in different studies, the variations in factor loadings were noted. The diverse factor compositions in different studies could be attributed to the factor analytic extraction procedures and respondents' sociodemographic characteristics.

Although factor analytic studies of the BDI-II in the West have consistently reported that the BDI-II was composed of two positively correlated cognitive-affective and somatic dimensions in college samples, it concerns the cross-cultural researchers as to whether the symptom dimensions of the BDI-II established in the West can be applied to non-Western cultures. In the study of depression across cultures, it is important to empirically validate the psychometric properties of screening instruments in different cultural contexts. Only when the underlying constructs of depression are confirmed cross-culturally, can cross-cultural comparisons of depression be rendered plausible. Despite the breadth of research available on the English BDI-II, only a few studies have examined the psychometric properties in other-language translations of this inventory (Al-Musawi, 2003; Kojima, Furukawa, Takahashi, Kawai, Nagaya, & Tokudome, 2002; Penley, Wiebe, Nwosu, 2003). To date, Al-Musawi (2003) has presented the only known data from college students in non-Western cultures. His results indicated that the Arabic BDI-II exhibited acceptable internal consistency (Cronbach's alpha = .84), and substantial stability over a two-week period ($r = .75, p < .01$). However, factor analyses indicated that three, rather than two, oblique factors provided the most parsimonious and meaningful solution to the data. Al-Musawi's findings raised the question regarding the generalizability of the construct underlying the BDI-II, specifically, whether the factor structure observed in the English BDI-II data can be replicated in non-Western cultures. The present study was thus designed to ascertain what the dimensions of Chinese BDI-II were for Chinese college students in Taiwan.

The purpose of this study was to gather further empirical evidence on the dimensions of the Chinese BDI-II with two specific aims. Firstly, this study explored potential dimensions of the Chinese BDI-II in a large sample of

Chinese college students in Taiwan. Secondly, as sex differences could be related to differences in the presentation of depressive symptoms (Dozois et al., 1998), this study also assessed the factor compositions of the Chinese BDI-II in Chinese male and female college students. The aim of this study was to shed some light on issues of dimensionality of the Chinese BDI-II. The evaluation of the factor structure of the Chinese BDI-II may provide valuable means to examine cross-cultural comparability of a universal conception of depression.

Method

Instrument

Beck Depression Inventory-II (BDI-II). The BDI-II is a 21-item self-report instrument that assesses the presence and severity of depressive symptoms for the past two weeks. Using the BDI-II, the respondents rate each item on a 4-point scale, ranging from 0 to 3. The responses to the 21 items are aggregated to yield total scores reflecting severity of depressive symptoms of each respondent, with summary scores ranging from 0 to 63. Extensive reliability and validity data have been reported (e.g., Beck, et al., 1996; Dozois, et al, 1998; Whisman, et al., 2000).

Participants and Procedures

The data reported in this study was obtained from a survey that was primarily designed to investigate the mental health of college freshmen in a private university in Southern Taiwan. The survey was conducted at the beginning of the school year 2003. The Chinese version of the BDI-II was administered to 1154 students. Of those, 61 were excluded owing to missing data, resulting in the current sample of 1093 students. Among the 1093 respondents, 481 (44%) were male and 612 (56%) were female. Mean age for this sample was 19.64 (SD = 3.41), ranging from 17 to 56 years of age. The majority of the participants (85.5%) were 20 years old or younger. Of the participants, 850 (77.8%) were enrolled in the regular programs, while 243 (22.2%) were from the evening programs. Only 15 (1.4%) of the participants reported being married.

Results

BDI-II scores among Chinese college students in Taiwan

The mean BDI-II total score for the 1093 students was 7.64 (SD = 6.58; range = 0-54). This mean value indicated that this sample of Chinese college students in Taiwan, overall, was not depressed. No significant difference was found in the overall mean BDI-II scores between males (M = 7.95, SD = 6.55) and females (M = 7.39, SD = 6.60). According to the cut-off scores provided by Beck et al. (1996) in the manual, 931 (85.18%) participants had scores within the "minimal" range (0-13); 108 (9.88%) had scores within the mild range (14-19); 41 (3.75%) had scores within the moderate range (20-28), and 13 (1.19%) had scores within the severe range.

The mean values of the 21 items on the BDI-II ranged from .12 to .79, with a mean of .36. According to student *t*-test with a Bonferroni adjustment (alpha/21), Chinese college men had significantly higher scores than women in the following items: *past failure*, t (1091) = 3.94, $p < .001$, *loss of pleasure*, t (1091) = 3.69, $p < .001$, and *feeling of punishment*, t (1091) = 3.21, $p = .001$; whereas, women had scores significantly higher than men on just one item - *crying*, t (1091) = 3.73, $p < .001$. The coefficient alpha for the total scale was .86, which although was not as high as the alpha of .93 reported by Beck et al. (1996), suggested that the Chinese BDI-II exhibited a satisfactory level of internal consistency.

Dimensions of the Chinese BDI-II

The Kaiser-Meyer-Olkin (KMO) statistic for the present data was .93, indicating that the data were acceptable for factor analysis (Kaiser, 1974). A principal component analysis was performed on the responses of 1093 Chinese college students. This analysis produced four components with eigenvalues greater than 1.00, accounting for 44.39% of the total variance. To avoid over-factoring, further analyses that employed variance, scree plot, and residuals showed that two components could be extracted meaningfully. Thus, principal components analysis was performed to retain two components and apply the varimax and oblimin rotations. Results from the two rotations were highly comparable, thus the results from the oblimin rotation (which allows for correlation between the factors) was reported here.

After rotation, the first component accounted for 18.18% and the second for 15.62% of the total variance. The reliability, using Cronbach alpha, for Component 1 was .78, and .72 for Component 2. Once a factor structure has been found, it is important to decide which variables make up which factors (see Table 1). Typically, researchers take a loading of an absolute value of more than .30 to be important. However, the significance of a factor loading will depend on the sample size. Stevens (1992) recommended that for a sample size of 600 a loading greater than .21 can be considered significant. According to Stevens' criteria, Component 1 consisted of 11items assessing cognitive-affective symptoms of depression, and Component 2 was composed of 10 somatic symptoms of depression (see Table 1).

The data were also analyzed for sex differences in the factor structure. According to the principal components analysis, two components could be retained as a relatively adequate representation of the data for both sexes, representing cognitive-affective and somatic symptoms. Table 1 presents the factor compositions for both men and women subgroups. The reliability, using Cronbach's alpha, for the men's subgroup was .85, .78 for Component 1, and .75 for Component 2, and for the women's subgroup was .86, .79 for Component 1, and .76 for Component 2.

Table 1
Item loadings of the Chinese Beck Depression Inventory

	Total		Men		Women	
	C1	C2	C1	C2	C1	C2
Sadness	**.37**	.26	**.49**	.17	.007	**.55**
Pessimism	**.54**	.001	**.55**	-.002	.27	**.37**
Past Failure	**.68**	-.003	**.71**	-.11	**.63**	.009
Loss of Pleasure	.007	**.55**	.12	**.53**	-.006	**.66**
Guilty Feelings	**.48**	-.004	**.34**	.12	**.73**	-.30
Feeling of Punishment	**.50**	.11	**.48**	.11	**.54**	.009
Self-dislike	**.66**	.004	**.70**	.001	**.53**	.19
Self-critical	**.57**	-.006	**.56**	-.001	**.66**	-.005
Suicidal Thoughts	**.65**	-.006	**.63**	-.006	**.59**	.003
Crying	.18	**.32**	**.31**	.16	.007	**.47**
Irritation	.31	**.36**	**.42**	.22	.28	**.40**
Loss of Interest	.009	**.52**	.003	**.60**	.004	**.55**
Indecisiveness	.26	**.28**	-.004	**.48**	**.48**	.15
Worthlessness	**.74**	-.005	**.79**	-.11	**.55**	.17
Loss of Energy	.21	**.55**	.17	**.50**	.17	**.65**
Changes in Sleep	-.18	**.64**	-.13	**.68**	-.007	**.44**
Agitation	.29	**.41**	.27	**.36**	.36	**.40**
Changes in Appetite	-.14	**.68**	-.001	**.60**	-.11	**.59**
Concentration Difficulty	**.31**	.30	**.30**	.28	**.33**	.32
Fatigue	.005	**.63**	-.001	**.68**	.17	**.51**
Loss of Interest in Sex	**.27**	.19	.17	**.32**	**.43**	.002
Coefficient alpha	.78	.72	.78	.71	.79	.78

Note. Items in boldface type indicate highest loading on that component.

C1 = Component 1 (cognitive-affective), C2 = Component 2 (somatic-affective)

Discussion

This study provides additional evidence of the psychometric characteristics of the Chinese BDI-II. The reliability of the inventory, assessed by Cronbach's alpha coefficient, was .86, which compared favorably with existing findings of the reliability status of the English BDI-II (e.g., Steer & Clark, 1997; Whisman et al., 2000). Results from the exploratory factor analysis showed that the two-factor solution appeared to be a parsimonious solution, representing cognitive-

affective and somatic symptoms. The overall pattern of results supported the existence of the cognitive-affective and somatic dimensions of the Chinese BDI-II in non-clinical college students that were proposed by Beck et al. (1996). Contrary to Al-Musawi's findings of a three-factor solution for the Arabic BDI-II, the number and factor compositions of the Chinese BDI-II were comparable to those found for English BDI-II (Beck et al., 1996; Dozois et al., 1998; Steer & Clark, 1997; Storch et al., 2004; Whisman et al., 2000). For example, the factor composition of the Chinese BDI-II closely followed that of the Dozois *et al.* (1998) study. Only two items loaded differently in the two studies. The results suggested that Chinese college students shared similar depressive symptom profiles with their Western counterparts. However, the data that arose from this study showed that the item measuring *loss of interest in sex* has not had strong loading on either of the extracted factors. This finding implied that Chinese college students were not inclined to reveal their inner feelings related to such sensitive issues as sex. This finding may reflect the taboo related to talking about sex issues in Chinese societies.

Although there was no significant sex difference in the Chinese BDI-II mean scores, sex differences could be related to differences in symptom profiles. Separate factor analysis by sex was thus carried out. The results showed that the two-factor structure remained consistent across men and women subgroups, with the cognitive-affective and somatic dimensions present in both sexes. This finding did not concur with previous findings that indicated that male expression of depressive symptoms was characterized more by somatic symptoms than cognitive-affective symptoms, and the opposite was found for women (Dozois et al., 1998). Nevertheless, the symptom loadings of the Chinese BDI-II differed slightly between Chinese male and female college students. For example, while the items *sadness, pessimism, suicidal thoughts* and *crying* were loaded on the cognitive-affective factor in the men's subgroup, these items loaded on the somatic factor in the women's subgroup. These results may reflect sex differences in the manifestation of depressive symptoms. Additionally, this finding supported Beck *et al.*'s contention that affective symptoms were likely to shift from one factor to another because such symptoms are more sensitive than non-affective symptoms to the demographic characteristics of the sample being studied. It should be noted that these sex differences in depressive symptomatoloty remains to be confirmed in further studies on a clinical population with concurrent diagnoses established by clinical interview.

In summary, this study showed that the Chinese BDI-II was internally consistent, and the symptom dimensions of depression among Chinese college students approximated those displayed by college students in the West. These findings suggest that, owing to increasing Westernalization, Chinese college students in Taiwan may express their depressive symptoms in similar avenues to their Western counterparts. Nevertheless, the findings reported in this study need to be interpreted with great caution. Although college students constitute a helpful population to examine symptom manifestation of depression, as they

display a full spectrum of symptoms, ranging from non-depressed to severely depressed, the generalization of the results is limited to the college students. Further exploration of the factor structure of the Chinese BDI-II needs to be conducted in a variety of clinical and non-clinical different populations.

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