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FACTOR ANALYSIS AND PSYCHOMETRIC EVALUATION OF THE CONNOR-DAVIDSON RESILIENCE SCALE (CD-RISC) WITH CHINESE PEOPLE

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This study examines the psychometric properties of the Chinese version of Connor and Davidson's Resilience Scale (CD-RISC; 2003), an American instrument originating from a posttraumatic stress disorder research program. Confirmatory factor analysis of the Chinese data failed to verify the original 5-factor structure of CD-RISC obtained in the USA, while exploratory factor analysis resulted in a 3-factor structure of resilience (labeled respectively as Tenacity, Strength, and Optimism). The reliability coefficient of the Chinese version of CD-RISC was 0.91. The validity of CD-RISC was also satisfying in terms of the actual data matching the expected correlation between resilience measure and the variables of self-esteem, life satisfaction, and personality trait factors of NEO-FFI. It is concluded that the construct of resilience and its measurement from the West can be helpful and applicable in understanding Chinese adaptive behaviors, however, the understanding of the construct may also need some modification according to Chinese culture.

Keywords: resilience, factor structure, psychometric properties, culture, Chinese version of Connor and Davidson's Resilience Scale, tenacity, strength, optimism.

Decades of research on resilience have seen the emergence and development of positive psychology. Resilience has been used to represent the individual's capability of survival and adjustment after experiencing serious traumatic events. It has been defined as personal characteristics that could promote one's

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positive adaptation under stress and adversity (e.g., Wagnild, 2003). Tugade and Fredrickson (2004, p. 320) argued that "psychological resilience refers to effective coping and adaptation although faced with loss, hardship, or adversity". Along the lines of these conceptual frameworks, several psychological instruments have been developed to measure resilience (Block & Kreman, 1996; Wagnild & Young, 1993). These instruments have been proved to be reliable and valid in the West, and in turn have helped researchers further clarify the construct of resilience on the one hand, and on the other hand, have provided practical tools for practitioners to find ways of intervention to enhance the individual's resilience in the real-life environment (Bosworth & Earthman, 2002; Rak & Patterson, 1996; Yu & Zhang, 2005).

Among these instruments, a newly developed scale – Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003), has earned much attention from researchers for its high sensitivity to overall improvement of patients suffering from posttraumatic stress disorder (PTSD) after receiving psychological treatments. This scale has also been administered to other samples including over 1,000 normal participants in the community, primary-care outpatients, psychiatric inpatients, and generalized anxiety disorder patients. The results demonstrated that CD-RISC was a reliable and valid measurement of resilience (Connor & Davidson). A later study showed that resilient survivors of violent trauma exhibited better health and lower severity of PTSD symptoms than did those who were not resilient (Connor, Davidson, & Lee, 2003).

Factor analysis of the 25 items of CD-RISC resulted in 5 factors. The first factor was named as *personal competence, high standards, and tenacity*, endorsing one's strong sense of power and adherence to one's goal when facing setback situations. One example of an item is "not easily discouraged by failure". The second factor was labeled as *trust in one's instincts, tolerance of negative affect, and strengthening effects of stress*. The factor focused on one's calmness, decision, and promptness when coping with stress, for instance, "focus and think carefully". The third factor measured *positive acceptance of change and secure relationships with others*. The factor was mainly related to one's adaptability, as shown by one of the items: "able to adapt to change". The fourth factor, named as *control*, implied one's control of achieving one's own goal and getting assistance from others. The last factor, named as *spiritual influences*, assessed one's faith in God or in fate (Connor & Davidson, 2003). This 5-factor structure would have broad applications in psychiatric and psychological interventions, and even in educational practices to nurture children with high resilience.

As a self-regulating psychological mechanism, resilience could protect people from adverse consequences of hard times. On this basis, the construct of resilience is believed to be a universal one. However, since cultures are so different in their geological, historical and social environments, the realities of adversity and hard

times may be different for people who are living in different cultures. Therefore, one may question whether the meaning and conceptual structure of resilience could remain the same across cultures. Up to now, most studies on resilience with using CD-RISC have been conducted in the West, thus there is no direct evidence to answer the question with regard to cultures in other areas of the world.

But accumulating evidence has indirectly shown that non-Western people adapt to their specific physical and social environment in ways that are sometimes different from those of Western people. For example, cultural difference was disclosed in the study using another well-known resilience scale (RS) (Wagnild & Young, 1993). The RS was also developed in the United States, with satisfactory indexes of reliability and validity in American people in predicting their life satisfaction, morale, and health in stressful situations (Wagnild, 2003). Two factors (named respectively as *Personal competence* and *Acceptance of self and life*) converged from the 25 RS items in the American sample. However, when the same RS was administered to a Russian immigrant group, the factor structure changed a lot (Aroian, Schappler, Neary, Spitzer, & Tran, 1997). The researchers explained this change by arguing that it was because some of the scale items, such as "I am a friend with myself" and "It is okay if there are people who don't like me", were inappropriate and meaningless for these recent immigrants from the former Soviet Union. Finally, the researchers had to delete 13 items from the original 25-item pool to get a 2-factor structure of the Russian version of RS. It was also found in a Chinese study (Yang, 1981) that people who survived disasters were most likely to fulfill expectations of others and to satisfy interests of inner groups (i.e., family-serving motives) rather than to achieve their own internal wishes (i.e., self-serving motives) as Western people. Therefore, it is reasonable to hypothesize that the Chinese version of the CD-RISC, when properly translated, may not be able to retain the same factor structure as that used with an American sample.

In the present study, the variables of self-esteem and life satisfaction are to be used as the concurrent validity indicators of CD-RISC in a Chinese sample, instead of using the measures of hardiness, social support, perceived stress, disability, and stress vulnerability, which were originally used in Connor and Davidson's research (2003). The main reasons for doing so are: practically speaking, only the scales measuring self-esteem and life satisfaction have been properly translated and widely applied in mainland China; and theoretically speaking, these two variables have been consistently found to be correlated highly with various adaptive psychological outcomes in Chinese people (Xu, Wu, & Qiu, 2005; Zhang, Guan, Tang, Wang, & Tao, 2001), and also to be good indicators for concurrent validity for the RS (Wagnild & Young, 1993).

Besides the measures of self-esteem and life-satisfaction, the factor scores of the Big Five Model of the NEO Five-Factor Inventory (NEO-FFI; Costa &

McCrae, 1989) are also used in the present study as validity indicators, since there is strong evidence in the literature showing that the measure of resilience would be correlated negatively with the N factor, and positively with the factors of E, O, A, and C (Jacelon, 1997; Werner, 1995).

The aim of the present study was therefore, to explore the factorial structure of the Chinese version of the CD-RISC and to examine its reliability and validity among Chinese people, in order to further understand its potential for cross-cultural application in the Chinese culture.

METHOD

PARTICIPANTS

The participants were 560 residents from Guangdong province and Beijing city with almost the same numbers of males and females. Their age range was as follows: 10% of them under 20 years old, 41% between 20-29, 21% between 30-39, 11% between 40-49, 11% between 50-59, and the last 6% over 60. The identified occupations include workers (34%), teachers (23%), businessmen, farmers, retirees, college students and others (43%).

INSTRUMENTS

Chinese version of Connor-Davidson Resilience Scale (CD-RISC) The scale consists of 25 items with an alpha value of 0.89 and test-retest correlation of 0.87 in the studies of American participants. Its validity was shown by the fact that the scale had high correlations with such psychological variables as hardiness, social support, perceived stress, degree of disability, and stress vulnerability (Connor & Davidson, 2003).

The CD-RISC items were translated with a process of translation and back-translation by persons fluent in both Chinese and English. The translators were employed and trusted by Connor and Davidson themselves. Minor modifications on the item translation were made in the present study with the consent of Connor (personal communication, August 11, 2005) in order to improve its readability among mainland Chinese. The participants were asked to respond on a 5-point Likert scale, from 1 (*not true at all*) to 5 (*true all the time*).

Rosenberg Self-Esteem Scale (RSES) The scale measures the individual's sense of self-worth and self-acceptance (Rosenberg, 1965). The Cronbach alpha values were 0.88 for the English version (Greenberger, Chen, Dmitrieva, & Farruggia, 2003), and 0.86 for the Chinese version (Li, 2004). The RSES had a correlation coefficient of 0.46 with the Coopersmith's self-esteem (Coopersmith, 1981) and of -0.43 with Zung's depression (Yang, Zhang, & Jiang, 2004; Zhang, 1997; Zung, 1965) when used with Chinese samples. The correlation coefficient of RSES with implicit self-esteem measured by the Implicit Association Test

(IAT; Greenwald, McGhee, & Schwartz, 1998) was 0.22 with Chinese samples (Cai, 2003), while the coefficient was 0.28 in American samples (Greenwald & Farnham, 2000).

Life Satisfaction Index A (LSI-A) The index of 20 items measures one's present life satisfaction level and compares it with one's own life satisfaction in the past and with that of others (Neugarten, Havighurst, & Tobin, 1961). The scale now has a widely used Chinese version (Fan, 1999), which showed good discriminant validity by identifying depressive patients (Wu, 2005), and was sensitive to improvement after depressive patients received psychological and behavioral training (Yan, Chu, & Wei, 2005).

NEO Five-Factor Inventory (NEO-FFI) The short form inventory (Costa & McCrae, 1989) can be quickly and effectively used to measures the Big Five factors of personality: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). The test-retest reliability of its Chinese version ranged from 0.83 to 0.93, and the internal consistency ranged from 0.80 to 0.91 (Yang et al., 1999; Leung, Cheung, Zhang, Song, & Xie 1997).

Procedure

Participants were recruited by posters placed in public areas of communities, workplaces and universities in Guangdong and Beijing. They participated in the study voluntarily. Following a brief introduction of the study and explanation of informed consent, the testers administered all the paper-pencil questionnaires to the participants in small groups. The scales of the Chinese versions of CD-RISC, RSES, LSI-A and NEO-FFI were presented in a random order.

RESULTS

Confirmatory Factor Analysis of the Chinese version of the CD-RISC

In order to examine whether or not the 5-factor structure of the CD-RISC obtained in American samples should be retained, confirmatory factor analysis (CFA) by LISREL was conducted on the whole set of data, and resulted in $\chi^2/df = 4.18$, GFI = 0.74, AGFI = 0.68, CFI = 0.71, and RMSEA = 0.112. Obviously, the data failed to support the American 5-factor model in the present study.

Exploratory Factor Analysis of the Chinese Version of CD-RISC

A principal components analysis with a varimax rotation was performed on the data to explore the possible structure of the CD-RISC with Chinese participants. Different models with 2-, 3-, 4-, 5- or 6-factor solutions were tried in turn, and then the 6-, 5-, 4-, and 2-factor solutions were rejected for their quite misleading and dual loading patterns. The 3-factor model seemed to be the best in terms

of its simplified loading pattern (Table 1). The model explained 45.01% of the variance.

The first factor was named as Tenacity, composed of 13 items, describing an individual's equanimity, promptness, perseverance, and sense of control when facing situations of hardship and challenge. The second factor of 8 items was labeled as Strength, focusing on the individual's capacity of recovering and becoming strong after setback and past experiences. The last factor was primarily loaded by 4 items, reflecting the individual's tendency of looking on the positive sides of things and trusting one's personal and social resources. Therefore, this factor was labeled as Optimism, measuring one's confidence in resisting adverse events.

TABLE 1
EXPLORATORY FACTOR ANALYSIS OF CD-RISC IN CHINESE PEOPLE

Items	Factors		
	Tenacity	Strength	Optimism
15. Prefer to take the lead in problem solving	**0.66**	0.17	0.23
12. When things look hopeless, I don't give up	**0.66**	0.21	0.07
21. Strong sense of purpose	**0.65**	0.19	0.02
17. Think of self as strong person	**0.64**	0.12	0.33
22. In control of my life	**0.62**	0.29	-0.14
23. I like challenge	**0.60**	0.38	0.10
11. One can achieve one's goals	**0.59**	0.29	0.19
16. Not easily discouraged by failure	**0.57**	0.41	0.09
14. Under pressure, focus and think clearly	**0.56**	0.41	0.17
18. Make unpopular or difficult decisions	**0.53**	0.11	0.32
19. Can handle unpleasant feelings	**0.50**	0.15	0.32
13. Know where to get help	**0.48**	0.22	0.32
20. Have to act on a hunch	**0.42**	-0.03	0.06
9. Things happen for a reason	-0.03	**0.72**	0.16
8. Tend to bounce back after illness or hardship	0.19	**0.66**	0.21
10. Best effort no matter what	0.41	**0.60**	-0.11
1. Able to adapt to change	0.26	**0.59**	0.20
7. Coping with stress strengthens	0.13	**0.56**	0.47
5. Past success gives confidence for new challenge	0.19	**0.50**	0.34
25. Pride in your achievements	0.33	**0.46**	0.00
24. One works to attain one's goals	0.39	**0.43**	-0.01
6. See the humorous side of things	0.20	-0.04	**0.74**
3. Sometimes fate and God can help	-0.11	0.14	**0.61**
2. Close and secure relationships	0.18	0.21	**0.56**
4. Can deal with whatever comes	0.35	0.15	**0.50**
Eigenvalue	8.11	1.70	1.44
Variance explained (%)	32.42	6.81	5.78

Notes: Factor loadings with absolute value greater than .40 are shown in boldface.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Internal Consistencies

The reliability coefficient of the Chinese version of the CD-RISC was 0.91. The internal consistency alpha values of the 3 factors were: 0.88 for Factor 1, 0.80 for Factor 2, and 0.60 for Factor 3. The reliability coefficient of Factor 3 was not as high as that for Factors 1 and 2, but it was acceptable in terms of the number of items it had (4 items only).

Concurrent Validity

Table 2 lists the correlation matrix formed between the total score of the Chinese version of the CD-RISC and the variables of self-esteem, life satisfaction, and 5 personality subscales on the other side. It is obvious from the table that the total score was positively correlated with self-esteem and life-satisfaction. Resilience scores also had positive correlations with personality factors E, O, A, and C, but a negative correlation with N factor. The correlation pattern confirms the hypotheses of the present study, and therefore provides convincing evidence for the validity of the Chinese version of the CD-RISC among Chinese people.

TABLE 2
Correlations Between Total Resilience and Theoretically Related Assessments

	Self-esteem	Life satisfaction	N	E	O	A	C
Resilience	.49**	.48**	-.47**	.43**	.27**	.36**	.64**

Notes: Resilience = Connor and Davidson's Resilience Scale.
Self-esteem = Rosenberg Self-Esteem Scale.
Life satisfaction = Life Satisfaction Index A.
N, E, O, A, C = NEO Five-Factor Inventory.
** $p < 0.01$

DISCUSSION

Cross-cultural psychologists are particularly concerned with such issues as whether personality dimension is universal or cultural-specific (Lin & Church, 2004). Structure equivalence thus becomes one of the most important psychometric indicators to examine cross-culturally the adaptability of a psychological construct and its measurement. Finding construct equivalence (meaning sometimes the same structure of measurement) in different countries is a key step to show the comparability of a theoretical construct across cultures (e.g., NEO-PI; McCrae & Costa, 1997).

The present study has provided more evidence of the need for cross-cultural comparison of an imported construct and its measurement from the West to the East, by showing that the resilience construct, defined by the CD-RISC (Connor & Davidson, 2003), may have somewhat different implications in American and

Chinese cultures. Neither the confirmatory factor analysis nor the explorative factor analysis on the data from a relatively large sample of Chinese people could replicate the American 5-factor structure of resilience, while the EFA disclosed a 3-factor solution, which seems to be more meaningful to Chinese people than the 5-factor structure.

Tenacity (Factor 1) takes up a large proportion of the explained variance of the 3-factor structure, and extracts all items from the original factor 4 (Control) and a large number of items from the original factor 1 (e.g., goal-orientation) and factor 2 (e.g., calmness, decision, and promptness). This implies that a resilient Chinese person consciously integrates behaviors of controlling, goalsetting, and decisionmaking, when he/she is drawn into a situation of frustration and setback. To some extent, this factor is similar to the construct of hardiness (control, commitment, and challenge), which was found to be a reliable buffer between individual's illness and the effects of stressful life events (Kobasa, 1979).

The items in Strength (Factor 2) do not come from any single factor of the original structure, rather they are quite a mixture. Strength apparently reflects the process of disruption-reintegration (Richardson, 2002). It suggests that resilient people usually regard change as a normal part of life rather than as a threat to life; they would not only be able to rebound to the previous life state, but also to achieve new integration and further growth positively after striving against adverse experiences. Some old Chinese doctrines of Confucian and Mencian philosophy may be best used to describe the meaning of this factor, as "a great office……stimulates his mind, hardens his nature, and supplies his incompetencies", and "life springs from sorrow and calamity, and death from ease and pleasure" (Legge, trans. Chapter 24, 1895). Recently, this specific aspect of resilience has been addressed by many researchers as stress-related growth in health psychology and positive psychology (Frazier, Tashiro, Berman, Steger, & Long, 2004).

Optimism (Factor 3) is so named because the items loading on this factor are also a mixture, just as in factor 2, and represent the individual's generally positive attitude towards and faith about adverse situations and risk events. Chinese individuals getting a high score on the factor would probably tend to be confident in overcoming difficulties by believing that there are personal and interpersonal coping resources available. Optimism is an important aspect of resilience. The conclusion has been repeatedly reached in psychological studies, and also confirmed by one of the psychosomatic studies (Scheier et al., 1989), in which patients benefited from their optimistic attitudes in recovery from coronary artery bypass surgery.

In addition to that, another major difference found in the present study in applying the CD-RISC to Chinese people is that the original factor 4 (Control) and factor 5 (Spiritual influence) based on American data do not emerge as

independent factors in the new structure based on Chinese data. The reasons behind this are probably related to endorsement of individual independence as well as religious belief.

Studies on the locus of control and perceived control (Gould, 1999; Weisz, Rothbaum, & Blackburn, 1984) have concluded that people in the West place much more emphasis on changing the external world according to their own goal in their adaptation than do people in the East, who would rather change their internal world (e.g., desire, personal goals, emotion) to adapt to the demands of the outside environment. Therefore, the meaning of the control construct differs between the West and the East. Without clarifying the meaning, the imported construct of control could not be used to predict Chinese behaviors in stressful situations as reliably as in Western culture (Lefcourt, 1992).

Since Chinese people are probably the least religious people in the world, there is no wonder that the original factor 5 (Spiritual influence) does not separate from others to be an independent factor in the Chinese sample. Chen and Zhang (2004) found a similar result for the Spirituality factor (believing in the existence of supernatural forces and the functions of religion) which disappeared from the factor analysis of Chinese social axioms. However, in their cross-cultural study of social axioms (Leung et al., 2002), the factor of Spirituality appeared repeatedly as one of the pancultural dimensions in the United States, Germany, Venezuela, Japan, and even Hong Kong, where people have a stronger religious tradition than people of Mainland China.

In sum, the construct of resilience may be presented as a triad of Tenacity, Strength, and Optimism in Chinese culture. This is again supported by the fact that the Chinese version of the CD-RISC is as reliable and valid as its English version to measure the resilience construct in Chinese society. The alpha value of the Chinese version is higher than that (α = 0.89) reported in Connor and Davidson's study (2003). And Wagnild and Young (1993) found that resilience measured by RS correlated with self-esteem at 0.57 and with life satisfaction at 0.59. These coefficients showed high correlations between resilience and validity indicators in the present study. Similarly, the correlation pattern of resilience and personality traits of NEO-FFI in this study supports the Western conclusion on resilient children (who are described as confident, competent, optimistic, active, responsible, self-disciplined, caring, affectionate, even-tempered, etc., Werner, 1989).

However, it may be interesting to note that although the correlation between resilience and C (Conscientiousness) factor is generally positive, it varies in degree with different groups of people. For example, among American students, this correlation was found to be 0.59 for the ethnic minority group, while it was 0.29 for the Caucasian group (Campbell-Sills, Cohan, & Stein, 2006). In the present study, the coefficient is as high as 0.64. This finding suggests that certain

dimensions of personality traits (e.g., C) may make people of different cultures resilient to trauma and difficulties at different levels.

The present study concludes that the construct of resilience and its measurement from the West may be helpful and applicable in understanding Chinese people, however, the understanding of the construct may also need to be modified somewhat according to Chinese culture.

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