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1 BRIEF COMMUNICATION

2 Transcultural and psychometric validation of the Dispositional
3 Resilience Scale (DRS-15) in Chinese adult women

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9 **Abstract**
10 *Purpose* The aim of this study was to report translation
11 and transcultural adaptation of the 15-item Dispositional
12 Resilience Scale in traditional Chinese (C-DRS-15) and
13 evaluate its psychometric properties.
14 *Methods* The DRS is a self-report instrument that measures
15 psychological hardiness. We followed an international stan-
16 dard of cross-cultural translation and validation of patient-
17 reported outcome measures to create the Chinese version.
18 Then, the translated C-DRS-15 was validated on 542 Chinese
19 women from a population-based sample in Hong Kong.
20 *Results* The internal consistency and criterion-related
21 validity were investigated. Exploratory and confirmatory
22 factor analysis revealed that the C-DRS-15 was supported by
23 a modified three-factor structure in our Chinese sample
24 (RMSEA = .06, CFI = .94, TLI = .92, and SRMR = .06).

25 The reliability (Cronbach's α coefficient = .78) and validity
26 were satisfactory. Total resilience score was negatively
27 correlated with depression ($p < .001$), with non-depressed
28 women scoring higher on the C-DRS-15.
29 *Conclusions* The C-DRS-15 was demonstrated to be a
30 reliable and valid measurement to assess hardiness in
31 Chinese women.

33 **Keywords** Psychometric validation · Hardiness ·
34 Resilience · Chinese · Psychological health

Background

36 Resilience research has emerged in social science and
37 medical disciplines during the twenty-first century [1–3],

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and resilience can promote positive mental health outcomes and psychological well-being [4]. The Dispositional Resilience Scale (DRS) is a measure of psychological hardiness, considered as a personality style to differentiate individuals under stress based on commitment towards life, control of life, and willingness to overcome challenges [5]. The original 45-item DRS scale was developed by Bartone [6], and later reduced to 30 and 15 items with satisfactory psychometric properties [7–9]. This study is to report the translation and transcultural adaptation of the 15-item DRS to traditional Chinese and evaluate its psychometric properties in a population-based sample of Chinese adult women in Hong Kong.

Methods

Translation and transcultural adaptation

Transcultural adaptation was consistent with the international standard of cross-cultural translation and validation of patient-reported outcome (PRO) measures (MAPI Institute: http://www.mapi-institute.com). The DRS-15 was translated by two native Chinese translators into the 15-item Dispositional Resilience Scale in traditional Chinese (C-DRS-15). The consensus version was translated back into English, and the two English versions were compared for consistency. The first C-DRS-15 was obtained after modification and refinements on semantic equivalence (same meaning with grammatical consideration), idiomatic equivalence (same expression), experiential equivalence (same application), and conceptual equivalence (validity of the concept) in the Chinese context [10]. Five Chinese adult women tested the first C-DRS-15, undergone cognitive debriefing via face-to-face interviews, and evaluated on completion time, length, relevance, clarity, and comfort of the instrument. Their comments were used for further item modification and refinements. The final C-DRS-15 was obtained thereafter and pre-tested on ten Chinese adult women to ensure administration feasibility to the public.

Psychometric validation

Two-stage systematic stratified sampling was applied on the data from a population-based household survey by the Census and Statistics Department in Hong Kong from April to August 2012. Addresses were first stratified according to geographical area by random sampling with fixed sampling intervals and non-repetitive random numbers. In the second stage, Chinese women aged 18 or older in each household residing in the selected stratum were randomly selected as respondents. Response rate was 68 % (n = 550). Non-participation encompassed both failure to contact potential respondents (n = 89) and refusals to respond (n = 164). Written consent was obtained from all respondents, and the study was approved by the University of Hong Kong/ Hospital Authority Hong Kong West Cluster Joint Institutional Review Board for both the cognitive debriefing (UW 12-047) and psychometric validation studies (UW 12-111).

The respondents anonymously answered the self-administered questionnaire comprised of the C-DRS-15, the Chinese Edinburgh Depression Scale (C-EDS), and sociodemographics. The C-DRS-15 comprises 15 items covering three subscales: commitment, control, and challenge. All items are listed in Table 3 and rated on 4-point Likert scale (0 = not at all true, 1 = slightly true, 2 = quite true, 3 = completely true). The total score ranges from 0 to 45, with a higher score representing greater psychological hardiness. The C-EDS measures depressive symptoms and comprises 10 questions rated on 4-point Likert scale, with total score ranging from 0 to 30 and cut-off score of 9/10 recommended for Chinese [11]. Self-perceived resilience was assessed by yes–no question: "Do you think you are a person who can positively face difficulties and recover, learn, and grow from them?" Research assistant collected the completed questionnaires in a sealed envelope.

Construct validity of the C-DRS-15 was examined by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) [12]. Prior to splitting the sample into the training and validation sets, two cases with more than 10 % of missing data and six cases who were non-Chinese women were removed. In the training set (n = 261), we performed EFA with principal component extraction, scree plot assessment, geomin (oblique) rotation, and factor loadings examination. In the validation set (n = 281), CFA was used to assess the factor structure. The three-factor structure (commitment, control, and challenge) hypothesized in the original DRS was also assessed for its appropriateness in Chinese population. Internal consistency was assessed using Cronbach's α coefficient. Finally, convergent validity was examined by comparing the scores of depressed and non-depressed women with two-independent samples t test and assessing the difference by the Cohen's d effect sizes [15]. Depression was chosen for assessing convergent validity, because studies have reported that depressed women were less resilient than non-depressed women [4, 13, 14]. Data analysis was performed using Mplus 7.0 [16].

Results

The sample comprised 550 female participants. Almost all were Chinese (n = 544, 98.9 %). Participants' characteristics are shown in Table 1.

135 C-DRS-15 required refinement during the translation
136 process, and participants commented that the items were
137 relevant and they felt comfortable completing the ques-
138 tionnaire. The mean completion time of the scale was
139 acceptable at 3.8 min.
140 Table 2 shows the EFA factor loadings. The commit-
141 ment factor comprised six items describing individual's
142 vitality, strength, capacity, and promptness when facing
143 hardship. The control-adaptation factor comprised six
144 items of hardship resistance and coping, and difficulties
145 with minimal changes. The positivity factor comprised
146 three items describing individual's positive view of things
147 and confidence in managing adverse events. The percent-
148 age of variance explained by each item on C-DRS-15
149 ranged from 31 to 81 %.

Table 1 Participant characteristics ($n = 542$)

	n (%)
Age (years)	
Under 20	63 (11.6)
20–29	133 (24.4)
30–39	108 (19.9)
40–49	114 (21.1)
50–59	70 (12.8)
60 or over	54 (9.9)
Education	
None or below primary	37 (6.8)
Primary	51 (9.4)
Secondary	324 (59.6)
Tertiary or above	131 (24.1)
Employment status	
Employed	229 (42.1)
Housewives	158 (29)
Searching for jobs	25 (4.5)
Retired	29 (5.3)
Studying (full time)	102 (18.8)
Marital status	
Single	206 (37.9)
Married or cohabiting	286 (52.5)
Separated/divorced/widowed	50 (12.8)
Presence of chronic illness[a] in the past year	132 (24.3)
Presence of financial difficulties in the past year	98 (18)
Self-perceived hardiness by one yes–no question	494 (90.8)
Chinese Dispositional Resilience Scale (C-DRS-15) total score (mean [SD])	22.82 (6.2)
Edinburgh Depression Scale (EPDS) total score (mean [SD])	7.0 (5.4)

[a] Chronic illness refers to medical diagnosed diseases such as heart disease, hypertension, diabetes mellitus, asthma, chronic obstructive pulmonary disease, neurological diseases, headache, or chronic pain

150 The factor structure was assessed by CFA (Table 3). The
151 originally hypothesized three-factor model (Model A) dem-
152 onstrated unsatisfactory goodness of fit indices
153 (RMSEA = .12, CFI = .67, TLI = .60, and SRMR = .09).
154 After allowing for error covariances (Model B), the fit indices
155 improved but remained unsatisfactory (RMSEA = .08,
156 CFI = .86, TLI = .82, and SRMR = .07). The EFA-derived
157 three-factor structure (Model C) with correlated error
158 covariance had adequate goodness of fit (RMSEA = .06,
159 CFI = .94, TLI = .92, and SRMR = .06). The standardized
160 estimates and path diagram of Model C are shown in Fig. 1.
161 Cronbach's α coefficient was .78 (commitment subscale,
162 $\alpha = .78$; control-adaptation subscale, $\alpha = .75$; positivity
163 subscale, $\alpha = .61$), which demonstrated moderate to high
164 internal reliability [17]. Criterion-related validity was evi-
165 dent in the significant differences between the commitment
166 score (depressed 8.78 ± 3.6; non-depressed 9.57 ± 3.31,
167 $p = .02$), positivity score (depressed 5.34 ± 1.96; non-
168 depressed 6.22 ± 1.9, $p < .001$), and total score (depressed
169 24.28 ± 6.22; non-depressed 26.47 ± 5.81, $p < .001$). The
170 Cohen's d effect sizes for the commitment, positivity, and
171 C-DRS-15 scales were small to moderate with a range from
172 0.23 to 0.46. There was no significant difference in control-
173 adaptation score (depressed 10.14 ± 3.47; non-depressed
174 10.7 ± 3.25, $p = .07$). In general, non-depressed women
175 scored higher than depressed women on the C-DRS-15.

Discussion

177 This study revealed that the original three factors of the
178 DRS-15 were not reproduced in our Chinese sample.
179 Instead, C-DRS-15 with a modified three-factor structure
180 of commitment, control adaptation, and positivity was
181 valid and reliable. From a statistical perspective, the
182 modified structure was developed with consideration of
183 EFA results, goodness of fit statistics, and factor loadings
184 during CFA. Marginal alpha coefficient for the positivity
185 subscale (.61) was justified because of only three items.
186 Furthermore, criterion-related validity was demonstrated
187 with C-DRS-15 scores negatively correlated with
188 depression.
189 From a theoretical perspective, the modified structure
190 conveys meanings for Chinese women in our study. The
191 commitment factor includes items from the original com-
192 mitment, control, and challenge factors. Our findings imply
193 that hardy Chinese women consciously integrate commit-
194 ment, control, and challenge in devoting themselves to
195 strategies to manage difficulties, solve problems, make
196 decisions, and set goals while promptly deal with stressful
197 events. The integration is consistent with the Chinese
198 Connor–Davidson Resilience Scale [18] in Chinese indi-
199 viduals. Furthermore, Chinese take a holistic approach in

Table 2 Factor loadings of the C-DRS-15 after geomin rotation ($n = 261$)

Items		Commitment	Control adaptation	Positivity
1	Most of my life gets spent doing things that are meaningful	*0.72*	0.03	0.09
7	I really look forward to my work activities	*0.50*	0.30	0.08
10	Most days, life is really interesting and exciting for me	*0.66*	0.05	0.09
2	By working hard you can nearly always achieve your goals	*0.82*	0.05	0.04
5	Changes in routine are interesting to me	*0.47*	0.06	0.33
9	I enjoy the challenge when I have to do more than one thing at a time	*0.46*	0.01	0.29
6	How things go in my life depends on my own actions	0.37	*0.39*	0.05
12	It is up to me to decide how the rest of my life will be	0.21	*0.53*	0.11
15	My choices make a real difference in how things turn out in the end	0.01	*0.83*	0.04
3 (R)	I don't like to make changes in my regular activities	0.23	*0.27*	0.01
11 (R)	It bothers me when my daily routine gets interrupted	0.05	*0.42*	0.03
14 (R)	I like having a daily schedule that doesn't change very much	0.10	*0.65*	0.01
4 (R)	I feel that my life is somewhat empty of meaning	0.02	0.03	*0.71*
8 (R)	I don't think there's much I can do to influence my own future	0.15	0.01	*0.57*
13 (R)	Life in general is boring for me.	0.09	0.16	*0.60*
Factor correlations				
Commitment		1.00		
Control adaptation		0.52	1.00	
Positivity		0.21	0.001	1.00

Italic value indicates the highest factor loading of each item. The DRS-15 items are copyrighted material and may not be reproduced without permission. Information on use is available at www.kbmetrics.com

(R) indicates negatively keyed items

Table 3 Goodness of fit indices of different models ($n = 281$)

| Models	X^2	df	RMSEA	CFI	TLI	SRMR
Model A (original three-factor model)	428	87	.12	.67	.60	.09
Model B (original three-factor model with error covariance)	221	80	.08	.86	.82	.07
Model C (EFA-derived three-factor model with error covariance)	147	80	.06	.94	.92	.06

RMSEA root-mean-square error of approximation, *CFI* comparative fit index, *TLI* Tucker–Lewis index, *SRMR* standardized root-mean-square residual

responding to daily demands [19], and this supports how commitment, control, and challenge cannot be isolated when hardy Chinese are dealing with stressful situations.

The control-adaptation factor contains items from the original control and challenge factors and reflects individual acceptance, suppression of changes, and restraint coping in the Chinese context. Chinese individuals believe in *fate*, with life events predetermined by external forces [20]. They perceive that individual efforts exert little influence on outcomes and prefer minimal changes when facing challenges since changes may tremendously affect the family. For Chinese women, "family harmony", "satisfying marriage", and "having blessed, well-behaved and high-achieving children" are significant values [21, 22]. Therefore, adaptation is the essence of managing stress and challenge in Chinese women.

The positivity factor serves as the cognitive resilient element in managing adverse events while reflecting peoples' positive expectations in life. These people are more optimistic and have confidence in overcoming problems and controlling their own future. Positive perceptions of adverse events and personal resources help in enhancing individual capability to deal with stressful circumstances [23, 24].

Despite our sample covered a wide spectrum of demographics in Hong Kong, study participants were Chinese women. Therefore, findings cannot be generalized to men. Also, data unavailability did not allow the examination of test–retest reliability, but such was reported high in DRS-15 [9]. Finally, the study relied on self-reported data collected at one time point, so follow-up data would be of value in examining whether hardiness results are consistent

Author Proof
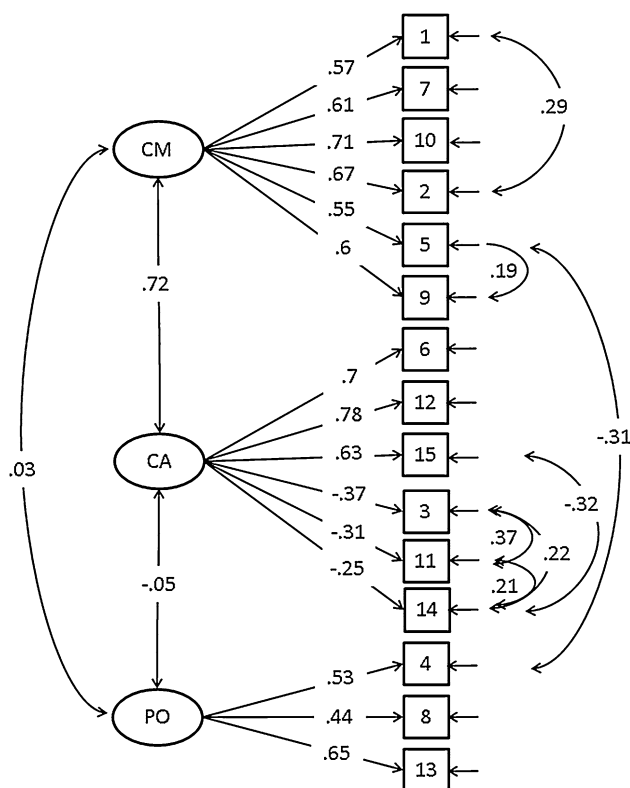
Fig. 1 Standardized estimates in a confirmatory factor analytic model of the C-DRS-15. *CM* commitment, *CA* control adaptation, *PO* positivity

232 in demonstrating the dispositional traits of individuals in
233 Chinese society.

Conclusions

235 The present study is the first to confirm that the C-DRS-15,
236 with modified factor structure from the original English
237 DRS-15, is a reliable and valid measurement tool to eval-
238 uate hardiness in Chinese women.

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