Factor Structure, Psychometric Properties, And Correlates Of Revised Chinese Version Of Chronic Pain Coping Inventory Among Chronic Pain Patients In Hong Kong

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Abstract

The present study was to examine the factor structure, psychometric properties, and correlates of the revised Chinese version of Chronic Pain Coping Inventory (RC-CPCI) among Chinese patients with chronic pain in Hong Kong. One hundred seventy patients (95 woman, 56%), aged from 18 to 84 years, (Mean=48.21, SD=13.89) with an average 4.63 years (SD=7.07) of chronic pain participated into the studies. In the RC-CPCI, 6 factors, namely the Positive Coping, Negative Coping, Social Coping, Exercise/Stretch, Task Persistence, and Activity Pacing were found. The factors were shown to have adequate internal consistency, and to correlate with different pain belief and outcome measures. Limitations of the study were discussed.

INTRODUCTION

The prevalence of chronic pain is 10.8% in Hong Kong (1). Coping may be defined as the use of behavioral and cognitive techniques to manage stressful demands. Chronic pain and associated functional, vocational, and psychosocial disability can be viewed as stressors that may mobilize the use of coping strategies by patients. Evidence from a number of sources suggests that differences in the use of pain coping strategies may play a significant role in adjustment to chronic pain (2). And considerable amount of interest have been aroused to develop measures of pain-related coping and examine how coping is related to functioning among persons with chronic pain (3, 4).

One such measure is the Vanderbilt Pain Management Inventory (VMPI, 4), which consists of the Active Coping and Passive Coping. The Passive Coping has been found to relate with worse adjustment (5). Though VMPI has been widely used in the pain population, there is a need to identify specific coping strategies for clinical application and intervention. The Chronic Pain Coping Inventory (CPCI), which consists of 8 coping factors, has been shown as a useful assessment tool in reliably explaining variances of pain intensity, disability and depressive symptoms for English speaking patients with chronic pain (4, 6, 7). Though Wong and colleagues have replicated some evidence for partial factorial structure of the Chinese version of the CPCI with the confirmatory factor analysis (CFA), 2 of the 8 factors have unsatisfactory goodness of fit in the CFA (8). One empirical question left unanswered is whether the original factorial structure is culturally applicable to the Chinese population.

After the development of the initial CPCI, Nielson and colleagues (9) have proposed to add a subscale, the Activity Pacing Scale, into the CPCI. However, there is no examination whether this subscale is factorially distinctive from other factors in the CPCI. Another purpose of the present study was to re-examine the factorial structure of this revised version after incorporating this additional subscale in the inventory. Besides, we would like to document the correlates of this revised Chinese version of CPCI with other measures of pain and outcomes such as anxiety, depression, physical functioning.

Therefore, the present study was to examine the factor structure, psychometric properties, and correlates of the revised Chinese version of Chronic Pain Coping Inventory (CPCI) among chronic pain patients in a Chinese Hong

Kong sample.

METHOD

Subjects

After the ethics approval from hospital review board was obtained, consecutive patients with chronic pain in their first attendance to 3 pain clinics in Hong Kong were invited into the study. The inclusion criteria of the participants were (a) having persistent pain for over 3 months, (b) literate and able to complete the questionnaires, (c) aged 18 or above. The exclusion criteria were (a) having the cancer-related pain and (b) refusing to give the written consent. From 2011 to 2013, a total of 170 patients (95 woman, 56%), aged from 18 to 84 years, (Mean=48.21, SD=13.89) with an average 4.63 years (SD=7.07) of chronic pain participated into the studies. The reported locations of the pain included the head (41.8%), shoulder (8.2%), limb (28.2%), chest (4.7%), back (11.2%), abdomen (2.4%), and others (3.5%).

Measures

1. The principal measure in this study was the Revised Chinese version of CPCI (RC-CPCI), which was consisted of the original 42 items with 8 subscales (respectively Guarding, Resting, Asking for Assistance, Relaxation, Task Persistence, Exercise/Stretch, Seeking Social Support, and Coping Self-Statement) and the additional Activity Pacing Scale (6 items) (9). Each item would be from 0 to 7 days of practice of the coping in a week. The mean could be obtained by dividing the aggregate score with the total number of items in each factor. The internal consistency of the factors in the original scale was satisfactory (alpha >0.7). Different factors correlated well with different outcome measures (4). The present Chinese version was translated by the first author and then refined by two experienced Clinical Psychologists in doctorate level (KK Leung and S Chang), who were proficient in Chinese and English, and worked with chronic pain patients (Appendix 1: RC-CPCI was attached).
2. Other measures of pain and outcome used in this study included thee Chinese version of VPMI (10), HK-Pain Self-Efficacy Pain Questionnaire (11), HK-Pain Catastrophizing Scale (12), SF-36 (13), Hospital Anxiety and Depression Scale (14), which all had been well validated with satisfactory psychometric properties for Chinese patients.

RESULT

As the initial multivariate analyses of variance indicated no sex differences on all measures, male and female data were combined in all subsequent statistical tests.

Factor Analyses of the RC-CPCI

A principal component analysis was initially performed. Twelve factors with eigenvalues exceeding unity emerged, and together they accounted for 66.4% of the total variance. To avoid overfactoring, the scree test was employed (15). It showed that 6 factors could be appropriately and meaningfully extracted. The 6-factor solution, which could be considered as an adequate representation of the data, was rotated to a Varimax criterion for interpretation (16). The factors and their loadings are presented in Table 1. We used salient loadings .36 for the purpose of interpreting the meaning of each component. To simplify the interpretation of findings, we decided to delete any item loading .36 on more than one factor.

In the present results of factor analyses, each of the first 3 factors was consisted of 2 factors as derived in the original model. The first factor, named Positive Coping (9 items), was the combination of the factors “Relaxation” (5 items) and “Coping Self-Statement” (4 items) in the original CPCI. The second factor, named Negative Coping (10 items), was comprised of the factors “Guarding” (7 items) and “Resting” (5 items). The third factor, labelled as Social Coping (9 items), was formed by the exact items in the factors “Asking for Assistance” (4 items) and “Seeking Social Support” (5 items). The remaining 3 factors, respectively the Task Persistence (6 items), Exercise/Stretch (5 items), and Activity Pacing (6 items), had replicated the same items in the 3 factors in the original study. As 2 items had factor loading less than .36 (items 7 and 42) and 1 item (number 25) had loadings greater .36 onto two factors, these 3 items were being removed from the RC-CPCI. The total number of the items in the present RC-CPCI was reduced from 48 to 45.

In Table 1, we presented a summary of the factor structure, and the mean, SD, and alpha of each factor. In Table 2, we also presented a summary of the percentile rank for each factor score.

Table 1

Factor loadings, structure, and descriptive statistics of Revised Chinese version of CPCI

Factor loadings, structure, and descriptive statistics of Revised Chinese version of CPCI

Items	Positive Coping	Negative Coping	Social Coping	Exercise/ Stretching	Task Persistence	Activity Pacing
17	.775					
10	.726					
15	.635					
23	.628					
33	.596					
29	.594					
1	.515					
38	.444					
8	.366					
36		.646				
37		.597				
20		.576				
30		.568				
32		.567				
31		.547				
22		.510				
3		.480				
6		.462				
12		.364				
7						
42						
13			.782			
28			.763			
14			.702			
11			.676			
4			.616			
5			.610			
16			.591			
40			.559			
26			.418			
39				.818		
35				.739		
27				.665		
19				.658		
24				.609		
25				*.535*	*.362*	
9				.416		
21					.715	
2					.691	
41					.621	
18					.531	
34					.481	
47						.797
46						.737
48						.737
45						.728
44						.700
43						.628
No. of item	9	10	9	6	5	6
M (SD)	2.72 (1.75)	3.71 (1.59)	1.81 (1.54)	3.22 (2.09)	3.28 (1.90)	3.32 (2.07)
Alpha	.86	.79	.77	.83	.74	.88

Note. N = 170. Factor loadings <.36 are suppressed. Three items are removed from the scale. One item (number 25) has loading <.36 onto 2 factors, and 2 items (number 7 and 42) has loading less than .36. Total number of items in the inventory is reduced from 48 to 45.

Table 2

Percentile ranks of the mean of factors in RC-CPCI

Percentiles	Positive Coping	Negative Coping	Social Coping	Exercise/ Stretch	Task Persistence	Activity Pacing
1	.00	.00	.00	.00	.00	.00
5	.22	.81	.00	.00	.40	.00
10	.75	1.72	.00	.28	.80	.22
20	1.11	2.24	.33	1.17	1.40	1.33
30	2.33	2.80	.67	1.68	2.00	2.32
40	2.16	3.38	1.00	2.55	2.60	2.67
50	2.56	3.80	1.56	3.17	3.20	3.27
60	3.11	4.20	2.00	3.83	3.92	3.50
70	3.44	4.60	2.69	4.65	4.40	4.17
80	4.09	5.10	3.22	5.27	5.24	5.57
90	5.67	5.80	3.89	6.38	5.60	6.67
95	6.13	6.30	4.78	7.00	6.68	7.00
99	7.00	6.83	6.52	7.00	7.00	7.00

NB: The mean of each factor ranged from 0 to 7, indicating the number of days to use the coping strategy by the patients in 1 week

Correlation of RC-CPCI factors with pain scales

To examine the associations between the RC-CPCI with other pain coping and belief, correlational analyses were conducted with results shown in Table 3. Several salient findings were summarized in the followings. First, Positive Coping did not have significant association with pain belief such as pain catastrophizing or pain self-efficacy, but it had significant correlation with Active Coping in the VMPI and other factors in the RC-CPCI. Second, Negative Coping and Task Persistence had relatively stronger associations with other coping and belief scales, as compared to other factors in the RC-CPCI. Third, the remaining factors such as the Social Coping, Exercise/Stretch, and Activity Pacing had different degree of associations with different pain coping and belief.

Table 3

Correlation between RC-CPCI factors with pain measures

Measures	1	2	3	4	5	6	7	8	9	10
1. Positive Coping	-									
2. Negative Coping	.29**	-								
3. Social Coping	.33**	.44**	-							
4. Exercise/Stretch	.55**	.30**	.19*	-						
5. Task Persistence	.27**	-.13	-.01	.22**	-					
6. Activity Pacing	.50**	.05	.18*	.35**	.44**	-				
7. Passive Coping	.08	.44**	.35**	.02	-.24**	-.15	-			
8. Active Coping	.32**	-.06	.24**	.30**	.45**	.44**	-.13	-		
9. PCS	.01	.31**	.09	.08	-.09	-.20*	.58**	-.23**	-	
10.PSEQ	.08	-.43**	-.03	.06	.43**	.27**	-.41**	.55**	-.46**	-

Note: RC-CPCI = Revised Chinese version of Chronic Pain Coping Inventory Pacing Scale; Passive Coping and Active Coping are both factors in the Vanderbilt Pain Management Inventory; PCS = Pain Catastrophizing Scale; PSEQ = Pain Self-Efficacy Questionnaire *$p < .05$. **$p < .01$. (two-tailed)

Correlation of RC-CPCI factors with outcome measures

To evaluate the relationship between the RC-CPCI with outcome measures, we conducted the correlational analyses between the RC-CPCI factors with pain intensity, emotional distress, and physical health functioning. The findings were presented in Table 4. Some key points were highlighted below. First, only the factor Activity Pacing was significantly associated with pain intensity, whereas none of any other factors were. Second, Negative Coping, Task Persistence, and Activity Pacing had significant associations with emotional distress in the expected directions. Third, Positive Coping did not associate with any outcome measures, whereas Negative Coping and Task Persistence had strong association with most of the physical functioning subscales. Finally, the Social Coping, Exercise/Stretch, and Activity Pacing had different degree of associations with different aspects of physical functioning.

Table 4

Correlations of RC-CPCI factors with outcome measures

	Pain Level	HADS Anx	HADS Dep	SF36 PF	SF36 RolePH	SF36 RoleEP	SF36 E/F	SF36 EWB	SF36 SF	SF36 P	SF36 GH
1. Positive Coping	-.03	.02	-.07	-.12	-.07	-.10	.09	.09	-.04	.06	.13
2. Negative Coping	.00	.32**	.39**	-.45**	-.39**	-.42**	-.25**	-.27**	-.37**	-.31**	-.20*
3. Social Coping	-.04	.11	.09	-.31**	-.17*	-.15	.04	-.03	-.10	-.18*	-.04
4. Exercise/ Stretch	-.08	.12	.05	-.14	-.15	-.18*	.05	.05	-.04	-.06	.12
5. Task Persistence	-.08	-.24**	-.29**	.17*	.20*	.19*	.25**	.30**	.28**	.26**	.26**
6. Activity Pacing	-.29**	-.15	-.21*	-.03	.02	-.01	.19*	.23**	.14	.20*	.20*

Note: HADS – Anx = Hospital Anxiety & Depression Scale – Anxiety Scale; HADS – Dep = Hospital Anxiety and Depression Scale – Depression Scale; SF-36 – PF = Physical functioning; SF-36 – RolePH = Role limitations due to physical health; SF-36 – RoleEP = Role limitations due to emotional problems; SF-36 – E/F = Energy/Fatigue; SF-36 – EWB = Emotional well-being; SF-36 – SF = Social functioning; SF-36 – P = Pain; SF-36 – GH = General Health. *$p < .05$. **$p < .01$.

DISCUSSION

The purposes of the present study are three-folded. First, it aimed to reexamine the factor structure of the RC-CPCI in the Chinese culture. Second, it documented the psychometric properties of the RC-CPCI in the present Chinese pain patients. Third, it demonstrated the associations of RC-CPCI with other pain constructs and outcome measures.

For the factorial structure, we have found a parsimonious and meaningful pain coping behaviors with the present clinical sample. The results replicated partial factorial structure resembling to the original one (such as the exact factor composites for Task Persistence, Exercise/Stretch, and Activity Pacing), but found different coping patterns such as the Positive Coping, Negative Coping and Social Coping in the Chinese patients. Interestingly, the Positive Coping and Negative Coping indeed were noted to be separately similar to the Active Coping and Passive Coping in the VMPI, as shown in their respective correlational coefficients. Thus, the model of Positive Coping (or Active Coping) and Negative Coping (or Passive Coping) may be empirically applicable to the Chinese culture. Besides, the present factor analyses lent support to the assertion that Activity Pacing was a separate and independent behavioral coping in pain patients. Our findings also show that the internal consistencies of each factor in the RC-CPCI are good. It appears that the RC-CPCI enjoyed satisfactory psychometric properties.

We documented the significant associations of RC-CPCI with various pain variables and outcome measures. These findings added to the literature that RC-CPCI has acceptable construct validity as reflected by its significant associations with respective pain variables and outcome measures in anticipated directions. A few interesting findings that relate to the association with other pain and outcome variables deserve an attention. First, as a replication of the previous findings (17), our present work found that different coping strategies are associated with different outcome variables. For instance, Negative Coping, which is associated with resting and guarding, is found to be negatively correlated with pain self-efficacy but positively with pain catastrophizing. Conversely, Activity Pacing that is the skill related to pain activity tolerance is shown to positively related to pain self-efficacy but negatively with pain catastrophizing. These findings signify the importance of matching the cognitive and behavioral intervention strategies for chronic pain patients in maximizing the therapeutic gains. Second, Positive Coping that consists of relaxation practice and coping statements are shown unrelated to any of the outcomes and other pain measures. However, it is significantly and strongly associated with other pain coping in particularly the Activity Pacing and Exercise/ Stretch in the RC-CPCI and the Active Coping in the VMPI. This finding indicates that Positive Coping may affect outcome variables via an indirect path from other coping strategies such as Activity Pacing and Exercise/Stretch rather than a direct one. Future investigation may need to examine this speculation, which can have a vital treatment implication for adjustment to chronic pain.

However, several limitations should be noted in the present studies. The present study has adopted convenience sampling and we have no information regarding to those who refused to take part into the study, due to inability to obtain the consent. Thus one should be cautious in direct generalization of the present findings to other Chinese chronic pain patients. However, the present findings can be treated as the preliminary evidence for the factorial structure of RC-CPCI for the Chinese pain patients. Future studies should replicate and examine the structural validity of the RC-CPCI. Second, in this study, owing to limited resource, we have not shown the re-test reliabilities of the RC-CPCI that future investigation may report this psychometric property of the test. Finally, this present study is a correlational one, implying none of any causal relationship among coping strategies, pain belief, and outcome variables. The pain coping and adjustment model for Chinese chronic pain patients can be tested and examined in future randomized control trials.

APPENDIX

Appendix Part 1

RC-CPCI

姓名 _____ 日期 _____

在過去一星期內，你有幾多日是用了以下的方法處理疼痛的呢？（請留意，你可能在某些沒有疼痛的日子，仍會使用這些方法，以減輕或避免將來的疼痛。請你在每項處理疼痛方法的個旁，圈上你在一星期內使用該項方法的日數，不論你在當時是否有疼痛出現。）

	過去一星期使用幾多日
1. 想像一個令人心境平靜或分散注意力的影像，以助自己放鬆	0 1 2 3 4 5 6 7
2. 專注放鬆自己二的肌肉	0 1 2 3 4 5 6 7
3. 告訴自己事情會好轉	0 1 2 3 4 5 6 7
4. 想一想所有我已有的好東西	0 1 2 3 4 5 6 7
5. 告訴自己，我的疼痛可能會好轉	0 1 2 3 4 5 6 7
6. 透過冥想/默想，放鬆自己	0 1 2 3 4 5 6 7
7. 提醒自己，有些人誰比我更淒慘	0 1 2 3 4 5 6 7
8. 使用自我催眠放鬆	0 1 2 3 4 5 6 7
9. 使用深、慢呼吸，放鬆自己	0 1 2 3 4 5 6 7
10. 我會休息	0 1 2 3 4 5 6 7
11. 提醒自己，事情可能會更糟	0 1 2 3 4 5 6 7
12. 我會盡量爭取休息	0 1 2 3 4 5 6 7
13. 因為疼痛而限制自己的步行	0 1 2 3 4 5 6 7
14. 一瘸一拐的步行以減少疼痛	0 1 2 3 4 5 6 7
15. 限制我的站立時間	0 1 2 3 4 5 6 7
16. 躺在床上	0 1 2 3 4 5 6 7
17. 避免一些體力活動(如搬起、運送或推動)	0 1 2 3 4 5 6 7
18. 避免活動	0 1 2 3 4 5 6 7
19. 自己進入房間休息	0 1 2 3 4 5 6 7
20. 得到朋友的支持	0 1 2 3 4 5 6 7
21. 要求別人幫我做些事	0 1 2 3 4 5 6 7
22. 得到家人的支持	0 1 2 3 4 5 6 7
23. 我會與我身邊的人交談	0 1 2 3 4 5 6 7
24. 打電話給朋友，好助我感受好些	0 1 2 3 4 5 6 7

Appendix Part 2

	過去一星期使用幾多日
25. 尋求人幫助處理一項項事或工作	0 1 2 3 4 5 6 7
26. 請別人幫我抬起、搬運或推動一些東西	0 1 2 3 4 5 6 7
27. 與朋友或家人交談以得到支持	0 1 2 3 4 5 6 7
28. 請別人把東西（如醫藥、食品、飲料）拿給我	0 1 2 3 4 5 6 7
29. 坐在地上，伸展，並舉起雙手拉伸至少 10 秒	0 1 2 3 4 5 6 7
30. 做帶氧運動（或一些能使心跳加速的運動）至少 15 分鐘	0 1 2 3 4 5 6 7
31. 背部躺在地上，伸展身體及雙手，並維持至少 10 秒	0 1 2 3 4 5 6 7
32. 做至少 5 分鐘運動，以改進全身機能	0 1 2 3 4 5 6 7
33. 伸展疼痛的肌肉，並維持伸展至少 10 秒	0 1 2 3 4 5 6 7
34. 運動至少 1 分鐘，以強化背部肌肉	0 1 2 3 4 5 6 7
35. 不理會疼痛	0 1 2 3 4 5 6 7
36. 我沒有讓疼痛干擾我的活動	0 1 2 3 4 5 6 7
37. 只是不注意理會疼痛	0 1 2 3 4 5 6 7
38. 我只管繼續下去	0 1 2 3 4 5 6 7
39. 不讓疼痛影響我在做什麼	0 1 2 3 4 5 6 7
40. 只要我放慢一點的做，並給自己偶爾的休息，我便能做得更多的事情	0 1 2 3 4 5 6 7
41. 我專注「緩慢而穩定」地做事情，而不注意我的痛楚	0 1 2 3 4 5 6 7
42. 我將手上的工作，拆細為數件較易處理的小工作，所以儘管我有痛楚，我還可做得不少	0 1 2 3 4 5 6 7
43. 我「緩慢而穩定」做事情，以助自己分散注意，減少痛楚	0 1 2 3 4 5 6 7
44. 我以「緩慢而穩定」的節奏，循序做我的事情	0 1 2 3 4 5 6 7
45. 我以一個合理的循序漸進速度（不太快或太慢）做事情，使痛楚對我的影響只是有限	0 1 2 3 4 5 6 7

Factor	Item no.	No. of item	Total score	Individual Mean	Norm mean(SD)	Comment
1. PC	1-9	9			2.72 (1.75)	
2. NC	10-19	10			3.71 (1.59)	
3. SC	20-28	9			1.81 (1.54)	
4. E/S	29-34	6			3.22 (2.09)	
5. TP	35-39	5			3.28 (1.90)	
6. AP	40-45	6			3.32 (2.70)	

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