

**Pain-related beliefs among Chinese patients with chronic pain: The construct and concurrent predictive validity the Chinese version of the 14-item version of Survey of Pain Attitudes (ChSOPA-14)**

**Running head: Pain beliefs among Chinese chronic pain patients**

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## **Abstract**

**Context:** Pain beliefs as indexed by the Survey of Pain Attitudes (SOPA) have been consistently shown to predict pain adjustment outcomes in Western populations. However, its utility in non-western populations is unclear.

**Objective:** We evaluated the construct and predictive validity of the Chinese version of the 14-item SOPA (ChSOPA-14) in a sample of Chinese patients with chronic pain.

**Methods:** A total of 208 Chinese patients with chronic musculoskeletal pain completed the ChSOPA-14, the Chronic Pain Grade (CPG) questionnaire, the Pain Catastrophizing Scale (PCS), the Centre for Epidemiological Studies-Depression Scale (CES-D), and measures of sociodemographic characteristics.

**Results:** Except Medical Cure, all ChSOPA-14 scales were significantly correlated with validity criterion measures (all  $p < 0.05$ ) in expected directions. The present Chinese sample scored the highest on the Medical Cure scale (mean=2.98, SD=1.05) but the lowest on the Disability scale (mean=1.75, SD=1.67). Results of hierarchical multiple regression analyses showed the ChSOPA-14 scales predicted concurrent depression ( $F(7,177)=14.51, p < .001$ ) and pain disability ( $F(7,180)=8.77, p < .001$ ). Pain Control (std $\beta$ =-.13; 95% CI: -3.41, -.13;  $p < .05$ ) and Emotion (std $\beta$ =.29; 95% CI: 1.76, 5.02;  $p < .001$ ) emerged as significant independent predictors of concurrent depression whereas Disability (std $\beta$ =.19, 95% CI: 1.33, 7.88,  $p < .01$ ), Emotion (std $\beta$ =.16, 95% CI: .08, 7.59,  $p < .05$ ), and Solicitude (std $\beta$ =-.14, 95% CI: -7.05, -.04,  $p < .05$ ) significantly associated with concurrent disability.

**Conclusion:** The findings offer preliminary evidence for the construct and concurrent predictive validity of the ChSOPA-14. This makes available a suitable instrument for chronic pain in the Chinese population and will facilitate future cross-cultural research on pain beliefs.

**Keywords:** Chronic pain; Pain belief; Chinese.

## **INTRODUCTION**

The Survey of Pain Attitudes (SOPA) assesses beliefs about pain that are hypothesized to influence adjustment to pain and that are the targets of multidisciplinary pain treatment.<sup>1</sup> The SOPA measures seven pain-related belief dimensions: (a) Medical Cure, (b) Pain Control, (c) Solicitude, (d) Disability, (e) Medication, (f) Emotion, and (g) Harm.<sup>2,3</sup> To lower assessment burden, brief versions of the SOPA have been developed.<sup>4</sup> All SOPA versions have empirical support for their reliability and validity.<sup>2-5</sup>

Previous studies employing SOPA to measure pain beliefs and cognitions have shown that SOPA Disability, Medical Cure, Solicitude, and Control scales are associated with concurrent adjustment outcomes.<sup>6,7</sup> In another study that assessed patient functioning and behavior based on patient report, spouse report, and direct observation, post-treatment to follow-up change in SOPA Disability, Harm, and Solicitude scales were found to be associated with posttreatment to follow-up change in patient functioning scores<sup>8</sup>. Other studies have shown that changes in SOPA scores after a pain education program are significantly associated with changes in physical functioning.<sup>9,10</sup>

While previous research supports the hypothesized associations between SOPA scales and measures of patient functioning, the existing data have been obtained exclusively from Western populations. The utility of the scale in non-Western pain populations has not yet been evaluated. In light of this, this study sought to evaluate the psychometric properties of the Chinese version of the 14-item version of SOPA in a sample of Chinese patients with chronic pain.

## **METHODS**

### **Subjects**

Following ethics approval from both the university and hospital Institutional Review Boards, consecutive patients with chronic musculoskeletal pain attending an orthopedics specialist out-patient clinic of a Hong Kong public hospital were invited to participate in the study. Inclusion criteria included: (1)  $\geq 18$  years of age; (2) native Cantonese speakers; (3) lacking communication problems or physical conditions preventing completion of the study measures; (4) exhibiting no confusion and having no prior diagnosis of cognitive impairment from medical records; and (5) willing to participate in the study were approached and gave fully informed consent. Interviews generated information on pain and socio-demographic characteristics. Those

meeting chronic pain criteria (pain duration >3 months) then completed the remaining questionnaires while waiting for their consultation. After obtaining written consent, patients completed a face-to-face interview using standardized questionnaires while waiting for their consultation.

## Measures

### *The 14-item Survey of Pain Attitudes (SOPA-14)*

The SOPA-14<sup>1,4</sup> consists of 14 items assessing seven pain related beliefs including (1) belief in a medical cure for pain (Medical Cure), (2) belief in one's ability to control pain (Pain Control), (3) belief that it is the responsibility of others to assist patients who are experiencing pain (Solicitude), (4) belief that the patient is disabled because of pain (Disability), (5) belief that medications are the best treatment strategy for pain (Medication), (6) the influence of emotions on pain (Emotion), and (7) belief that pain evidences physical injury (Harm). Each subscale consists of 2 items and patients are asked to rate on a 5-point Likert scale (0=very untrue; 4=very true). The Chinese version of SOPA-14 (ChSOPA-14) was translated by the first author (WSW). The initial Chinese version was back-translated into English by a bilingual psycholinguist. The back-translation (in English) was then reviewed by authors of the original English version for the content equivalence between the back-translation and the original versions of the SOPA. Discrepancies were discussed and resolved by consensus, and modifications in the translations were made, as needed, resulting in the penultimate version of the ChSOPA-14.

The penultimate ChSOPA-14 items were subsequently evaluated by a panel consisting of 11 bilingual postgraduate students. Each panel member was asked to rate the fluency and semantic equivalence of the Chinese translation against the original English version of SOPA-14 items on 5-point Likert scales (1=poor, 2=fair, 3=good, 4=very good, 5=excellent). The results of the panel evaluation showed that 3 of the 14 items obtained a modal rating of 5, suggesting an excellent equivalence of the item translation. All of the remaining items had a modal rating of 4, indicating good equivalence of the English-Chinese translation. The penultimate ChSOPA-14 was subsequently piloted in 10 Chinese patients attending a public hospital orthopaedics specialist out-patient clinic in Hong Kong. The patients indicated that the instructions and the items were easy to understand. The final Chinese translation of the ChSOPA-14 was prepared based on the results the above translation and evaluation processes.

### ***Chronic Pain Grade (CPG)***

Chronic pain severity was assessed using the Chronic Pain Grade (CPG) questionnaire,<sup>11</sup> a seven-item instrument that measures three domains of pain severity: persistence, intensity and disability/interference. The three intensity items ask respondents to rate their current, average and worst pain intensity on 0–10 Numerical Rating Scales (NRS). A Characteristic Pain Intensity Score is derived by averaging the responses to the intensity items and multiplying this by 10. Three CPG items assess pain interference with (1) daily activities, (2) social activities, and (3) working ability using 0–10 NRSs. The CPG Disability Score is derived by multiplying the average of the three interference items by 10. Persistence is assessed in the original CPG by asking the respondent to indicate the number of days out of the past six months days that he/she was disabled by pain (although we modified this to “the past three months” because chronic pain is now defined as pain that persists for at least three months<sup>11</sup>). The Disability Score and the number of disability days are recoded into 5-point scales and summed, yielding “Disability Points”. Based on the Pain Intensity Score and Disability Points, the CPG classifies respondents into five hierarchical grades (see Table 1). The English version of the CPG possesses good psychometric properties.<sup>12</sup> The CPG was translated into Chinese language based on standard translation procedures and results of exploratory factor analyses showed that the CPG six items were grouped into 3 main dimensions: Disability, Intensity and Persistence. The Cronbach’s  $\alpha$  for the CPG Disability and Characteristic Intensity scales were .87 and .68, respectively.<sup>13</sup>

### ***Pain Catastrophizing Scale (PCS)***

Pain-related catastrophizing cognitions were assessed using the 13-item Pain Catastrophizing Scale (PCS).<sup>14</sup> Respondents are asked to reflect on past painful experiences and to indicate the frequency with which they experienced each of 13 thoughts or feelings when experiencing pain on 5-point Likert scales (0=“Not at all”; 4=“All the time”). The PCS can be scored into three scales (Rumination, Magnification, and Helplessness) as well as a total score that ranges from 0 to 52. The PCS has demonstrated good internal consistency (Cronbach’s  $\alpha$  for the total scale=.87), test-retest reliability at 6 weeks ( $r=.75$ ), and construct validity.<sup>14</sup> The Chinese PCS also showed good psychometric properties (Cronbach’s  $\alpha$  for the total score = .93, item-total correlation coefficients ranging from .58 to .78).<sup>15</sup>

### ***Center for Epidemiological Studies -- Depression Scale (CES-D)***

Depression was assessed using the 20-item Center for Epidemiological Studies -- Depression scale (CES-D).<sup>16</sup> The CES-D was designed to assess frequency of depressive symptoms in non-psychiatric populations. Respondents are asked to indicate the frequency with which they experience each of the 20 symptoms listed during the past week on 4-point Likert scales (0="Less than one day"; 3="5-7 days"). The total CES-D score is computed by summing the responses of all items, with higher scores indicating greater depressive symptoms (score range: 0-60). The CES-D has demonstrated good concurrent validity with clinical diagnoses of depression in chronic pain populations.<sup>17,18</sup> The Chinese version has been validated, yielding good internal consistency (Cronbach's  $\alpha=.77$ ) and reliability ( $r=.77$ ).<sup>19</sup>

### **Statistical analysis**

Basic descriptive statistics were used to assess sample characteristics. Pearson's correlation tests were performed to evaluate the univariate relationship between the SOPA-14 scales and the four criterion variables (PCS, CPG Characteristic Pain Disability, CES-D, and Average Pain Intensity score). Three hierarchical multiple regression models (Model 1-3) were fitted to assess the extent to which the ChSOPA-14 scales were associated with concurrent criterion variables (depression, pain intensity, and disability) to test for the overall importance of pain-related beliefs as predictors of functioning, and identify those beliefs that contribute unique variance to the criterion variables. In each regression analysis, socio-demographic variables that were significant in univariate analyses ( $p<.05$ ) were entered in the first block to control for their potential confounding effects. Two pain variables, including pain duration and number of pain sites, were entered in the second block, followed by PCS. The seven ChSOPA-14 scales were then entered in a final step. The dependent variables of pain intensity and disability were indexed by the CPG Characteristic Pain Intensity Score and Disability Score, respectively. Depression was indexed by the CES-D total score.

## **Results**

### ***Characteristics of the Chinese sample***

A total of 208 (of 218 eligible patients; 95% of patients approached) completed the interview and the questionnaires at baseline. The mean age of the sample was 40.95 (SD=11.28)

years and 54.3% were female. About 47.0% of the patients reported monthly household incomes of <HK\$15,000 (US\$1,923) and 55.9% were married or cohabited; 53.4% had completed secondary and 12.1% tertiary education. While 53.4% reported no particular religious belief, 28.2% endorsed Buddhism, Daosim or ancestor worship. Over half (53.0%) of the patients reported being in full-time employment, whereas 16.5% and 11.7% respectively described themselves as unemployed or housewives.

The pain characteristics of the sample are summarized in Table 1. This Chinese sample identified an average of 1.89 (SD=1.44; range, 1-11) pain sites, with 48.7% reporting multiple pain sites. The most common pain site was the leg (37.0%). Patients reported an average duration for their pain problem of 4.15 years (SD= 83, median=2.0, range, 3 months to 40 years). Over half (54.3%) had had pain for up to 2 year's duration. The sample reported an average of 25.38 days (SD=38.10; range, 0-90 days) of pain associated disability. The CPG classification placed 52.5% of the sample as Grade III or above (high disability and moderately-to-severely limiting). The mean total scores of the PCS and CES-D were 29.00 (SD=14.30) and 17.99 (SD=14.06), respectively.

[Insert Table 1 about here]

### ***Means, standard deviations, and correlations of SOPA-14 scales with criterion measures***

Table 2 presents the means, standard deviations, and correlations of SOPA-14 scales with criterion variables. The Medical Cure (mean=2.98; SD=1.05) and Disability scales (mean=1.75; SD=1.67) obtained the highest and lowest means, probably reflecting were the most strongly and weakly endorsed pain attitudes respectively. Except Medical Cure (all  $p>0.05$ ), all ChSOPA-14 scales demonstrated significant correlation with the four criterion measures (all  $p<0.05$ ). Pain Control consistently demonstrated negative correlations ( $r_s\geq 0.30$ ) with the criterion variables assessed ( $p<0.05$ ).

[Insert Table 2 about here]

### ***Multivariate prediction of concurrent chronic pain adjustment from the ChSOPA-14 scales in the Chinese sample***

Table 3-5 report the results of hierarchical multiple regression analyses for the concurrent association between ChSOPA-14 scales and chronic pain adjustment outcomes in the current

Chinese sample. After controlling for socio-demographic and pain variables, both PCS ( $F(1,184)=92.48, p<.001$ ) and ChSOPA-14 scales ( $F(7,177)=14.51, p<.001$ ) contributed significantly to associations with concurrent depression (Table 3). ChSOPA-14 accounted for 13% of the total variance in depression scores. Pain Control ( $\text{std}\beta = -.13$ ; 95% CI: -3.41, -.13;  $p<.05$ ) and Emotion ( $\text{std}\beta = .29$ ; 95% CI: 1.76, 5.02;  $p<.001$ ) emerged as significant independent (when controlling for other ChSOPA-14 scales) correlates of concurrent depression. After adjusting for sociodemographic and pain variables, only PCS ( $F(1,186)=12.60, p<.001$ ) contributed significantly to associations with concurrent pain intensity (Table 4). When socio-demographic and pain variables were controlled, both PCS ( $F(1,187)=13.67, p<.001$ ) and ChSOPA-14 ( $F(7,180)=8.77, p<.001$ ) contributed significantly to associations with concurrent disability (Table 5). The amount of unique variance explained by PCS and ChSOPA-14 were 14% and 10% respectively. Of the 7 ChSOPA-14 scales, Disability ( $\text{std}\beta = .19$ , 95% CI: 1.33, 7.88,  $p<.01$ ), Emotion ( $\text{std}\beta = .16$ , 95% CI: .08, 7.59,  $p<.05$ ), and Solicitude ( $\text{std}\beta = -.14$ , 95% CI: -7.05, -.04,  $p<.05$ ) significantly associated with concurrent disability.

[Insert Table 3-5 about here]

## DISCUSSION

This paper aimed to assess the construct and concurrent predictive validity of the Chinese version of the 14-item SOPA in a sample of Chinese patients with chronic pain. The findings offer preliminary evidence for the validity of the seven ChSOPA-14 scales as evidenced by its satisfactory univariate associations with pain catastrophizing, depression, pain disability and intensity measures in expected directions, and multivariate associations with the validity criterion.

Belief in control over pain is generally viewed as adaptive, while believing that one is disabled or that chronic pain signals damage is not.<sup>3,20</sup> Our sample more strongly endorsed a belief in their ability to control pain but more weakly endorsed the belief that they were disabled and in medication as the appropriate treatment strategy for pain as compared to previous reports in Western samples.<sup>4,21</sup> By holding more adaptive pain beliefs, as measured by these domains, the Chinese sample would be expected to evidence better adjustment to pain than the US samples.<sup>4,21</sup>

Compared to data reported in previous studies,<sup>4,21</sup> the Medication scale score in this Chinese sample was lower, suggesting that Chinese patients may adopt of a Western medical



perspective when considering the Medication items; hence, a lower Medication score might indicate the Chinese sample was more interested in traditional Chinese medication, rather than disbelief in medication. Hong Kong's mixed medical system ensures its Chinese patients are familiar with both Western as well as Chinese medical strategies, such as acupuncture. Most Hong Kong residents use both systems. Also, medication beliefs were positively associated with all criterion variables, most strongly with depression. Perhaps strong beliefs in the appropriateness of medication for pain treatment prompts over-reliance on medical treatment and reducing use of non-medical adaptive coping strategies, such as exercise or systematic relaxation, or greater engagement of avoidance behaviors, both of which may further impair physical, via disuse syndrome, and psychological functioning via depression, for example. While this study design prohibits determining interactions between pain cognition, pain coping strategies and their effects on pain adjustment outcomes the impact of relationships between pain beliefs and coping on pain adjustment has been described elsewhere.<sup>20</sup>

Consistent with previous report,<sup>21</sup> the associations between the Medical Cure scale and the criterion variables were not significant in this sample. This interesting consistency across cultures suggests that beliefs in medical cure may not influence adaptation and they are not important in both the Chinese and the Western culture. Yet, Chinese culture encourages sick role adoption, as higher SOPA Solicitude scale scores indicate, reflecting a stronger belief, relative to the Western samples, that family members adopt caretaking roles to family member patients. Overall, these findings suggest that self-management approaches to pain in Chinese patients may face more obstacles than among patients in Western countries. Exploration of participation in self-management-oriented multidisciplinary treatment programs among patients from China and Western countries is warranted.

The direction of relationship of the Emotion, Medication, and Solicitude scales with pain intensity in this Chinese sample was the opposite seen for the Western sample in previous study.<sup>4</sup> Among Chinese patients, greater Emotion, Medication and Solicitude scores were associated with greater pain intensity. This suggests help seeking may be more likely for Chinese, whereas the inverse relationships in the Western sample<sup>4</sup> suggest a hopelessness-like response. These differential relationships between pain beliefs and perceptions suggest culture may predispose certain interpretive responses to pain experiences and, in turn influence adaptive reactions, reflecting Zbrowski's early observations.<sup>22</sup> This informs approaches to adapting CBT for treating

pain in Chinese patients. The specific beliefs, targeted in CBT intervention for Chinese patients, need to accommodate meaning differences in cultural backgrounds, such as shifting Chinese patients away from seeking unrealistic pain amelioration to self-management of their pain, to improve intervention effectiveness.

Pain catastrophizing predicted adjustment outcomes in all multivariate models we tested, consistent with Western population findings.<sup>20,23,24</sup> Multivariate associations between the ChSOPA-14 scales and validity criteria provide preliminary evidence supporting the ChSOPA-14's concurrent predictive validity. After controlling for sociodemographic variables, pain history, and catastrophizing, ChSOPA-14 scales still accounted for 13% of the total variance in concurrent depression. In particular, Pain Control and Emotion were independently associated with concurrent depression. Consistent with previous data,<sup>6</sup> stronger Pain Control beliefs associated with decreased concurrent depressive mood (i.e., better mood). ChSOPA-14 scales accounted for 10% of the total variance in concurrent pain disability scores, primarily attributable to higher Disability and Emotion, but lower Solicitude scores, consistent with previous studies.<sup>7,8</sup>

Our results should be interpreted in light of their limitations. First, our Chinese sample derived from a specialist orthopedics clinic. How generalizable ChSOPA-14 and these findings are to other pain populations within China and how comparable between the Chinese and the Western samples in previous reports<sup>4,21</sup> given the different pain services they attended are unclear. However, because specialist services for chronic pain in Hong Kong are currently limited to eight multidisciplinary public hospital pain clinics, where most chronic pain patients are managed by orthopedics specialists, the applicability of the ChSOPA-14 likely remains high. Under the current public service model for pain management in Hong Kong, if pain patients attending orthopaedic clinic do not show any better in 1-2 years, they will be referred to pain clinic; by which time, patients' pain, disability and psychiatric problems have already been present for some time or more common. Hence, the current Chinese sample attending orthopedics services are likely to represent the chronic pain population with presenting problems at an early stage of the chronic pain trajectories. Direct comparisons between the pain characteristics of the Chinese and Western samples and the extent to which differences on pain beliefs were arisen from differences on pain characteristics cannot be determined in this study. These issues should be addressed in future cross-cultural studies. Second, the ChSOPA-14 translation was used within a Cantonese-speaking context and assessed in Cantonese-speaking Hong Kong-Chinese.

Consequently, replication of the findings in other Chinese and Asian populations is needed. Third, the study's cross-sectional design does not allow conclusions regarding causality. Future research should be conducted to explore non-linear, unidirectional relationships among ChSOPA-14 scales, catastrophizing cognition, pain characteristics, and adjustment outcomes using analytic approaches such as structural equation and latent growth curve modeling in the context of randomized trials designed to alter pain beliefs, to help elucidate possible causal associations among these variables.

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