

# Validation of Pain Catastrophizing Scale–Thai Version in Older Adults with Knee Osteoarthritis

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**Abstract:** Pain catastrophizing is an important psychological factor influencing pain severity and disability in knee osteoarthritis, one of the most common musculoskeletal problems in older adults. The Pain Catastrophizing Scale was developed in English to measure how catastrophizing impacts on pain experience but to date, no Thai version has been validated. The purpose of this study was to translate and examine psychometric properties of the Pain Catastrophizing Scale–Thai Version in older adults with knee osteoarthritis. This study included two phases. Phase 1 consisted of translating the instruments into Thai using the committee approach; conducting interviews to confirm their accuracy; and assessing content validity by expert committee. Phase 2 consisted of testing construct validity using convergent and divergent validities, and exploratory factor analysis; and examining internal consistency reliability. A convenience sample of 150 older adults with knee osteoarthritis was asked to complete the Numeric Rating Scale, the Arthritis Impact Measurement Scales 2–Short Form, and the Pain Catastrophizing Scale–Thai Version.

The content validity index for item and scale level index confirmed its validity. Factor analysis indicated three factors, rumination, magnification, and helplessness, accounted for 65.97% of variance and were positively associated with pain intensity level and negatively associated with health status. Cronbach's alpha coefficients for the total score and subscales were at an acceptable level. We conclude that the Pain Catastrophizing Scale–Thai version is a valid and reliable instrument able to be use for clinical or research purposes but encourage further testing with different samples by nurse researchers and others in different communities.

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## Introduction

Pain, especially in musculoskeletal system, is the most common problem in older adults. Older adults usually suffer from pain related to degenerative diseases such as osteoarthritis (OA). Among OA, knee OA was found to be the most prevalent.<sup>1</sup> For example 11.3% of Thai older adults were diagnosed as knee OA<sup>2</sup> and approximately 40% of older adults

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>70 years were diagnosed as knee OA.<sup>3</sup> It is expected that the numbers of people with knee OA will increase due to increasing aging populations.<sup>2</sup>

Pain is a significant symptom for knee OA. In a community setting, it has been found that 63.9% of Thai older adults had knee pain.<sup>4</sup> Negative pain cognition, such as pain catastrophizing (PC), can mediate behavioral response to pain.<sup>5</sup> Pain catastrophizing is defined as individuals' exaggeration of pain perceptions that results in negatively evaluating their ability to deal with pain.<sup>6</sup> The psychological stimulation provided by catastrophizing induces strong perceptions of pain experiences and emotional distress.<sup>6</sup> Pain catastrophizing greatly impacts on chronic pain in older adults with knee OA. It was found that persons with knee OA living in the community had moderate level of PC.<sup>7-9</sup> A high level of PC has been associated with high pain severity, increasing risk of physical disability, psychological distress, and poorer functional activity in persons with knee OA.<sup>7,9-11</sup> Disability resulting from PC can then lead to functional decline and poor quality of life.<sup>7</sup> For acute pain, it was found that persons undergoing total knee replacement surgery had mild level of PC.<sup>12,13</sup> Interestingly, PC has been associated with physical performance<sup>13</sup> and is a predictor of postoperative pain severity<sup>14,15</sup> and pain outcome after knee arthroplasty.<sup>12</sup> Reduction of PC can minimize pain and disability as well as can positively improve coping with pain.<sup>15,16</sup> Based on the literature, PC more likely impacts on chronic pain than acute pain.

## **Review of Literature**

To better understand PC, researchers have developed self-report tools, such as the Coping Strategies Questionnaire (CSQ)<sup>17</sup> and the Pain Catastrophizing Scale (PCS).<sup>6</sup> The CSQ was developed to measure the frequency persons engage in catastrophizing when they experience pain,<sup>17</sup> and has good internal consistency, reliability and stability overtime. Sullivan and colleagues subsequently developed a self-reporting measure,

the PCS, to measure how catastrophizing impacts on pain experience.<sup>6</sup> Using factor analysis, the PCS yielded 3 factors: rumination (4 items), magnification (3 items), and helplessness (6 items).<sup>6</sup> The PCS was frequently and widely used in several studies investigating catastrophizing in chronic pain.<sup>5,7,8,16</sup> The PCS includes 3 catastrophizing constructs whereas the CSQ has one. Therefore, the PCS is considered to be broader assessment of catastrophizing than the CSQ.<sup>18</sup>

The items on the PCS were developed in English based on the results of previous research on three factors related to PC: the tendency to a) increase attention on pain-related thoughts, b) exaggerate the threat value of pain stimuli, and c) adopt a helpless orientation to coping with painful situations.<sup>6</sup> The PCS includes three major constructs: rumination about pain, magnification of related symptoms, and feeling of helplessness.<sup>19</sup> Rumination was defined as worry and incapable to stop thinking about pain-related thoughts.<sup>6</sup> Magnification refers to unpleasant thoughts of painful situations and thinking of negative outcomes.<sup>6</sup> Helplessness refers to inability to deal or cope with painful situations.<sup>6</sup>

The investigators conducted four studies to examine its psychometric properties.<sup>6</sup> In the first study, the PCS was tested with psychological students and construct validity was confirmed using factor analysis. Rumination, magnification, and helplessness subscales accounted for 41%, 10%, and 8% of the total variance, respectively. Cronbach's alpha coefficients for the PCS total score and the rumination, magnification, and helplessness subscales were 0.87, 0.87, 0.60, and 0.79, respectively. In the second study, student participants were asked to complete the PCS and were interviewed about their thoughts on catastrophizing after one of their arms was immersed in a container of iced water. Investigators examined between-groups (catastrophizer vs non-catastrophizer and men vs women) and within-groups (catastrophizing, coping, neutral) comparisons to ensure construct validity of the PCS. In the third study, investigators used the

same procedures as the second study, in which the PCS and interview were performed on people with nerve entrapment and radiculopathy after they were referred for electrical stimulation of nerves with needle electrodes. The construct validity of the PCS was also examined using between-groups (catastrophizer vs non-catastrophizer) and within-groups (catastrophizing, coping, neutral). Lastly, to test convergent validity, the correlations among anxiety, depression, negative affectivity, and fear of pain were examined and showed statistical significance.

Osman and colleagues<sup>20</sup> further examined factor structure, validity, and reliability of the PCS in three studies among undergraduate students. The construct validity was confirmed using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Although they failed to replicate a 3-factor structure using EFA, a 3-factor oblique model established that the model fitted the criteria. The concurrent validity was confirmed by the association among the PCS total score, subscales' scores and a) inventory of negative thoughts in response to pain, b) anxiety, and c) social desirability. The PCS had discriminant validity in which it was able to differentiate between samples who sought for treatment of various medical or physical pain-related problems and non-treatment. Cronbach's alpha coefficients for the total score ranged from 0.89 to 0.93.

Subsequently, researchers<sup>21</sup> re-examined the validity and reliability of the PCS in the community and pain outpatient samples. The construct validity was confirmed through CFA. The 3-factor oblique model indicated the best fit. The criterion validity was also supported because the PCS total and subscale scores could differentiate pain in outpatient and community samples. The convergent and divergent validities were confirmed by the correlation between PCS total score and a) negative affect and b) positive affect. Cronbach's alpha coefficients for the total score, rumination, magnification, and helplessness for community samples were 0.95, 0.95, 0.88, and

0.91, respectively and for community samples were 0.92, 0.85, 0.75, and 0.86, respectively.

The PCS has been translated into 20 languages, such as Dutch,<sup>22</sup> German,<sup>16</sup> Chinese,<sup>23</sup> Norwegian,<sup>24</sup> Italian,<sup>25</sup> Korean,<sup>26</sup> and Hindi<sup>5</sup>, and has been validated in clinical samples for different types of chronic pain, including pain-free sample,<sup>22</sup> fibromyalgia,<sup>22</sup> low back pain<sup>5, 16, 22, 24, 25</sup> and chronic non-malignant pain.<sup>23, 26</sup> Researchers<sup>5, 16, 22-26</sup> used a back-translation method to translate the PCS to their target language. The sample size to test the translated versions of the PCS ranged from 90 to 550 samples.<sup>5, 16, 22-26</sup> Regarding reliability, 6 out of 7 studies<sup>5, 16, 23-26</sup> examined internal consistency reliability. Cronbach alpha coefficients ranged from 0.76 to 0.93 for total scale, from 0.84 to 0.90 for helplessness, and from 0.70 to 0.88 for rumination subscales. However, Cronbach alpha coefficients for the magnification subscale were higher than 0.70 in only 2 out of 6 studies.<sup>23, 26</sup> Test-retest reliability was also examined in four studies<sup>5, 23, 24, 26</sup> and the intra-class correlation coefficients of the total and for each subscale were between 0.65 and 0.97. For validity, four studies<sup>5, 16, 24, 25</sup> examined construct validity using EFA, and three factors accounted for 58-69.6% of variance. Five studies<sup>5, 16, 22, 23, 26</sup> also indicated that a three-factor model provided the best fit to the data. The translated PCS was positively correlated with pain,<sup>5, 16, 23, 25, 26</sup> depression,<sup>16, 23, 25, 26</sup> disability,<sup>5, 16, 23, 25</sup> and anxiety<sup>23, 25, 26</sup> and was negatively related to general health,<sup>16, 23</sup> social function,<sup>23</sup> role emotional,<sup>23</sup> mental health,<sup>23</sup> physical functioning,<sup>26</sup> psychological functioning,<sup>26</sup> and quality of life.<sup>5</sup>

Findings also indicate that PCS is also a valid and reliable cross-cultural tool as it has been translated and validated in various chronic pain populations living in eastern and western countries.<sup>5, 16, 22-26</sup> Although back-translation is helpful to confirm semantic equivalence between translated version and original measures, we cannot ensure that participants are able to understand and interpret the meaning of questionnaire items. In addition, there were some limitations in

previous studies. Some researchers<sup>22</sup> used pain-free student samples, which could be a bias in sample selection. Researchers<sup>26</sup> also tested the translated PCS in patients with non-specific pain, which could introduce selection bias. Most studies<sup>5, 16, 22, 24, 25</sup> tested the PCS in a low back pain, which most likely occurred in adults but no study examined knee OA pain, a common cause of pain in older adults. Regarding validity, although EFA confirmed the validity of the translated PCS, one item that originally belonged to a helplessness subscale was loaded in the rumination subscale.<sup>16</sup> For reliability, Cronbach alpha coefficients for magnification subscale in 4 studies,<sup>5, 16, 24, 25</sup> were <0.70, which were lower than standard recommendation. In Thailand, there was no validated tool in Thai to assess the perceptions of PC levels, which ultimately would help improved their quality of care and quality of life for older adults, hence this study.

## **Study Aim**

The aim of this study was to translate, then examine the psychometric properties, of the PCS–Thai Version (PCS–Thai).

## **Method**

**Design:** A cross-sectional descriptive design.

The study had four phases, translation into Thai; examination through cognitive interviews; validation by experts; and testing with a sample of older adults with knee pain.

**Phase 1: Translation.** After obtaining permission to translate the PCS, we undertook the process of committee translation using three steps: forward translation, a consensus meeting, and a reconciliation meeting.<sup>27</sup> For forward translation<sup>27, 28</sup>, the PCS was translated into Thai individually by three experts (first and third authors and a nursing lecturer). During a consensus meeting, they met to discuss their versions of each item in order to ensure that each

translated question had the same meaning as the source question before selecting the optimal version. Two items of disagreement in the translations that could not be resolved were documented for discussion during the reconciliation meeting. Lastly, an adjudicator (the second author, an expert in orthopaedic and gerontological nursing), was invited to a meeting in order to reconcile item discrepancies, agree on phrasing equivalency, and select the most appropriate meanings for the PCS–Thai version. Two of 13 items of the PCS–Thai were modified to better reflect Thai cultural meanings. For example, one item was modified from “It’s awful and I feel that it overwhelms me” to “My pain is so excessive, that I cannot endure to continue my daily lifestyle.”

**Phase 2: Cognitive Interviews:** This is a reliable method to identify unclear items of a questionnaire where participants are asked to explain their interpretation of the meaning of each questionnaire item. If the meaning of item was not clear for them, they are asked to offer suggestions to improve it.<sup>27</sup> This method is helpful to support item improvement by modifying appropriate terms to suit a participant’s cultural context, so that the measure can be similarly used across cultures.<sup>29</sup> Five to 15 respondents are an appropriate sample size for cognitive interviews.<sup>30</sup> In this study, 10 older adults with knee OA underwent such interviews and gave suggestions to re-arrange the words in two items to facilitate understanding. Three unclear items were identified and revised in accordance with their suggestions. One item was modified from “I become afraid that the pain will get worse.” to “I become afraid that the pain will increase.”

**Phase 3: Validation:** Content validity of PCS–Thai was assessed by five experts who were fluent in both Thai and English languages (two experts on pain management, two experts on gerontological nursing, and one expert on psychiatric nursing). They were asked to rate the relevance and appropriateness of the PCS–Thai. Then, the content validity index for scales (S–CVI) and the content validity index for items (I–CVI) were

calculated. The S-CVI of the PCS-Thai was 1.00 and the I-CVI for each item range was 1.00.

**Phase 4: Testing of the PCS:** Convergent and divergent validities were assessed by examining an association between a) PCS-Thai and pain using the Numeric Rating Scale and b) PCS-Thai and disability in persons with arthritis scale using the modified Arthritis Impact Measurement Scales2-Short Form. Construct validity was also examined using EFA. Finally, internal consistency reliability for the total item and for each subscale was examined by calculating Cronbach's alpha coefficients.

A convenience sample of 150 older adults with knee OA were recruited from five districts of a province of north-eastern Thailand. The five districts were randomly selected from the 12 districts in the province. The sample size was calculated by 10:1 ratio, which means the participants to variable ratio should not be lower than 10.<sup>31</sup> Moreover, the sample size needed to be  $\geq 100$ .<sup>31</sup> Because the PCS includes 13 items, the sample size of 150 was able to detect a level of significance. Inclusion criteria were: adults  $\geq 60$  years; diagnosed with OA in at least one knee by an orthopedist or met the American College of Rheumatology classification criteria for clinical knee OA; having knee pain and meeting at least three additional criteria (stiffness  $< 30$  minutes, crepitus, bony tenderness, bony enlargement, and no palpable warmth); able to understand Thai; no cognitive impairment (as determined by a Mini-Cog score  $\geq 3$ ) or psychiatric illnesses; no history of knee injury or knee replacement surgery; and no history of steroid injections in knee joints within 3 months before enrollment. People with dementia or who were bedridden were excluded.

**Ethical considerations:** This study was approved by the institutional review board of Faculty of Medicine, Ramathibodi Hospital (approval # 03-59-77). All participants signed informed consent forms after it was explained they had a right to refuse to participate in this study at any time, and that deciding not to

participate would not affect their care at the sub-district health promoting hospital. To maintain participant confidentiality and anonymity, we kept all documentation and digital recordings secure and participants were assigned identification numbers.

**Measures:**

**A Demographic Questionnaire** with open and multiple choice questions was used to obtain each participant's age, gender, marital status, educational level, income and site of knee pain.

**The Pain Catastrophizing Scale-Thai Version** (PCS-Thai) was used to measure PC. This has 13 items in three dimensions: rumination (4 items), magnification (3 items), and helplessness (6 items). Each item is rated on a 5-point Likert scale ranging from 0 = not at all to 4 = all the time. The total score ranges from 0 to 52. Higher scores represent a higher level of catastrophizing.

**The Arthritis Impact Measurement Scales 2** (AIMS2-SF) measures functional health status in persons with arthritis,<sup>32</sup> and used in this study to determine divergent validity of the PCS-Thai. The AIMS2-SF has been translated into Thai and was used to examine older knee OA adults' health status living in urban areas in Thailand.<sup>33</sup> The AIMS2-SF has 18 items, in four dimensions: physical activities (6 items), symptoms (3 items), psychological problem (5 items), and social activities (4 items). Each item is rated on a 5-point Likert scale ranging from 1 = every day/always to 5 = no days/never. The scores on negative items are recoded. Thus, higher scores indicate better function. Then, the raw scores for each aspect are summed and normalized to a possible score ranging from 0 (worst function) to 10 (best function).<sup>34</sup> Cronbach's alpha coefficients for the AIMS2-SF total score and physical function, symptom, affect, and social subscales were higher than 0.70, except social activities subscale. The construct validity of the original AIMS2-SF was confirmed with factor analysis.<sup>32</sup> Cronbach's alpha coefficient of the AIMS2-SF in Thai version was 0.69.<sup>33</sup> In this study, Cronbach's alpha coefficient for the AIMS2-SF total

score and physical function, symptom, affect, and social subscales were 0.87, 0.82, 0.70, 0.75, and 0.70, respectively.

**Numeric Rating Scale (NRS)** is used to measure pain severity.<sup>35</sup> The NRS was used to determine convergent validity of the PCS–Thai version and involves self-rating of a person’s knee pain from 0 (no pain) to 10 (the worst pain). A higher score indicates the worse pain. The NRS was validated with older adults and had good internal consistency reliability with a Cronbach’s alpha coefficient of 0.86.<sup>36</sup> The construct validity was established through factor analysis.<sup>36</sup>

**Procedures:** After study approval, we contacted the sub–district administrative organization, community leaders, and nurses working at the sub–district health promoting hospital to inform them about the study and provide study approval. The nurses helped to recruit participants who were then screened regarding their meeting of the inclusion criteria. After participants completed questionnaires (approximately 30 minutes), they received a small gift and brochure about self–care for knee OA.

**Data Analysis:**

**Construct validity testing.** To confirm convergent validity, Pearson correlation coefficients were used to examine bivariate relationships between the PCS–Thai and NRS. In addition, Pearson correlation coefficients were used to examine bivariate relationships between PCS–Thai and AIMS2–SF Thai versions to evaluate divergent validity. Although the PCS was developed following theoretical foundation and a three factor structure of the PCS was confirmed in several studies,<sup>5, 6, 16, 20, 21</sup> EFA was chosen to test the

construct validity of the PCS–Thai. EFA is suitable method to validate a translated measure that has been used in a different population with diverse culture.<sup>37</sup> Therefore, the principal component analysis (PCA) with orthogonal varimax rotation was performed. According to the Keiser–Guttman rule, an eigen–value greater than 1, the scree plot, and theoretical structure were used for factor retention.<sup>31</sup> The Kaiser–meyer–olkin values test was performed to test sampling adequacy and Bartlett’s test of sphericity was also performed to determine the appropriateness of factor analysis.

**Reliability testing.** Internal consistency reliability for the total items and for each subscale were examined by calculating the Cronbach’s alpha coefficients.

**Results**

Approximately 78% of the 150 participants were female; the mean age was 69.6 years (SD = 6.08); 92.67% had elementary level education, 61% were married; and 74 participants (49%) had bilateral knee pain. With respect to knee pain severity, the mean pain score was 6.36 (SD = 2.35).

**Convergent and divergent validities.** **Table 1** indicates positive moderate correlations between a) the pain severity score and the PC (total score) and b) the pain severity score and the PCS–helplessness subscale. Moreover, the positive small correlations were found between a) pain and the PCS–rumination subscale and b) pain and the PCS–magnification subscale. In contrast, negative correlations existed between the overall functional health status and the total score of PC.

**Table 1** Correlations among pain catastrophizing constructs, health status, and pain severity

Measure	PCS subscale			Total PCS
	Rumination	Magnification	Helplessness	
Pain severity (NRS)	.21*	0.25*	0.42*	0.35*
Health status (AIMS2–SF)	–0.15*	–0.02	–0.21*	–0.16**
Physical activities	–0.11	–0.04	–0.19*	–0.14
Symptom	–0.22*	–0.06	–0.30*	–0.25*
Psychological problem	–0.09	0.004	–0.11	–0.08
Social activities	–.0007	0.02	0.04	0.03

Note. \*p < .01 \*\*p < .05

*Exploratory factor analysis.* The Kaiser–Meyer–Olkin value was 0.91, indicating sampling adequacy. Bartlett’s test of sphericity was also significant ( $\chi^2 = 872.712$ ,  $df = 66$ ,  $p = 0.000$ ) representing the correlation of variables, which means the data set was appropriate for EFA. A factor loading score of  $<0.50$  was removed for clarity. The results of the factor analysis revealed three factors accounted for 65.97%. The first factor included five items and explained for 25.98%

of the total variance. Most items loaded on the helplessness subscale as presented in the original scale, except item 1. The second factor included five items and explained 22.72% of the total variance. Most items loaded on the rumination subscale as shown in the original scale. The third factor covered three items and was described as magnification as explained in the original instrument. Moreover, the third factor accounted for 17.27% of total variance. (Table 2).

**Table 2** Exploratory factor analysis of the PCS (Thai version)

Item	Statement	M	SD	PCS subscale		
				Factor 1	Factor 2	Factor 3
Factor 1						
2	I feel I can’t go on.	1.65	1.17	0.6640		
3	It’s terrible and I think it’s never going to get any better.	1.68	1.09	0.7268		
4	My pain is so excessive, that I cannot endure to continue my daily lifestyle.	1.79	1.19	0.8475		
5	I feel I can’t stand it anymore.	1.55	1.08	0.7003		
12	There’s nothing I can do to reduce the intensity of pain.	1.59	1.17	0.6007		
Factor 2						
1	I worry all the time about whether the pain will end.	1.85	1.08		0.6759	
8	I anxiously want the pain to go away.	2.19	1.20		0.7506	
9	I can’t seem to keep it out of my mind.	1.65	1.23		0.6085	
10	I keep thinking about how much it hurts.	1.63	1.17		0.6474	
11	I keep thinking about how badly I want the pain to stop.	2.58	1.17		0.7599	
Factor 3						
6	I become afraid that the pain will get worse.	2.09	1.28			0.7197
7	I keep thinking of other painful events.	1.48	1.12			0.7803
13	I wonder whether something serious may happen.	1.55	1.25			0.7206
Variance explained				25.98	22.72	17.27
Total variance explained						65.97
Eigen-value				6.48	1.08	1.01

*Reliability.* Cronbach’s alpha coefficients for the total PCS and for rumination, magnification, and helplessness subscales ranged from 0.757 to 0.914.

The inter-item correlations for subscales ranged from 0.739 to 0.867. The item to total correlations for subscales ranged from 0.561 to 0.772 (Table 3).

**Table 3** Cronbach’s alpha coefficients of the PCS (Thai version)

Scale/Subscale	Number of items	Cronbach’s alpha coefficients	Range of inter-item correlations	Range of item to total correlations
Total PCS	13	0.914	0.589–0.803	0.511–0.759
Rumination	5	0.844	0.743–0.839	0.580–0.732
Magnification	3	0.757	0.804–0.843	0.561–0.621
Helplessness	5	0.857	0.739–0.867	0.582–0.772

## Discussion

The purpose of this study was to translate, and undertake psychometric testing, of the PCS–Thai Version. Overall, the PCS–Thai was a valid and reliable instrument for measuring PC in people with knee OA.

### Content Validity and Construct Validity

For validity testing, both I–CVI and S–CVI of the PCS–Thai received complete agreement on the items’ relevance were obtained from the panel of experts. In addition, the results indicated that the PC was positively associated with pain intensity. Our findings were consistent with those of previous studies<sup>23, 25, 26</sup> in which PC had moderate correlation with pain intensity. Therefore, our results supported the convergent validity of the PCS–Thai version between constructs that are theoretically similar. As expected, PC was negatively associated with health status. Our findings were consistent with a previous study<sup>26</sup> in which higher PC was associated with lower functional health status. Pain catastrophizing and functional health status are unrelated constructs. Pain catastrophizing refers to exaggerated negative response toward actual pain;<sup>6</sup> however, functional health status focuses on individual’s ability to perform normal daily activities required to meet basic needs in order to maintain health and well-being.<sup>34</sup> Thus, our results supported the divergent validity of the PCS–Thai to distinguish the constructs

that are theoretically different. However, the correlation between PC score and health status was low. The possible reason is because the PCS–Thai was validated with older adults with knee OA, who usually had functional decline and chronic illnesses. Among older adults with knee OA, illness representation had direct and indirect effects on perception of their health status.<sup>32</sup> Therefore, other factors, such as illness representation, may influence more on older knee OA adults’ perception of their health status, and PC might not strongly affect health status. In a future study, the PCS–Thai should be validated with other measures to confirm their divergent validity.

We tested construct validity using PCA with varimax rotation. The results showed that the three factors accounted for 65.97%. Our results supported the evidence of three factor structure, which were similar to the original version.<sup>6</sup> In addition, the three factors were consistent with other translated versions,<sup>5, 16, 22 - 26</sup> which supported that the PCS can be used across cultures. However, the number of items included in each subscale was a bit different from the original PCS in which item 1 (“I worry all the time about whether the pain will end.”) was loaded in the rumination subscale instead of the helplessness subscale as presented in the original PCS. In our study, factor 1 (helplessness) included 5 items instead of 6 items as presenting in the original PCS. Rather

than 4 items included in Factor 2 (rumination) as shown in the original PCS, our rumination subscale included 5 items. The 3 items included in the magnification construct were exactly the same with the original PCS.

Item 1 originally belonged to the helplessness subscale, although it fitted better in the rumination subscale. Our result were similar to those in a previous study validating PCS Italian version in adults with chronic low back pain in which item 1 was loaded on rumination better than helplessness subscale.<sup>25</sup> However, the PCS Norwegian version<sup>24</sup> was validated in adults with non-specific low back pain and reported that item 1 loaded better in the magnification subscale. The contrasting findings may be due to the PCS being validated in different populations. In our study, the PCS was validated in Thai older adults with knee OA. Chronic knee OA pain could interfere highly with physical function which resulted in kept thinking about this problem over time when they performed activities. With respect to Thai culture, item 1 fitted better in the rumination subscale than the magnification subscale. Despite the contrast in findings, it is recommended that the PCS score should be reported as a total score and each subscale following the original PCS to avoid problems of unequal items in comparing the results across the studies.<sup>16, 24</sup>

#### **Internal Consistency and Reliability**

Ideally, a Cronbach's alpha coefficient should be higher than 0.70 to represent item fit with the construct for the new scale or between 0.80 and 0.90 to indicate good internal consistency reliability.<sup>38</sup> For clinical assessment, the Cronbach's alpha coefficient should be at least 0.90.<sup>39</sup> The Cronbach's alpha coefficient for total scale of the PCS-Thai was high ( $\infty = 0.91$ ), was fairly similar with the original ( $\infty = 0.87$ ),<sup>6</sup> Italian ( $\infty = 0.92$ ),<sup>25</sup> German ( $\infty = 0.92$ ),<sup>16</sup> Chinese ( $\infty = 0.92$ ),<sup>23</sup> Norwegian ( $\infty = 0.90$ ),<sup>24</sup> and Korean ( $\infty = 0.93$ ).<sup>26</sup> Cronbach's alpha coefficient in our study was lower than 0.95, and thus redundancy was not an issue.<sup>40</sup>

Cronbach's alpha coefficients for each subscale were higher than 0.70, reflecting homogeneity of items. Moreover, the inter-item correlations and item to total correlations for most subscales were higher than 0.30, which reflected their homogeneity.<sup>31</sup> The helplessness subscale had the highest Cronbach's alpha coefficient following by rumination, and magnification, in line with other translated versions.<sup>16, 23, 24, 25, 26</sup> Compared to the others, our Cronbach's alpha coefficient on magnification subscale ( $\infty = 0.75$ ) was a little higher than the original ( $\infty = 0.60$ ),<sup>6</sup> Italian ( $\infty = 0.56$ ),<sup>25</sup> German ( $\infty = 0.67$ ),<sup>16</sup> and Norwegian ( $\infty = 0.63$ )<sup>24</sup> versions. At least three items should be included in a subscale to reflect construct theory domain.<sup>31</sup> Therefore, our results indicated that three items included in the magnification subscale were appropriate.

#### **Limitations**

Data was collected at one time, which limited other types of reliability testing (e.g., test-retest reliability). The data was collected from older adults with knee OA living in one province in north-eastern Thailand, limiting generalization to other populations. To gain a broader understanding of PC, the instrument should be tested in various settings and different types of pain population.

#### **Conclusion and Implications for Nursing Practice**

The PCS was translated to Thai using the committee translation approach combined with cognitive interviews. We believed that this method could achieve cultural appropriateness and equivalence of translated questionnaire items. The PCS was also tested in a specific pain associated with knee OA, which impacts highly to cause disability in older populations. We found that the PCS-Thai Version was valid and reliable instrument to measure PC in

older adults with knee OA and pain living in a community setting. The results of this study provide the evidence of important factors that contribute to PC. Nurses can use the instrument to assess PC, and to evaluate practice outcomes and interventions for PC. In future studies, the PCS–Thai Version should be tested in people with other types of pain and different settings. Moreover, the PCS–Thai version can be used in future studies of factors that influence pain and disability in older adults with knee OA. The information obtained will be helpful to facilitate nursing care and interventions with the ultimate goal of improving their quality of care.

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## การทดสอบความตรงของแบบประเมินความรู้สึกเชิงลบต่อความปวดในผู้สูงอายุข้อเข่าเสื่อม

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**บทคัดย่อ:** ความรู้สึกเชิงลบต่อความปวดเป็นปัจจัยทางด้านจิตสังคมที่สำคัญ และส่งผลต่อการมีระดับความปวดที่รุนแรง และภาวะทุพพลภาพในผู้ที่มีข้อเข่าเสื่อม ซึ่งเป็นปัญหาสำคัญด้านกระดูกและกล้ามเนื้อในผู้สูงอายุ แบบประเมินความรู้สึกเชิงลบต่อความปวดต้นฉบับสร้างขึ้นเป็นภาษาอังกฤษเพื่อใช้ประเมินความรู้สึกเชิงลบว่าส่งผลต่อประสบการณ์ความปวดมากเพียงใด ในปัจจุบันไม่พบแบบประเมินความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทยที่มีการทดสอบค่าความเที่ยงและความตรง วัตถุประสงค์ของการศึกษานี้ เพื่อแปลและทดสอบคุณสมบัติการวัดทางจิตวิทยาของแบบประเมินความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทยในผู้สูงอายุที่มีข้อเข่าเสื่อม การศึกษาครั้งนี้แบ่งเป็น 2 ระยะ ระยะที่ 1 ประกอบด้วย การแปลแบบประเมินเป็นภาษาไทยด้วยวิธีการแปลแบบทึบ ทดสอบความเข้าใจ และความถูกต้องของแบบสอบถามด้วยวิธีการสัมภาษณ์ และ ประเมินความตรงของเนื้อหาจากผู้เชี่ยวชาญ ระยะที่ 2 ประกอบด้วย การตรวจสอบความตรงเชิงโครงสร้างด้วยการวิเคราะห์ ความตรงเชิงเหมือน ความตรงเชิงต่าง และ วิเคราะห์องค์ประกอบเชิงสำรวจ และการตรวจสอบความเที่ยง ด้วยการตรวจสอบความสอดคล้องภายในเนื้อหา โดยผู้สูงอายุที่มีข้อเข่าเสื่อมจำนวน 150 ราย ตอบแบบวัดระดับความปวด แบบวัดภาวะสุขภาพในผู้ป่วยข้อเข่าเสื่อมฉบับย่อ แบบประเมินความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทย

ผลการวิเคราะห์ความตรงของเนื้อหายืนยันความตรงเชิงเนื้อหาทั้งรายข้อคำถาม และในภาพรวม ผลการวิเคราะห์องค์ประกอบเชิงสำรวจ พบว่า 3 องค์ประกอบ สามารถอธิบายความแปรปรวนได้ทั้งหมด 65.97% แบบประเมินความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทยยังมีความสัมพันธ์เชิงบวกกับระดับความปวด และ มีความสัมพันธ์เชิงลบกับภาวะสุขภาพ การทดสอบความเชื่อมั่นค่าสัมประสิทธิ์ ครอนบาคอัลฟา ของแบบประเมินความรู้สึกเชิงลบต่อความปวดทั้งฉบับ และรายด้าน คือ ความคิดใคร่ครวญ ความรู้สึกเกินความเป็นจริง ความรู้สึกหมดหนทาง มีค่าอยู่ในระดับพอใช้ได้ แบบประเมินความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทยเป็นเครื่องมือที่มีความเที่ยงและความตรง สามารถนำไปใช้ประเมินความรู้สึกเชิงลบต่อความปวดทั้งในทางคลินิกและทางวิจัยได้

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**คำสำคัญ :** เครื่องมือวัด ข้อเข่าเสื่อม ผู้สูงอายุ แบบวัดความรู้สึกเชิงลบต่อความปวดฉบับภาษาไทย คุณสมบัติการวัดทางจิตวิทยา การตรวจสอบความตรง

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