

# The Psychometric Property of the Short Thai Version of the Philadelphia Mindfulness Scale

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## ABSTRACT

**Objective:** To develop and investigate the psychometric property of the short Thai version of the Philadelphia Mindfulness Scale (PHLMS).

**Methods:** The pooled data from the mindfulness invention studies between 2011 and 2014 were analyzed. The items of original version were selected by 3 methods i.e., mean difference between the two groups of high score and low score by t35-test, researchers' opinion and corrected item total correlation. Two forms of short Thai version were developed. These forms were analyzed by using exploratory factor analysis (EFA) in randomly selected 303 cases and only the selected form was confirmed by confirmatory factor analysis (CFA) in 873 cases by using the Mplus program. The goodness of fit indices was determined by Chi-square index, root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker Lewis Index (TLI). Pearson's correlation was used to analyze the discriminant validity with Hospital Anxiety Depression Scale (HAD).

**Results:** Only the researchers' opinion version (ROV) containing 10 items was confirmed by CFA and had factor loadings between 0.50-0.80. The goodness of fit was acceptable. The ROV and each domain (awareness and acceptance) had acceptable composite reliability at 0.86, 0.72 and 0.83 respectively.

**Conclusion:** The short version of PHLMS contained 10 items and demonstrated the good validity among clinical cases, beginners in meditation practice and care givers; and could classify people with different frequencies of meditation practice.

**Keywords:** Philadelphia Mindfulness Scale; psychometric; Thai version (Siriraj Med J 2018;70: 320-326)

## INTRODUCTION

Since mindfulness based stress reduction (MBSR) programs have been developed by Kabat Zinn in 1985<sup>1</sup>, the benefit outcomes have been established by clinical outcomes and self-rating scales. The mindfulness assessment scales have followed the mindfulness operation definition by Bishop et al which consisted of two major components i.e., self-regulation of attention and orientation to experience.<sup>2</sup> The assessment scales are self-rating reporting and contain 1 to 5 domains which range from 10 to 39 items.<sup>3</sup> Some scales have been popular to use across cultures such as Mindful Attention Awareness Scale (MAAS)<sup>4,5</sup>, Kentucky Inventory of Mindfulness Scale (KIMS)<sup>4</sup> and Philadelphia Mindfulness Scale (PHLMS).<sup>6</sup>

Christopher et al reported that culture and race had

impacted on the structure domain of the mindfulness questionnaires (KIMS) among Thai and US students<sup>4</sup> and also Thai monks and US students.<sup>7</sup> KIMS had some items which crossed domains and did not follow the original version which might be from concept of mindfulness practice or local culture.<sup>7</sup> Therefore users should be aware of cross cultural effects before applying the tool to evaluate the outcome of mindfulness program.

The Philadelphia Mindfulness Scale (PHLMS), followed the concept proposed by Bishop et al, and contains 2 components which are awareness and acceptance. It has been translated into various languages such as Lebanese<sup>8</sup>, Spanish<sup>9</sup>, Chinese<sup>10</sup> and Thai.<sup>11</sup> The Thai version was tested among hospital personnel and confirmed that 19 items (except item number 7) followed the original version.<sup>11</sup>

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It could be explained by a few cases (103 cases) and most were female (84.5%). However, the internal consistency demonstrated by Cronbach's alpha was high (0.87 and 0.88 for awareness and acceptance respectively).

The Thai PHLMS version has been used as a concurrent validity study of the Sati Assessment Scale<sup>12</sup> and in research studies.<sup>13,14</sup> From our experiences, the 20 item-PHLMS was too long for clinical practice especially in patients with uneducated or low educated level. The short 10-item Chinese PHLMS version was selected by factor loadings (above 0.30) and Goenka's concept of vipassana and had indices of goodness better than that of the full version. However, this short version had been conducted via online social media in 200 Buddhists, of whom (102 persons) were mainly general followers of Buddhism or secular. The Spanish and Lebanese did not adjust the questionnaire. Therefore, this study was aimed to develop the short version and to explore psychometric properties in variety of samples such as care givers, clinical cases, and beginner in meditation practice in order to apply the short version in general practice.

## MATERIALS AND METHODS

Secondary data from the Sati assessment scale<sup>12,15</sup> were selected that is; age, sex, meditation practice, PHLMS, and Hospital Anxiety Depression Scale (HAD). This study was approved by Srithanya Ethical committee (Q 9/2557) on 19 September 2014.

The full PHLMS version is a rating scale (1-5; never to very often) which consists of 20 items divided into 2 domains i.e., the odd number items for awareness domain and the even numbers for acceptance domain. Volunteers had to rate the questionnaire by her/himself within 1 week.

The HAD<sup>16</sup> is a rating scale (0-3; always to never) consisted of 14 items and was divided into 2 parts i.e. the odd numbers for anxiety (HAD\_anx) and the even numbers for depression (HAD\_dep).

## Methods

The first step was item selection by 3 different ways as follows:

- i. Corrected item-total correlation (CITC) is one of the best efficacies of item selection.<sup>17</sup>
- ii. Mean difference of each item between groups: Each item of PHLMS was classified into the group of high score and that of lower score by percentile 35 ( $t_{35}$ -test)<sup>18</sup> to ensure adequate number of selected cases. Only significant items were selected.
- iii. Item selection by researchers' opinion regarding the

definition of Sati by the Tripitaka and the Satipatthana Sutta.<sup>19</sup>

The second step was psychometric property study by exploratory factor analysis and confirmatory factor analysis. The derived items were further analyzed for internal consistency by Cronbach's alpha and composite reliability and the discriminant validity by Hospital Anxiety Depression scale (HAD). Levels of mindfulness and practice were related to stress and psychological symptoms.<sup>20</sup>

The sample was divided into 2 groups by the SPSS command: 'data/select cases/ random samples of case/sample size/ approximately/25% of all cases' in order to identify the possible model by exploratory factor analysis (EFA) in the group one and confirmatory factor analysis (CFA) in the other group by the Mplus program.

## Statistical analysis

Descriptive analysis was used to compare the demographic data by Chi-square and t-test between two groups of samples.

According to the original version, two factors were specified and related in EFA, and promax rotation, polychoric correlation and weighted least squares (WLS) methods of analysis were applied. The factor loading should be at or above 0.3 and root mean square of residual (RMSR) was less than 0.05.<sup>21</sup>

The confirmatory factor analysis (CFA) was analyzed in the second group of samples. The goodness of fit indices in this study were comparative fit index (CFI) and Tucker Lewis Index (TLI; >0.95) and root mean square error of approximation (RMSEA; <0.08).<sup>22,23</sup>

Internal consistency by Cronbach's alpha and composite reliability<sup>24</sup> of the short version were calculated. The mean score of derived items was correlated to that of the Hospital Anxiety Depression Scale by Pearson's correlation coefficient.

## RESULTS

Total sample was 1,176 cases. Of these, 355 were psychiatric care-givers, 286 participants at Yong Buddhist Association of Thailand, 259 health personnel, 175 university students and 101 medical cases. Most were female (70.7%) and average age at 40.1 (SD=15.0) years, single (58%) primary to secondary education level (44.6%). There were 833 persons experienced in formed meditation, but only 99 person (11.9%) practiced regularly. The first group (303 persons) and the other (873 persons) did not have statistical difference of age, sex education, meditation practice and mean scores of two domains of the PHLMS as shown in [Table 1](#).

**TABLE 1.** Demographic data of 2 groups

Variables	N (%)			P-value
	Group 1 (N= 303)	Group 2 (N=873)	Total	
Sex	Male	77 (25.3)	268 (30.7)	0.08
	Female	225 (74.7)	604 (69.3)	
Average age (SD)	40.4 (14.7)	40.0 (15.2)	40.1 (15.0)	0.20
Age range	17-83	18-79	17-83	
Marital	Single	169 (56.0)	520 (59.8)	0.35
	Married	77 (25.5)	217 (25.0)	
	Separated	56 (18.5)	132 (15.2)	
Education	≤Secondary	114 (37.6)	332 (38.2)	0.64
	Bachelor	89 (29.4)	274 (31.5)	
	≥Master	100 (32.8)	263 (30.3)	
Meditation	Rarely	129 (60.1)	367 (58.1)	0.82
	Sometimes	35 (15.9)	97 (15.8)	
	Frequently/Always	58 (26.1)	147 (24.1)	
Duration	<20 Min	134 (61.2)	391 (64.6)	0.57
	20-30 Min	56 (25.6)	147 (24.4)	
	>30 Min	29 (13.2)	66 (10.9)	
Sum Awareness Score	33.9 (5.7)	34.4 (6.0)	34.2 (6.0)	0.20
Sum Acceptance Score	29.9 (6.5)	29.4 (7.0)	29.5 (6.9)	0.28

### Item selection results

According to CITC values, the sequence of items were 16, 13, 10, 14, 12, 20, 11, 17, 15 and 19 respectively. For the mean difference between groups by  $t_{35}$ , no item was excluded. (Table 2). Therefore, there were only two short forms; that is “c” (from CITC) and “r” (r= researcher’s opinion) in order to explore by EFA.

### EFA

EFA was done in the first group, but the full version of PHLMS was a bi-factor model as original version and the fit indices were not acceptable. ( $\chi^2 = 1002.2$ ,  $df = 151$ ,  $RMSR = 0.115$ ) The short form “c” (SFC) had two domains and did not have acceptable fit indices either. ( $\chi^2 = 400.1$ ,  $df = 26$ ,  $RMSR = 0.099$ ) The short form “r” (SFR) comprised 2 domains of 5 items which showed acceptable fit indices. ( $\chi^2 = 142.1$ ,  $df = 26$ ,  $RMSR = 0.05$ ) and factor loading weights were ranged 0.32 – 0.84. The SFR was further analyzed by CFA.

### CFA

CFA was studied in the second group. The full original version in which the odds number items for awareness domain and the even number items for acceptance domain (model\_A), had fit indices which were not acceptable. The SFR was divided into 2 domains; that is item number 1, 5, 9, 11 17 and 19 were in awareness domain and item numbers 14, 16, 18 and 20 were in acceptance domain. The error between item 5-9 and item 18 - 20 were adjusted (model\_B) and factor loading weights ranged 0.52 – 0.84. Each item explained common variance of mindfulness scale from 27 to 71% and the fit indices were acceptable. Then second order confirmatory analysis was calculated in order to confirm the SFR which explained the mindfulness scale (model\_C). The fit indices were not different from those of model\_B. (Table 3) The factor loading weights of the awareness domain and acceptance were 0.90 and 0.56 respectively.

**TABLE 2.** Item selection by CITC,  $t_{35}$ , researchers' opinion (res)

PHLMS	CITC	$p(t_{35})$	res
1. I am aware of what thought passing through my mind.	0.38	<0.01	✓
2. I try to distract myself when I feel unpleasant emotions.	0.39	<0.01	
3. When talking with other people. I am aware of their facial and body expressions.	0.34	<0.01	
4. There are aspects of myself I don't want to think about.	0.38	<0.01	
5. When I shower I am aware of how the water is running over my body.	0.30	<0.01	✓
6. I try to stay busy to keep thoughts and feelings from coming to my mind.	0.23	<0.01	
7. When I am startled, I notice what is going on inside my body.	0.42	<0.01	
8. I wish I could control my emotions more easily.	0.40	<0.01	
9. When I walk outside, I am aware of smells or how the air feels against my face.	0.34	<0.01	✓
10. I tell myself that I shouldn't feel sad.	0.47	<0.01	
11. When someone asks how I am feeling, I can identify my emotions easily.	0.43	<0.01	✓
12. There are things I try not to think about.	0.46	<0.01	
13. I am aware of thoughts I'm having when my mood changes.	0.50	<0.01	
14. I tell myself that I shouldn't feel sad.	0.47	<0.01	✓
15. I notice changes inside my body, like my heart beating faster or my muscles getting tense.	0.36	<0.01	
16. If there is something I don't want to think about, I'll try many things to get it out of my mind.	0.50	<0.01	✓
17. Whenever my emotions change, I am conscious of them immediately.	0.42	<0.01	✓
18. I try to put my problems out of mind.	0.39	<0.01	✓
19. When talking with other people, I am aware of the emotions I am experiencing.	0.42	<0.01	✓
20. When I have a bad memory, I try to distract myself to make it go away.	0.44	<0.01	✓

**Abbreviations:**  $p(t_{35})$  = p-value from t-test, res = researchers' opinion

**TABLE 3.** Factor loadings and variances ( $R^2$ ) (N=870)

Factor	Model_B				Model_C			
	Loading	SE	P-value	$R^2$	Loading	SE	P-value	$R^2$
Aware								
item 1	0.50	0.03	<0.01	0.25	0.50	0.03	<0.01	0.27
item 5	0.53	0.03	<0.01	0.28	0.53	0.03	<0.01	0.28
item 9	0.56	0.03	<0.01	0.31	0.56	0.03	<0.01	0.31
item 11	0.62	0.02	<0.01	0.38	0.62	0.02	<0.01	0.38
item 17	0.80	0.02	<0.01	0.63	0.80	0.02	<0.01	0.63
item 19	0.65	0.02		0.42	0.65	0.02	<0.01	0.42
Acceptance								
item 14	0.70	0.02	<0.01	0.50	0.70	0.02	<0.01	0.49
item 16	0.79	0.02	<0.01	0.62	0.79	0.02	<0.01	0.58
item 18	0.80	0.02	<0.01	0.64	0.80	0.02	<0.01	0.71
item 20	0.73	0.02	<0.01	0.54	0.73	0.02	<0.01	0.60
PCC								
Accept with aware	0.52	0.03	<0.01	mindful by				
5 - 9	0.30	0.04	<0.01	aware	0.90	.01	<0.01	
18 - 20	0.24	0.05	<0.01	accept	0.58	.03	<0.01	
					PCC	SE		
				5 - 9	0.30	0.04	<0.01	
				18 - 20	0.24	0.05	<0.01	

**Abbreviations:** SE = estimate standard error, PCC= polychoric correlation coefficient

### Reliability study

Cronbach’s alpha values for the whole 10 items, awareness and acceptance domain were 0.81, 0.75 and 0.82 respectively in the second group. The corrected item-total correlations (CITC) were between 0.35 - 0.59. The composite reliability of the whole short form, awareness and acceptance domains of model\_C by the equation 5 of Raykov<sup>24</sup> were 0.86, 0.72 and 0.83 respectively.

### Discriminant validity study

The discriminant validity was tested in 765 persons consisting of 355 psychiatric care-givers, 160 health

personnel, 149 participants at Yong Buddhist Association of Thailand and 101 medical cases. Pearson’s correlation coefficient between awareness and acceptance domains and HAD\_anx were -0.14, -0.17 (p<0.01) respectively and those of HAD\_dep were -0.25, -0.32 (p<0.01) respectively.

### Discriminant power study

In the mean scores among different experiences of meditation, the PHLMS of awareness were significantly different between each group. For the acceptance domain only the frequently/always practice was significantly different from the others. (Table 5)

**TABLE 4.** Model fit indices (N=870)

Model	$\chi^2/df$	RMSEA	CFI	TLI
Model_A 20 items	2,304.9/169	0.121(0.116,0.125)	0797	0.772
Model_B (short “r” )	130.0/32	0.059(0.049, 0.070)	0.982	0.975
Model_C	130.0/32	0.059(0.049, 0.070)	0.982	0.975

**Abbreviations:**  $\chi^2$ = chi square, df= degree of freedom, RMSEA = root mean square error of approximation, CFI = comparative fit index, TLI= Tucker Lewis Index

**TABLE 5.** Comparing mean scores of PHLMS meditation practice (N=833)

Meditation practice	Awareness			Acceptance		
	Mean (SD)	95% CI	P-value	Mean (SD)	95% CI	P-value
Rarely	20.9(3.5)**	20.6, 21.3	<0.01	11.2(3.5)*	10.9, 11.5	0.02
Sometimes	21.1(4.1)**	20.4, 21.8		11.5(3.5)+	10.8, 12.1	
Frequently/Always	22.3(3.7)**	21.8, 22.8		10.5(3.7)*+	10.0, 11.0	
average	21.3(3.7)	21.1, 21.6		11.1(3.6)	10.8, 11.3	

\*, + between group and p= 0.04 and \*\* p<0.01

## DISCUSSION

Item selection by statistical method yielded some drawbacks due to data distribution, and diversity of study sample.<sup>7</sup> Culture and beliefs also impacted on concept of item development<sup>6</sup> which considered some acceptance items were avoidance instead of acceptance.<sup>3</sup>

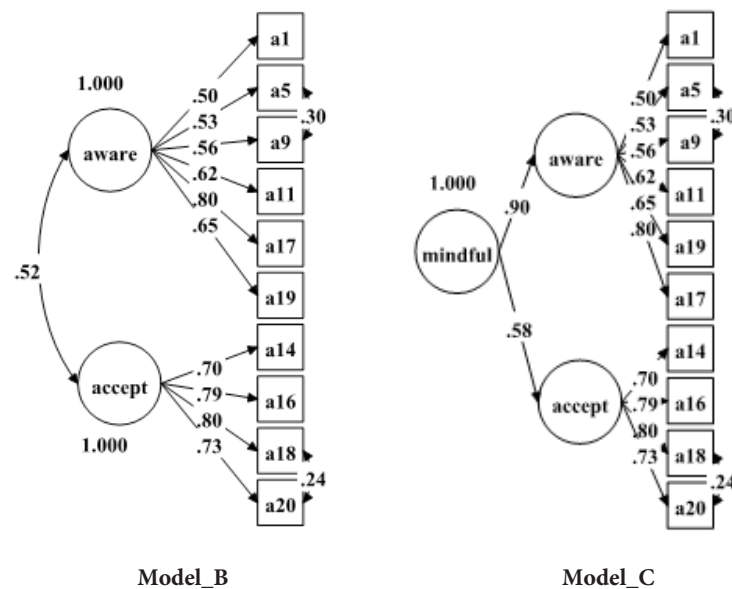
Some items of the short form in this study differed from Chinese version<sup>10</sup> even though they follow Buddhism which might be explained by culture and beliefs. We considered the item 3 was related to external person like Zeng and et al. The item 7 was related to the

item 11 and also the item 13 and the item 1, therefore we selected the items (1, 11) which had wider point of view. Finally selected items contained both negative and positive aspects which followed the psychological questionnaire development.<sup>25</sup>

Error was adjusted between the item number 5-9 (body awareness) and the number 18-20 (mind) according to the Satipatthana Sutta. Therefore model modifications for these correlations were possible as the awareness of the first pair and the acceptance for the other pairs.

The two domains of SFR followed the original





**Fig 1.** Structure model and second order CFA.

a1-a20: item1-20, one head arrow indicated loading factor, two heads arrow indicated correlation between item/domain

version that is the odd numbers for the awareness, and the others for the acceptance. The goodness of fit indices were all acceptable (CFI, TFI and RMSEA) and for the second order CFA, the SFR had high significant loading factor weights on mindfulness score in this group of samples. In general, people factors such as race, culture and meditation experiences impacted on construct validity.<sup>10,26,27</sup> Only one forth of samples had regular meditation practice, thus further investigation should be done in more experienced people that might have another structural result. The PHLMS-SFR could classify people with different meditation experiences in this sample group. Basically, the mindfulness assessment scale has an objective to assess mindfulness on daily activity which varies according to each person's perception. It had been observed that people without mindfulness meditation experience could not specify their own daily emotional experience correctly compared with those who meditated.<sup>25</sup> Duration of meditation practice was not analyzed in this study due to only a few cases (11.7%) had practice time more than 30 minutes.

PHLMS-SFR for both domains had significantly negative correlation to HAD which agreed with findings from Cardaciotto et al<sup>6</sup> and Zeng et al<sup>10</sup>, that is, PHLMS had negative correlation to those of Beck Anxiety & Depression Inventory and also those of Chinese PHLMS and Chinese Positive and Negative Affect scale). The internal consistency and CITC were acceptable. It was noticed that composite reliability values were higher than those by Cronbach's alpha which considered each item as having the same weight and ignored the error in

correlation between items. According to Kabat-Zinn and Theravada Buddhist concepts, mindfulness means accept and aware in each present moment<sup>2,25</sup> in order to reach equanimity of mind,<sup>19</sup> thus score of acceptance domain should be reversed in order to measure mindfulness practice. However, for positive thinking or avoidance as secular person, the score can be used directly.

## CONCLUSION

The short version of PHLMS which was selected by researchers' opinion contained of 10 items which had a good psychometric property in the variety of samples such as student, care-givers, hospital personnel and medical cases which can be applied to evaluate mindfulness practice in daily life.

## Limitation

The PHLMS short version which assessed daily mindfulness practice, was not for the purpose of diagnostic scale and was limited to people age above 17 years.

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