Adaptation and validation of the west haven-yale multidimensional pain inventory for Pakistani population

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Abstract

Objective: To evaluate the adapted version of West Haven-Yale Multidimensional Pain Inventory for patients with chronic pain.

Method: The multiphase study was conducted from January to December 2021. The factorial structure of the Urdu version of West Haven-Yale Multidimensional Pain Inventory was evaluated on a sample of adult patients aged 18-45 years with non-specific chronic pain, taken from public and private hospitals and clinics of Lahore, Pakistan. The Urdu version was then subjected to factor analysis, while Cronbach's alpha, composite reliability, convergent and discriminant validity of the scale were also calculated. Data was analysed using SPSS 24.

Results: Of the 306 subjects, 204(66.7%) were females and 102(33.3%) were men. The overall mean age was 30.94+/-8.44 years. There were 166(54.2%) subjects who were married, and 137(44.8%) reported experiencing pain daily. The confirmatory factor analysis showed a 45-item structure for 12 sub-scales as the best fit. The statistics for the final model were observed as minimum discrepancy function by degrees of freedom divided was 1.69, root mean square error of approximation was 0.05, and standardised root mean square residual was 0.06. Comparative fit index value was 0.91 and Tucker-Lewis coefficient was 0.90. Cronbach's alpha reliability ranged between 0.68 and 0.89 for the subscales, while for the total scale, it was 0.72.

Conclusion: The Urdu version of West Haven-Yale Multidimensional Pain Inventory was found to be a reliable and valid tool for chronic pain assessment for patients in Pakistan.

Key Words: Chronic pain, Non-specific chronic pain, Psychometrics, Urdu, Pakistan.

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Introduction

Pain, more specifically chronic pain, has gained attention in recent years because of its adverse impact on health outcomes. Chronic pain is defined as any pain which lasts longer than the average healing duration following an injury. It has been estimated that chronic pain is one of the leading causes of disability due to the burden it incurs on the individual, as well as on healthcare and economic systems.[1] According to an estimate, chronic pain affects persistently or intermittently around 30-50% population globally.[2] The pain may be neuropathic, which is the one followed by a nerve injury, nociceptive resulting from a tissue injury, or nociplastic, which arise from sensitised system of nerves. For either type of mechanism involved in pain, its consequences affect considerably the daily life of individuals.[1]

Chronic pain can have adverse effects on an individual's

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everyday life not only physically, but also psychologically. A large number of people complain about restrictions in their daily living, social life,[3] recreational and self-care activities, more specifically in cases of high-impact chronic pain.[4] Patients with chronic pain are also frequently present with clinical conditions, such as fibromyalgia, nerve damage, injuries, surgeries, arthritis and infections that may be a consequence of some clinical or lifestyle cause. These conditions initiate pain, but the pain may or may not be the only symptom or complaint reported by the patient.[5] Chronic pain has also been linked to poor quality of life (QOL)[3] and a shortened span of life despite controlling several other prevalent factors, such as depression,[1] anxiety, poor health perception, use of opioid,[4] and suicide.[1]

In the United States, chronic pain is considered one of the highly occurring conditions. Although a precise estimate of its prevalence is unknown, a rough estimate suggests that about 50 million adults are suffering from chronic pain worldwide. Out of these, nearly 8% are considered to have high-impact chronic pain.[4] According to one study, approximately one-half of the national population in the United Kingdom suffers from chronic pain, with prevalence estimates ranging between 35% and 51%.

Further exploration revealed a high prevalence among young adults, such as those aged 18-39 years, with a trend of increased prevalence among those aged up to 75 years.[6] Recent data showed a high prevalence of chronic pain among Europeans, with chronic back and neck pain frequently reported (40%) in 19 countries,[7] and with regard to gender-based prevalence, women are common victims of chronic pain.[4,7] A recent study in Pakistan reported that 54% of the patients were suffering from chronic neuropathic pain, and further reported a high association of stress, anxiety and depression with chronic pain among aging individuals.[8] A study related to chronic non-specific musculoskeletal pain reported 34.5% prevalence of low back pain, 31.4% neck pain, and 20.4% shoulder pain.[9] Studies also reported the vulnerable area of the pain, such as back, knee, foot and hip.[3]

Although confusion exists related to the assessment of chronic pain, clinicians stress upon a bio-psycho-social approach of assessment which could also improve the diagnosis underlying a pain.[10] Considering the clinical importance of chronic pain, some instruments have been made available for its psychological assessment to rule out any underlying non-medical diagnosis. One-dimensional measures that can be used are Numeric Rating Scale (NRS) and Visual Analogue Scale (VAS), which focus only on the pain intensity or effects. The McGill Pain Questionnaire (MPQ) addresses the perceptual quality of pain, while the Brief Pain Inventory (BPI) offers significant knowledge about pain burden over a period by following the assessment of patients' pain experiences.[11] The West Haven-Yale Multidimensional Pain Inventory (WHYMPI) is a comprehensive tool to assess chronic pain. Unlike the other measuring tools for chronic pain, the standardised WHYMPI fills the void in the chronic pain assessment, and is also brief and feasible to use.[12] It has shown excellent psychometric standing[13] and is recommended for use in psychophysiological and behavioural assessment of chronic pain due to its dynamic characteristics.[14] This inventory has been validated across populations in different languages,[13-15] but no recent study has reported its validation in Urdu language. An appropriate tool to measure chronic pain is required that is also valid for Pakistani population as instances have been reported where chronic pain was found linked to psychological disorders.[16]

The current study was planned to adapt and evaluate the WHYMPI for use on chronic pain patients in Pakistan.

Subjects and Methods

The multiphase study was conducted from January to December 2021. The first phase of study was related to the structural evaluation of WHYMPI in Pakistani population for which the Urdu version of WHYMPI[17] was used. Initially, the version was pilot-tested on 10 participants and changes were made in the translation based on the feedback of the participants.

The second phase was cross-sectional for which data was collected from chronic pain patients using a socio-demographic form and WHYMPI which focuses on the subjective experience of pain along with its psychological and social impacts on the patient. The scale consists of 52 items that are rated on a 7-point Likert scale, and grouped into[12] sub-factors. The total scale consists of three parts assessing different domains. The first domain has five sub-scales that assess pain experiences. The second domain has three sub-scales covering individuals' perception of the response to their pain by their spouses and significant others. The third domain deals with individuals' participation in daily life tasks. The WHYMPI has been demonstrated as a sensitive measure to detect improvement in chronic pain symptomatology, and has shown satisfactory psychometric properties.[12,13]

The second phase of the study comprised adult patients of non-specific chronic pain. The rule of the thumb was used for the estimation of sample size. For factor analysis, it is 5 participants per item, which suggested 260 subjects, but literature suggested a minimum of 300 participants.[18] Participants were recruited from different pain clinics and hospitals of Lahore city, including Jinnah Hospital, Hameed Latif Hospital and others. The participants aged 18-45 years and were experiencing chronic pain for at least three months. Individuals with physical disabilities, terminal illnesses and recent surgical experiences were excluded. Prior to data-collection, the study was approved by the ethics review board of University of the Punjab, Lahore. Permission was also obtained from the administration of participating hospitals and clinics. Individuals were enrolled only after taking informed consent from them.

In the last phase, descriptive statistics were calculated using SPSS 24, and the factor structure of the translated version of WHYMPI was confirmed through confirmatory factor analysis (CFA). Chi-square goodness of fit test and other mode-fit criteria, such as Tucker-Lewis index (TLI)[19], comparative fit index (CFI)[20], root mean square error of approximation (RMSEA), standardised root mean square residual (SRMR), modification indices (MI), Bentler-Bonett Normed Fit Index (NFI)[20] and the significance value of P-Close were used to check the robustness of the proposed model. Psychometric properties of the scale were also calculated. The reliability of the construct was assed using

composite reliability (CR) and Cronbach's alpha (α), while convergent validity was assessed through average variance extracted (AVE), and discriminant validity was checked using Heterotrait-Monotrait (HTMT) ratio and Fornell-Larcker criterion.[21-23]

Results

Of the 306 subjects, 204(66.7%) were females and

**Table-1:** Demographic characteristics (n=306).

| Characteristics	M	SD	f	%
Age (Years)	30.94	8.44		
Education				
Illiterate			29	9.5
Below Matric			30	9.8
Matric			49	16
Intermediate			51	16.7
Bachelors			52	17
Masters			74	24.2
MPhil and Above			21	6.9
Frequency of Pain Experience				
Daily			137	44.8
Most of the days			96	31.4
Sometimes			71	23.2
Rarely			2	0.7
Marital Status				
Single			134	43.8
Married			166	54.2
Separated			4	1.3
Widowed			2	0.7
Family System				
Joint			109	33.3
Nuclear			220	66.7

SD: Standard deviation.

102(33.3%) were men. The overall mean age was 30.94+/-8.44 years. There were 166(54.2%) subjects who were married, and 137(44.8%) reported experiencing pain daily (Table 1).

CFA showed that the 52-item model was not a good fit and had low factor loadings along with strong covariance (Figure 1). The model was re-specified and some modifications were made, leaving out items with poor loadings and strong inter-item covariance in the final model (Figure 2).

After modification, the model showed appropriate goodness of fit indices. The values observed, with minimum discrepancy function by degrees of freedom divided (CMIN/DF) 1.69, RMSEA 0.05, SRMR 0.06, CFI 0.91 and TLI 0.90. The value of NFI was 0.81, and factor loadings of the inventory ranged 0.52-0.89.
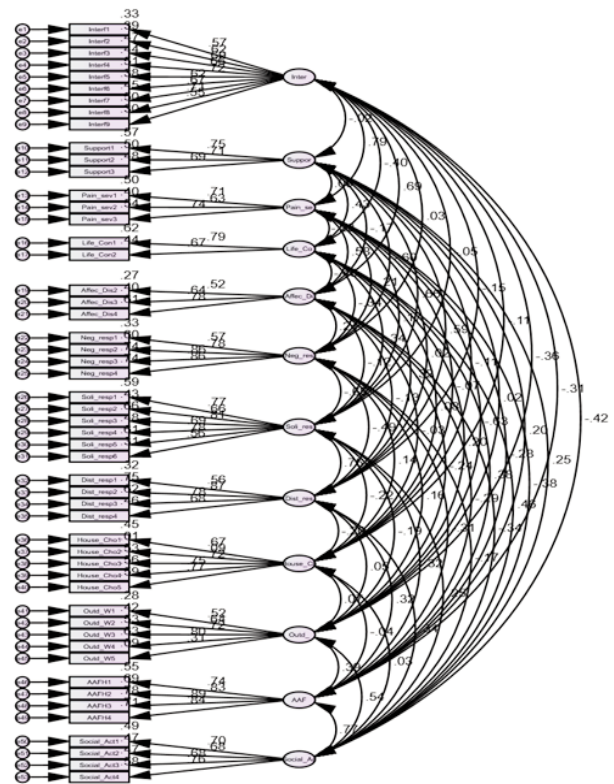
Figure-1: Model 1 of Confirmatory Factor Analysis (CFA) of West Haven-Yale Multidimensional Pain Inventory (WHYMPI), indicating a poor fit.
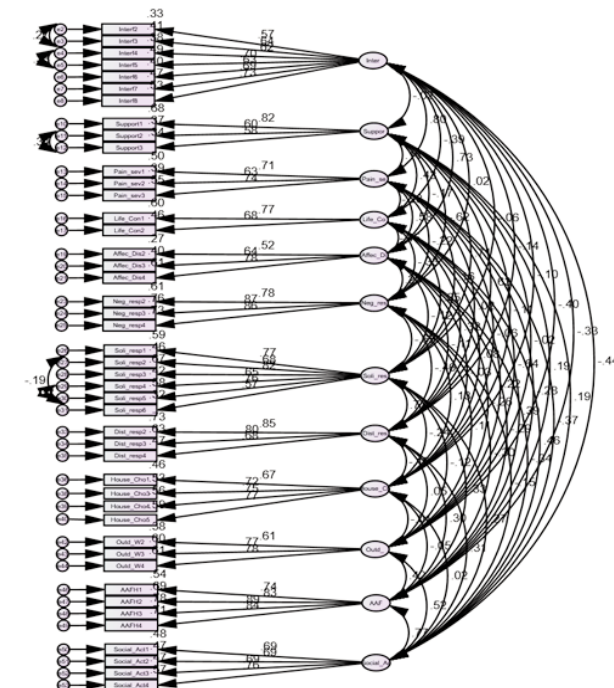
Figure-2: Final model of Confirmatory Factor Analysis (CFA) of West Haven-Yale Multidimensional Pain Inventory (WHYMPI0, depicting a good fit.

Table-2: Fornell-Lacker criterion and Heterotrait-Monotrait (HTMT) ratio values.

	CR	α	AVE	1	2	3	4	5	6	7	8	9	10	11	12
Interference	.84	.86	.43	.66	.03	.79	.37	.68	.02	.04	.16	.11	.39	.33	.43
Support	.72	.76	.46	- .02	.68	.07	.44	.22	.55	.65	.60	.12	.06	.20	.27
Pain Severity	.74	.74	.48	.80***	.14	.69	.23	.53	.19	.16	.00	.03	.64	.31	.39
Life-Control	.69	.69	.53	- .39***	.43***	.23**	.73	.49	.33	.33	.35	.08	.20	.40	.47
Affective Distress	.68	.68	.43	.73***	.17*	.58***	.45***	.65	.27	.13	.16	.04	.27	.31	.38
Negative Responses	.88	.87	.70	.02	.62***	.22**	.33***	.23**	.84	.65	.47	.13	.12	.31	.16
Solicitous Responses	.86	.86	.51	- .06	.71***	.16*	.35***	.12	-.65***	.71	.77	.21	.10	.34	.29
Distracting Responses	.82	.82	.61	- .14*	.63***	.02	.32***	.12	-.46***	.77***	.78	.17	.04	.31	.33
Household Chores	.82	.82	.53	- .10	.11	.06	.08	.03	.13*	.24***	-.19**	.73	.00	.05	.01
Outdoor Work	.77	.76	.53	- .40***	.02	.64***	.22**	.26**	.11	.12	.05	-.01	.73	.42	.52
Activities away from home	.90	.89	.68	- .33***	.19**	.28***	.38***	.29***	-.30***	.33***	.30***	-.05	.42***	.83	.78
Social Activities	.80	.80	.50	- .44***	.19**	.37***	.46***	.34***	-.15*	.27***	.31***	.02	.53***	.77***	.71

* p < .05; ** p < .01; *** p < .001
CR: Composite reliability, AVE: Average variance extracted,   : Cronbach's alpha.

Cronbach's α reliability ranged between 0.68 and 0.89 for the sub-scales, and for the total scale it was 0.72. Composite reliability values were >0.60 for all the sub-scales. Regarding convergent validity, AVE values exceed 0.50 for 6(50%) sub-scales, while the remaining 6(50%) sub-scales that did not meet the cut-off value of 0.50 were interference, support, pain severity, affective distress, solicitous responses, and social activities.

For discriminant validity, HTMT ratio showed that the values in upper diagonal were 0.85 and 0.90, while the square-roots of AVE were greater than the correlations between the sub-scales (Table 2).

Discussion

The current study evaluated in the local context the factorial structure of WHYMPI, a widely used measure of chronic pain. CFA was used to evaluate the factorial structure of WHYMPI and it showed that the original 12 sub-scale structure with 52 items did not appear optimal and required some modification. The 45-item version of the scale with 12 sub-factors had the best fit for measuring chronic pain in Pakistani population. The scale also proved to be psychometrically well-established.

The final model met the model-fit criteria suggested by literature.[19,20] However, the NFI value was 0.81 which was below the benchmark,[19] therefore, other model-fit criteria were also considered. The factor-loadings of the 45-item version ranged up to 0.89 which is approximately similar to the factor-loadings (0.43-0.87) reported by Kerns et al. in 1985 for the original version of WHYMPI.

These findings strongly support the construct validity of the scale.

Some significant differences were observed in the Urdu version from the original scale. These differences may be attributed to cultural diversity and beliefs that surround the matter of chronic pain in the local culture, which is a collectivist entity, where people are more likely inclined towards social desirability than individual preferences. Evidence suggests that patients are more likely to report high on chronic pain than on disorders like depression or anxiety, probably because of a socially acceptable attitude towards physical problems compared to psychological problems.[24,25] This is also evident from frequent visits to physicians compared to mental health providers.[25] This could be one of the reasons behind the reduced number of items in the adapted Urdu version as most of the items were deleted from two domains related to responses towards chronic pain and the daily routine of individuals dealing with chronic pain.

Since WHYPMI is a self-report measure, the subjective nature of responses should also be considered while assessing individuals with chronic pain. Literature also supports this, suggesting that social desirability bias apart from psychometric limitations strongly influence the structure of the scale.[26]

The WHYPMI is known as a reliable measure of chronic pain measurement. Gulcelik et al.[13] reported it to be a reliable measure for non-specific chronic pain measurement, which was also the case in the current

study. The current results showed Cronbach's α reliability values ranged between acceptable and good. Similarly, the composite reliability was for all the 12 sub-scales. Both values for all the sub-scales were >0.6 which is the reference criteria required to establish construct reliability.[21] The AVE value for convergent validity of the scale showed that for a few sub-scales it was <0.50 even though composite reliability value was >0.60. As such, the AVE value of <0.50 was considered acceptable.[27] The HTMT values obtained for WHYMPI sub-scales (Table 2) appeared to meet the cut-off criteria of 0.85 and 0.90.[23] The greater value of square-roots of AVE than the correlations between the sub-scales depicted that the scale met the Fornell-Larcker criterion.[23]

Patients with chronic pain frequently report disturbance in their daily life functioning.[1] It was also evident in the current study as higher scores of the participants were observed on items related to day-to-day functioning as well as with the higher response rate in demographic information categories that demonstrated very frequent pain episodes.

The current study has some limitations, like a smaller sample. Future studies should be conducted with relatively larger samples and with various populations to validate the current findings.

Despite the limitations, however, the study is a significant contribution to indigenous literature as the findings suggest that the use of the local version of WHYMPI would facilitate an accurate and precise assessment of the subjective experiences of chronic pain patients.

Conclusion

The Urdu version of WHYMPI was found to be a psychometrically sound measure of subjective chronic pain for Pakistani Urdu-speaking population.

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Author's Contributions

HL: Conception of work, acquisition, analysis, interpretation and drafting.
SD: Conception of work, reviewed and revised the draft.