Psychometric feature of the child and parent versions of psychological inflexibility in pain scale (PIPS) in children with chronic pain and their parents

Original Article

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Abstract:

Background: The aim of this study was to investigate the validity, reliability and factor structure of the child and parent's version of psychological inflexibility in pain scale (PIPS) in the population of children with chronic pain and their parents.

Methods: The sample consisted of 112 pairs of children and parents, selected through available sampling method from the Tehran Children's Hospitals. The PIPS questionnaire along with KIDScreen scale (to measure well-being), Child Behavior Checklist (CBCL) (the Youth Self-Report (YSR)) (to measure negative mood) and Visual Analogous Scale (VAS) (to measure pain severity) was implemented on them.

Results: The reliability results of PIPS showed that the Cronbach's alpha for the child and parent versions was 0.66 and 0.82, respectively. In addition, the rerun correlation of child and parent versions was significant and acceptable, ranging from 0.47 to 0.78. Moreover, the highest correlation between PIPS dimensions in two versions of the child and parent was 0.89 and 0.92, respectively. The convergent and divergent validity of the PIPS showed that this questionnaire had a negative and significant correlation with the KID Screen scale and had a positive and significant correlation with the CBCL, YSR and VAS.

Conclusions: The results of the exploratory factor analysis of this questionnaire revealed new factors. The exploratory factor analysis of child version indicated four factors (the factors 1, 3 and 4 are related to avoidance, and factor 2 measures the fusion) and in the confirmation factor analysis, the good fitting of these new factors was confirmed.

Key Words: Chronic Pain, Inflexibility, Children, Reliability, Validity

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Introduction:

Today, the role of cognitive-behavioral therapy (CBT) in the treatment of patients with chronic pain has been well studied [1, 2]. Recent approaches to CBT such as acceptance and commitment treatment (ACT) [3] emphasize acceptance or desire to obtain the negative experiences, instead of controlling or reducing pain and other negative experiences. The results of laboratory and clinical studies [4, 5] indicated the importance of acceptance guidelines to facilitate the increased function in the presence of chronic pain and distress [6, 7, 8]. Recent study [9] has been suggested that the acceptance modifies the effects of catastrophizing on variables such as depression, anxiety and performance. Thus, there is growing evidence to support that psychosocial flexibility is a moderator of the relationship between pain (thoughts and emotions associated with pain) and performance. ACT is one of the treatments based on acceptance. In this treatment, the unwillingness of individuals to experience negative experiences (pain and fear) is an important indicator of unworthy life [9].

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According to this approach, empirical avoidance occurs when an individual has no desire to exposure his/her private experiences (feelings, emotions, thoughts and pain-related memories) and he/she takes steps to change these experiences, their abundance and the context in which they occur. As a result, dealing with all of the cases such as exposure to feelings of pain, cognition, emotions and memories avoiding by patients should be considered in ACT [10]. The ACT approach states that avoiding is the result of cognitive fusion - a process in which thoughts about an event integrate with the actual event. Following such thoughts, emotional responses occur similar to the actual event and as a result, certain behaviors occur. The inability to act effectively in accordance with the values in the presence of unpleasant thoughts, emotions or symptoms, is considered to be a psychological inflexibility [3, 11].

There are limited valid tools for assessing the processes associated with psychological flexibility in patients with chronic pain. The most widely used tool is the chronic pain acceptance questionnaire (CPAQ), consisting of two subscales activity engagement and pain willingness [12, 13]. Recently, the psychological inflexibility in pain scale (PIPS) has been designed to measure psychological flexibility aspects [14], the rigid dominance of psychological reactions over chosen values and contingencies in guiding action which often occurs when individuals attempt to avoid experiencing unwanted internal events, and to examine the processes of ACT. The results of the previous study have shown that the psychological inflexibility scale compared to the subscale of pain control strategies is more reliably related to the variables of physical and emotional performance such as the severity of pain, anxiety and distress associated with pain, depression, physical and mental disability, the use of analgesic drugs, and daily activities [15].

In general, few researches have been conducted on psychological flexibility in Iran such as the research of Imani [16] who investigated the confirmatory factor structure of the Acceptance and Action Questionnaire- 2 (psychological flexibility) (AAQ-II) among students of Tehran University of Medical Sciences. Imani showed that the questionnaire had an appropriate reliability and validity for assessing students' experiential avoidance/psychological inflexibility. In addition, another study was conducted to standardize and assess the validity and reliability of PIPS in people with migraine headache in Kashan and indicated that the reliability and validity of this instrument were appropriate [17].

Although the previous data have supported the two subscales of the PIPS questionnaire, more analysis is needed for the utility of this tool [18]. On the one hand, though this questionnaire has been designed recently and validated for adult population, it has not yet been validated in the population of children, especially Iranian children [8]. On the other hand, the results of some studies indicate that the responses of children's self-report are inappropriate and their reports are different from their parents'. For example, in a study [19] a weak to moderate correlation was reported between the cancer children's rating of coping strategies and their parental rating. It was found that there was a moderate to weak relationship between the reaction of children to medical treatments as they believe and the parental rating of the children's reaction (r= 0.25- 0.46) [20]. Thus, on the one hand, due to the lack of necessary research in relation to Iranian reliability and validity of PIPS, and on the other hand, given that the reports of children are probably different from their parents; therefore, the aim of the current study was to verify the reliability and validity of the PIPS questionnaire in the Iranian population of children and their parents.

Methods:

This descriptive study was conducted on all children with chronic pain, referred to Pediatric Specialized Hospitals in Tehran. The sample was 112 pairs of children and parents who were selected by available sampling method from the Mofid Children's Hospital, Children's Medical Center, Hazrat Ali Asghar Hospital and Bahrami Hospital (different parts and clinics of these centers, such as: neurology, neurosurgery, surgery, blood, rheumatology, orthopedics and physiotherapy were used). The used tools in this research were:

1- PIPS [10] containing two subscales of avoidance and cognitive fusion, which have the proper psychometric properties. The findings of the exploratory and confirmatory factor analysis of Wicksell et al.'s [10] study support both subscales of this 12-item questionnaire. The factor loadings for avoidance were from 0.59 to 0.84 and for cognitive fusion were from 0.42 to 0.82. Furthermore, the standardized regression weights for avoidance and for cognitive fusion were from 0.57 to 0.84 and 0.49 to 0.62, respectively. The results of this study showed modal fit ($X_2(53)=137.63$, $p<0.001$; $X_2/df=2.60$; RMSEA=0.089; CFI=0.895; GFI=0.904), proper internal consistency and strong relationship with criterion variables (such as disability and life satisfaction). The structural validity of this tool

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was supported through high correlation with the CPAQ (r=0.54) and the Tampa Scale Kinesiophobia (TSK) (r=0.50). It is noteworthy that the results of hierarchical regression showed that the PIPS scale compared the TSK scale involved more variance of pain, disability, life satisfaction and depression. In addition, PIPS is a moderator of the relationship between pain and disability and this confirms that this scale is a good tool for measuring the processes of treating people with chronic pain. In that way, it can be said that this tool can be useful to check the importance of flexibility/inflexibility in chronic pain and analysis of changing processes in exposure-based interventions, and useful for professionals who work with patients with chronic pain.

2- Kidscreen [21]***:*** This study used the version of Kidscreen with 27 questions including five dimensions as following: Physical well-being (5 items), psychological well-being (7 items), parent relation and self-perception (7 items), social support and peers (4 items) and school environment (4 items). Items are rated on a 5-point Likert scale ranging from 1 = never, 2=seldom, 3=quite often, 4=very often and 5=always-reflecting the frequency of behaviors or feelings; or 1=not at all, 2=slightly, 3=moderately, 4=very, 5=extremely-reflecting the intensity of a belief or attitude in the previous week. The scores were converted into a linear scale from 0 to 100, representing the best and worst quality of life (QoL). In order to construct the validity of the questionnaire, Robitail et al.'s [22] conducted a study on 8-18-year-old children and adolescents from 13 European countries. Proper results were obtained from exploratory and confirmatory factor analysis of this instrument. Cronbach's alpha coefficient for all dimensions varied between 0.78 and 0.84. The construct validity of the Kidscreen-27 was assessed using the Strengths and Difficulties Questionnaire (SDQ) in children and adolescents, Child Health and Illness Profile-Adolescent Edition (CHIP-AE), Youth Quality of Life Instrument- Surveillance Version (YQOL-S), the Children with Special Health Care Needs (CSHCN), Family Affluence Scale (FAS) and Pediatric Quality of Life Inventory (PedsQL). The correlations between Kidscreen-27 and other QoL questionnaires that measure similar structures, were moderate to high (from 0.36 to 0.63). Nik-Azin et al.'s [21] studied the reliability and validity of this instrument on 551 Iranian students. The results of their study were similar to previous research.

3- Child Behavior Checklist (CBCL): CBCL assesses competencies (abilities), action or adaptive functioning and emotional-behavioral problems of 6-18-year-old children. This checklist covering 13 questions with 113 items was answered by parents or a person who was responsible for the child and took care of him/her. The CBCL scales included competence and adaptive functioning scales based on experience and DSM. The raw scores of problem CBCL scales were obtained by summing the scores of 0, 1 or 2 questions related to any scale. Minaee [23] obtained good psychometric properties of CBCL. In this research, the child's version of this questionnaire (YSR) was used, too.

4- Visual Analogous Scale (VAS). The severity of the pain is graded in response to the question "How much pain do you have today?" based on a VAS from 0, "I'm not bad at all", to 10 "as I imagine I'm bad," once on the day. The average of these scores is measured in all subjects [8]. Due to the special characteristics of rating by person, this scale does not require psychometric properties.

Implement method: The method of doing research was two steps. In the first step, the PIPS were translated by a few psychologists. Then, the translations were compared together, their problems were removed and the necessary corrections were made. The prepared PIPS was translated again into English by an English specialist and compared with the original questionnaire. Then, the problems of the prepared PIPS were resolved and finally the final questionnaire was prepared. In the second step, the researchers performed the prepared PIPS with CBCL, KID Screen and VAS, randomly on 112 pairs of children with chronic pain and their parents, to the Mofid Children Hospital, Hazrat Ali Asghar Hospital, Children's Medical Center and Bahrami Children's Hospital.

Data analysis method: In order to analyze the data, we used descriptive methods to calculate mean, standard deviation, minimum, maximum and skewness. In the current study, Pearson correlation coefficient and alpha coefficients were used to calculate the reliability coefficients. The exploratory and confirmatory analysis was used to exam the construct validity, and the correlation of PIPS questionnaire with CBCL (Parent Report) YSR (Child Report), Kidscreen and (VAS) was studied to assess the convergent and divergent validity.

Results:

The average age of children was 9.62. The numbers of boys and girls were 48 (42.9%) and 64 (57.1%), respectively. Most children were in elementary School (72.3 %). The education of the most parents was at the

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guidance level (30%). Fathers often were self-employed (58%) and mothers were often housewives (89.3%). Descriptive features of child and parent versions of PIPS are shown in table 1. As seen, in the population of children, the mean of avoidance and fusion subscales, and the total score was 31.69, 22.17 and 53.97, respectively. In the parents' population, the mean of avoidance and fusion subscales, and total score was 32.22, 20.45 and 51.93, respectively. Table 2 shows the reliability findings in Cronbach's alpha and test-retest correlation, in both child and parental versions. The Cronbach's alpha versions of the child and parent are 0.66 and 0.82, respectively, indicating high alpha coefficients. In addition, the rerun correlation was significant in both PIPS versions and its range was from 0.47 to 0.78. The correlation between FDI dimensions in both child and parent versions was obtained moderately and robustly, representing a conceptual relationship between the dimensions. The highest correlations were related to avoidance scales, and total scores in two versions of the child and the parent were obtained 0.89 and 0.92, respectively. Thus, according to the obtained results, we can say that the child and parent versions of PIPS have good reliability. The findings of the convergent and divergent validity (table 3) represented that the child's version had a negative correlation with subscales of QoL and a positive and significant correlation with YSR subscales (affect problem, anxiety problem, anxiety depression and solid depression) and VAS. Similarly, the findings of the convergent and divergent validity of the parent version (table 3) suggested that the parental version had a negative correlation with subscales of QoL and a positive correlation with the CBCL subscales (affect problem, anxiety problems, anxiety depression and solid depression) and VAS. In that way, it can be said that both the child and parent versions of PIPIS have the convergent and divergent validity. Also, the results of the exploratory factor analysis and the confirmatory factor analysis (tables 4, 5) were investigated to verify the structure validity. The result of the KMO test of child' version was 0.62, illustrating the sufficient sample size. The result indicates that contrary to the original version of PIPS, indicating two factors of avoidance and fusion, in the current study, four factors were obtained for the child's version in the exploratory analysis. Due to the inappropriate fitting of the factors derived from the exploratory factor analysis of parent version, the results of the exploratory factor analysis were not presented. As illustrated in table 4, the model's fitness indices demonstrate the fitness of the previous factors (2 factors) and the new factors (4 factors) of the child's version. Of course, as can be seen, the fitness of the new factors is somewhat better than the previous factors. In related to the parent version of PIPS, the indicators presented in table 5 indicate the fitness of the original version factors of PIPS.

Table 1. Descriptive Indicators PIPS (n=112)

Components of Metabolic Syndrome	TSH levels		P value*
	Elevated n=10 Mean± SD	Normal n=187 Mean± SD	
Waist circumference (Cm)	71.83±10.26	69.22±7.35	0.93
HDL (mg/dl)	42.75±7.83	40.69±9.41	0.39
Triglycerides (mg/dl)	101.25±36.49	92.7±38.7	0.72
FBS(mg/dl)	91.75±4.65	92.87±6.39	0.58
BP(systolic) (mmHg)	115±17.6	112.21±12.68	0.9
BP(diastolic) (mmHg)	75±10.48	69.79±11	0.43

Table 2. Cronbach's alpha coefficients and two run of PIPS

version		Intercorrelation		Test - retest				
				Pretest		Posttest		Test-retest correlations
		N of items	Cronbach's Alpha	M	SD	M	SD	
Child version	Avoidance	8	0.613	34.30	7.861	30.950	10.465	0.689**
	Fusion	4	0.662	22.350	4.749	19.20	6.237	0.639**
	Total	12	0.660	56.650	10.043	50.150	14.897	0.677**
Parent version	Avoidance	8	0.830	33.25	8.346	33.95	13.85	0.780**
	Fusion	4	0.635	22.20	5.001	19.00	5.821	0.474*
	Total	12	0.827	55.450	10.236	52.950	18.282	0.788**

*P<0.05 **P<0.01

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Table 3. Correlation between PIPS with KIDScreen, YSR and VAS

version		criterias	Avoidance	Fusion	Total
Child version	KIDScreen	Physical well-being	-0.226*	-0.029	**-0.187***
		Psychological well-being	-0.360**	-0.053	**-0.322****
		Parent relation and self-perception	-0.196*	0.203*	**-0.061**
		Social support and peers	-0.276**	-0.211*	**-0.307****
		School environment	-0.277**	-0.028	**-0.226***
	YSR	Affect problem	0.342**	0.063	**0.236***
		Anxity problem	0.419**	0.068	**0.346****
		Anxity depression	0.361**	0.018	**0.273****
		Solid depression	0.294**	0.419**	**0.185**
	VAS	VAS	0.290**	0.190*	**0.303****
Parent version	KIDScreen	Physical well-being	-0.257**	-0.186*	**-0.233***
		Psychological well-being	-0.128	-0.046	**-0.122**
		Parent relation and self-perception	-0.226*	-0.072	**-0.157**
		Social support and peers	-0.134	-0.075	**-0.041**
		School environment	-0.180	-0.023	**-0.128**
	CBCL	Affect problem	0.111	0.038	**0.084**
		Anxity problem	0.201*	0.077	**0.169**
		Anxity depression	0.071	-0.075	**0.011**
		Solid depression	0.104	0.074	**0.120**
	VAS	VAS	0.230*	0.011	**0.175**

*P<0.05 **P<0.01

Table 4. The results of the confirmatory factor analysis of the child version of PIPS

		Two factors of PIPS	Four factors of PIPS
Child version of PIPS	X2/df	3.01	1.92
	GFI	0.81	0.88
	AGFI	0.72	0.80
	CFI	0.64	0.82
	RMSEA	0.13	0.091

Table 5. The results of the confirmatory factor analysis of the parent version of PIPS

		Two factors of PIPS
Parent version of PIPS	X2/df	129.35
	GFI	0.85
	AGFI	0.78
	CFI	0.89
	RMSEA	0.10

Discussion:

The present study was conducted to investigate the validity and reliability of PIPS in a sample of children with chronic pain and their parents. In this study, Kidscreen, VAS and some subscales of CBCL (parent form) and YSR (child form) were used to assess the convergent and divergent validity of PIPS. As demonstrated in the previous studies, inflexible efforts to control the unwanted thoughts and emotions are largely ineffective and can be followed by increasing these experiences [24,25], suffering and pain [4,26], distress [27] and also decreasing the valuable life activities and QoL [28]. In general, the results of the internal correlation of this tool (child report and parent versions) are consistent with the results of previous study [10]. In this regard, the results of the convergent and divergent validity of the current research are similar to the results of the mentioned researches.

In addition, in general, the results of the reliability findings with the Cronbach's alpha and rerun correlation of both versions of the child and the parents is the same as that of some researches [10, 17, 18].

A remarkable point in this research is that although the findings of parents and children were similar in some cases, there were some differences in their assessment. In this regard, it was found that the greatest difference was related to the correlation between the

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subscales of CBCL (YSR) and Kidscreen with the PIPS. In general, in the assessment of children compared to their parents, there was significant correlation between the subscales of anxiety and depression of the YSR with the PIPS scale. It seems that this can be owing to exaggeration of children about the symptoms, denial of their cues by parents and low parental anxiety levels [29].

In this study, due to improper fitness of new factors derived from the parent version of PIPS, the results of these factors were not reported and the results of the confirmatory factor analysis of the two-factor version of PIPS (original version) were reported. In relation to the child version of PIPS, the four factors derived from the exploratory factor analysis showed model fitness. Although the original questionnaire of PIPS consisted of two factors (avoidance and cognitive fusion), the four factors were obtained in the child version of PIPS in the present study. It seems that the four factors derived from the exploratory factor analysis are the result of breaking the factor of avoidance of the original questionnaire. That is, the items related to the avoidance of daily activities have been placed in one factor, items associated with the avoidance of painful work have been put in another factor and also items related to controlling painful events have been placed in another factor.

In conclusion, it can say that has an appropriate psychometric feature in Iranian children with chronic pain and their parents. Thus, PIPS with other tools can be used in the population of children with chronic pain and used to assess the psychological flexibility of children with chronic pain in ACT, too.

Despite the adequacy of the sample size using KMO, generally, the low sample size was the limitation of the current study. Moreover, since the sampling of children suffering from chronic pain was done only from Tehran hospitals, it is not possible to generalize the results of this study to all Iranian children with chronic pain. Finally, another limitation was the lack of a healthy children sample for comparing to the children with chronic pain in terms of the psychological inflexibility. Given the limitations of the current research, it is suggested that PIPS should be used in a larger population of children with chronic pain and in different cities. In addition, the use of this scale in a sample of healthy children for evaluating differential reliability can be as a further suggestion.

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