Psychometric Properties of the Persian Version of the Padua Inventory: Washington State University Revision (PI-WSUR)

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Objective: The psychometric properties and factor structure of the Persian Padua Inventory Washington State University Revision (PI-WSUR), a measure of obsessive- compulsive phenomena, was examined in a non-clinical sample of 348 Iranian university students.
Method: The PI-WSUR was translated into Persian, and its back translation was controlled by the author inventory. A pilot study based on cultural differences was carried out on twenty students. The study subjects consisted of 348 university students, and they completed PPI, OCI-R, MOCI, BAI, STAI, BDI-II and the demographic inventory.
Results: The factor analysis of the PI-WSUR, exhibited eight factors similar but not identical with factor structure in previous studies. as the eight factors are as follows: contamination obsessions; washing compulsions; ordering compulsions; checking compulsions; obsessional thoughts to harm self/others; obsessional thoughts about violence; obsessional impulses to harm self/others; and obsessional impulses to steal. The result also indicated excellent internal consistency (Cronbach alpha= 0.92), Spearman split test (0.95) and test- retest (r= 0.77). We assessed the concurrent validity of the PPI in relation to the Obsessive Compulsive Inventory-Revised (OCI-R), and the Maudsley Obsessive-Compulsive Inventory (MOCI).
Conclusion: The Iranian version of the PI to some extend remains the sound psychometric properties of the original version..

Keywords: *Iran, Obsessive compulsive disorder, Psychological tests, Psychometrics*

Several theoretical and psychometrically sound measures have been developed to assess the presence and severity of OCD symptoms in community and clinical samples. Each type of instrument has unique strengths and weaknesses. Multiple methods of assessment are commonly used for OCD and spectrum conditions, including formal diagnostic interviews, as well as interviews for gathering clinical information. At present, various self-report instruments are available to assist in the diagnosis and measurement of OCD. The most widely accepted measures are: Leyton Obsessional inventory short form (LOI) (1); The Maudsley Obsessive-Compulsive Inventory (MOCI) (2); Padua Inventory-Washington State University Revision (PI-WSUR) (3,4);Yale-Brown Obsessive-Compulsive Scale-self-report (Y-BOCS-SR) (5); Obsessive-Compulsive Inventory-Revised (OCI-R) (6); Vancouver Obsessional compulsive inventory (VOCI) (7); Florida obsessive-compulsive inventory (FOCI) (8); Schedule of compulsions, obsessions, and pathological impulses (SCOPI,) (9); Clark-Beck Obsessive Compulsive Inventory (CBOCI) (10). Nonetheless, those measures have several shortcomings, in terms of content or psychometric properties that limit their use in both clinical and research settings (11, 12). Some researchers have investigated sub-types of OCD symptoms (13-15); there is also an emerging consensus in the field that OCD is better conceptualized according to the dimensional model (16). Recently, Lee (17) proposed a model of obsessive thoughts that is pertinent to theories of OCD as proposed by Rachman (18-20). They suggested that obsessive thoughts can be classified into two types of autogenous obsessions.

Sanavio (3) developed the original Padua Inventory as the first major of self reported OCD symptoms. The original Italian version of the PI added two obsessive factors to the two traditional cleaning and checking scales. The replication of the research across different cultures requires the use of a measure that has been standardized across those cultural contexts. It was a self report inventory that assessed the degree of disturbance or difficulty of 60 different thoughts and behaviors engendered for the individual with OCD. The PI has been adopted in different countries.

Some researches showed that original PI also measures "worry" in addition to "obsessions" (30). The result from Kyrios, Bhar and Wade (21) study indicated that the PI exhibited a similar but not identical factor structure compared to previous studies. It was consisted of four factors which were termed as: (1)

checking and repeating; (2) contamination fears, and orderliness; (3) impaired mental control; (4) urges and worries. However, in Macdonald's study (22), four factors emerged and were labeled as (1) impaired control over mental activities/ doubting; (2) contamination; (3) checking; (4) worries about losing control over motor behavior. One of the best-supported factor solutions on PI was reported by Leckman (23), who found four dimensions: (a) obsessions (aggressive, sexual, religious, or somatic); (b) symmetry obsessions and ordering, counting and repeating compulsion; (c) contamination obsessions and cleaning compulsions; and (d) hoarding obsessions and collecting compulsions ;while Abramowitz (24) who clustered the broadest sampling of OC symptoms, obtained a five cluster solution: harming; contamination; hoarding; unacceptable thoughts; and symmetry. Van Oppen (25) also evaluated the factor structure of the Padua inventory (3), and identified the five following factors: impulses; washing; checking; rumination; and precision. In Baer study (26), however, three factors were found and labeled as symmetry and hoarding; contamination and cleaning; and pure obsessions. A factor analysis in Wakabayashi (27) study replicated a four-factor structure, consisting of three factors corresponding to those found in previous studies ('Impaired control of mental activity', 'Being contaminated' and 'checking behavior') and one factor ('Impulsive thought'), which partly differed from that found previously. To examine psychometric properties of PI, Goodarzi (28), collected data in the city of Shiraz (Iran), and found good reliability for the PI and confirmed its factorial structure reported by previous studies. Also, he was a ble to differentiate between OCD patients and normal individuals, but failed to differentiate between neurotic and OCD patients. Later research demonstrated that obsessional subscales of PI appeared to measure general "worry" (29). This problem has implication for the use of the PI, particularly in studies that utilize the Padua to examine the relation between obsession and worry. Burns (30) believed that if the Padua measures worry in addition to the obsessional aspect of OCD, then it b ecomes difficult to differentiate between "obsession" and "worry". Thus, his aim was to determine the content-based revision of the original PI and to provide a better measure of obsessions and compulsions. Therefore, he (30) attempted to solve this measurement problem with initiation of Padua inventory-Washington State University-Revised (PI-WSU-R) which contains 39-items each rated on a f ive point scale, indicating the degree of disturbances caused by the symptoms. The revision was constructed to measure five content dimensions relevant to OCD i.e., (1) obsessional thoughts to harm oneself/ others; (2) obsessional/Impulses to harm oneself/others; (3) contamination obsessions and washing compulsion; (4) checking compulsions; and (5) dressing/ grooming compulsions. The PI-WSUR demonstrated good internal consistency, with α' ranging from .77 to .88 on

subscales and α' of .92 for the total scale (4). Overall, the PI-WSUR has demonstrated good psychometric properties and reports showed an improvement of the original PI. It has been demonstrated adequate 6 months test-retest reliability (r= .76) in a styudy in Iceland (31).

Identification of stable, and homogeneous subgroups of OCD patients may have important implications for understanding variability in treatment response for improving treatment effectiveness and may also advance etiologic theory (26, 32). Cross-cultural studies on the Padua Inventory indicate that PI-WSUR can define the similarities and differences of factors involved in OCD concept across different cultures. Hence, it was felt that a study of the PI-WSUR within the Iranian culture could be useful, and could provide national measure for further study of obsessive-compulsive phenomena within Iranian context. Thus, our goal in this study was to make an assessment of a Persian translation of PI-WSUR, to examine its psychometric properties and factor structure in an Iranian sample of college students.

Materials and Method

Participants
The sample consisted of 348 (213 Male and 135 female) volunteering students of Tehran University of Medical Sciences. The age range of the total sample was 18-44, having an average age of 21/85, with standard deviation of 3/12.

Measures
The Padua Inventory- Washington State University Revision (PI-WSUR) (30): is a 39-item self-report measure of obsessions and compulsions (4). Each item is rated on a 5-point scale according to the degree of disturbance caused by the thought or behavior (0= "not at all" to 4= "very much"). The PI-WSUR items were organized to measure 5 content areas relevant to OCD. These 5 areas are obsessional thoughts to harm self/others (OTAHSO); obsessional impulses to harm self/others (OITHSO); contamination obsessions and washing compulsions (COWC); checking compulsions (CHKC); and dressing/grooming compulsions (DRGRC). The PI-WSUR demonstrated good internal consistency, with α's ranging from .77 to .88 on subscales and α's of .92 for the total scale (4).

Maudsley Obsessional-Compulsive Inventory (MOCI) (33): MOCI is a 30-item true-false self-report questionnaire that assesses overt rituals and their related obsessions, providing four subscales and a total score. The scale has been shown to have satisfactory test-retest reliability (r= .80) and internal consistency (.70 to .80; (33). The MOCI's validity was found to be satisfactory with the washing and checking subscales, showing good discriminant and convergent validity (34). This inventory has been used with adequate validity and reliability [13]. The Persian language version of the test has been used in a number of studies in Iran (35-37).

State-Trait Anxiety Inventory (STAI) (38): STAI is a 40-item self-report measure of general anxiety. The first 20 items assess state anxiety or how the participant feels "right now". The second 20 items assess trait anxiety, or how the participant feels "generally". The STAI has high reliability and validity (38). Only the state subscale (STAI-S) was used in the present study. The STAI-Persian has excellent internal consistency (Cronbach's a=.90) and test-retest reliability (r= .53) assessed in an Iranian student sample (39).

Beck Depression Inventory (BDI-II) (40): BDI-II is the second edition of the widely use Beck Depression Inventory. Originally introduced in 1960s (41). BDI-II was revised to approximate the DSM-IV (42) criteria for major depression. The reliability and validity of various non-English versions of the BDI have been established in numerous previous studies. The BDI-II contains 21-item sets, each with a series of four statements describing the severity of depressive symptoms along ordinal continuum from absent or mild (scored 0) to severe (scored 3). Scores on this test can thus range from 0 to 63. The BDI-II-Persian has excellent internal consistency (Cronbach's a=.87) and test-retest reliability (r= .73) assessed in Iranian student sample (37).

Beck Anxiety Inventory (BAI) (43): BAI is a 21-item anxiety symptom checklist that covers common anxiety symptoms commonly experienced by clinically anxious people. Scores on this test can thus range from 0 to 63. It has excellent psychometric properties. The BAI-Persian has excellent internal consistency (Cronbach's a=.92) and test-retest reliability (r=.87) assessed in Iranian student sample (44).

The Obsessive-Compulsive Inventory-Revised (OCI-R) (45) : The OCI-R is a new 18-item questionnaire based on the earlier 84-item OCI (6). The OCI-R assesses OCD symptoms across six factors: (1) washing; (2) checking/doubting; (3) obsessing; (4) mental neutralizing; (5) ordering; and (6) hoarding. Preliminary data suggest that the OCI-R possesses good internal consistency (α's ranged from .81 to 93 across sample), and test-retest reliability (.57 to .91 across samples). A cutoff of 15 on the CI-R showed good sensitivity (84%) and specificity (78%) in its ability to distinguish individuals with OCD from non-clinical participants (45). The OCI-R-Persian has excellent internal consistency (Cronbach's a=.85) and test-retest reliability (r=.75) assessed in Iranian student sample (46).

Statistical Analyses
The evaluations of the psychometric properties of the PPI-WSUR were as follows: First, using a confirmatory factor analytic model, the factor structure of the PPI-WSUR was assessed via Principal Component Analysis (PA) with Varimax rotation. Second, the Convergence validity was computed by correlation of PPI-WSUR with OCI-R and MOCI.

Third, the Reliability of the PPI-WSUR was assessed by two methods: test-retest and split-half.

Results

Factor Structure of Persian Padua Inventory: Washington State-University Revision (PPI-WSUR)
A confirmatory factor analytic model was used to examine the conceptual structure underlying the Padua Inventory, the Persian version. These techniques identify which items most strongly cluster together by assessing the correlation between items within the instrument. Furthermore, the principal factor analysis (PCA) procedure was selected to identify the factor structure. This inventory has 39 items, therefore, factor analysis was accomplished according to a matrix of 39*39. The Olken-Meyer coefficient of sampling adequacy was 0.872 indicating that the sample is quite representative ,and Bartlette test of sphericity was highly significant (P<0.001) indicating that the correlation matrix does differ from an identity correlation matrix. Extracted factors were rotated using orthogonal factors method. We used Varimax rotation, which minimizes the number of variables that have high loadings on each given factor. Rotation serves to make the output more understandable and is usually necessary to facilitate the interpretation of factors. After rotation, 8 factors explain 61.453% of the total variance observed. Initial Eigen values of 8 Factors were in order: 12.392%, 9.186%, 9.133%, 8.254%, 6.669%, 5.983%, 5.355%, and 4.480%. Factor loadings are the basis for imputing a label to the different factors. Observantly to nature of factors 1-8, we denominated them in order of (CONO), (WASC), (ORDC), (CHKC), (OTAHSO), (OTAV), (OITHSO), and (OITS). Table 1 shows that from the 39 items, 6 items(1,2,7,8,9,10) belong to factor one; Likewise, factor two comprises 4 items(3,4,5,6);items of 11,12,13 belong to factor 3; factor 4 comprises 10 items(14,15,16,17,18,19,20,21,22,23); items of 24, 25,26,27,30 belong to factor5; th sixth factor comprises of 2 items(28,29); factor 7 be long to items of 31,32,33,34,35,36,39 and finally 2 items (37,38) belong to factor 8. That is, the communality is the squared multiple correlation for the variable using the factors as predictors (Table 1).

Convergence validity of PPI-WSUR
To calculate convergence, we assessed the correlation of PPI-WSUR with OCI-R and MOCI. PPI-WSUR total was positively associated with OCI-R and MOCI total (r= 0.699, r=0.587, p<0.01). PPI-WSUR was associated with all OCI-R subscales (p<0.01) except for PPI-WSUR-OITS with OCI-R-ordering. There was significant association between most of the PPI-WSUR subscales and MOCI subscales (p<0.01) with two exceptions on PPI-WSUR-OITT with MOCI subscales, and PPI-WSUR subscales with MOCI-slow.

Significant association was also observed between PPI-WSUR and its subscales with BAI, STAI, BDI-II (p<0.01) except for PPI-WSUR-OITS and STAI (Table 2).

Reliability of PPI-WSUR
A reliable test gives consistent results. Therefore, we used two methods including time sampling and domain sampling. In the first method, test-retest reliability was assessed in two weeks (Inter-class). In the second method, split-half (spearman-Brown correlation) and

Cronbach's Alpha coefficient were used. Scores on the PPI-WSUR e were remarkably consistent in these two methods (Table3).

Discussion
The present study investigated the psychometric properties of the Iranian version of the PI-WSUR on a large non clinical sample.

Table1. PPI-WSUR -scale: Varimax-rotated Factor loadings for the 8-factor solution

Factors	Factor Loading
Factor 1 Contamination obsessions (CONO)	
1- I feel my hands are dirty when I touch money.	.63
2- I think even slight contact with bodily secretions (perspiration, saliva urine, etc.) may contaminate my clothes or somehow harm me.	.75
7- I wash my hands more often and longer than necessary.	.47
8- I sometimes have to wash or clean myself simply because I think I may be dirty or "contaminated".	.51
9- If I touch something I think is "contaminated", I immediately have to wash or clean myself.	.52
10- If an animal touches me, I feel dirty and immediately have to wash myself or change my clothing.	.53
Factor 2 Washing compulsions (WASC)	
3- I find it difficult to touch an object when I know it has been touched by strangers or by certain people.	.59
4- I find it difficult to touch garbage or dirty things.	.54
5- I avoid using public toilets because I am afraid of disease and co iation.	.69
6- I avoid using public telephones because I am afraid of contagion and disease.	.69
Factor 3 Ordering compulsions (ORDC)	
11- I feel obliged to follow a particular order in dressing, undressing, and washing myself.	.63
12- Before going to sleep, I have to do certain things in a certain order.	.76
13- Before going to bed, I have to hang up or fold my clothes in a special way.	.76
Factor 4 Checking compulsions (CHKC)	
14- I have to do things several times before I think they are properly done.	.54
15- I tend to keep on checking things more often than necessary.	.50
16- I check and recheck gas and water taps and light switches after turning them off.	.78
17- I return home to check doors, windows, drawers, etc., to make sure they are properly shut.	.77
18- I keep on checking forms, documents, checks, etc., in detail to make sure I have filled them in correctly.	.73
19- I keep on going back to see that matches, cigarettes, etc, are properly extinguished.	.70
20- When I handle money, I count and recount it several times.	.66
21- I check letters carefully many times before posting them.	.69
22- Sometimes I am not sure I have done things which in fact I knew I have done.	.59
23- When I read, I have the impression I have missed something important and must go back and reread the passage at least two or three times.	.40
Factor 5 Obsessional thoughts about harm to self/others (OTAHSO)	
24- I imagine catastrophic consequences as a result of absent-mindedness or minor errors which I make.	.53
25- I think or worry at length about having hurt someone without knowing it.	.74
26- When I hear about a disaster, I think it is somehow my fault.	.73
27- I sometimes worry at length for no reason that I have hurt myself or have some disease.	.67
30- I invent useless worries about germs and disease.	.58
Factor 6 Obsessional thoughts about violence (OTAV)	
28- I get upset and worried at the sight of knives, daggers, and other pointed objects.	.69
29- When I hear about a suicide or a crime, I am upset for a long time and find it difficult to stop thinking about it.	.63
Factor 7 Obsessional impulses to harm self/others (OITHSO)	
31- When I look down from a bridge or a very high window, I feel an impulse to throw myself into space.	.61
32- When I see a train approaching, I sometimes think I could throw myself under its wheels.	.77
33- At certain moments, I am tempted to tear off my clothes in public.	.51
34- While driving, I sometimes feel an impulse to drive the car into someone or something.	.79
35- Seeing weapons excites me and makes me think violent thoughts.	.70
36- I sometimes feel the need to break or damage things for no reason.	.58
39- I sometimes have an impulse to hurt defenseless children or animals.	.46
Factor 8 Obsessional impulses of Stealing (OITS)	
37- I sometimes have an impulse to steal other people's belongings, even if they are of no use to me.	.82
38- I am sometimes almost irresistibly tempted to steal something from the supermarket.	.84

Table 2. Correlation between PPI-WSUR (total and subscales) and OCI-R ،MOCI، BAI ،STAI ،BDI-II

	OCI-R							MOCI					BAI	STAI	BDI-II
	Total	Wash	Chek	Obssess	Hoard	Ord	Neu	Total	Check	Wash	Slow	Doubt			
Padua (PPI-WSUR -Total)	.699**	.672**	.613**	.570**	.405**	.435**	.420*	.587*	.541*	.429	.04	.462*	.473*	.402*	.451*
Padua (PPI-WSUR -CONO)	.559**	.689**	.455**	.400**	.268**	.368**	.282*	.481*	.299*	.437*	.015	.357*	.292*	.225*	.230*
Padua (PPI-WSUR -WASC)	.469**	.553**	.360**	.343**	.215**	.335**	.263*	.385*	.280*	.429*	.072	.292*	.296*	.228*	.194*
Padua (PPI-WSUR -ORDC)	.423**	.437**	.319**	.333**	.181**	.359**	.235*	.381*	.308*	.282*	.064	.336*	.232*	.183*	.199*
Padua (PPI-WSUR -CHKC)	.594**	.509**	.723**	.485**	.368**	.301**	.345*	.541*	.600*	.319*	.108	.404*	.409*	322*	.350*
Padua (PPI-WSUR -OTAHSO)	.370**	.491**	.463**	.561**	.398**	.354**	.394*	.462*	.290*	.245*	-.030	.417*	.458*	.407*	.462*
Padua (PPI-WSUR -OTAV)	.356**	.290**	.237**	.388**	.289**	.171**	.293*	.261*	.222*	.168*	-.006	.204*	.302*	.252*	.246*
Padua (PPI-WSUR -OITHSO)	.356**	.266**	.242**	.310**	.276**	.178**	.346*	.196*	.197*	.123*	-.040	.171*	.289*	.236*	.355*
Padua (PPI-WSUR -OITS)	.199**	.157**	.126**	.152**	.175**	.064	.285*	.01	.074	.104	.036	.033	.111*	.079	.141*

Contamination obsessions (CONO); Washing compulsions (WASC); Ordering compulsions (ORDC); Checking compulsions (CHKC); Obsessional thoughts about harm to self/others (OTAHSO); Obsessional thoughts about violence (OTAV); Obsessional impulses to harm self/others (OITHSO); Obsessional impulses to thieve (OITT)

Table3.Reliability by Time sampling & domain sampling models

Padua (PPI-WSUR) elements	Cronbach's Alpha	split-half	Test-retest
Padua (PPI-WSUR -Total)	.92	.95	.77
Padua (PPI-WSUR -CONO)	.77	.82	.84
Padua (PPI-WSUR -WASC)	.71	.77	.72
Padua (PPI-WSUR -ORDC)	.74	.80	.75
Padua (PPI-WSUR -CHKC)	.87	.90	.83
Padua (PPI-WSUR -OTAHSO)	.83	.89	.60
Padua (PPI-WSUR -OTAV)	.56	.60	.40
Padua (PPI-WSUR -OITHSO)	.86	.90	.62
Padua (PPI-WSUR -OITS)	.80	.74	.78

Contamination obsessions (CONO); Washing compulsions (WASC); Ordering compulsions (ORDC); Checking compulsions (CHKC); Obsessional thoughts about harm to self/others (OTAHSO); Obsessional thoughts about violence (OTAV); Obsessional impulses to harm self/others (OITHSO); Obsessional impulses of Stealing (OITS)

The eight content categories are as follows: contamination obsessions (CONO); washing compulsions (WASC);
ordering compulsions (ORDC); checking compulsions (CHKC); obsessional thoughts to harm self/others (OTAHSO); obsessional thoughts about violence (OTAV); obsessional impulses to harm self/others (OITHSO);obsessional impulses of stealing (OITS). The total amount of variance explained by the eight factors was small (.40), and comparable to earlier versions of the PI. Although there was some difference between the results of this study and those in the other countries for the items which loaded on each factors, the "checking compulsions" factor was almost identical between all the studies (36, 21, 22, 23, 24, 25, 27). Meanwhile, the findings for the "ordering compulsions" factor obtained in this study also corresponded relatively well with the same factor in prior studies. In all previous studies (36, 21, 22, 23, 24, 25, 27), contamination loaded on one factor, but in the Iranian sample it emerged as two identical factors of obsession and compulsion named as "contamination obsessions" and "washing compulsion". The present result might reflect as culture- specific on washing in Iran. Concerning these three factors, it appeared that they were core and universal construct of OCD. Although, in the present study, the "dressing grooming compulsion" factor did not emerge as a separate factor, the "obsessional thought to harm s elf/others" and "obsessional impulses to harm self/others" factors were similar to Burns (36) and Wakabayashi (27) studies. Interestingly, two factors (obsessional thought about violence and obsessional impulse to steal) emerged as new factors which were specific to domestic culture in Iran. The PPI-WSUR and its eight subscales showed good test-retest as well as internal consistencies with Cronbach's alpha, showing 92 in the full scale and ranging from .87 to .56 in subscales test- retest. These results suggest that the PPI-WSUR is a reliable instrument to measure individual differences in the degree of obsessive-compulsive symptoms in Iran.

In summary, the present finding indicated that the main structure of OC symptoms is adequately assessed by the PPI-WSUR. The present study provides evidence for its factorial structure and reliability, convergent and discriminant validity in a non-clinical sample. Overall, the convergent and divergent validity is found to be good for the eight subscales. In contrast with other self-report inventories, this questionnaire particularly measures obsessional thoughts/ impulses to harm self/ others, which is not consisted with other OCD questionnaires. Although the validity and reliability of the PPI-WSUR in this study was quite satisfactory, further studies are needed to investigate factor structure and reliability of OCD in clinical sample. Finally, the data reported in this study was gathered from university students, and it is possible that different results may emerge if subjects were not students.

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