

The Psychometric Properties of the Inferential Confusion Scale Based in Turkish Patients with Obsessive-Compulsive Disorder

Orçun YORULMAZ¹, Gülay DİRİK², Oya KARAALI³, Emel ÜVEZ⁴

Abstract

Objective: Among the influential cognitive factors in obsessive-compulsive disorder (OCD), inferential confusion is a cognitive bias, which is described as the acceptance of possibilities as reality in contrast to sensory information. The present study aimed to determine the role of this construct in a clinical sample, and to test the cross-cultural validity of inferential confusion and to determine the psychometric properties of the Inferential Confusion Scale (ICS) in a Turkish clinical sample.

Method: The study included a group of patients with OCD and other anxiety disorders, and a control group, both of which were administered the ICS, Eysenck Personality Questionnaire- Revised and Abbreviated Form (EPQR-A), Obsessive-Compulsive Beliefs Questionnaire (OBQ), Beck Depression Inventory (BDI), Trait Anxiety Inventory (TAI), and Padua Inventory-WSUR. One-way analysis of covariance (ANCOVA) was performed for group comparisons, while Pearson's Product Moment Correlation test was used to examine interrelationships among the variables.

Results: ANCOVA analysis results indicate that OCD patients expressed more concern on the ICS, which had satisfactory reliability values, and this difference remained when controlled for depression and anxiety. In addition, inferential confusion was positively associated with OCD symptoms and relevant cognitive measures; thus, it seems that the Turkish version of the ICS is a reliable and valid instrument for the evaluation of inferential confusion. Furthermore, as with responsibility-threat estimation and depression, inferential confusion was one of the cognitive factors that differentiated the OCD patients from the controls and was a significant predictor of OCD symptoms, beyond other cognitive variables.

Conclusions: In accordance with the literature, the findings of the present study show that the Turkish ICS is a reliable and valid measure for use in Turkey, and that inferential confusion is a critical cognitive factor with an important role in OCD.

Key Words: Obsessive-Compulsive Disorder, Inferential Confusion, Obsessive Beliefs, Psychometric Properties.

INTRODUCTION

Recent cognitive accounts (Rachman, 1997; Salkovskis, 1999) of obsessive-compulsive disorder (OCD) emphasize an appraisal process in which people misinterpret intrusive thoughts, impulses, and images, which is critical to the onset and maintenance of the disorder. Faulty belief domains - namely responsibility/threat estimation, importance/control of thoughts, and certainty/perfectionism - contribute to the misappraisal process (Obsessive-Compulsive Cognitions Working Group

[OCCWG], 2003, 2005). In other words, intrusive thoughts are actually experienced by almost everybody; however, such factors as an individual's understanding of the experience, dysfunctional appraisal of its negative consequences, and personal responsibility for the experience, differentiate normal intrusive thoughts and abnormal obsessions. Individuals exhibit compulsive behaviors in order to reduce discomfort.

Many studies performed with different samples, including Turkish samples, have confirmed the validity

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¹Psych. PhD, ²Psych. Ass. Prof., ³Psych., ⁴Psych., Department of Psychology, Faculty of Arts and Science, Uludağ University, Bursa, Turkey.

Orçun Yorulmaz, e-mail: orcuny@uludag.edu.tr

TABLE 1. Characteristics of the study sample.

	OCDG (n = 52)	OADG (n = 21)	Student Control (n = 180)
Gender n (%)			
Female	42 (81)	15 (71)	90 (50)
Male	10 (19)	6 (29)	90 (50)
Age			
Mean (SD)	32.83 (10.07)	33.67 (11.91)	21.76 (1.64)
Range	18-68	18-59	18-27
Marital Status (%)			
Single	24 (46)	11 (51)	176 (98)
Married	28 (54)	10 (49)	4 (2)
Years of Education			
Mean (SD)	10.06 (4.52)	9.42 (5.66)	13.93 (0.99)
Job Status (%)			
No	39 (75)	9 (43)	6 (3)
Yes	13 (25)	12 (57)	174 (97)

OCDG: Obsessive-compulsive disorder group; OADG: other anxiety disorders group.

of this cognitive assumption (Frost and Steketee, 2002; Yorulmaz et al., 2009). On the other hand, other studies report insignificant findings concerning the impact of these cognitive belief domains in some OCD patients (Taylor et al., 2006). Unlike belief domains, which are assumed to function after an intrusive experience, inferential confusion is an alternative cognitive factor that plays a role in the formation of intrusions (Aardema and O'Connor, 2003). It can be described as the assumption that possibilities are reality, even though sensorial information supports the contrary. In other words, instead of typically making inferences as a result of the examination of objective reality-based data (e.g., there are spots on my shirt, then it must be dirty), the individual might subjectively draw a conclusion about a feared consequence by

means of inverse inferences, despite sensorial information that provides contradictory evidence (e.g. I was outside and there were many microorganisms; thus, my clothes must be dirty) (O'Connor and Robillard, 1995; Aardema et al., 2005). Moreover, insecurity about the senses also seems to play a role. For instance, even though an individual may know that the door is closed and locked, s/he cannot be sure, and accepts the possibility that the door is open and behaves accordingly. It is widely known that in clinical settings the presentation of only subjective data and evidence to patients, and psycho-education are not sufficient for the successful treatment of OCD, probably due to subjective inferential focus (Wu et al., 2009).

There are numerous reports that support the notion of inferential confusion. Findings reported in experimental (Pelissier and O'Connor, 2002) and treatment efficacy studies (O'Connor et al., 2005) indicate the role of inferential confusion in OCD. Additionally, cognitive-behavioral therapy has been reported to be influential in inferential confusion (Aardema et al., 2005). Surveys performed with the 15-item Inferential Confusion Scale (ICS), revised by Aardema, O'Connor, Emmelkamp, Marchand and Todorov (2004), both in clinical and nonclinical samples show that inferential confusion is associated with OCD symptoms and that OCD patients had more concerns about it than those in non-clinical samples (Aardema et al., 2005, 2006; Aardema, O'Connor, and Emmelkamp, 2006). Likewise, the Turkish adaptation study of this instrument conducted with university students also proved that it was reliable and valid for use in Turkey (Dirik et al., 2009). Yet, no study has examined its psychometric properties in clinical samples. In order to prevent possible problems associated with the generalization of findings obtained from non-clinical samples, the present study included clinical

TABLE 2. Means and standard deviations in the study sample.

	1. OCDG (n = 52)		2. OADG (n = 25)		3. Student Control (n = 80)		Significance	
	X	SD	X	SD	X	SD	F	Post-hoc Group Differences
ICS	51.54	10.98	45.81	7.68	39.65	9.10	(2, 152) = 24.26**	1 > 2 > 3
PI-WSUR	59.61	30.38	35.33	22.23	19.33	7.91	(2, 152) = 61.99**	1 > 2 > 3
Cleaning	19.64	11.99	13.24	9.22	7.34	4.13	(2, 153) = 34.54**	1 > 2 > 3
Control	20.75	11.86	11.19	8.89	6.38	3.65	(2, 153) = 49.92**	1 > 2 > 3
Obsess. Thoughts	11.17	8.05	6.28	5.97	2.46	2.29	(2, 153) = 53.74**	1 > 2 > 3
Obsess. Impulses	3.33	5.32	0.86	1.46	1.48	1.98	(2, 153) = 5.88*	1 > 2, 3
Grooming	4.73	3.80	2	2.07	1.68	1.74	(2, 153) = 21.73**	1 > 2, 3

** p < 0.001, * p < 0.02.

OCDG: Obsessive-compulsive disorder group; OADG: other anxiety disorders group; ICS: Inferential Confusion Scale; PI-WSUR: Padua Inventory-Washington State University Revision.

TABLE 3. Correlation coefficients between inferential confusion and the other variables in the study sample.

	OCDG (n = 52)	OADG (n = 25)	Student Control (n = 180)
PI-WSUR	0.35**	0.38	0.42**
Cleaning	0.25	0.20	0.23*
Control	0.21	0.37	0.41**
Obsess. Thoughts	0.48**	0.42	0.43**
Obsess. Impulses	0.35**	0.15	0.31**
Grooming	0.01	0.23	0.19**
OBQT	0.48**	0.39	0.40**
RTE	0.48**	0.39	0.45**
PERFC	0.33*	0.31	0.23**
ICT	0.42**	0.33	0.34**
BDI	0.42**	0.54**	0.26**
TAI	0.61**	0.65**	0.45**
EPQ- Neuroticism	0.46**	0.39	0.35**
Psychoticism	0.11	−0.32	0.09
Extraversion	−0.25	0.09	−0.16*

** $p < 0.001$, * $p < 0.05$.

ICS: Inferential Confusion Scale; OBQT: Obsessive-Compulsive Beliefs Questionnaire Total; RTE: responsibility/threat estimation; PERFC: perfectionism/certainty; ICT: importance/control of thoughts; PI-WSUR: Padua Inventory-Washington State University Revision; BDI: Beck Depression Inventory; TAI: Trait Anxiety Inventory; EPQ: Eysenck Personality Questionnaire.

and non-clinical samples, and instruments that measure obsessive beliefs, depression, and anxiety, with the aim to determine the psychometric properties of the ICS and to investigate the clinical validity of this concept in Turkey.

METHOD

Sample

The present study included 52 OCD patients, 21 patients with other anxiety disorders (generalized anxiety disorder, $n = 13$; panic disorder, $n = 5$; posttraumatic stress disorder, $n = 3$), and 190 students from various departments of Uludağ University. In addition, the Turkish version of ICS was re-administered to 60 of the university students (48 female, 12 male) within 2 weeks to determine its test-retest reliability. Table 1 presents some of the sociodemographic characteristics of the study sample.

Instruments

Inferential Confusion Scale (ICS)

The ICS was developed by O'Connor and Robillard (1995) and its current 15-item form with a unidimensional factor structure was revised by Aardema et al. (2004). The scale is designed to evaluate inferential con-

fusion on a 5-points scale (1: totally disagree; 5: strongly agree). Studies show that the ICS is a reliable and valid instrument ($\alpha = 0.90$). OCD patients score higher than patients with other anxiety disorders and control groups. The Turkish ICS items are presented in the Table in the Appendix section.

Obsessive Beliefs Questionnaire (OBQ)

The OBQ was developed to investigate faulty obsessive beliefs. The scale has 44 items rated on a 7-point scale (1: strongly disagree; 7: strongly agree) (OCCWG, 2001). Yorulmaz and Gençöz (2008) constructed a Turkish version, which was reported to be reliable and valid. Like the original form, the Turkish OBQ also has 3 dimensions: responsibility/treat estimation, certainty/perfectionism, and importance of thought and control. Its Cronbach's alpha reliability was reported as 0.91, 0.90, and 0.91 for OCD patients, patients with other anxiety disorders, and students, respectively.

Padua Inventory-Washington State University Revision (PI-WSUR)

Developed by Sanavio (1988) and revised by Burns et al. (1996), the PI-WSUR has 39 items rated on a 5-point scale. It has 5 factors—obsessions harmful to self/other, obsessions harmful to self/other impulses, control compulsions, contamination and washing compulsions, and dressing/grooming compulsions. The psychometric properties of the Turkish version of the PI-WSUR were reported by Yorulmaz et al. (2008). The Cronbach's alpha reliability of the PI-WSUR was 0.94, 0.91, and 0.94 for OCD patients, patients with other anxiety disorders, and students, respectively, in the present study.

Eysenck Personality Questionnaire- Revised Abbreviated (EPQR-A)

The 24-item EPQR-A was constructed after revision of the 48-item Eysenck Personality Questionnaire (Francis et al., 1992). The EPQR-A examines personality in 3 dimensions—extraversion, neuroticism, and psychoticism—and includes a lie scale for the control of social desirability. Karancı et al. (2007) adapted the scale for use in Turkey and examined its psychometric properties. Consistent with the original version, the Cronbach's alpha reliability of the extraversion, neuroticism, and psychoticism dimensions for OCD patients was 0.82, 0.59, 0.46, respectively, and 0.76, 0.66, and 0.27, respectively, for patients with anxiety disorders, and 0.81, 0.71, and 0.46, respectively, for students in the current study.

Beck Depression Inventory (BDI)

The BDI, a 21 item-self report scale, measures the severity of depressive symptoms (Beck et al., 1988). The Turkish version of BDI was reported to be reliable and valid (Hisli, 1988). In the present study the Cronbach's alpha reliability of the Turkish BDI for OCD patients, patients with other anxiety disorders, and students was 0.91, 0.90, and 0.86, respectively.

State-Trait Anxiety Inventory (STAI)

The STAI was developed by Spielberger et al. (1970) to measure the level of state and trait anxiety, and includes 20 items for each dimension (state and trait anxiety). Öner and Le Compte (1985) adapted the scale for use in Turkey. In the present study only the trait anxiety scale was used, and the Cronbach's alpha reliability for OCD patients, patients with other anxiety disorders, and students was 0.92, 0.88, and 0.80, respectively.

Procedure

After obtaining approval from the Bursa Provincial Health Directorate and Bursa State Hospital, the questionnaires were administered to the outpatients. Prior to administering the questionnaires to the students, permission was obtained from the lecturer of the course at the university.

Statistical Analysis

Statistical analysis was performed with SPSS v.15.0. First, the consistency of the internal reliability of each scale was examined. Then, clinical and criteria validity were examined using analysis of variance (ANOVA) and analysis of covariance (ANCOVA). Correlational analysis was performed in order to evaluate the interrelationships between inferential confusion and OCD-relevant factors and symptoms, while discriminant function analysis was conducted in order to identify the variables specific to OCD. Finally, hierarchical regression analysis was used to determine whether or not inferential confusion plays a role in OCD.

RESULTS

Reliability

Analysis of the internal consistency of the Turkish ICS shows that it had satisfactory reliability coefficients (for OCD patients: $\alpha = 0.86$; for patients with other anxiety disorders: $\alpha = 0.85$; for students $\alpha = 0.85$). The range of correlation coefficients for the item-total scale

(0.14-0.77 for OCD patients and 0.30-0.72 for student controls) and the test-retest reliability coefficient based on 60 students 2 weeks after initial testing ($r = 0.87$) support this finding. Other instruments used in the study also had acceptable reliability ($\alpha > 0.75$).

Group Comparisons

In order to investigate the criterion and clinical validity of the Turkish ICS, one-way ANOVA and LSD post-hoc comparison tests were performed ($n = 80$; 44 females and 36 males). As can be seen from Table 2, the OCD patients reported more confusion than the patients with other anxiety disorders and controls, and similar difference was present in the OCD symptoms and subgroups of the symptoms. Moreover, group comparisons were repeated with ANCOVA in which depression and anxiety were covariates. The results of that analysis shows that OCD patients still had higher ICS scores, even after depression and anxiety were controlled for (e.g. for inferential confusion $F(2, 153) = 5.29, p < 0.01$).

The Relationships between Inferential Confusion and Symptoms of OCD

Correlational relationships between inferential confusion and symptoms of OCD are shown in Table 3. In line with expectations, inferential confusion was positively associated with total OCD symptoms, obsessional thoughts, and impulses in the OCD patients. In both the OCD patients and students, inferential confusion was also positively related to obsessive beliefs, levels of depression and anxiety, and neuroticism. On the other hand, there weren't any significant associations between inferential confusion, and psychoticism or extraversion. In the patients with other anxiety disorders, except for depression and anxiety, there were no significant patterns.

Hierarchical regression analysis was conducted to predict symptoms of OCD in the university student sample ($n = 180$). With a stepwise equation, age, gender, personality characteristics, and depression and anxiety scores were entered in the first step, while the second step was composed of faulty belief domains and inferential confusion. The results show that neuroticism ($\beta = 0.34, t = 4.88, R^2 \text{ change} = 0.12, p < 0.001$) and depression in the first step ($\beta = 0.17, t = 2.12, R^2 \text{ change} = 0.02, p < .05$), and beliefs about responsibility/threat estimation ($\beta = 0.43, t = 6.85, R^2 \text{ change} = 0.18, p < 0.001$), importance/control of thoughts ($\beta = 0.24, t = 3.03, R^2 \text{ change} = 0.03, p < 0.005$), and inferential confusion ($\beta = 0.16, t = 2.26, R^2 \text{ change} = 0.02, p < 0.05$) in the second step were significant predictors of OCD symptoms.

Discriminant function analysis was performed to determine which of the factors were OCD-related and differentiated the OCD patient group. Patients with other anxiety disorders and controls were merged to form a new group (e.g., OCD patients vs. others). Findings indicate only 1 discriminative function (Wilk's lambda: 0.71; canonical r : 0.54; χ^2 (3): 52.27; $p < 0.001$). According to the pooled within group correlation coefficients, inferential confusion (0.80), belief of responsibility/threat estimation (0.79), and depression (0.73) were critical variables that correctly classified 77% of the group. As a result, the reliability analysis, hierarchical regression, and discriminant function analysis show that inferential confusion was associated with symptoms of OCD and that the Turkish ICS is a reliable and valid instrument tool for use in Turkey.

DISCUSSION

The present study focused on inferential confusion, which can be defined as concentrating on subjective evaluations and behaving accordingly, while ignoring objective data. It was aimed to determine the validity of inferential confusion in the clinical sample and the psychometric properties of the Turkish ICS. The scale demonstrated high internal consistency, and satisfactory test-retest reliability coefficients and item-total test correlation coefficients. Group comparisons show that the OCD patients had more concerns about inferential confusion than the patients with other anxiety disorders and the control group; this difference was still observed after depression and anxiety were controlled for. Moreover, when means and standard deviations obtained in the present study ($X = 51.54$, $SD = 10.98$), original study, and several similar studies (e.g., ($X = > 48$, $SD = > 12$, Aardema et al., 2005, 2006) were compared, the consistency was noteworthy,

supporting the criterion validity of the scale. Furthermore, significant and positive associations between inferential confusion, and symptoms of OCD and relevant cognitive factors in the OCD patients and control group indicates the concurrent validity, while the lack of a significant relationship between psychoticism, and extraversion or confusion in these groups, or between inferential confusion and any other variable is indicative of the scale's discriminant validity. As with beliefs of responsibility/threat estimation and depression, the observation that inferential confusion differentiated the OCD patients supports the scale's discriminant validity. Regression analysis findings also indicate that inferential confusion significantly predicted OCD symptoms. Thus, these results are consistent with the findings of other studies that reported a role for inferential confusion in OCD (Aardema et al., 2005, 2006).

In conclusion, the present study's findings show that the Turkish ICS is a reliable and valid instrument for use with clinical and nonclinical Turkish populations. In addition, inferential confusion was shown to have a significant role in OCD, which appears to be cross-culturally consistent. Hence, it can be stated that in addition to other popular cognitive factors such as faulty belief domains, this cognitive bias should be considered during psychological assessment and the psychotherapeutic treatment of OCD patients. On the other hand, the present study has some limitations: diagnostic criteria for the patient groups were based only on DSM-IV (APA, 1994), there was a limited number of patient samples, the patients with other anxiety disorders constituted only 1 group, there were similar comorbid pathologies in the patient groups, patients with other types of psychopathologies were excluded, and only some cognitive factors were analyzed. As such, future studies should take these issues into account.

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Appendix 1.

INFERENTIAL CONFUSION SCALE

Below there are various statements. You are requested to state how much you agree or disagree with each statement by using the rating scale, after reading.

1: Totally Disagree, 2: Disagree, 3: Undecided, 4: Agree, 5: Strongly Agree

	Totally Disagree	Disagree	Undecided	Agree	Strongly Agree
1. I am sometimes more convinced by what might be there than by what I actually see.	1	2	3	4	5
2. I sometimes invent stories about certain dangers that might be there without paying attention to what I actually see.	1	2	3	4	5
3. I sometimes know there is a danger solely on the basis of my understanding of something and so there is no need to look.	1	2	3	4	5
4. No matter where you are, you can never be sure whether you are safe.	1	2	3	4	5
5. As soon as I think there might be danger, I immediately take precautions to avoid it.	1	2	3	4	5
6. I often cannot tell whether something is safe, because things are not what they appear to be.	1	2	3	4	5
7. Sometimes I have the idea that danger is near, even though there is no obvious reason.	1	2	3	4	5
8. Even if I don't have any actual proof of a certain danger, my imagination can convince me otherwise.	1	2	3	4	5
9. There are many invisible dangers.	1	2	3	4	5
10. Just the thought that there could be danger is proof enough for me that there is.	1	2	3	4	5
11. I often know a problem exists, even though I don't have visible proof.	1	2	3	4	5
12. My imagination can make me lose confidence in what I actually perceive.	1	2	3	4	5
13. Even if I have all sorts of visible evidence against the existence of a certain danger, I still feel that it will occur.	1	2	3	4	5
14. I am more often afraid of something that I cannot see than something I can see.	1	2	3	4	5
15. I often react to a scenario that might happen as if it is actually happening.	1	2	3	4	5