Assessment

Psychometric Characteristics of the Penn State Worry Questionnaire and Metacognitions Questionnaire-30 and Metacognitive Predictors of Worry and Obsessive–Compulsive Symptoms in a Turkish Sample

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The purpose of the present study was twofold. First, to examine the psychometric properties of the Penn State Worry Questionnaire (PSWQ) and the Metacognitions Questionnaire-30 (MCQ-30) in a Turkish sample. Second, to investigate metacognitive predictors of pathological worry and obsessive–compulsive (o–c) symptoms in this group. The sample included 561 non-clinical participants. Consistent with non-English versions, the Turkish version of the PSWQ was found to have a two-factor structure. The MCQ-30 was shown to be composed of five factors similar to the English version. Reliability analyses indicated that both the PSWQ and MCQ-30 possessed high internal consistency, split-half reliability and test–retest coefficients. As expected, both scales positively correlated with measures of o–c symptoms, trait anxiety, and anxiety and depression, as well as with each other. Negative and positive metacognitive beliefs about

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worry were significant predictors of both pathological worry and o–c symptoms. Cognitive confidence emerged as a specific predictor of worry, while beliefs about the need to control thoughts emerged as a unique predictor of o–c symptoms. Copyright © 2008 John Wiley & Sons, Ltd.

INTRODUCTION

Intrusive thoughts play an important role in the development and maintenance of most forms of psychological disorders. Worry, which is considered a type of intrusive thought, represents the cognitive component of anxiety (Borkovec, 1985; Mathews, 1990; Wells & Matthews, 1994). Although worry is a common experience in non-clinical samples (Davey, 1994; Mathews, 1990), it can lead to significant impairments in normal functioning in its more malign forms. Particularly, the experience of chronic, excessive and generalized worry that is perceived as uncontrollable is represented as a fundamental characteristic of generalized anxiety disorder (GAD) in Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (APA, 1994). Not being confined to GAD, worry has been verified as a cognitive activity that is present, to some extent, in nearly all anxiety disorders, such as panic disorder, social phobia, specific phobia and obsessive–compulsive disorder (OCD; APA, 1994; Barlow, 1988; Brown, Antony, & Barlow, 1992).

In a recent theory of worry, metacognitive beliefs are thought to be important in determining its pathological nature (Wells, 1995, 1997). In particular, positive and negative beliefs about worry were found as central to vulnerability to and persistence of GAD (Davis & Valentiner, 2000; Wells & Carter, 1999; Wells & Papageorgiou, 1998). Maladaptive metacognitions have also been linked with OCD, which is another disorder of intrusive thought (Wells, 1997, 2000), and several studies are consistent with predictions of the metacognitive theory of OCD (Emmelkamp & Aardema, 1999; Fisher & Wells, 2005; Gwilliam, Wells, & Cartwright-Hatton, 2004; Hermans, Martens, De Cort, Pieters, & Eelen, 2003; Myers & Wells, 2005; Purdon & Clark, 1999; Wells & Cartwright-Hatton, 2004; Wells & Papageorgiou, 1998).

Two commonly used research instruments in the study of worry and metacognitive factors in psychopathology are the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) and the Metacognitions Questionnaire-30 (MCQ-30; Wells & Cartwright-Hatton, 2004). These two instruments have supported the recent burgeoning of empirical research on the contributions of worry and metacognitions to the development and maintenance of emotional disorders. However, there has been little research conducted in this area in Turkey. Thus, to be able to reveal the cross-cultural validity of the models related to pathological worry and obsessional symptoms, studying the psychometric characteristics of the PSWQ and MCQ-30 in different cultures seems to be crucial.

The PSWQ is a 16-item trait measure designed to capture the frequency, intensity and uncontrollability of worry in general, without referring to the content of specific topics. It is a principal measure of pathological worry similar to that found in GAD. While 11 items are positively scored, the remaining five items (items 1, 3, 8, 10 and 11) require reverse scoring. In this way, a single total score is obtained by summing all items, and higher scores represent higher levels of pathological worry. Adequate internal consistency for the PSWQ, ranging between 0.86 and 0.95, has been consistently reported in both clinical and non-clinical samples (Brown et al., 1992; Fresco, Heimberg, Mennin, & Turk, 2002; Meyer et al., 1990). In addition, the test–retest reliability of the PSWQ over different time intervals ranges between 0.74 and 0.93 across three independent college samples (Meyer et al., 1990). The instrument has been proved to be useful in both adult and elderly samples, in terms of discriminating individuals with GAD from those with other anxiety disorders, as well as from the control groups (Beck, Stanley, & Zebb, 1995; Behar, Alcaine, Zuellig, & Borkovec, 2003; Brown et al., 1992; Fresco, Mennin, Heimberg, & Turk, 2003). The convergent validity of the PSWQ is supported by significant correlations with other anxiety constructs, such as trait anxiety (Belzer, D'Zurilla, & Maydeu-Olivares, 2002; Davey, 1993; Meyer et al., 1990; van Rijsoort, Emmelkamp, & Vervaeke, 1999), state anxiety (Dugas, Freeston, & Ladouceur, 1997; Stöber & Joorman, 2001) and o–c symptoms (Burns, Keortge, Formea, & Sternberger, 1996) in non-clinical samples. The PSWQ is also positively correlated with depression (Meyer et al., 1990).

Studies evaluating the factor structure of the PSWQ using exploratory and confirmatory factor analysis have produced inconsistent results. While some researchers have concluded that the PSWQ is a unidimensional measure (Brown, 2003; Brown

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et al., 1992; Gana, Martin, Canouet, Trouillet, & Meloni, 2002; Ladouceur, Freeston, Rheaume, Letarte, & Dumont, 1992; Meyer et al., 1990), other studies have reported that the PSWQ yielded two potentially meaningful factors, the second one being composed of items that were reverse scored (Beck et al., 1995; Carter et al., 2005; Fresco et al., 2002). In addition, some non-English versions of the PSWQ, such as the Dutch (van Rijsoort et al., 1999), German (Stöber, 1995) and Italian (Meloni & Gana, 2001) versions, have revealed a two-factor structure depending on the direction of the wording of items, with the exception of two French versions (Gana et al., 2002; Ladouceur et al., 1992). Although the factor solution obtained in these cross-cultural studies indicated the presence of two subscales, van Rijsoort et al. (1999) have decided on a single underlying factor because of the good psychometric characteristics of the PSWQ as a whole and its common acceptance as a unidimensional instrument. The conclusion reached by some that the negatively keyed items constitute an independent latent factor as a representation of 'absence of worry' has been subjected to criticisms due to the lack of a theoretical rationale supporting this second factor's clinical and theoretical meaning (Brown, 2003).

The MCQ-30 is a multidimensional measure of a range of metacognitive processes and metacognitive beliefs about worry and cognition relevant to vulnerability to and maintenance of emotional disorders. This measure was originally developed out of the metacognitive model of psychological vulnerability (Wells & Matthews, 1994, 1996), and some of the domains measured are important in the model of worry and GAD (Wells, 1994, 1997). Although it was initially developed as a 65-item questionnaire (Cartwright-Hatton & Wells, 1997), the scale was further revised into a shorter 30-item version (Wells & Cartwright-Hatton, 2004). Consistent with the initial form, the MCQ-30 is composed of five correlated but conceptually distinct factors (shorthand in parentheses): (1) positive beliefs about worry (positive beliefs), which assesses the extent to which the person believes that worrying is helpful; (2) negative beliefs about worry concerning uncontrollability and danger (uncontrollability and danger), which measures the extent to which the person believes that worrying is uncontrollable and dangerous; (3) lack of cognitive confidence which measures confidence in memory; (4) beliefs concerning the need to control, and consequences of not controlling, one's own thoughts (need to control thoughts); and (5) cognitive self-consciousness, which assesses the tendency to monitor one's own thoughts and

focus one's attention inwards. Total scores for the MCQ-30 and its subscales are obtained by summating all items, and higher scores indicate higher levels of metacognitive beliefs or processes. Wells and Cartwright-Hatton's (2004) study, conducted with student and non-student participants, demonstrated that the MCQ-30 had good psychometric qualities. Accordingly, the internal consistency of the total MCQ-30 ($\alpha = 0.93$) and its subscales ($\alpha = 0.92, 0.91, 0.93, 0.72$ and 92, respectively) were found to be satisfactory. Test–retest reliability, after a period of 22–118 days, was reported as high (0.75) for the total MCQ-30, while stability of the subscales ranged from acceptable to good (0.79, 0.59, 0.69, 0.74 and 0.87, respectively). As evidence of convergent validity, total and subscale scores of the MCQ-30 were found to be significantly and positively correlated with the measures of pathological worry, o–c symptoms and trait anxiety in many studies (e.g., Myers & Wells, 2005; Wells & Cartwright-Hatton, 2004; Wells & Papageorgiou, 1998). More specifically, the total score of the MCQ-30 correlated significantly with the PSWQ ($r = 0.54$), State-Trait Anxiety Inventory-Trait (STAI-T; $r = 0.53$) and a range of obsessional symptom subscales (Wells & Cartwright-Hatton, 2004).

In view of these findings, the present study was motivated by the need to examine the utility of the PSWQ and the MCQ-30 in a Turkish sample. In particular, we examined the latent structure and reliability and validity of these cross-cultural versions. In this way, cross-cultural studies of individual differences and cross-cultural theory testing using these self-report measures would be possible. In addition, we sought to replicate the findings (e.g., Wells & Papageorgiou, 1998) that have provided support for the role of metacognitive factors in predicting pathological worry and o–c symptoms. Following the metacognitive model of GAD and OCD (Wells, 1995, 1997, 2000), it was hypothesized that negative beliefs concerning the uncontrollability and danger of worry would independently predict pathological worry and o–c symptoms while controlling for the overlap between worry and o–c symptoms. The contribution of the other dimensions of metacognition was also explored in the present sample drawn from a non-Western culture.

METHOD

Subjects

The sample in the present study consisted of 561 participants. There were 457 (81.5%) undergraduate

and post-graduate students from various departments of Abant Izzet Baysal University and Middle East Technical University, and 104 (18.5%) non-students who were employees of these universities. While the student sample consisted of 251 females (54.9%) and 206 males (45.1%), the non-student sample included 49 females (47.1%) and 55 males (52.9%). As a whole, the sample was composed of 300 (53.5%) females and 261 (46.5%) males. The age of the total sample ranged from 17 to 52 years with a mean of 23.55 (Standard Deviation [SD] = 5.7).

Instruments

In addition to the Turkish versions of the PSWQ and MCQ-30, the instrument battery included the Turkish versions of the following instruments.

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

The PI-WSUR (Burns et al., 1996) is a 39-item scale measuring o–c symptoms without worry contamination. Each item in the PI-WSUR is scored on a five-point scale ranging from *not at all* (0) to *very much* (4). In Burns et al.'s (1996) study, a high level of internal consistency was reported for the total PI-WSUR ($\alpha = 0.92$), as well as stability over a 6- to 7-month intervals. The total score of PI-WSUR was shown as having a moderate relationship with the PSWQ ($r = 0.34$, $p < 0.001$).

The adaptation study of the PI-WSUR into Turkish was conducted in samples of college students and patients with OCD and other anxiety disorders (Yorulmaz et al., 2007). In a non-clinical college student sample, the Cronbach's alpha coefficient of the scale was 0.93 for the total scores. The test–retest reliability of the total scale within a 4-week interval was 0.86. The Turkish PI-WSUR was also found to be positively related with other o–c symptom measures, such as the Maudsley Obsessive–Compulsive Inventory ($rs = 0.76$ for student, 0.88 for OCD samples) and the Thought–Action Fusion Scale ($rs = 0.39$ for student, 0.67 for OCD samples).

STAI-T

The STAI-T (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a 20-item measure used to assess anxiety proneness. Respondents indicate their agreement with each item on a four-point Likert scale ranging from *almost never* (1) to *almost always* (4). Responses are summated to obtain a total trait anxiety score. High scores indicate more trait anxiety. The STAI-T has been found to possess good to excellent internal consistency ($rs = 0.86$–0.95) and test–retest reliability ($rs = 0.65$–0.75) in adult, college and high school samples (Spielberger et al., 1983). Convergent validity of the STAI-T with other measures of anxiety was shown in normal and in anxiety disorder samples (Bieling, Antony, & Swinson, 1998; Creamer, Foran, & Bell, 1995).

The Turkish adaptation of the scale was assessed by Öner and Lecompte (1985). As comparable with the original scale, the internal consistency coefficients of the Turkish version were found to range from 0.83 to 0.87, while the test–retest reliability ranged from 0.71 to 0.86 in a period of over a year in five samples of university students. In terms of validity, the STAI-T scores of the psychiatric patient group were found to be significantly higher than the normal comparison group. The correlation between the Turkish STAI-T and Beck Anxiety Inventory (BAI) was reported as 0.53.

BAI

The BAI (Beck, Epstein, Brown, & Steer, 1988) consisting of 21 items, is a four-point Likert-type measure of cognitive and somatic symptoms of anxiety. Scores can range from 0 to 63. Good internal consistency and high short-term test–retest reliability have been demonstrated in mixed psychiatric samples and in patients with anxiety disorders (Beck et al., 1988; de Beurs, Wilson, Chambless, Goldstein, & Feske, 1997), as well as in non-clinical samples (e.g., Creamer et al., 1995). As for concurrent and convergent validity, the BAI was found to be moderately correlated with anxiety ($rs = 0.36$–0.69) and depression ($rs = 0.25$–0.56) measures in psychiatric (Beck et al., 1988) and student samples (Osman, Kopper, Barrios, Osman, & Wade, 1997). The BAI was adapted to Turkish by Ulusoy, Şahin, and Erkmen (1998), who found it to have reliability and validity coefficients that are comparable with the original values.

Beck Depression Inventory (BDI)

The BDI (Beck, Rush, Shaw, & Emery, 1979) is composed of 21 items that assess the symptoms of depression. The items are rated on a four-point Likert-type scale, and scores can range from 0 to 63. The BDI has a well-established reliability that its mean coefficient alpha, across 25 years of studies, was reported as 0.86 in psychiatric populations and 0.81 in non-psychiatric populations (Beck, Steer, & Garbin, 1988). A psychometric evaluation of the Turkish version of the BDI was carried out by Hisli

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(1988, 1989), and its psychometric properties were found to be similar to the original scale.

Procedure

The PSWQ was translated into Turkish by three independent translators, while the number of translators was five for the MCQ-30. All of the translators were bilingual and had strong psychology backgrounds. The translated Turkish items, together with the original items, were given to two additional judges, who were asked either to choose one of the translations or to make their own translations for each item. Finally, two of the judges, one of whom was from the first and the other from the second step translation group, reviewed and decided on the final forms of the Turkish versions of the PSWQ and the MCQ-30. The final forms were then translated back into English by a psychology professor familiar with Western culture. The back-translated versions were very close to the original scales.

The instruments were administered during regular class hours to student participants. The students either received credit for their participation or were volunteers. A method of convenience sampling was used to obtain non-student participants. Before the instruments were administered, instructions were given to all participants. The instruments were presented in randomized sequences to eliminate the effect of sequencing. The cover page included a brief explanation about the study and an informed-consent form. The instruments took approximately 30 minutes to administer.

A small subsample of 26 student participants were retested with the PSWQ and MCQ-30. The retest interval between the two administrations ranged from 5 to 7 weeks. There were 24 men and

2 women in this group of participants. The age of the total sample ranged from 23 to 46 years, with a mean of 28.39 (SD = 4.3).

RESULTS

Descriptive Statistics

Mean scores and SDs of the PSWQ and MCQ-30 subscales are presented for the total sample, men and women, separately, in Table 1. The mean worry level was comparable to that reported both in the original study and in the other research with non-clinical students and community individuals (Meyer et al., 1990; see also Molina & Borkovec, 1994 and Startup & Erickson, 2006 for reviews). To illustrate, compiling from a number of studies, Startup and Erickson (2006) reported a mean score on the PSWQ of 47.42 (SD = 13.40) for college students and 42.67 (SD = 11.71) for community adult samples.

The total and subscale means for the MCQ-30 obtained from the current sample, as a whole, tended to be higher than the mean values reported in the original study (Wells & Cartwright-Hatton, 2004). For example, a mean value of 48.41 (SD = 13.31) was reported for the total MCQ-30 for the English version, which compares with 63.90 (SD = 12.26) in the current sample.

Independent samples t-tests were used to test whether there were any differences between men and women on the PSWQ and on the subscales of the MCQ-30 (see Table 1). Consistent with the literature (Molina & Borkovec, 1994; Robichaud, Dugas, & Conway, 2003; Startup & Erickson, 2006), women scored significantly higher than men on the PSWQ in our non-clinical sample. As a result of these comparisons, differences between men and women on the total score of MCQ-30 did not

Table 1. Means (standard deviations) and mean differences on the PSWQ and MCQ-30

Variables	Total ($n = 561$)	Men ($n = 261$)	Women ($n = 300$)	t value	Effect size d
1. PSWQ	44.67 (12.73)	42.25 (12.05)	46.78 (12.95)	−4.27****	0.36
2. MCQ-30 Total	63.90 (12.26)	64.57 (11.58)	63.32 (12.81)	1.20	−
Positive beliefs	11.89 (3.94)	12.59 (3.99)	11.28 (3.81)	3.97****	0.34
Uncontrollability and danger	12.13 (3.83)	11.66 (3.61)	12.53 (3.98)	−2.70**	0.23
Lack of cognitive confidence	11.23 (4.38)	10.66 (4.07)	11.72 (4.58)	−2.88***	0.25
Need to control thoughts	12.84 (3.67)	13.44 (3.74)	12.32 (3.53)	3.63****	0.31
Cognitive self-consciousness	15.82 (3.60)	16.22 (3.56)	15.46 (3.60)	2.50*	0.21

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.005$. **** $p < 0.001$.
PSWQ = Penn State Worry Questionnaire. MCQ-30 = Metacognitions Questionnaire-30. d = Cohen's measure of effect size.

emerge as significant. However, the mean scores of men for positive beliefs, need to control thoughts and cognitive self-consciousness subscales were significantly higher than those of women. The mean scores of women for uncontrollability and danger and lack of cognitive confidence were significantly higher than those of men. Although these gender differences were statistically significant, overall they are small in magnitude and may not be meaningful. In order to determine the standardized magnitude of these differences, the effect sizes were calculated using Cohen's formula. As can be seen in Table 1, the effect size values indicated that the magnitude for the significant differences between men and women were small.

Psychometric Properties of the PSWQ

Factor Structure

To examine the factor structure of the PSWQ, a principal component factor analysis with a Varimax rotation was performed. The Kaiser–Meyer–Olkin measure of sampling adequacy showed that the coefficient was 0.94, which is higher than its minimum required value of 0.60 (Tabachnick & Fidell, 2001). Bartlett's test of sphericity was significant (degree of freedom [df] = 120, $p < 0.001$), indicating the suitability of the correlation matrix for factoring. Scree plot and eigenvalues revealed two factors with eigenvalues of 7.13 (explaining 44.54% of the total variance) and 1.44 (explaining 8.97% of the total variance), accounting for 53.51% of the total variance. The lower limit for a factor loading was set at 0.30 (Tabachnick & Fidell, 2001). While the first factor consisted of 11 positively scored items, the second factor was composed of five reverse-scored items. In accordance with the previous studies that obtained the same factor structure, these factors were called 'presence of worry' and 'absence of worry' factors, respectively. Table 2 presents the factor loadings of the PSWQ items. Cronbach's alpha reliability coefficients for the presence and absence of worry factors were 0.92 and 0.68, respectively.

These results, particularly the low reliability of the factor composed of the reverse-scored items, correspond with the findings of studies focusing on the psychometric properties of the PSWQ in a cross-cultural context (Meloni & Gana, 2001; Stöber, 1995; van Rijsoort et al., 1999). In order to examine whether the PSWQ has a substantial and conceptually distinct second subscale that might be called 'absence of worry' or the presence of this factor only results from the effect of reverse wording, the

data of the present study were subjected to refactoring. Two principal component analyses, one for 11 items phrased in the positive direction and one for five items worded in the negative direction, were conducted. In the first analysis, scree plot and eigenvalues indicated one factor with an eigenvalue of 6.28, and this single factor explained 57.08% of the total variance. For the five-item scale, principal component analysis, together with the scree plot, revealed one factor with an eigenvalue of 2.23, accounting for 44.61% of the total variance. These results demonstrated that the positively scored items alone explained more of the variance than the combination of the positive and negative items or negative items alone, and the contribution of the reverse-scored items to the whole scale was less than that of the positively scored items.

Reliability

The corrected item–total correlations for the total PSWQ ranged from 0.32 to 0.75. While these correlations were between 0.56 and 0.77 for the presence of worry factor, they ranged from 0.35 to 0.54 for the absence of worry factor. These coefficients denoted that both positively and negatively scored items were acceptable as they are higher than the conventional level of 0.20 (Kline, 1986). The reliability of the PSWQ was determined by computing the internal consistency coefficient, the split-half reliability and the test–retest correlations. Cronbach's alpha coefficient for the whole scale was found to be 0.91, supporting high reliability for the scale corresponding with the relevant literature. It is worth noting that the magnitude of this alpha was quite similar to the alpha coefficient (α = 0.92) for the 11-item, presence of worry factor. The Guttman split-half reliability for the whole PSWQ was 0.91. Whereas Cronbach's alpha coefficient for the first half, which was composed of eight items, was 0.82, it was 0.84 for the second half, which consisted of eight items.

The test–retest reliability of the PSWQ was assessed via Pearson correlation on a subsample of 26 participants. The retest coefficients for the total PSWQ, for the positive items and for the negative items were 0.88 ($p < 0.01$), 0.88 ($p < 0.01$) and 0.72 ($p < 0.01$), respectively. In order to examine any changes in the PSWQ and its factors over the test–retest interval, paired samples t-tests were carried out. The result of these tests indicated that there was no significant mean difference between these two intervals for the PSWQ total scores and the presence and absence of worry factors.

Table 2.   Rotated factor loadings of the Penn State Worry Questionnaire items

Item and item number	Loadings on factors	
	1	2
Factor 1: Presence of worry		
I worry all the time (15) (Sürekli olarak endişeliyimdir)	**0.83**	−0.11
Once I start worrying, I can't stop (14) (Bir kez endişelenmeye başladığımda, bunu durduramam)	**0.79**	−0.20
I am always worrying about something (7) (Her zaman birşeyler hakkında endişeleniyorum)	**0.79**	−0.23
I've been a worrier all my life (12) (Tüm yaşamım boyunca endişeli biri olmuşumdur)	**0.78**	−0.24
I know I shouldn't worry about things, but I just can't help it (5) (Yaşamakta olduğum şeyler hakkında endişelenmemem gerektiğini biliyorum ama kendime engel olamıyorum)	**0.75**	−0.25
Many situations make me worry (4) (Birçok durum beni endişelendirir)	**0.74**	−0.28
I notice that I have been worrying about things (13) (Yaşamakta olduğum şeyler hakkında endişeleniyor olduğumu fark ederim)	**0.74**	−0.16
As soon as I finish one task, I start to worry about everything else I have to do (9) (Bir işi bitirir bitirmez, yapmak zorunda olduğum tüm diğer şeyler hakkında endişelenmeye başlarım)	**0.67**	−0.11
My worries overwhelm me (2) (Endişelerim beni bunaltır)	**0.66**	−0.22
I worry about projects until they are all done (16) (Tamamen yapıp bitirene kadar tasarladığım işler hakkında endişelenirim)	**0.60**	−0.29
When I am under pressure, I worry a lot (6) (Baskı altında olduğumda çok endişelenirim)	**0.60**	−0.23
Factor 2: Absence of worry		
I don't tend to worry about things (3) (Yaşamakta olduğum şeyler hakkında endişelenme eğiliminde değilimdir)	−0.18	**0.71**
I never worry about anything (10) (Asla herhangi bir şey için endişelenmem)	−0.15	**0.68**
I find it easy to dismiss worrisome thoughts (8) (Endişe verici düşünceleri aklımdan kolaylıkla atarım)	−0.35	**0.67**
If I don't have enough time to do everything, I don't worry about it (1) (Herşeyi yapmaya yeterli zamanım yoksa, bunun için endişelenmem)	−0.01	**0.59**
When there is nothing more I can do about a concern, I don't worry about it anymore (11) (Bir konu ile ilgili olarak yapabileceğim daha fazla bir şey olmadığında, artık o konu hakkında endişelenmem)	−0.17	**0.51**

Convergent Validity

To investigate the convergent validity of the PSWQ, Pearson correlations of the PSWQ with PI-WSUR, STAI-T, BAI and BDI were computed. As can be seen in Table 3, positive correlations ranging from moderate to strong were obtained

between the PSWQ and these measures, and these coefficients were in parallel with previous research findings.

With respect to the question of whether reverse-scored items in the Turkish version of the PSWQ measure a different component of worry, which

Table 3. Correlations of the PSWQ and MCQ-30 with measures of anxiety and depression (*n* = 561), and differences in dependent correlations between total PSWQ, presence of worry and absence of worry

	PSWQ (a)	PSWQ1 (b)	PSWQ2 (c)	Difference			STAI-T	BAI	BDI	MCQ-1	MCQ-2	MCQ-3	MCQ-4	MCQ-5	MCQ-30
				a versus b t (558)	a versus c t (558)	b versus c t (558)									
PI-WSUR	0.49**	0.51**	−0.26**	1.94	10.49**	11.76**	0.49**	0.49**	0.44**	0.34**	0.47**	0.11**	0.42**	0.26**	0.50**
STAI-T	0.67**	0.67**	−0.44**	0.00	17.74**	19.74**	–	0.54**	0.65**	0.23**	0.65**	0.34**	0.24**	0.07	0.49**
BAI	0.43**	0.44**	−0.26**	0.93	9.45**	10.40**		–	0.52**	0.21**	0.45**	0.17**	0.28**	0.12**	0.39**
BDI	0.46**	0.48**	−0.26**	1.90	9.99**	11.18**			–	0.16**	0.47**	0.23**	0.25**	0.05	0.37**
MCQ-1	0.38**									–	0.34**	0.12**	0.33**	0.28**	0.65**
MCQ-2	0.70**										–	0.30**	0.44**	0.25**	0.73**
MCQ-3	0.30**											–	0.10*	−0.08	0.50**
MCQ-4	0.30**												–	0.47**	0.72**
MCQ-5	0.16**													–	0.57**
MCQ-30	0.58**														–

*p < 0.05. **p < 0.01.
PSWQ = Penn State Worry Questionnaire. MCQ-30 = Metacognitions Questionnaire-30. PSWQ1 = presence of worry factor. PSWQ2 = absence of worry factor. PI-WSUR = Padua Inventory-Washington State University revision. STAI-T = State-Trait Anxiety Inventory Trait form. BAI = Beck Anxiety Inventory. BDI = Beck Depression Inventory. MCQ1 = positive beliefs. MCQ2 = uncontrollability and danger. MCQ3 = lack of cognitive confidence. MCQ4 = need to control thoughts. MCQ5 = cognitive self-consciousness.

makes a direct contribution to understanding psychological disturbances, the relationships among presence and absence of worry factors and anxiety and depression measures were examined (see Table 3). The scores on each factor of the PSWQ were calculated by summating the relevant items on these factors. Higher scores on the 'presence of worry' factor indicated higher levels of worry, whereas higher scores on the 'absence of worry' factor indicated lower levels of worry. The presence of worry showed a strong negative correlation with the absence of worry (*r* = −0.53), indicating that these two factors were intercorrelated, but the magnitude is not consistent with the idea that they measure opposite ends of the same construct unless they are considered to ineffectively tap it.

The magnitude of the relationships between the presence of worry and the PI-WSUR, STAI-T, BAI and BDI were almost identical to those obtained between the total scores of the PSWQ and these measures. In order to determine whether the presence of worry factor correlated with PI-WSUR, BAI and BDI to a significantly different degree than did the total PSWQ scores, tests of differences between dependent correlations (Steiger, 1980) were carried out. As can be seen in Table 3, none of these relationships were significantly different than the relationships of total PSWQ scores with measures of anxiety and depression. That is, positive items had an equivalent strength to the total PSWQ in detecting the relationship patterns between pathological worry and psychological symptomatology. As for the absence of worry, it revealed moderate and negative correlations with measures of anxiety and depression. All of these correlation coefficients were significantly smaller than the PSWQ total score and presence of worry factor correlations obtained for these symptom measures (see Table 3).

Psychometric Properties of the MCQ-30

Factor Structure

In order to investigate the factor structure of the Turkish version of the MCQ-30, scores obtained from the scale were subjected to an exploratory factor analysis using principal components factoring. The Kaiser–Meyer–Olkin measure of sampling adequacy was found to be 0.89, and Bartlett's test of sphericity was significant (df = 435, *p* < 0.001). Scree plot and eigenvalues indicated five factors with eigenvalues of 6.79, 4.19, 2.81, 2.03 and 1.38 for extraction. These factors were subjected to an oblique rotation since previous research with the

MCQ and MCQ-30 demonstrated that dimensions of the MCQ are intercorrelated. The explained variances by these five factors were 22.65%, 13.98%, 9.38%, 6.76% and 4.61%. The lower limit for a salient item loading was set at 0.30 (Tabachnick & Fidell, 2001). The rotated loadings of the MCQ-30 items for each of the extracted factors are presented in Table 4. Comparison of the results from the original English non-clinical sample (Wells & Cartwright-Hatton, 2004) and the present Turkish sample showed that the factor structure was quite similar. Therefore, the same factor names used in the original study were assigned to these factors.

Although items 11 and 13 loaded on two factors in the Turkish version of the scale, the loadings of these items on their related subscales were higher than those on the unrelated subscales.

Reliability

Except for one item (item 5), corrected item–total coefficients ranged from 0.20 to 0.59 for the total MCQ-30. As for the individual subscales, they ranged from 0.29 to 0.67 for uncontrollability and danger, 0.54 to 0.86 for lack of cognitive confidence, 0.61 to 0.77 for positive beliefs, 0.42

Table 4. Rotated factor loadings and alpha coefficients of Metacognitions Questionnaire-30 items (structure matrix)

Item and item number	Loadings on factors				
	1	2	3	4	5
Factor 1: Uncontrollability and danger ($\alpha = 0.80$)					
My worrying thoughts persist, no matter how I try to stop them (9) (Durdurmak için ne kadar uğraşsam da, endişe verici düşüncelerim devam eder)	**0.78**	0.29	−0.35	0.11	0.25
My worrying could make me go mad (15) (Endişelerim beni deliye döndürebilir)	**0.77**	0.22	−0.18	0.09	0.32
When I start worrying, I cannot stop (21) (Endişelenmeye başladığımda, bunu durduramam)	**0.75**	0.31	−0.38	0.04	0.28
I could make myself sick with worrying (4) (Endişelenerek kendi kendimi hasta edebilirim)	**0.73**	0.14	−0.02	0.12	0.28
I cannot ignore my worrying thoughts (11) (Endişe verici düşüncelerimi görmezden gelmek elimde değildir)	**0.58**	0.27	−0.55	0.22	0.21
My worrying is dangerous for me (2) (Endişelerim benim için tehlikelidir)	**0.46**	0.08	0.21	0.14	0.29
Factor 2: Lack of cognitive confidence ($\alpha = 0.89$)					
I do not trust my memory (26) (Hafızama güvenmem)	0.18	**0.92**	−0.06	−0.10	0.09
I have a poor memory (17) (Hafızam zayıftır)	0.19	**0.89**	−0.13	−0.08	0.08
I have little confidence in my memory for actions (29) (Olaylarla ilgili hafızama güvenim azdır)	0.25	**0.83**	−0.13	−0.10	0.12
I have little confidence in my memory for words and names (8) (Kelime ve isimlerle ilgili hafızama güvenim azdır)	0.16	**0.81**	−0.09	−0.06	0.01
I have little confidence in my memory for places (24) (Yerlerle ilgili hafızama güvenim azdır)	0.22	**0.68**	−0.00	−0.05	0.07
My memory can mislead me at times (14) (Hafızam beni zaman zaman yanıltabilir)	0.12	**0.66**	−0.14	−0.04	0.06
Factor 3: Positive beliefs ($\alpha = 0.89$)					
Worrying helps me to solve problems (23) (Endişelenmek sorunları çözmeme yardımcı olur)	0.12	0.14	**−0.85**	0.14	0.17

Table 4.   (*Continued*)

Item and item number	Loadings on factors				
	1	2	3	4	5
Worrying helps me cope (19) (Endişelenmek yaşadıklarımla başetmeme yardımcı olur)	0.11	0.10	**−0.84**	0.18	0.14
Worrying helps me to get things sorted out in my mind (10) (Endişelenmek işleri zihnimde bir düzene koymama yardımcı olur)	0.11	0.06	**−0.82**	0.21	0.12
I need to worry, in order to work well (28) (İyi çalışmak için, endişelenmem gerekir)	0.17	0.11	**−0.77**	0.13	0.26
I need to worry in order to remain organized (7) (Planlı kalabilmek için endişelenmem gerekir)	0.28	0.12	**−0.73**	0.16	0.29
Worrying helps me to avoid problems in the future (1) (Endişelenmek gelecekte olabilecek sorunları engellememe yardımcı olur)	0.16	0.11	**−0.71**	0.22	0.14
Factor 4: Cognitive self-consciousness (α = 0.80) I constantly examine my thoughts (30) (Düşüncelerimi sürekli incelerim)	0.30	0.01	−0.27	**0.78**	0.33
I pay close attention to the way my mind works (18) (Zihnimin nasıl çalıştığına çok dikkat ederim)	0.14	−0.09	−0.16	**0.77**	0.23
I monitor my thoughts (12) (Düşüncelerimi izler, takip altında tutarım)	0.01	−0.09	−0.28	**0.73**	0.32
I am constantly aware of my thinking (16) (Düşüncelerimin sürekli farkındayımdır)	0.01	−0.07	−0.07	**0.69**	0.33
I am aware of the way my mind works when I am thinking through a problem (5) (Bir sorun üzerinde düşündüğüm esnada, zihnimin nasıl çalıştığının farkında olurum)	−0.02	−0.11	−0.10	**0.62**	−0.01
I think a lot about my thoughts (3) (Düşüncelerim hakkında çok düşünürüm)	0.42	0.07	−0.13	**0.56**	0.20
Factor 5: Need to control thoughts (α = 0.73) Not being able to control my thoughts is a sign of weakness (20) (Düşüncelerimi kontrol altına alamamak bir zayıflık işaretidir)	0.10	0.08	−0.15	0.36	**0.75**
If I could not control my thoughts, I would not be able to function (27) (Düşüncelerimi kontrol altına alamazsam, iş göremez hale gelirim)	0.29	0.12	−0.14	0.30	**0.70**
I will be punished for not controlling certain thoughts (22) (Bazı düşünceleri kontrol altına almadığım için cezalandırılacağım)	0.38	0.10	−0.22	−0.01	**0.62**
It is bad to think certain thoughts (25) (Bazı düşünceleri akıldan geçirmek kötüdür)	0.25	0.08	−0.08	0.06	**0.62**
I should be in control of my thoughts all the time (13) (Düşüncelerimi her zaman kontrolüm altında tutabilmem gerekir)	0.11	0.00	−0.25	0.55	**0.56**
If I did not control a worrying thought, and then it happened, it would be my fault (6) (Endişe verici bir düşünceyi kontrol altına almazsam, ve sonra bu düşüncem gerçekleşirse, bu benim hatam olur)	0.28	0.07	−0.29	0.31	**0.54**

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to 0.68 for cognitive self-consciousness and 0.37 to 0.57 for need to control thoughts, indicating that all items were associated with their respective subscales. Item 5, whose relationship with the whole scale was lower than the conventional level of 0.20, was not excluded from the MCQ-30 since it was correlated sufficiently with its corresponding subscale ($r = 0.42$) and had a high loading on this subscale. In addition, examination of the alpha statistics demonstrated that deletion of this item would not make any significant contribution in terms of the reliability of the factor.

Internal consistency and test–retest reliability coefficients were computed for the whole scale and its subscales. Cronbach's alpha coefficient for the full MCQ-30 was found to be 0.87, indicating high reliability for the total score. The internal consistency coefficients of the factors are presented in Table 4 and ranged from 0.73 to 0.89. The Guttman split-half reliability for the total MCQ-30 was 0.90, and Cronbach's alpha coefficients were 0.77 and 0.76 for the first and the second halves, each including 15 items, respectively. In addition, the Guttman split-half reliabilities of the MCQ-30 factors were 0.82 for uncontrollability and danger, 0.90 for lack of cognitive confidence, 0.90 for positive beliefs, 0.84 for cognitive self-consciousness and 0.76 for need to control thoughts. Twenty-six participants were retested with the MCQ-30. The retest interval ranged from 5 to 7 weeks. While the retest correlation for the total MCQ-30 scores was found to be 0.80 ($p < 0.01$), it was 0.75 ($p < 0.01$) for positive beliefs, 0.90 ($p < 0.01$) for uncontrollability and danger, 0.45 ($p < 0.05$) for lack of cognitive confidence, 0.68 ($p < 0.01$) for need to control thoughts and 0.56 ($p < 0.01$) for cognitive self-consciousness. Paired samples *t*-tests revealed that none of the mean differences between two administrations was significant for any of the MCQ-30 subscales or total scores.

Convergent Validity

In order to evaluate the convergent validity of the MCQ-30 and its subscales, the correlation coefficients among MCQ-30 total score, MCQ-30 subscales, PSWQ, PI-WSUR, STAI-T, BAI and BDI were examined. In line with previous research, as can be seen in Table 3, there were positive correlations between total MCQ-30 and PSWQ, PI-WSUR, STAI-T, BAI and BDI. Except for the correlations between the cognitive self-consciousness subscale and trait anxiety and depression, all of the remaining subscales of the MCQ-30 revealed significant positive correlations with the other

convergent validity measures, ranging from strong to weak. Except for the relationship between lack of cognitive confidence and cognitive self-consciousness subscales, all of the other MCQ-30 subscales were found to be intercorrelated.

Metacognitive Predictors of Pathological Worry

In order to test whether metacognitive factors are significant predictors of pathological worry, a multiple regression analysis was performed with the PSWQ as a dependent variable. The PI-WSUR was entered in the first step to control the o–c symptom and worry overlap. Gender was also treated as a covariate and was controlled in the first step. In order to determine whether metacognitive factors could explain a significant proportion of variance in pathological worry above and beyond o–c symptoms and gender, the subscales of the MCQ-30, as a set, were entered in the second step.

As can be seen in Table 5, R was significantly different from zero at the end of each step. In step one, o–c symptoms and gender together predicted a significant proportion of variance in pathological worry ($R^2 = 0.26$, F [2, 558] = 98.15, $p < 0.001$). In the last step, the block of metacognitive variables made a further individual and significant contribution to the explained variance ($R^2_{change} = 0.30$, F_{change} [5, 553] = 75.68, $p < 0.001$), indicating that these metacognitive variables accounted for an additional 30% of the variance in PSWQ, in addition to the PI-WSUR and the effect of gender. In accordance with the hypothesis, negative beliefs about worry were independently associated with pathological worry. Incidentally, we found that positive beliefs about worry and low cognitive self-confidence were independent predictors of pathological worry.

Metacognitive Predictors of O–C Symptoms

To examine the independent metacognitive predictors of o–c symptoms, a multiple regression analysis in which PI-WSUR was regressed on the MCQ-30 subscales was performed. Again, the overlap of worry with PI-WSUR and the effect of gender were controlled in the first step, followed by the forced entry of MCQ-30 subscales in step two. In the first step (see Table 6), the control variables, as a set, were significant in predicting o–c symptoms ($R^2 = 0.24$, F [2, 558] = 86.88, $p < 0.001$). In this set, only worry emerged as a significant individual associate of o–c symptoms. In the second step, the block of metacognition variables made a further

Table 5. Statistics for the regression equation with PSWQ regressed on PI-WSUR, gender and MCQ-30 subscales

Variables	β	t (within set)	df	F_{change}	R^2
Step 1: Control variables			2558	98.15**	0.26
PI-WSUR	0.48	13.13**	558		
Gender	0.16	4.33**	558		
Step 2: Metacognitive factors			5553	75.68**	0.56
MCQ-1	0.17	5.42**	553		
MCQ-2	0.54	15.21**	553		
MCQ-3	0.08	2.63*	553		
MCQ-4	−0.05	−1.29	553		
MCQ-5	−0.03	−1.05	553		

Multiple $R = 0.75$**, Adjusted $R^2 = 0.56$

*$p < 0.01$. **$p < 0.001$.
PSWQ = Penn State Worry Questionnaire. PI-WSUR = Padua Inventory-Washington State University revision. MCQ-30 = Metacognitions Questionnaire-30. MCQ-1 = positive beliefs. MCQ-2 = uncontrollability and danger. MCQ-3 = lack of cognitive confidence. MCQ-4 = need to control thoughts. MCQ-5 = cognitive self-consciousness. df = degree of freedom.

Table 6. Statistics for the regression equation with PI-WSUR regressed on PSWQ, gender, and MCQ-30 subscales

Variables	β	t (within set)	df	F_{change}	R^2
Step 1: Control variables			2, 558	86.88***	0.24
PSWQ	0.49	13.13***	558		
Gender	−0.05	−1.23	558		
Step 2: Metacognitive factors			5, 553	17.17***	0.34
MCQ-1	0.11	2.67**	553		
MCQ-2	0.13	2.50*	553		
MCQ-3	−0.05	−1.28	553		
MCQ-4	0.24	5.44***	553		
MCQ-5	0.04	1.04	553		

Multiple $R = 0.58$**, Adjusted $R^2 = 0.33$

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.
PI-WSUR = Padua Inventory-Washington State University revision. PSWQ = Penn State Worry Questionnaire. MCQ-30 = Metacognitions Questionnaire-30. MCQ-1 = positive beliefs. MCQ2 = uncontrollability and danger. MCQ3 = lack of cognitive confidence. MCQ4 = need to control thoughts. MCQ5 = cognitive self-consciousness. df = degree of freedom.

significant contribution ($R^2_{change} = 0.10$, F_{change} [5, 553] = 17.17, $p < 0.001$). Consistent with the research's hypothesis, negative beliefs about uncontrollability and danger made a unique contribution to o–c symptoms. Additional unique contributions were also found for positive beliefs about worry and beliefs about the need to control thoughts.

DISCUSSION

The two main aims of the present study were to investigate the psychometric properties of Turkish versions of the PSWQ and MCQ-30 and to explore the metacognitive predictors of worry and o–c symptoms in a Turkish sample. For the

first purpose, the factor structure, internal consistency, split-half reliability, test–retest reliability and convergent validity of these scales were examined.

Results for the PSWQ

The initial factor analysis revealed a two-factor structure which was mainly based on the direction of the wording of items. While the 'presence of worry' factor was composed of 11 positively worded items, the 'absence of worry' factor was composed of the remaining five items written in the negative direction. Although this finding was in accordance with many studies (Beck et al., 1995; Carter et al., 2005; Fresco et al., 2002;

Meloni & Gana, 2001; Stöber, 1995; van Rijsoort et al., 1999), there are other studies supporting a unidimensional, general factor solution for the PSWQ (Brown, 2003; Brown et al., 1992; Ladouceur et al., 1992; Meyer et al., 1990). To clarify the individual contributions of these factors to pathological worry, two complementary factor analyses were performed. Among all factor analyses in the current study, the greatest amount of variance in pathological worry was explained by the positive items, followed by the total PSWQ scores and the negative items, respectively.

While the internal consistencies of the whole PSWQ and presence of worry factor were found to be equivalently high, the internal consistency of the absence of worry factor was found to be low. The Turkish version of the PSWQ was also found to have high split-half reliability and temporal stability (from 5 to 7 weeks) as a whole. On the other hand, the stability of the presence and absence of worry factors across the retest interval was also supported.

The relationships between the PSWQ and PI-WSUR, STAI-T, BAI and BDI were examined in connection with the convergent validity of the scale. The results verified that the PSWQ was significantly and positively associated with o–c symptoms, trait anxiety, and anxiety and depression symptoms. Such a pattern between pathological worry and anxiety and depression is a widespread finding in the literature (see Molina & Borkovec, 1994; Startup & Erickson, 2006 for reviews). Tests of differences between dependent correlations revealed that the magnitude of these relationships was not significantly different for the presence of worry factor and the whole PSWQ, while it was significantly smaller for the absence of worry factor.

Overall, these results indicate that the PSWQ is a reliable and valid instrument that could be utilized in Turkish culture in a manner consistent with the English version (Meyer et al., 1990). The analysis of the absence of worry factor might suggest that using only the presence of worry factor without the reverse-scored items would not cause loss of information in studies focusing on the relationships between pathological worry and psychological dysfunction. On the other hand, there was no direct evidence indicating a reason for the exclusion of these items from the scale. In fact, the psychometric properties of the whole PSWQ were found to be acceptable and similar to those reported in other studies. Given the fact that the aim of including these negative statements in the original PSWQ was to reduce the effects of

agreement (Meyer et al., 1990), we do not know the effects that dropping these items might have on participants' responses.

Results for the MCQ-30

The MCQ-30 includes metacognitions that are related to both content and process dimensions. In accordance with the original scale, the Turkish version of the instrument was found to be composed of five factors: positive beliefs about worry, negative beliefs about uncontrollability of thoughts and danger, lack of cognitive confidence, beliefs about need to control thoughts, and cognitive self-consciousness.

Reliability analyses, with respect to internal consistency and split-half reliability procedures, indicated that the instrument and its subscales possess high reliability. In addition, test–retest coefficients and tests of differences between two applications supported the stability of MCQ-30 and its subscales across time in a Turkish sample as parallel to the findings in the original study (Wells & Cartwright-Hatton, 2004). On the other hand, although retest correlations indicated a high level of stability for the whole scale and positive beliefs about worry, uncontrollability and danger, and need to control thoughts subscales, the correlations for lack of cognitive confidence and cognitive self-consciousness subscales were relatively low, suggesting that these subscales may act more similar to state variables and be prone to fluctuation.

Providing evidence for the convergent validity of the MCQ-30 and its subscales, the relationships with related constructs were significant and in the expected direction. The present findings are consistent with the data showing positive relationships between metacognitions and o–c symptoms (Gwilliam et al., 2004; Hermans et al., 2003; Myers & Wells, 2005; Purdon & Clark, 1999; Wells & Cartwright-Hatton, 2004; Wells & Papageorgiou, 1998). Moreover, the associations of MCQ-30 and its subscales with pathological worry and trait anxiety were significant, which is consistent with the original study, with the exception of the correlation between cognitive self-consciousness and trait anxiety. In particular, the MCQ-30 uncontrollability and danger subscale strongly correlated with pathological worry, accounting for 49% of the variance in worry in accordance with the original study (53%). Therefore, the findings of the current study provide further evidence for the pattern of associations between metacognitive beliefs and

pathological worry and trait anxiety (Davis & Valentiner, 2000; Wells & Carter, 1999; Wells & Papageorgiou, 1998).

The means for MCQ-30 and its subscales obtained from a Turkish sample tended to be higher than that reported for an English sample (Wells & Cartwright-Hatton, 2004). This may indicate true cultural differences, but this notion must be confirmed with subsequent studies.

Metacognitive Predictors of Worry and O–C Symptoms

The promising findings for psychometric properties of the PSWQ and the MCQ-30 set the stage for a preliminary examination of metacognitive predictors of worry and o–c symptoms. Results of multiple regression analyses provided support for the hypothesis based on metacognitive theory (Wells, 1997, 2000) that negative beliefs about uncontrollability and danger would independently predict pathological worry and o–c symptoms. Negative beliefs about worry predicted both pathological worry and o–c symptoms after controlling for the overlap between worry, o–c symptoms, gender and other metacognitions. Results also indicated different patterns of other unique metacognitive predictors of worry versus o–c symptoms. Positive beliefs about worry contributed to both worry and o–c symptoms. However, lack of cognitive confidence was specific to pathological worry, and beliefs about the need to control thoughts was specific in predicting o–c symptoms.

CONCLUSIONS

The findings of the current study provided preliminary data on the psychometric properties of the Turkish version of the PSWQ and the MCQ-30 and the metacognitive predictors of worry and o–c symptoms. Overall, the results suggest that both scales are psychometrically adequate measures that possess acceptable reliability, temporal stability and validity in a non-clinical population drawn from a non-Western culture. The positive associations between dimensions of metacognition and pathological worry and o–c symptoms are also consistent with earlier findings (Cartwright-Hatton & Wells, 1997; Wells & Papageorgiou, 1998). Given the promising initial findings, there is a need for studies focusing on the psychometrics of the Turkish versions of these scales in clinical samples, particularly in patients with GAD. In addition, the ability of the scales to differentiate individuals with GAD from those without GAD and/or those with other anxiety disorders should be studied, along with their sensitivity to treatment effects. Thus, replication of this study in patient samples is recommended.

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