

# Adaptation, Validity, and Reliability of the Metacognition Questionnaire-30 for the Turkish Population, and its Relationship to Anxiety and Obsessive-Compulsive Symptoms

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## Abstract

**Objective:** The present study aimed to evaluate the psychometric properties of the short form of the Metacognition Questionnaire (MCQ-30) in a population of Turkish university students. The metacognition questionnaire (MCQ) measures individual differences in a selection of metacognitive beliefs, judgments, and monitoring tendencies considered important in the metacognitive model of psychological disorders.

**Method:** The study included 850 university students from 15 Turkish universities. Mean age of the participants was 21.22 years, 282 (33.17%) were female, and 568 (66.82%) were male.

**Results:** Construct validity was evaluated by exploratory and confirmatory factor analysis (CFA). Exploratory factor analysis revealed that the Turkish version of MCQ-30 has 5 components, which is same factor structure as the original form. In addition, the fit indices of CFA suggested an acceptable fit to a 5-factor model consistent with the original MCQ-30. The Turkish MCQ-30 showed acceptable to good test-retest reliability, internal consistency, and convergent validity. Significant positive relationships between the subscales of MCQ-30 and measures of anxiety and obsessive-compulsive symptoms provided further support for the convergent validity of the Turkish version. Moreover, significant negative correlations were observed between age and the MCQ-30 subscales, and the effect of gender was significant on some of the subscales.

**Conclusion:** The psychometric properties of the Turkish version of MCQ-30 showed that the instrument is a valuable additional tool for the assessment of metacognition in Turkey.

**Key Words:** Metacognition, MCQ-30, anxiety, obsession, compulsion

## INTRODUCTION

The concept of metacognition can be described as a higher-order cognitive structure, i.e. knowledge and processes that control, execute, and evaluate cognition. Metacognition is a superior system that encompasses a person's self-awareness of his/her cognitive functions and facts, and that enables a person to purposefully direct these functions and facts (Crick, 2000; Dienes and Perner, 1999). In other words, it's a person's knowledge about his/her own knowledge, thoughts about his/her own thoughts, and or eye on his/her own cognitive process.

Metacognition plays a key role in the functional and adaptive working of human cognition. Consequently, it is considered that any dysfunction in this system, as a matter of course, would be a factor in the etiology and progress of psychopathology (Wells and Cartwright-Hat-

ton, 2004). Accordingly, some dysfunctional thoughts and coping methods related to psychological disorders are caused by some metacognitive functions. According to this hypothesis, people have some negative and positive beliefs (metacognitions) about their thoughts (their dysfunctional cognitions), which effect the evaluation of their experiences. This type of metacognition provokes maladaptive responses.(Cartwright-Hatton and Wells, 1997; Gwilliam et al. 2004). For instance, in respect of the metacognitive model of obsessive-compulsive disorder (OCD), people have beliefs about the importance and influence of some intrusive thoughts. For example, "I always have to be worried so as to be ready for negativity", or "If I think that I'll hurt my children, it indicates that I will". Metacognitions based on inappropriate criteria result in neutralizing and checking rituals. For example, "if I don't behave a certain way, the escalat-

ing emotion will drive me crazy.”, or “;unless I perform this ritual, that thought will materialize.” thereby, their evaluations about the threat will become permanent, resulting in less confidence in their memory (Mather and Cartwright-Hatton, 2004)

The number of researchers exploring metacognitive models and psychopathology has increased in recent years. Research into to the function of metacognition in generalized anxiety disorder (GAD) (Wells, 2005) obsessive-compulsive disorder (OCD) (Fisher and Wells, 2004; Myers and Wells, 2004; Wells and Papageorgiou, 1999), post traumatic stress disorder (PTSD) (Holeva et al., 2001), psychoses (Bacon et al., 2001; Morrison and Wells 2003; Weiss et al., 2002), depression (Papageorgiou and Wells, 2003), and substance abuse (Toneatto, 1999) has introduced evidence that verifies the effects of metacognition. However, the measurement of metacognition has been a challenging process in all these studies. The Thought Control Questionnaire (TCQ), Anxious Thoughts Inventory (AnTI), and Metacognitions Questionnaire (MCQ) are 3 questionnaires that are widely used (Wells and Cartwright-Hatton, 2004). The first and second questionnaires are used both in psychopathological and normal systems. In addition to these, MCQ is based on psychopathological metacognitions and is therefore appropriate for assessing metacognitions related to psychopathology.

MCQ was developed and psychometrically studied by Cartwright-Hatton and Wells (1997); it consists of 5 factors that are conceptually dissimilar, but interrelated. The 5 factors are: (1) positive beliefs, (2) cognitive confidence, (3) uncontrollability and danger, (4) cognitive self-consciousness, and (5) the need to control thoughts. All the factors include 2 common components that are positive and negative metacognitive thoughts (structures) and metacognitive processes (selective attention and observation of inner metacognitive processes). The study conducted by the developers of MCQ indicated that alpha reliability (Cronbach's alpha) of the 5 factors is 0.72-0.89.

Studies using MCQ have demonstrated that negative beliefs about thoughts differentiated GAD patients from patients with other anxiety disorders (Wells and Cartwright-Hatton, 2004). Researches studying the relationship between metacognition and obsessive-compulsive symptoms report that metacognitive factors that are measured by MCQ are positively related to obsessive-compulsive factors (Gwilliam et al., 2004; Hermans et al., 2003; Janeck et al., 2003; Wells and Papageorgiou,

1998). Wells and Papageorgiou (1998) concluded that metacognitions are positively related to pathological anxiety symptoms.

Similarly, there have been a number of studies about metacognition in Turkey (Irak, 2005; Peynircioğlu and Tekcan, 2000; Tekcan and Aktürk, 2001). These studies commonly made use of the feeling-of-knowing (FOK) paradigm. In the sources we were able to locate, no questionnaires other than paradigms were use and, consequently, future research will be difficult because paradigms such as FOK require an experimental design, are complex to implement and interpret, and are inappropriate for psychopathological samples. Therefore, the purpose of the present study was to translate MCQ into Turkish and to evaluate its validity and reliability with a Turkish sample, thereby bringing into use a questionnaire that assesses metacognitions in psychopathologic as well as in normal sample populations for research and clinical implementation.

## METHOD

### Sample

The study included 850 (568 female, 282 male) college students studying 27 different majors at 15 Turkish universities in Istanbul and Ankara in the fall 2005 and spring 2006 semesters. The volunteers were aged 17-36 years (mean: 21.22 years; SD: 1.90 years).

### Instruments

#### Metacognitions Questionnaire-30 (MCQ-30)

The questionnaire was originally developed (MCQ) by Cartwright-Hatton and Wells (1997) who subsequently developed a short version of the questionnaire containing 30 items (MCQ-30) (Cartwright-Hatton and Wells, 2004). In the process of its original development, GAD, OCD, hypochondriasis, and panic disorder (PD) patients were asked about their worries and intrusive thoughts, as well as the sources of these cognitive activities and the problems they caused. At the end of the process, a collection of metacognitions was attained and the 61-item MCQ (long version) was developed.

Each item on MCQ-30 is rated on a 4-point Likert scale; (1) do not agree to (4) agree very much. MCQ-30 scores range from 30 to 120 points and higher scores indicate greater pathological metacognitive activity.

According to the psychometric study conducted by Cartwright-Hatton and Wells (2004), MCQ-30 consists

of 5 factors and that are identical to those of the long version. Factor 1 is positive beliefs and the 1<sup>st</sup>, 7<sup>th</sup>, 10<sup>th</sup>, 20<sup>th</sup>, 23<sup>rd</sup> and 28<sup>th</sup> items refer to this factor and account for positive beliefs about worries that help with problem solving or plan making. In addition, worry is a desirable personality trait. Factor 2 is uncontrollability and danger, and the 6<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 21<sup>st</sup>, 25<sup>th</sup>, and 27<sup>th</sup> items refer to this factor, which has 2 dimensions. The first is the belief that for a person to be functional and safe, he/she needs to control his/her worries. The second is the belief that worries are uncontrollable. Factor 3 is cognitive confidence and the 8<sup>th</sup>, 14<sup>th</sup>, 18<sup>th</sup>, 24<sup>th</sup>, 26<sup>th</sup>, and 29<sup>th</sup> items refer to this factor, which is related to a person's mistrust of his/her own attention and memory capacity. Factor 4 is the need to control thoughts; the 2<sup>nd</sup>, 4<sup>th</sup>, 9<sup>th</sup>, 11<sup>th</sup>, 16<sup>th</sup>, and 22<sup>nd</sup> items refer to this factor, which is related to the need to control negative beliefs containing themes of superstition, punishment, and responsibility because it is thought that if a person doesn't control his/her beliefs, he/she will be responsible for the damage caused and will be punished. Factor 5 is cognitive self-consciousness and the 3<sup>rd</sup>, 5<sup>th</sup>, 12<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, and 30<sup>th</sup> items refer to this factor, which expresses a person's self-involvement with his/her own cognitive processes.

According to the psychometric study by Cartwright-Hatton and Wells (2004), the inter-item correlation score of MCQ-30 is  $> 0.3$  among the items supporting suitability for factor analysis. Additionally, the Kaiser-Meyer-Olkin (KMO) score is 0.90, indicating that the correlation matrix was suitable for factoring. For internal reliability, corrected item-total correlation scores are in the range of 0.31-0.68 for the full-scale and in the range of 0.77-0.83 for positive beliefs subscale, 0.72-0.87 for cognitive confidence subscale, 0.70-0.82 uncontrollability and danger subscale, 0.56-0.83 for cognitive self-consciousness subscale, and 0.30-0.65 for the need to control thoughts subscale. The alpha reliability of the full-scale is 0.93 and in the range of 0.72-0.93 for the subscales. Relationships between the subscales are significant and these correlations are similar to the correlations of MCQ (long version). The comparative fit index (CFI) conducted for construct validity is 0.91 (values exceeding 0.90 are considered to be a good fit).. At the same time, the root mean square residual (RMSR) coefficient is 0.04 (values less than 0.05 are interpreted as indicating a good fit).. To determine the convergent validity, the developers correlated MCQ-30 with trait anxiety, obsessive-compulsive symptoms, and pathological worry, which all significantly correlated with MCQ-30.

### **Trait Anxiety Inventory (TAI)**

This scale is the subscale of the State-Trait Anxiety Inventory (STAI), which was developed by Spielberger et al. in 1970 (Önel, 1994). TAI measures how anxious a person feels, independent of the environment and circumstances. The inventory was adapted to Turkish by Le Compte and Öner, and is commonly used in clinical research. Öner assessed its reliability and validity in 1994. Each item is rated on a 4-point Likert scale; almost never (1) to almost always (4). TAI scores range from 20 to 80 points; higher scores indicate more anxiety.

### **Maudsley Obsessive Compulsive Inventory (MOCI)**

MOCI was developed by Hodgson and Rachman in 1977 and was designed to explore the level and type of obsessive-compulsive symptoms (Erol and Savaşır, 1988). The inventory consists of control, hygiene, slowness, and rumination subscales. Scores range from 0 to 37 points and higher scores indicate more severe obsessive-compulsive symptoms. The inventory was restructured by Erol and Savaşır (1988) with the addition of 7 new items, bringing the total to 37 items. This study demonstrated that MOCI is a valid and reliable measure for assessing the types and prevalence of obsessive-compulsive disorders for clinical and research applications.

### **PROCEDURE**

Initially, a pre-study was conducted to adapt MCQ-30 to Turkish. This pre-study was composed of 2 steps: translation and counter-translation. In the first step, the items of the questionnaire were translated from English into Turkish with many possible alternatives for each item. Subsequently, these translation drafts were sent for evaluation to 7 Turkish professionals with a PhD in psychology and advanced English language skills. They were asked to choose the most appropriate item-translation from the suggested alternatives and to suggest a new translation if more appropriate. At the end of the process, the collectively approved items formed the Turkish version questionnaire. In the second step, 3 specialists back translated the questionnaire into English and the latest version of the questionnaire was consequently formed.

The process of data collection was conducted at 17 universities in Ankara and İstanbul at the appointment hours (20 min before class) assigned by the class instructors of the related faculties. Only volunteer students participated the study after they were fully informed about the nature of the research. The scale sequence was coun-

terbalanced. The scales were self-administrated in groups. Additionally, the scale battery was re-administrated to a group of 49 students 20 days later, for assessing test-retest reliability.

## RESULTS

Prior to analysis, the data were tested on the basis of normality, linearity, and homoscedasticity that are the central hypotheses of multivariate statistics, and we additionally investigated whether the data has extreme scores. As a result of the analysis, neither univariate nor multivariate outliers were found.

In accordance with the aim of the study, the data was analyzed in 2 stages. In the first stage findings about the validity and reliability of MCQ-30, in the second stage, findings about the relationship between MCQ-30, and TAI and MOCI were reported.

### Inter-item Correlations

Pearson's Correlation was used to investigate the relationships between the items that form MCQ-30 and the findings are presented in Table 1. As the table illustrates, no outstanding relationship was found between the items. Significant correlation coefficients ranged from 0.090 to 0.764 ( $P < 0.01$ ).

### Results of Reliability Analysis

The test-retest reliability method was used to determine the reliability of MCQ-30. The time interval between the test-retest was 20 days, and the findings are presented in Table 2. Results showed that the relations between all items were significant. In detail, test-retest correlation coefficients ranged from 0.40 (MCQ19) to 0.94 (MCQ9) for items and from 0.70 to 0.85 for subscales. Results indicated that MCQ-30 was a reliable measure in Turkish sample.

### Results of Validity Analysis

#### 1. Internal Validity

The Cronbach's alpha correlation method was used to assess internal validity. The alpha reliability coefficient of MCQ-30 was 0.86. Moreover, the coefficient was 0.72 for the first half of the questionnaire (odd numbered items) and 0.79 for the second half (even numbered items). The results indicated that MCQ-30 has high internal validity.

#### 2. Construct Validity

Factor analysis was used to determine the construct va-

lidity of MCQ-30. Principle component analysis (PCA) was used in the study. The KMO index, which is a criterion for determining if items are appropriate for principal component analysis, was 0.89 (perfect fit) (Bartlett's chi-square = 9165.11,  $p = 0.001$ ). Furthermore, 6 factors (eigenvalue > 1) were found and these factors explained 55.98% of the total variance. On the other hand, the Scree Plot graphic indicated 5 factors. The 5 factors solution with varimax rotation explained 52.44% of the total variance (Table 3). The present study's findings revealed factor constructs similar to the original questionnaire. The first factor included the 1<sup>st</sup>, 7<sup>th</sup>, 10<sup>th</sup>, 20<sup>th</sup>, 23<sup>rd</sup>, and 28<sup>th</sup> items of MCQ-30 (e.g. worrying helps me overcome problems). This factor explained 12.42% of the total variance. As with the original version of the questionnaire, this factor is referred as the positive beliefs factor (the 2<sup>nd</sup> factor in the original version). The second factor included the 8<sup>th</sup>, 14<sup>th</sup>, 18<sup>th</sup>, 24<sup>th</sup>, 26<sup>th</sup>, and 29<sup>th</sup> items of MCQ-30. This factor explained 12.39% of the total variance. This factor, which is 1<sup>st</sup> factor in the original version and includes the same items as the Turkish version (e.g. I do not trust my memory), and is referred to as the cognitive confidence factor. The third factor, which explained 11.14% of the total variance (4<sup>th</sup> factor in the original version), included the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 9<sup>th</sup>, 11<sup>th</sup>, 16<sup>th</sup>, and 22<sup>nd</sup> items of MCQ-30 (e.g. When I start worrying I cannot stop). This factor is referred to as the uncontrollability and danger factor. The third item that belongs to the cognitive self-consciousness factor in the original version (e.g. I constantly examine my thoughts), takes place under the uncontrollability and danger factor with factor loading of 0.652. After considering it meaning, it was determined that this item should have taken place under the cognitive self-consciousness factor; however, its factor loading was 0.297 under this factor. Due to the great difference between the factor loading, the 3<sup>rd</sup> item didn't take place under the 3<sup>rd</sup> factor (cognitive self-consciousness). The fourth factor, cognitive self-consciousness, which explained 8.37% of the total variance (the 3<sup>rd</sup> factor in the original version), included the 5<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, and 30<sup>th</sup> items of MCQ-30 (e.g. When I start worrying I cannot stop). The 13<sup>th</sup> item on the original version of the questionnaire (I should be in control of my thoughts all of the time) is placed under the need to control thoughts factor. In the adaptation study, the 13<sup>th</sup> item was placed under the fourth factor with factor loading of 0.47 and under the fifth factor with factor loading of 0.43. This indicates the instability of 13<sup>th</sup> item. It has been suggested that when using PCA if factor loading are too close, the item can take place under the factor that it fits best, depending on what it means and what it measures (Kim and Mueller, 1978; Stevens,

**Table I.** The inter-item relationships of MCQ-30.

	MCQ1	MCQ2	MCQ3	MCQ4	MCQ5	MCQ6	MCQ7	MCQ8	MCQ9	MCQ10	MCQ11	MCQ12	MCQ13	MCQ14	MCQ15
MCQ1	1														
MCQ2	-0.115**	1													
MCQ3	0.175**	0.179**	1												
MCQ4	0.07	0.265**	0.401**	1											
MCQ5	0.009	0.082	0.102**	0.031	1										
MCQ6	0.165**	0.078	0.203**	0.153**	0.102**	1									
MCQ7	0.280**	-0.04	0.206**	0.180**	0.015	0.264**	1								
MCQ8	-0.03	0.03	0.01	0.038	-0.121**	-0.033	0.006	1							
MCQ9	0.189**	0.169**	0.409**	0.440**	-0.052	0.191**	0.281**	0.103**	1						
MCQ10	0.337**	-0.085	0.152**	0.148**	0.088	0.181**	0.508**	0.012	0.232**	1					
MCQ11	0.210**	0.151**	0.438**	0.313**	-0.002	0.250**	0.292**	0.012	0.522**	0.274**	1				
MCQ12	0.111**	0.089**	0.228**	0.021	0.321**	0.168**	0.101**	-0.078	0.067	0.154**	0.220**	1			
MCQ13	0.166**	0.077	0.194**	0.155**	0.115**	0.289**	0.205**	-0.004	0.205**	0.225**	0.270**	0.349**	1		
MCQ14	0.066	0.055	0.176**	0.142**	-0.025	0.092**	0.117**	0.240**	0.189**	0.091**	0.193**	0.059	0.117**	1	
MCQ15	0.104**	0.127**	0.147**	0.218**	-0.066	0.213**	0.172**	0.039	0.254**	0.179**	0.179**	-0.054	0.211**	0.128**	1
MCQ16	0.108**	0.203**	0.340**	0.494**	-0.027	0.177**	0.124**	0.055	0.472**	0.134**	0.317**	0.022	0.158**	0.166**	0.382**
MCQ17	0.033	0.112**	0.173**	0.095**	0.298**	0.150**	0.009	-0.039	0.113**	0.088	0.163**	0.289**	0.280**	0.013	0.056
MCQ18	-0.03	0.075	0.042	0.048	-0.167**	0.024	0.057	0.606**	0.123**	0.012	0.079	-0.074	-0.012	0.339**	0.076
MCQ19	0.110**	0.081	0.200**	0.162**	0.157**	0.236**	0.179**	0.045	0.216**	0.245**	0.164**	0.210**	0.203**	0.063	0.221**
MCQ20	0.357**	-0.113**	0.194**	0.138**	0.06	0.255**	0.549**	0.005	0.255**	0.607**	0.284**	0.168**	0.283**	0.145**	0.178**
MCQ21	0.138**	0.153**	0.161**	0.266**	-0.008	0.280**	0.230**	0.023	0.222**	0.185**	0.202**	0.126**	0.378**	0.105**	0.331**
MCQ22	0.183**	0.172**	0.367**	0.486**	-0.062	0.211**	0.271**	0.076	0.590**	0.223**	0.446**	0.06	0.205**	0.174**	0.306**
MCQ23	0.323**	-0.08	0.194**	0.161**	0.065	0.199**	0.500**	0.005	0.232**	0.614**	0.286**	0.177**	0.234**	0.149**	0.137**
MCQ24	0.025	0.015	0.06	0.079	-0.068	0.032	0.067	0.483**	0.151**	0.087	0.097**	-0.001	0.026	0.279**	0.069
MCQ25	0.038	0.175**	0.107**	0.131**	0.014	0.167**	0.145**	-0.024	0.218**	0.103**	0.180**	0.013	0.178**	0.074	0.312**
MCQ26	0.026	0.085	0.116**	0.128**	-0.146**	0.018	0.066	0.580**	0.192**	0.026	0.134**	-0.027	0.039	0.346**	0.097**
MCQ27	0.140**	0.113**	0.267**	0.265**	0.023	0.242**	0.265**	-0.017	0.264**	0.227**	0.305**	0.191**	0.344**	0.144**	0.247**
MCQ28	0.268**	-0.090**	0.190**	0.190**	0.06	0.181**	0.542**	0.007	0.283**	0.544**	0.253**	0.08	0.193**	0.132**	0.202**
MCQ29	0.011	0.033	0.054	0.076	-0.137**	0.004	0.084	0.553**	0.132**	0.066	0.08	-0.051	-0.027	0.338**	0.075
MCQ30	0.150**	0.143**	0.357**	0.209**	0.150**	0.207**	0.220**	-0.056	0.295**	0.193**	0.322**	0.389**	0.395**	0.112**	0.152**

\*\*P < 0.01, \* P < 0.05

2002). Therefore, we decided to place the 13<sup>th</sup> item under the fifth factor, as in the original version. The fifth factor, the need to control thoughts, which is the last factor of the questionnaire, included the 6<sup>th</sup>, 15<sup>th</sup>, 21<sup>st</sup>, 25<sup>th</sup>, and 27<sup>th</sup> items, and explained 8.13% of the total variance.

As a result, factor structure of the MCQ-30 was very similar to the original version of the questionnaire and these findings confirmed that of construct validity of MCQ-30's Turkish version.

The factor structure of the MCQ-30 was analyzed

Table I. Continued.

	MCQ16	MCQ17	MCQ18	MCQ19	MCQ20	MCQ21	MCQ22	MCQ23	MCQ24	MCQ25	MCQ26	MCQ27	MCQ28	MCQ29	MCQ30
MCQ1															
MCQ2															
MCQ3															
MCQ4															
MCQ5															
MCQ6															
MCQ7															
MCQ8															
MCQ9															
MCQ10															
MCQ11															
MCQ12															
MCQ13															
MCQ14															
MCQ15															
MCQ16	1														
MCQ17	0.153**	1													
MCQ18	0.109**	-0.036	1												
MCQ19	0.263**	0.358**	0.085	1											
MCQ20	0.155**	0.130**	0.063	0.276**	1										
MCQ21	0.289**	0.182**	0.035	0.238**	0.256**	1									
MCQ22	0.547**	0.090**	0.127**	0.243**	0.254**	0.283**	1								
MCQ23	0.135**	0.097**	0.032	0.206**	0.666**	0.195**	0.271**	1							
MCQ24	0.085	0.011	0.532**	0.114**	0.110**	0.051	0.157**	0.119**	1						
MCQ25	0.188**	0.085	0.032	0.114**	0.110**	0.258**	0.194**	0.078	0.137**	1					
MCQ26	0.164**	-0.026	0.692**	0.092**	0.061	0.117**	0.203**	0.071	0.626**	0.075	1				
MCQ27	0.265**	0.196**	0.013	0.209**	0.295**	0.413**	0.321**	0.258**	0.07	0.276**	0.057	1			
MCQ28	0.157**	0.068	0.079	0.209**	0.591**	0.228**	0.272**	0.571**	0.160**	0.148**	0.118**	0.304**	1		
MCQ29	0.127**	-0.029	0.689**	0.139**	0.068	0.075	0.143**	0.081	0.620**	0.071	0.764**	0.092**	.161**	1	
MCQ30	0.211**	0.381**	-0.013	0.367**	0.252**	0.266**	0.294**	0.257**	0.036	0.156**	0.012	0.379**	.247**	0.033	1

\*\*P < 0.01, \*P < 0.05

with confirmatory factor analysis (CFA), using AMOS v.6.0 (Arbuckle, 2003). The main aim of this analysis was to retest the construct validity of MCQ-30, which

was tested by conducting principle component analysis, with a different method, and to provide clarification of the argument about the 3<sup>rd</sup> and 13<sup>th</sup> items. On the basis

**Table II.** Test-retest correlation analysis results.

Item	Test-Retest Correlation
MCQ-1	0.73***
MCQ-2	0.84***
MCQ-3	0.77***
MCQ-4	0.87***
MCQ-5	0.60***
MCQ-6	0.72***
MCQ-7	0.51***
MCQ-8	0.79***
MCQ-9	0.94***
MCQ-10	0.64***
MCQ-11	0.72***
MCQ-12	0.88***
MCQ-13	0.64***
MCQ-14	0.74***
MCQ-15	0.68***
MCQ-16	0.72***
MCQ-17	0.73***
MCQ-18	0.78***
MCQ-19	0.40**
MCQ-20	0.74***
MCQ-21	0.70***
MCQ-22	0.63***
MCQ-23	0.72***
MCQ-24	0.43**
MCQ-25	0.54***
MCQ-26	0.67***
MCQ-27	0.62***
MCQ-28	0.50***
MCQ-29	0.76***
MCQ-30	0.82***
Subscales	
Positive Beliefs	0.73***
Cognitive Confidence	0.85***
Uncontrollability and Danger	0.84***
Cognitive Self-Consciousness	0.80***
Need to Control Thoughts	0.70***

\*\* P < 0.01, \*\*\* P < 0.001

of the PCA, in the CFA we hypothesized that the Turkish form of MCQ-30 has 5 factors, and 30 items were analyzed in accordance with the construct obtained by conducting PCA. According to the results of the first model (the hypothesis model), the indexes observed were not what was expected (RMSEA = 0.054; CFI = 0.88; GFI =

0.89; RMR = 0.54; IFI = 0.88; TLI = 0.87). It is recommended that RMSEA be  $\leq 0.50$  and other (as CFI, GFI, RMR) indexes should be  $\geq 0.90$  for a consistent model (Byrne, 2001; Hayduk, 1987; Scott, 1983). As a result of the analysis, cross factor loading of the 3<sup>rd</sup> and 13<sup>th</sup> items proposed exchange indexes. The most significant and at high rate suggestions are that the 3<sup>rd</sup> item is related to uncontrollability and danger and that the 13<sup>th</sup> item is related to items placed under the need to control thoughts factor. The revised model's indexes were considerably high (RMSEA = 0.051; CFI = 0.90; GFI = 0.90; RMR = 0.50; IFI = 0.90; TLI = 0.89) and the results indicated a good-fit [ $\chi^2$  (465, n = 850) = 1282.91,  $p < 0.001$ ]. Finally, the results of CFA confirmed the results of PCA, and supported the revision made to the 3<sup>rd</sup> and 13<sup>th</sup> items. Findings indicated that the 3<sup>rd</sup> item should be placed under the cognitive self-consciousness factor and the 13<sup>th</sup> item should be placed under the need to control thoughts factor.

### Convergent Validity

Previous studies of MCQ (Cartwright-Hatton and Wells, 1997; Wells and Cartwright-Hatton, 2004) reported a positive relationship between the MCQ-30 and obsessive symptoms. To assess the convergent validity of MCQ-30, the relationships between MCQ-30, MOCI and TAI was analyzed by Pearson's correlation method. Findings are presented in Table 4. A significant positive relationship was observed between the MCQ-30 subscales and its total score, and MOCI subscales and its total score, and TAI score. These findings are consistent with the findings of previous studies and they support the convergent validity of the MCQ-30's Turkish version. As can be seen in Table 4, the relationships between the MCQ-30 subscales were significant, except for cognitive confidence and cognitive self-consciousness subscales. The coefficients are consistent with the previous studies (Cartwright-Hatton and Wells, 1997; Wells and Cartwright-Hatton, 2004).

### Gender Effect

Multivariate analysis of variance (MANOVA) was used to analyze how the scores varied according to gender. Dependent variables were the 5 MCQ-30 subscales and its total score, and the independent variable was gender. The Wilk's lambda was significant ( $F = 58.62$ ,  $p < 0.001$ ,  $\eta^2 = 0.047$ ). Additionally, it was found that gender had a significant effect on the positive beliefs ( $F(1-848) = 6.63$ ;  $p < 0.001$ ) and uncontrollability and danger ( $F(1-848) = 5.02$ ,  $P < 0.05$ ) subscales. Mean

**Table III.** Principal Component Analysis results.

Items	Factors				
	1	2	3	4	5
	Positive Beliefs	Cognitive Confidence	Uncontrollability and Danger	Cognitive Self-consciousness	Need to Control Thoughts
20. Worrying helps me cope.	0.805	0.058	0.075	0.148	0.169
23. Worrying helps me to solve problems.	0.791	0.059	0.114	0.135	0.069
10. Worrying helps me to get things sorted out in my mind.	0.775	0.025	0.079	0.103	0.105
28. I need to worry in order to work well	0.740	0.106	0.120	0.041	0.178
7. I need to worry in order to remain organized.	0.707	0.036	0.152	0.015	0.173
1. Worrying helps me to avoid problems in the future.	0.513	-0.031	0.136	0.050	0.003
26. I do not trust my memory.	0.006	0.872	0.124	-0.039	0.051
29. I have little confidence in my memory for actions.	0.049	0.871	0.033	-0.039	0.050
18. I have a poor memory.	-0.009	0.846	0.039	-0.065	0.023
24. I have little confidence in my memory for places.	0.080	0.769	0.022	0.019	0.051
8. I have little confidence in my memory for words and names.	-0.041	0.759	-0.002	-0.059	-0.028
14. My memory can mislead me at times..	0.108	0.454	0.200	0.068	0.044
9. My worrying thoughts persist, no matter how I try to stop them.	0.214	0.123	0.736	0.020	0.140
22. When I start worrying, I cannot stop..	0.202	0.118	0.721	-0.013	0.235
4. I could make myself sick with worrying.	0.046	0.033	0.710	0.010	0.164
16. My worrying could make me go mad.	0.014	0.082	0.670	-0.017	0.322
3. I think a lot about my thoughts.	0.132	0.041	0.652	0.297	-0.039
11. I cannot ignore my worrying thoughts.	0.274	0.066	0.611	0.203	0.066
2. My worrying is dangerous for me.	-0.331	0.045	0.356	0.168	0.218
12. I monitor my thoughts.	0.112	-0.027	0.052	0.735	-0.057
17. I am constantly aware of my thinking.	-0.041	-0.006	0.069	0.675	0.161
30. I constantly examine my thoughts.	0.169	0.005	0.288	0.599	0.221

and standard deviation scores of males and females for MCQ-30 subscales and its total score are presented in Table 5. In details, females scored higher on the need to control thoughts subscale and males scored higher on the uncontrollability and danger subscale. Moreover, females scored higher on cognitive confidence subscale, whereas males scored higher on cognitive self-consciousness subscale, but these means were not statistically different.

### Age Effect

The relationship between age and MCQ-30 subscales

and its total score was analyzed by the Pearson's correlation method (Table 6). Correlation coefficients ranged from -0.085 to -0.122. Age had a significant negative relationship with the cognitive self-consciousness, uncontrollability and danger, and need to control thoughts subscale scores, and the total score. Even though the relations between age positively correlated with cognitive confidence and positive beliefs subscales, these correlations were not statistically significant.

Furthermore, participants were asked to report their academic year. Changes in the MCQ-30 subscales and its total score according to age/academic year were analyzed

**Table III.** Continued.

Items	Factors				
	1	2	3	4	5
	Positive Beliefs	Cognitive Confidence	Uncontrollability and Danger	Cognitive Self-consciousness	Need to Control Thoughts
5. I am aware of the way my mind works when I am thinking through a problem.	0.012	-0.140	-0.054	0.594	-0.116
19. I pay close attention to the way my mind works.	0.164	0.130	0.138	0.440	0.278
21. Not being able to control my thoughts is a sign of weakness.	0.136	0.045	0.133	0.154	0.685
15. I will be punished for not controlling certain thoughts.	0.093	0.044	0.218	-0.128	0.662
25. It is bad to think certain thoughts.	0.011	0.041	0.094	-0.008	0.624
27. If I could not control my thoughts, I would not be able to function.	0.223	0.027	0.233	0.241	0.513
13. I should be in control of my thoughts all of the time.	0.191	0.001	0.079	0.470	0.428
6. If I did not control a worrying thought and then it happened, it would be my fault.	0.208	-0.012	0.123	0.244	0.390
Eigenvalue	6.45	3.62	2.42	1.86	1.38
Variance explained	12.42	12.39	11.14	8.37	8.13
Total Variance	12.42	24.8	35.94	44.31	52.44
Alpha	0.85	0.87	0.81	0.70	0.65

using with MANOVA. In the analysis the dependent variables were the 5 MCQ-30 subscales and its total score, and the independent variable was academic year (years 1 to 4). The Wilk's lambda was significant ( $F = 5.18, p < 0.001, \eta^2 = 0.030$ ). Moreover, the academic year variable was significantly related to the cognitive self-consciousness, ( $F(3-845) = 8.25, p < 0.001$ ), uncontrollability and danger ( $F(3-845) = 4.59, p < 0.01$ ), and the need to control thoughts ( $F(3-845) = 20.665, p < .001$ ) subscales, and the total score ( $F(3-845) = 8.98, p < .001$ ). The mean and standard deviations of the MCQ-30 subscales and its total score according to age/academic year are presented in Table 6. According to the results of post-hoc LSD, freshman students' cognitive self-consciousness scores were significantly different for than those of sophomores, juniors, and seniors. Uncontrollability and danger scores of freshmen were significantly different than those of sophomores and seniors. Freshmen total scores were significantly different than those of sopho-

mores. All subscale scores declined as academic year advanced. These results support a significant negative relationship between MCQ-30 and age.

## DISCUSSION

In this study we investigated the validity, reliability, and adaptation of the Turkish version of the MCQ-30 with volunteer Turkish university students. The results indicate that the the MCQ-30 has high internal validity and the inter-items correlations of the questionnaire were selectively significant. In addition, factor analysis indicated that the Turkish version of MCQ-30 has the same factor structure as the original version. Results of the principal component analysis revealed that the total variance of MCQ-30's 5 factors is 52.44%, whereas the original study had a higher rate (68%). Results of CFA revealed that the Turkish version of MCQ-30 has the same factor structure as the original version.

Test-retest analysis results, which were conducted

**Table IV.** The Relationship between MCQ-30, and TAI and MOCI.

	Positive Beliefs	Cognitive Confidence	Uncontrollability and Danger	Cognitive Self-consciousness	Need to Control Thoughts	MCQ-30 Total	TAI Total	MOCI Total	MOCI Checking	MOCI Washing	MOCI Slowness	MOCI Doubting
Positive Beliefs	1.00											
Cognitive Confidence	0.11**	1.00										
Uncontrollability and Danger	0.31**	0.20**	1.00									
Cognitive Self-consciousness	0.31**	0.01	0.39**	1.00								
Need To Control Thoughts	0.40**	0.10**	0.49**	0.41	1.00							
MCQ-30Total	0.67**	0.49**	0.74**	0.61**	0.72**	1.00						
TAI Total	0.19**	0.24**	0.61**	0.20**	0.29**	0.48**	1.00					
MOCI Total	0.29**	0.08*	0.46**	0.29**	0.40**	0.46**	0.45**	1.00				
MOCI Checking	0.23**	0.05	0.38**	0.20**	0.33**	0.36**	0.36**	0.80**	1.00			
MOCI Washing	0.17**	0.03	0.21**	0.14**	0.25**	0.24**	0.20**	0.73**	0.44**	1.00		
MOCI Slowness	0.21**	0.09*	0.35**	0.19**	0.30**	0.35**	0.38**	0.73**	0.63**	0.42**	1.00	
MOCI Doubting	0.22**	0.03	0.30**	0.26**	0.31**	0.34**	0.29**	0.76**	0.55**	0.41**	0.49**	1.00

\*\* P < 0.01 \* P < 0.05

to assess the reliability of the Turkish version of MCQ-30, indicated that the reliability coefficients vary among the questionnaire's items, inter-item correlations ranged from 0.40 to 0.94, and inter-subscale correlations ranged

from 0.70 to 0.85, and these results are consistent with the original study. The results suggest that the Turkish version of MCQ-30 is a reliable measuring instrument.

Previous studies of MCQ-30 found a significant posi-

**Table V.** Mean and standard deviations of MCQ-30's subscales and its total score according to gender.

MCQ-30 Subscale	Gender	M	SD
Cognitive Confidence	Female	12.49	4.38
	Male	12.14	4.50
	Total	12.37	4.42
Positive Beliefs	Female	13.09	4.11
	Male	13.87	4.24
	Total	13.34	4.17
Cognitive Self-consciousness	Female	16.84	3.28
	Male	16.99	3.06
	Total	16.89	3.21
Uncontrollability and Danger	Female	13.86	4.11
	Male	13.20	3.81
	Total	13.64	4.02
Need to Control Thoughts	Female	13.76	3.63
	Male	14.74	3.41
	Total	14.09	3.58
Total	Female	70.04	12.50
	Male	70.94	12.30
	Total	70.34	12.43

**Table VI.** The relationship between MCQ-30 subscales and its total scores, and age; and mean and standard deviations according to academic year.

MCQ-30 Subscale	Academic Year	M	SD	Age (r)
Cognitive Confidence	1	12.28	4.48	0.02
	2	12.61	4.37	
	3	12.61	4.25	
	4	11.93	4.54	
	Total	12.37	4.42	
Positive Beliefs	1	13.60	4.08	0.01
	2	13.32	4.28	
	3	12.63	4.26	
	4	13.55	4.06	
	Total	13.34	4.17	
Cognitive Self-consciousness	1	17.51	2.87	-0.12**
	2	16.68	3.12	
	3	16.27	3.66	
	4	16.30	3.39	
	Total	16.89	3.21	
Uncontrollability and Danger	1	14.15	4.03	-0.11**
	2	13.68	4.13	
	3	13.14	3.82	
	4	12.79	3.90	
	Total	13.64	4.02	
Need to Control Thoughts	1	15.07	3.28	-0.1**
	2	14.07	3.56	
	3	12.81	3.66	
	4	13.00	3.57	
	Total	14.09	3.58	
Total	1	72.60	11.37	-0.1
	2	70.37	12.63	
	3	67.45	12.27	
	4	67.57	13.90	
	Total	70.34	12.44	

\*\*P < 0.01

tive relationship between the MCQ-30 and trait anxiety, worry, and obsessive symptoms. The current study's hypothesis is verified as well; metacognition have a significant relationship with trait anxiety and obsession, and a significant positive relationship was found between MCQ-30's subscales, and trait anxiety and obsession. These findings, which are similar to those of the original questionnaire, supported that of the convergent validity

of the MCQ-30's Turkish version . Results indicate that metacognition can be a predictor variable of symptoms like obsession and anxiety. Metacognition is expected to lead to important gains in information about information processing in different clinical groups. Furthermore, it will lead researchers to arrive at new conclusions concerning normal and clinical populations.

In the original study, gender did not have any significant effect on MCQ-30 scores; however, the current study revealed a significant effect of gender on some subscales namely, positive beliefs, uncontrollability and danger, and the need to control thoughts. In order to interpret the stated differences, size of the ratio in the current study among male and female estimates (compared with the original study) has to be considered. Moreover, broader age range in the original study (18-69) (compared with the current study, 17-36) has to be considered.

Findings revealed a significant negative relationship between age, and MCQ-30 subscale scores (cognitive self-consciousness, uncontrollability and danger, and the need to control thoughts) and total score. According to MANOVA results, academic year had a significant effect on the mentioned subscale scores. Findings revealed that the relation between age and the MCQ-30 positive.

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- Although the age range of the original study was broader than this study, investigation of the relationship between age and metacognition in different age ranges could reveal important results.
- In conclusion, the current study indicated that the Turkish version of MCQ-30 has satisfactory psychometric properties. MCQ-30 can now pave the way for future research into the role of metacognition in clinical cases. Recent studies that have highlighted the role of metacognition in GAD (Wells, 2005), OCD (Fisher and Wells, 2005; Myers and Wells, 2004; Wells and Papageorgiou, 1998), PTSD (Holeva et al., 2001), psychoses (Bacon et al., 2001; Morrison and Wells 2003; Weiss et al., 2002), depression (Papageorgiou and Wells, 2003), and substance abuse (Toneatto, 1999) lead us to the conclusion that important contributions can be made to the Turkish literature. Moreover, MCQ-30 will contribute to basic scientific research in normal sample as well.
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