


Reliability, validity, and factorial structure of the Turkish version of the Empathy Quotient (Turkish EQ)

Samet Kose ^{a,b,c}, Feryal Cam Celikel^d, Filiz Kulacaoglu^e, Ercan Akin^{c,f}, Mehmet Yalcin^c and Vedat Ceylan^c

^aDepartment of Psychiatry, University of Texas Medical School at Houston, Houston, TX, USA; ^bCenter for Neurobehavioral Research on Addictions, Houston, TX, USA; ^cDepartment of Psychology, Hasan Kalyoncu University, Gaziantep, Turkey; ^dDepartment of Psychology, Isik University, Istanbul, Turkey; ^eDepartment of Psychiatry, Bagcilar Research & Training Hospital, Health Sciences University, Istanbul, Turkey; ^fDepartment of Educational Sciences, Division of Guidance and Psychological Counseling, Hacettepe University, Ankara, Turkey

ABSTRACT

OBJECTIVES: Empathy is an essential ability that allows us to tune into how others are feeling or thinking. Empathy makes it possible to resonate with others' positive and negative feelings alike so that we can thus feel happy when we vicariously share the joy of others and we can share the experience of suffering when we empathize with someone in pain. Empathy training not only promotes prosocial behaviour, but also augments positive affect and resilience, which in turn fosters better coping with stressful situations. The Empathy Quotient (EQ) is a self-report questionnaire that was developed to measure the cognitive, affective, and behavioural aspects of empathy. Here, we aimed to examine the validity, reliability, and factor structure of the EQ in a Turkish sample.

METHODS: Participants were 436 mostly college students and civil servants (195 female, 241 male). Sociodemographic information, the Turkish version of the EQ, Marlowe-Crowne Social Desirability Scale (MC-SDS) 33-item full version and MC-SDS 13-item shorter versions were administered. All statistical analyses were performed by using SPSS version 23 for Windows.

RESULTS: EQ scores were significantly higher in female participants ($\bar{X}_{\text{Female}} = 46.45$, $SD_{\text{Female}} = 0.62$) compared to the male participants ($\bar{X}_{\text{Male}} = 43.68$, $SD_{\text{Male}} = 0.56$). The Cronbach's alpha coefficient for the scale was 0.76, Guttman's split-half reliability coefficient was 0.61, and test-retest reliability coefficient was 0.95. A positive and statistically significant correlation was found between the Turkish EQ and MC-SDS Full version ($r = 0.299$, $p < .01$) and short form of MC-SDS ($r = 0.273$, $p < .01$). A three-factor solution that accounted for 25.28% of the variance observed.

CONCLUSIONS: The Turkish version of the EQ has satisfactory validity, good internal and test-retest reliability with a robust factorial structure to use in a clinical population in Turkey. Moreover, as predicted, women scores were statistically significantly higher on the EQ than men. This result was consistent with a series of earlier studies reporting gender differences (female superiority) on questionnaires that measure empathy. A better knowledge of empathy will have important implications for the examination and understanding of certain neurological and psychiatric disorders, including autism, narcissistic and antisocial personality disorders, and may also provide important clues about the relevant brain circuitry underlying empathy.

ARTICLE HISTORY

Received 16 March 2018
Accepted 4 April 2018

KEYWORDS

Empathy Quotient (EQ); emotional responsiveness; empathic response; reliability; validity; factor structure

Introduction

Empathy is the ability to understand or experience what another person is feeling from within the other person's frame of reference. Empathy entails feeling concern for others, sharing and comprehending their emotions, plays a fundamental role in interpersonal interactions [1–3]. Empathy allows us to understand the others, predict the behaviour, and experience an emotion triggered by their emotion.

Empathy represents a complex socio-cognitive ability such as affective sharing and perspective taking [4,5]. Moreover, empathy is modulated by different cognitive, social, and contextual determinants [5,6]. Empathy not only involves the emotional experience

of another person, but also the recognition of the emotional state of the other person [7]. As empathy has a multidimensional nature, empathy researchers have traditionally fallen into two camps; theorists who have explained empathy in terms of affect, and theorists who have explained it in terms of cognition. Empathy involves both emotion sharing and executive control to modulate this experience by specific and interacting neural systems [8]. Thus, both approaches are essential to defining empathy and the cognitive and affective components of empathy co-exist and cannot be easily separated [1].

Empathy impairments have been reported in various psychiatric conditions like autistic spectrum

CONTACT Samet Kose  sametskose@gmail.com

© 2018 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group
This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

disorder [1], schizophrenia [9], antisocial personality disorders [10], borderline personality disorder [11], and eating disorder [12]. Since empathy plays a significant role in human development, it is important to measure and assess it. Recent studies about cognitive neuroscience indicated that empathy can be measured [7,13]. In the literature, there are several instruments to measure empathy. These measures are Chapin Social Insight Test [14], Empathy Scale (EM) [15], the Questionnaire Measure of Emotional Empathy (QMEE) [16], and the Interpersonal Reactivity Index (IRI) [17]. According to Baron-Cohen, IRI was the best measure of empathy among the other scales. Because three of the four factors of IRI were relevant to empathy but however there were not empathy itself. Thus, these measures cannot be recommended for use in clinical settings. Finally, Simon Baron-Cohen reported new measure for empathy called the Empathy Quotient (EQ) for use with adults of normal intelligence [1]. It was designed to assess the psychopathology as a result of a low empathy. The EQ is a psychological self-report measure, consists of 60 items, broken down into two types; 40 items tapping empathy and 20 filler items to distract the responder from a relentless focus on empathy to elicit more genuine responses. Recently, the original EQ [1] was validated in Japanese [18], French [19], and Italian [20] in sample of university students and the general population.

In the present study, we aimed to translate and establish psychometric properties and factorial validity of the EQ in a representative Turkish university students and civil servants sample and obtain normative data for future epidemiological and clinical studies in Turkey.

Methods

Study participants

Participants were 436 (195 female, 241 male) mostly college students and civil servants who were living in Tokat, Turkey. One of the researchers (FCC) administered the scales in paper format to the medical school students at Gaziosmanpasa University and also healthy visitors accompanying patients at the same university hospital. Written informed consents were obtained from the participants following the study protocol was thoroughly explained. Exclusion criteria included being diagnosed with psychiatric disorders, using psychotropic drugs, at that moment being under the influence of alcohol or a similar substance that would affect mental processes.

Psychometric measurements

Sociodemographic data form

This form includes demographic variables including gender, age, marital status, the number of children,

education, location, household members, occupation, employment status, and the number of siblings, family history of chronic disease, other known physical illnesses, and previous psychiatric treatments.

Turkish EQ

EQ is a 60-item self-report scale that is developed by Simon Baron-Cohen in 2004. Responses are given on a 4-point scale ranging from “strongly agree” to “strongly disagree.” Each of the empathy items scores one point if the respondent records he empathic behaviour mildly, or two points if strongly. Approximately half the items are worded to produce a “disagree” and half an “agree” for the empathic response. Scores can range from 0 to 80. A cut-off score fewer than 30 was the most useful to differentiate adults with autism spectrum disorder (from controls [1]. A three-factor solution has been observed: EQ-Cognitive Empathy (CE), EQ-Emotional Reactivity (ER), EQ-Social Skills (SS) [21]. The original version of the EQ shows acceptable internal consistency, convergent validity, and good test-retest reliability [1,21]. The Turkish EQ has been translated into Turkish by Samet Kose, and back-translated into English by Feryal Celikel who was blinded to the original items. After establishing the semantic equivalence of the EQ items, the content equivalence of all items was examined, and no items were excluded as being irrelevant to Turkish culture. The final version was approved by Simon Baron-Cohen.

Marlowe-Crowne social desirability scale

Marlowe-Crowne Social Desirability Scale (MC-SDS) is a self-report scale composed of 33 items and developed by Crowne and Marlow in 1960. The objective for developing this scale is to measure socially desirable responses. Subjects rate to extent to which they agree (true) or disagree (false) with each item: the 18 item keyed true are improbable but socially desirable and are thought to measure tendency to positive attribution, the 15 item keyed false are likely but socially undesirable and are thought to measure denial and self-deception [22]. The short form of Marlowe-Crowne Scale is a 13-item true or false questionnaire. Each respondent should have a social desirability score between 0 and 13 [23].

Statistical analysis

All variables were screened for the accuracy of data entry, missing values, and homoscedasticity using SPSS 23. The data had less than 5% of missing items, and no pattern was detected. Descriptive statistic was reported using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Correlation analyses between the MC-SD scale and Turkish EQ were performed

using Pearson's correlation coefficients. The internal consistency of the Turkish EQ was estimated using Cronbach's alpha coefficients and split-half reliability test. An exploratory factorial analysis was performed and principal components analysis (PCA) with Promax rotations was performed to assess construct validity. The alpha level of 0.05 was set up to indicate statistical significance.

Results

Sociodemographic characteristics of sample

The average age of 436 participants in the study was 22.60 with a standard deviation of 7.23. The sample consisted of 195 female participants (44.7%) and 241 male participants (55.3%). The majority of the participants in the study were single (86.7%), and 57 (13.1%) were married, and one participant was divorced. Among participants, 381 (87.4%) were living in a city centre, 50 (11.5%) were living in a county, and 5 (1.1%) people in the study were living in a village. The 78.2% of participants were student, 13.8% of participants were civil servant, 6.0% of participants were workers, 1.6% of them were housewife, and 0.5% of participants were retired. Sociodemographic characteristics of sample were shown in Table 1 in detail.

Comparison of empathy scores between male and female participants

An independent samples *t*-test was conducted to compare EQ scores in terms of gender. The results revealed that there was a statistically significant difference between male and female participants regarding the EQ scores [$t(434) = 3.286, p = .001$]. EQ scores were significantly higher in female participants ($\bar{X}_{\text{Female}} = 46.45, SD_{\text{Female}} = 8.72$) compared to the male participants ($\bar{X}_{\text{Male}} = 43.68, SD_{\text{Male}} = 8.78$).

Table 1. Sociodemographic characteristics of sample.

	22.60 ± 7.23	
Age	<i>n</i>	%
Gender		
Female	195	44.7
Male	241	55.3
Marital status		
Single	378	86.7
Married	57	13.1
Divorced	1	0.2
Educational status		
Primary school	1	0.2
Secondary school	30	6.9
High school	13	3.0
University	392	89.9
Occupation		
Student	341	78.2
Civil servants	60	13.8
Worker	26	6.0
Housewife	7	1.6
Retired	2	0.5

Note: EQ, The Empathy Quotient.

Table 2. The results of independent sample *T*-test.

	Gender	<i>N</i>	Mean	SD	df	<i>t</i>	<i>p</i>
Total EQ	Female	195	46.4462	8.72	434	3.286	.001
	Male	241	43.6763	8.78	434		

Internal consistency

Guttman's split-half reliability coefficient was 0.61. The correlation between forms was 0.43. The Cronbach's alpha coefficient for the EQ with 40 items found to be 0.693. However, as this coefficient was inadequate to decide that the Quotient was reliable, three items (Item 22, Item 27, and Item 57) were deleted according to Item-Total Statistics. After this, the Cronbach's alpha coefficient for the EQ with 37 items found to be 0.757. Table 3 shows a comparison between Turkish and British normative data and Cronbach's alpha values.

Test-retest reliability of the Turkish form of the EQ

Between test and retest administration, there was a period of two weeks and 136 participants participated in this process. The EQ scores were highly correlated with retest EQ scores ($r = 0.948, p < .001$).

Convergent validity

Convergent validity was examined by correlations between the EQ scores and MC-SDS 33-item full version and MC-SDS 13-item shorter version. Positive and statistically significant correlations were found between the Turkish EQ and MC-SDS 33-item ($r = 0.299, p < .01$) and MC-SDS 13-item ($r = 0.273, p < .01$). Correlations between the Turkish EQ and other scales were presented in Table 4.

Factor structure of Turkish EQ

A PCA was performed with a Promax rotation. The Keiser-Meyer-Olkin measure of sampling adequacy was 0.797 and the Bartlett test of sphericity was highly significant ($p = .000$), suggesting the data were suitable for PCA. The scree plot showed that only three plots appeared stacked and separate from the rest with the remaining plots falling away and bunched together. Three factors were kept as it was apparent from both the scree plot and Eigenvalues that they were the strongest. These three factors accounted for 25.28% of the variance cumulatively. 11 items (namely items 1, 6, 11, 12, 15, 27, 28, 29, 35, 37, and 49) loaded a value less than 0.30.

Discussion

In this study, we aimed to examine the validity, reliability, and factor structure of the EQ scale in a

Table 3. A comparison of Turkish and British EQ data.

	British sample <i>n</i> = 197					Turkish sample <i>n</i> = 436				
	Women		Male		α	Women		Male		α
	M	SD	M	SD		M	SD	M	SD	
EQ	47.2	10.2	41.8	11.2	0.92	46.45	8.72	43.68	8.78	0.76

Note: EQ, The Empathy Quotient.

Table 4. Correlations between the Turkish EQ and other scales.

	Age	Total EQ	MC-SDS (33 Item)	MC-SDS (13 Item)
Age				
Total EQ	0.060			
MC-SDS (33 Item)	0.116*	0.299**		
MC-SDS (13 Item)	0.064	0.273**	0.672**	

Note: EQ, The Empathy Quotient; MC-SDS, Marlowe-Crowne Social Desirability Scale.

*Correlation is significant at the .05 level (2-tailed).

**Correlation is significant at the .01 level (2-tailed).

Turkish sample. The main results of the study confirmed that the Turkish EQ was observed to have sufficient, reliable, stable, and (over time) psychometric properties.

Table 5. Factor Structure of the Turkish EQ.

Eigenvalue	5.135	3.180	1.795
Cumulative variation	12.838	20.787	25.276
Item	Factor 1	Factor 2	Factor 3
EQ52	0.748		
EQ55	0.692		
EQ58	0.677		
EQ36	0.676		
EQ54	0.663		
EQ25	0.658		
EQ44	0.583		
EQ26	0.583		
EQ19	0.521		
EQ41	0.509		
EQ43	0.426		
EQ1			
EQ28			
EQ6			
EQ59		0.631	
EQ48		0.513	
EQ32		0.509	
EQ50		0.487	
EQ42		0.473	
EQ39		0.450	
EQ18		0.435	
EQ38		0.391	
EQ34		0.340	
EQ60		0.318	
EQ11			
EQ8			0.604
EQ57			-0.580
EQ14			0.464
EQ21			0.454
EQ22			-0.404
EQ46		0.346	0.385
EQ4			0.321
EQ10			0.317
EQ12			
EQ29			
EQ35			
EQ37			
EQ27			
EQ49			
EQ15			

Note: EQ, The Empathy Quotient.

Extraction Method: Principal Components Analysis (PCA).

Rotation Method: Promax with Kaiser Normalization.

One additional result of this study is that in terms of total EQ scores, there is a statistically significant difference between male and female scale scores. Female's scores were significantly higher than males on the EQ. This finding supports the previous studies reporting a female superiority on empathy questionnaires. The means and standard deviations are slightly superior to those obtained by Baron-Cohen [1] and Wheelwright [24] and also those found by Berthoz et al., from France [19], Wakabayashi et al. from Japan [18], Preti et al., from Italy [20], and Muncer and Ling from North England study [25]. According to Muncer and Ling and Lawrence et al., the largest difference was observed for the EQ-ER subscale [21,25]. But, there were smaller differences in CE and no difference in SS [25]. According to Eysenck [26], this sex difference might be caused by several factors especially high neurosis in females because there is considerable overlap between neuroticism and measures of emotional intelligence [27]. In addition to Muncer's and Ling's and Berthoz et al.'s suggestions, the equality in SS scores might be caused by overestimations of men in a self-report measure [19,25]. According to the self-report scales, females were often stronger empathizers than males, but rarely confirmed in laboratory tests [28]. Gender differences in an emotional state may affect measures of empathic ability when using self-reports. However, some limited studies have reported that neural correlates of gender differences in empathy measures to be observable at neurophysiology and neuroanatomy [29]. For this reason, gender differences in the measure of empathy need more comprehensive investigation in the future.

Cronbach's alfa coefficients of the Turkish EQ for the scale were found 0.693. Generally, a Cronbach alpha value of the level of 0.70 and above is considered as acceptable. However, when we deleted three items (items 22, 27, and 57) Cronbach's alfa coefficients were found sufficient enough (0.757) and the internal consistency of the Turkish EQ was considered to be sufficient. According to the original EQ study of Baron-Cohen the Cronbach's alpha for the EQ was 0.92 and test-retest reliability was 0.97 which was significantly high. Our study also confirmed that the Turkish EQ has good test-retest reliability due to the fact that similar correlations were observed across a two-week interval ($r = 0.94$).

In terms of correlations observed between the EQ scores and MC-SDS full version and short form scores;

we expected that EQ scores would be positively correlated to social desirability scores, because empathizing ability requires being compliant with the expectations of others. The relationship between empathy and social desirability has been reported earlier [28] since empathy is likely to be the driver behind the motivation to be compliant with other's feeling and expectations. In our sample, Turkish EQ was found to be positively and significantly correlated with social desirability scores as in a recent Italian study by Preti et al. and French study by Berthoz et al. [19,20]. According to Preti's study, EQ-CE and EQ-ER scores were positively related to MC-SDS subscales (positive attribution and denial) [20]. Additionally, according to the French study, the MC-SDS score was correlated positively with the EQ total score [19].

Using a principal components analysis (PCA) with a Varimax rotation, the factor structure of EQ has been determined in the original study and a three-factor structure was extracted which offers a satisfactory fit for the data: CE, ER, and SS (SS) [21]. In this present study, a principal components analysis (PCA) with a Promax rotation was performed to find out the number of dimensions and which items construct each factor. A three-factor solution was extracted. The items for Factor 1 in our study were matching for Factor 1 CE items in Lawrance et al.'s study. Factor 2 was aimed to predict ER which was composed of similar items in the original study. Finally, Factor 3 items were matching with SS items in the original study [21]. These three factors accounted for 25.27% of the variance cumulatively. Eleven items (namely items 1, 6, 11, 12, 15, 27, 28, 29, 35, 37, and 49) loaded a value less than 0.30.

Our study has some limitations to be considered. The sample in this study was recruited from volunteer college students and civil servants with a limited age range, which limits the generalization of the results to other samples. Second, we are unable to compare and discuss our results on the basis of cultural differences.

In conclusion, this study of the Turkish version of the EQ confirmed sufficient stability and reliability of the questionnaire, including its internal consistency, test-retest reliability, concurrent validity, and three-factor structure.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Samet Kose  <http://orcid.org/0000-0003-0841-004X>

References

- [1] Baron-Cohen S, Wheelwright S. The empathy quotient: an investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *J Autism Dev Disord.* 2004;34(2):163–175.
- [2] Decety J. Empathy, sympathy and the perception of pain. *Pain.* 2009;145(3):365–366.
- [3] Decety J, Jackson PL. The functional architecture of human empathy. *Behav Cogn Neurosci Rev.* 2004;3(2):71–100.
- [4] Carlozzi AF, Bull KS, Stein LB, et al. Empathy theory and practice: a survey of psychologists and counselors. *J Psychol.* 2002;136(2):161–170.
- [5] Singer T, Lamm C. The social neuroscience of empathy. *Ann N Y Acad Sci.* 2009;1156:81–96.
- [6] Decety J. The neuroevolution of empathy. *Ann N Y Acad Sci.* 2011;1231:35–45.
- [7] Decety J, Moriguchi Y. The empathic brain and its dysfunction in psychiatric populations: implications for intervention across different clinical conditions. *Biopsychosoc Med.* 2007;1:22.
- [8] Decety J, Lamm C. Human empathy through the lens of social neuroscience. *ScientificWorldJournal.* 2006;6:1146–1163.
- [9] Bigelow NO, Paradiso S, Adolphs R, et al. Perception of socially relevant stimuli in schizophrenia. *Schizophr Res.* 2006;83(2–3):257–267.
- [10] Blair RJ. Responding to the emotions of others: dissociating forms of empathy through the study of typical and psychiatric populations. *Conscious Cogn.* 2005;14(4):698–718.
- [11] Harari H, Shamay-Tsoory SG, Ravid M, et al. Double dissociation between cognitive and affective empathy in borderline personality disorder. *Psychiatry Res.* 2010;175(3):277–279.
- [12] Guttman H, Laporte L. Alexithymia, empathy, and psychological symptoms in a family context. *Compr Psychiatry.* 2002;43(6):448–455.
- [13] Decety J, Meyer M. From emotion resonance to empathic understanding: a social developmental neuroscience account. *Dev Psychopathol.* 2008;20(4):1053–1080.
- [14] Gough HG. A validation study of the Chapin social insight test. *Psychol Rep.* 1965;17(2):355–368.
- [15] Hogan R. Development of an empathy scale. *J Consult Clin Psychol.* 1969;33(3):307–316.
- [16] Mehrabian A, Epstein N. A measure of emotional empathy. *J Pers.* 1972;40(4):525–543.
- [17] Davis MH. Measuring individual differences in empathy: Evidence for a multidimensional approach. *J Pers Soc Psychol.* 1983;44: 113–126.
- [18] Wakabayashi A, Baron-Cohen S, Wheelwright S. Individual and gender differences in empathizing and systemizing: measurement of individual differences by the empathy quotient (EQ) and the systemizing quotient (SQ). *Shinrigaku Kenkyu.* 2006;77(3):271–277.
- [19] Berthoz S, Wessa M, Kedia G, et al. Cross-cultural validation of the empathy quotient in a French-speaking sample. *Can J Psychiatry.* 2008;53(7):469–477.
- [20] Preti A, Vellante M, Baron-Cohen S, et al. The empathy quotient: a cross-cultural comparison of the Italian version. *Cogn Neuropsychiatry.* 2011;16(1):50–70.
- [21] Lawrence EJ, Shaw P, Baker D, et al. Measuring empathy: reliability and validity of the empathy quotient. *Psychol Med.* 2004;34(5):911–919.
- [22] Crowne DP, Marlowe D. A new scale of social desirability independent of psychopathology. *J Consult Psychol.* 1960;24:349–354.
- [23] Barger SD. The Marlowe-Crowne affair: short forms, psychometric structure, and social desirability. *J Pers Assess.* 2002;79(2):286–305.

- [24] Wakabayashi A, Baron-Cohen S, Uchiyama T, et al. Empathizing and systemizing in adults with and without autism spectrum conditions: cross-cultural stability. *J Autism Dev Disord.* 2007;37(10):1823–1832.
- [25] Muncer SJ, Ling J. Psychometric analysis of the empathy quotient (EQ) scale. *Pers Individ Dif.* 2006;40:1111–1119.
- [26] Eysenck HJ, Eysenck SBG. *Manual of the Eysenck personality questionnaire.* Sevenoaks: Hodder and Stoughton; 1975.
- [27] Davies M, Stankov L, Roberts RD. Emotional intelligence: in search of an elusive construct. *J Pers Soc Psychol.* 1998;75(4):989–1015.
- [28] Eisenberg N, Fabes RA, Murphy B, et al. The relations of emotionality and regulation to dispositional and situational empathy-related responding. *J Pers Soc Psychol.* 1994;66(4):776–797.
- [29] Cheng Y, Chou KH, Decety J, et al. Sex differences in the neuroanatomy of human mirror-neuron system: a voxel-based morphometric investigation. *Neuroscience.* 2009;158(2):713–720.