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Psychometric Properties of the Turkish Version of the Reflective Functioning Questionnaire in Men on Probation for Substance Use and a Healthy Control Group

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ABSTRACT

Objective: Mentalization is defined as the capacity to reflect on one's own mental state and the mental states of others. The primary aim of this study is to translate the Reflective Functioning Questionnaire (RFQ), which measures mentalization, into Turkish and evaluate its psychometric properties. In addition, reflective capacities of male adults on probation due to substance use were investigated and compared with the control group.

Methods: The questionnaire was translated into Turkish using a forward-backward-forward method and administered to 219 adults with no prior psychiatric history, as well as 205 substance-using male adults. Participants also completed a battery of self-report questionnaires measuring empathy, mindfulness, theory of mind, alexithymia, and impulsivity. Additionally, the substance-using group completed the Drug Use Disorders Identification Test to assess the severity of their drug use.

Results: The results indicate configural invariance of the original two-factor structure of the RFQ across the Turkish-speaking healthy control group and substance-using male adults, as well as satisfactory reliability and construct validity for the two subscales. The reflective functioning scores of the substance-using group were not significantly different from those of the control group.

Discussion: This study demonstrates the reliability and validity of the Turkish version of the RFQ. Despite no significant differences in RF scores between the groups, the findings highlight the significance of further exploring reflective functioning in individuals with substance use.

Keywords: Mentalization, reflective functioning, reflective functioning questionnaire, substance use disorder, validity, reliability

INTRODUCTION

Reflective functioning and mentalization terms are used in the literature interchangeably. Mentalization is defined as the ability to understand and envision intentional mental states such as feelings, desires, and thoughts of self and others while the term reflective functioning (RF) was coined as the operationalization of this capacity for empirical research. RF describes the ability to distinguish one's inner reality from the outer world and plays a crucial role in self-organization. Fonagy and colleagues (2008) conceptualize mentalizing as an innate potential that can be fully acquired through the attachment relation with the primary caregiver.

Mentalization is a dynamic, relationship-specific ability, which may fluctuate over time. A particular person's mentalizing capacity may differ depending on the person that he or she interacts with, furthermore, it may change over time regarding the same person depending on the stress or arousal (Fonagy et al. 2012). Moreover, mentalization is a multidimensional capacity, which is comprised of four functional polarities: 1. Internally focused vs Externally focused, 2. Self-oriented vs Other oriented, 3. Cognitive vs Affective, 4. Automatic vs Controlled (Fonagy and Luyten, 2012). It is argued that each of these dimensions has its own discrete neural circuits, and that these four systems provide an extensive matrix to

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comprehend the relation between mentalization and closely associated constructs. The first concept, theory of mind, refers to the ability of individuals to understand the thoughts and feelings of others through physical cues, while perspective-taking describes the capacity to evaluate different points of view. Empathy, on the other hand, is the emotional reflection of this cognitive understanding, characterized by the ability to internally sense the emotional states of others. Conversely, alexithymia is associated with difficulties in expressing and understanding emotional states. Mindfulness represents the ability of individuals to focus on their present thoughts, emotions, and bodily sensations with an open and accepting attention (Luyten and Fonagy, 2015).

Internally focused mentalization refers to a person's capacity to understand internal mental states, such as desires and wishes, whereas externally based mentalization relies on physical features, such as facial expressions and actions. Mentalization includes a self-reflective as well as interpersonal component. The capacity to reflect on the self and others are closely associated. Hence, impairments in one of these polarities mostly go hand in hand with the impairments in the other polarity. However, a deficiency in the capacity to reflect on mental states of the self does not automatically signify a deficiency in the capacity to reflect on the other's mental states or vice versa. There can be imbalances between these two capacities. An individual may be quite good in terms of understanding the other's mind while lacking a real comprehension of his/her own inner world, as it is often the case for people with antisocial characteristics. Controlled mentalization is a slow process that is mostly verbal, involving attention, intention and awareness whereas automatic mentalization is much faster and reflexive. And finally, full mentalization requires the consolidation of cognitive and affective aspects (Fonagy and Bateman 2012).

An important focus of research on the role of mentalizing has been its role in the transmission of attachment patterns from one generation to the next. There is now increasing evidence for the role of parental mentalizing in the psychological wellbeing and mental development of a child (Rostad and Whitaker 2016, Zeegers et al. 2017, Camoirano 2017). Some of these studies point out the role of RF as a resilience factor in case of adversity (Ensink et al. 2016, Ensink et al. 2017, Rutherford et al. 2015). Impairments in mentalizing capacity and its relation to several psychiatric conditions have also been another research interest that was initially studied on borderline personality disorder (Fonagy and Luyten 2009, Fischer-Kern et al. 2010, Ha et al. 2013) and then applied to several other disorders such as eating disorders (Mathiesen et al. 2015, Kuipers et al. 2017), depression (Fischer-Kern et al. 2013, Taubner et al. 2011), and psychosis (MacBeth et al. 2011, Braehler and Schwannauer 2012). Interestingly, research on the relationship between RF and substance abuse is still rather scarce.

The focus of a psychodynamic approach to substance use has shifted from symptoms to personality deficits over the past decades, and substance use is considered a problem of self-regulation rather than an attempt of drive satisfaction (Khantzian 2012, McDougall 1989, Krystal and Ruskin 1970). In addition, a large number of studies investigating the attachment styles of addicted people indicate a relationship between attachment insecurity and substance use (Schindler et al. 2005).

In line with these suggestions, a mentalizing model offers a useful framework for understanding substance use behaviors. The relation between mentalization and substance use is likely to be bi-directional. It is suggested that addictive substances hijack the neural system involved in attachment (İnsel 2003). Hence, hyperactivation of attachment system caused by substance use may contribute to a reduction or loss in mentalizing both regarding the self and the mental states of others. As substantial body of research indicates, intoxication distorts the thinking process and causes euphoria-like mood changes in short-term and alters normal brain circuitry that result in neuroplastic changes in long-term use (Leshner and Koob 1999, Gardner 2011) which can induce impairments in mentalization of emotional states (Philips et al. 2012).

On the other hand, mentalization difficulties may give rise to substance use as a means of regulating difficult emotions. Trigger descriptions of individuals with substance use indicate rather prior mentalization deficits. Interpersonal difficulties such as quarrels with family or partners or negative feelings that cannot be contained mostly set the scene for substance misuse (Philips et al. 2012). A longitudinal study by Cohen et al. (2007) examining the relationship between personality disorders in early adolescence and later substance use suggests a similar pattern. The findings indicate that personality disorders in adolescence are significant risk factors for substance use in later life.

Despite the theoretical relevance and the substantial number of studies on the relationship between substance use and concepts related to mentalization capacity, research specifically investigating the reflective capacities of individuals who use substances remains limited. Studies examining the relationship between mentalization and substance use mostly focus on the parental reflective functioning (Söderström and Skårderud 2009, Pajulo et al. 2012, Alvarez-Monjaras et al. 2019). This study aims to contribute to the growing body of literature on the association between mentalizing capacity and substance use by exploring the reflective functioning capacities of individuals with substance use problems.

One widely used measurement tool of Reflective Functioning (RF) is the Reflective Functioning Questionnaire (RFQ),

a self-report tool developed by Fonagy and colleagues that is easy to administer. Preliminary findings using the RFQ identified two relatively distinct factors that remain consistent across clinical and control samples: Certainty (RFQc) and Uncertainty (RFQu) about mental states. These factors correspond to two types of RF deficits: hypermentalizing and hypomentalizing, respectively.

Hypermentalizing refers to the tendency to mentalize excessively, often resulting in unrealistic or inaccurate mental representations with little to no supporting evidence. Over-attributing mental states to others can lead to interpersonal difficulties, such as blurring the boundaries between the self and others, being overly assertive during times of stress, or excessively idealizing or devaluing others. Interpersonal problems that an individual is unable to manage effectively often lead to overwhelming emotions (Luyten et al. 2012). In such cases, substances act as impulsive behaviors typical of borderline patients: attempts at self-regulation and self-soothing. On the other hand, hypomentalizing is associated with a more concrete way of thinking, reflecting difficulty in conceptualizing complex mental states of oneself and others. For these individuals, the euphoria induced by substances may serve as a coping mechanism for the unbearable feelings of emptiness or numbness they experience internally.

Given the heterogeneous nature of substance use, it is reasonable to expect significant variation in mentalizing deficits among individuals with substance use disorders. In this context, both extreme hypermentalizing and hypomentalizing may contribute to substance use. Understanding which type of mentalization deficit plays a more critical role in substance use could help clinicians develop more tailored and effective treatment strategies.

In light of the substantial body of empirical research highlighting the role of reflective functioning (RF) in both typical and atypical development, the primary aim of this study is to translate the Reflective Functioning Questionnaire (RFQ) into Turkish and examine its psychometric properties in Turkish-speaking populations. Currently, no instrument is available in Turkish to measure reflective functioning, making the translation of the RFQ a crucial step in advancing mentalization research among Turkish-speaking samples. The second aim of the study is to explore the relationship between substance use and reflective functioning. Two hypotheses are proposed: 1. A two-factor structure, reflecting the degree of subjective certainty or uncertainty about the relationship between behavior and mental states, will emerge similarly in both the control group and the substance-using group. 2. The two subscales are expected to demonstrate satisfactory internal consistency and reliable test-retest correlations.

As indicators of construct validity for the RFQ, we used social cognition scales such as theory of mind, alexithymia, empathy, and perspective-taking, as well as an impulsivity scale. We hypothesized positive correlations between the degree of certainty about mental states (RFQc) and scores on empathy, perspective-taking, mindfulness, and theory of mind. Additionally, we predicted negative associations between RFQc and alexithymia scores, as well as impulsivity. We anticipated inverse correlation patterns between the uncertainty about mental states scale (RFQu) and the aforementioned measurement tools. We also expected these correlations to reflect the multidimensional nature of mentalization capacity discussed in the introduction. Specifically, we predicted stronger correlations between the RFQ, which is primarily self-oriented and internally focused, and measurement tools that assess concepts closely related to this internally based dimension of mentalization.

Finally, the criterion validity of the RFQ was assessed by examining its ability to differentiate between control participants and substance users. Based on the literature on the relationship between substance use, attachment patterns, and emotion regulation, we hypothesized that individuals with substance use disorders would exhibit lower scores on RFQc, theory of mind, mindfulness, empathy, and perspective-taking, and higher scores on RFQu, alexithymia, and impulsivity compared to control participants. We anticipated that the internally based mentalization capacity of substance users would be more impaired than their externally focused mentalization capacity. It is the difficulty in understanding both their own internal states and those of others, along with the challenge of managing their own emotions, that may drive individuals to use substances.

METHODS

Participants

The research participants were divided into two groups: healthy individuals and adults who use substances. The control group consisted of individuals without a psychiatric diagnosis, selected through convenience sampling. The researchers informed people in their network verbally or via email and included those who consented to participate and had no history of psychiatric treatment. The substance-using group comprised male participants undergoing probation for illicit substance use, monitored between February and May 2021 at the probation unit of Bakırköy Mental Health Research and Education Hospital. Most participants in this group were actively using various psychoactive substances, including marijuana, cocaine, ecstasy, and other tranquilizers, with many continuing to use these substances at the time of the study. For the sake of brevity, the term "substance users" will be used to refer to this group throughout the article.

Data collection was conducted in accordance with the Helsinki Declaration (36) and followed protocols approved by the ethics committee for clinical research at Bakırköy Dr. Sadi Konuk Training and Research Hospital. Both groups were provided with a document outlining the objectives of the study. Participation was voluntary, and individuals provided their written consent. Inclusion criteria for both groups included being over 18 years of age, being a native Turkish speaker with sufficient literacy to read and understand the study material, and gender for the substance-using group. Participants were given a text explaining the purpose of the study, and those who agreed to participate provided written consent. The substance-using group consisted of 208 individuals, while the control group included 221 individuals. Data with more than 5% missing responses (substance users: n=3; control group: n=2) were excluded from the analysis. As a result, the final sample comprised 205 substance users and 219 healthy controls.

Measures

Participants completed the following battery of questionnaires under the supervision of trained clinical psychologists to ensure that the items were clearly understood.

Sociodemographic Data Form

A questionnaire prepared by the researchers to assess the sociodemographic characteristics of the participants, consisting of 13 questions.

Reflective Functioning Questionnaire (RFQ)

The RFQ consists of two subscales that measure levels of certainty (RFQc) and uncertainty (RFQu) about mental states. Both subscales contain 6 items, scored on a 7-point scale ranging from completely disagree to completely agree.

The **Certainty subscale** aims to assess the degree of certainty based on participants' agreement with statements such as "I don't always know why I do what I do." To capture high levels of certainty, the items are rescored so that higher scores on this scale indicate hypermentalizing, while moderate scores reflect an acknowledgment of the opacity of mental states, indicative of more genuine mentalizing.

The **Uncertainty subscale** includes items designed to assess a more concrete mode of thinking, with statements such as "Sometimes I do things without really knowing why." The responses are recoded so that high degrees of agreement (scores of 5, 6, or 7 on the original scale) indicate hypomentalizing, while lower to moderate levels (scores of 1, 2, 3, or 4 on the original scale) suggest genuine mentalizing.

Estimates of internal consistency for RFQc and RFQu were 0.67 and 0.63 in the control sample, and 0.65 and 0.77 in the clinical sample (Fonagy et al. 2016).

Toronto Alexithymia Scale (TAS-20)

The TAS is a 20-item, 5-point Likert scale that measures difficulties in identifying and describing emotions. It is one of the most widely used tools for assessing alexithymia and has demonstrated good internal consistency and test-retest reliability (Bagby et al. 1994). The TAS-20 consists of three subscales: identifying feelings (IF), describing feelings (DF), and externally oriented thinking (EOT). Due to reported low internal consistency of the EOT subscale (Cleland et al. 2005, Thorberg et al. 2020), only the IF and DF subscales were used in this study. Güleç and colleagues (2009) translated the scale into Turkish and found that the TAS-20 is a valid measure with adequate internal consistency within Turkish culture. The TAS assesses aspects of self-oriented, internally based mentalization (Fonagy and Luyten 2012).

Mindful Attention Awareness Scale (MAAS)

The MAAS is a 15-item, self-report, 6-point Likert scale designed to assess mindfulness. Mindfulness is described as receptive awareness of the present and being attentive to what is taking place in the present. The scale is scored by computing the average of the 15 items; therefore, the highest score would be 6. Higher scores indicate higher levels of mindfulness. The scale has demonstrated high discriminant and convergent validity and good test-retest reliability (Brown and Ryan 2003). A Turkish translation and validation study of the scale reported high reliability scores (Özyeşil et al. 2011). MAAS scores tap into internally-based, self-oriented mentalization dimensions (Fonagy and Luyten 2012).

Interpersonal Reactivity Index (IRI)

The IRI is a 28-item, self-report, 5-point Likert scale designed to assess empathy as a multidimensional construct. It consists of four subscales, each containing 7 items. Scores for each subscale can range from 0 to 28. The scale has demonstrated good internal consistency and test-retest reliability (Davis 1980). The Perspective Taking (PT) and Empathic Concern (EC) subscales were used in this study. The scale was translated into Turkish by Engeler and Yargıç (2007). The PT and EC subscales assess aspects of other-oriented, internally based mentalization. PT relates to the cognitive aspect, while EC measures the affective components (Fonagy and Luyten 2012).

Reading Mind in the Eyes Test (RMET)

The Reading Mind in the Eyes Test was developed by Baron-Cohen and collaborators (2001) to assess individuals' ability to recognize complex facial emotions. The original scale, revised in 2001, consists of 36 photographs of the eye region of faces. Participants are asked to select one of four items that best describes the mental state depicted in the images. The total number of correct answers is counted, and scores

can range from 0 to 32 in its Turkish version (Yıldırım et al. 2011). It is a widely used Theory of Mind test across cultures, and the Turkish version of the scale has been found reliable in a healthy population (Yıldırım et al. 2011). The RET provides an assessment of other-oriented, externally based mentalization (Fonagy and Luyten 2012).

Barratt Impulsiveness Scale (BIS)

The BSI is the most widely cited instrument designed to assess impulsivity as a multidimensional behavioral construct. It consists of 30 items, rated from 1 to 4. Scores can range from 30 to 120, with higher scores indicating higher levels of impulsivity. The scale comprises three subscales: attention, non-planning, and motor impulsivity (Patton et al 1995). A Turkish version of the scale was found to be a reliable and valid measure for the general population (Tamam et al. 2013). Although it is not a measure of social cognition, BIS scores can provide information about aspects of internally-based, self-oriented mentalization dimensions.

Substance Use Disorders Identification Test (DUDIT)

The DUDIT was developed to identify individuals with substance use issues. It is an 11-item, self-report rating scale and has proven to be an effective tool for screening substance-related problems (Berman et al. 2007). The maximum score for the scale is 44, with higher scores indicating greater severity of substance use. A Turkish translation of the scale was conducted by Evren et al. (2014), and it has been shown to be a reliable and valid tool for screening substance use.

Scale Translation

The first step in the validation process of the Turkish RFQ involved translating the original 54-item scale (RFQ, longer version) by independent native speakers of Turkish and English. A forward-backward-forward translation procedure was followed (Sousa and Rojinasrirat 2011). Initially, the original scale was translated into Turkish by a native Turkish speaker. Then, the Turkish translation was back-translated into English by a Turkish-English bilingual individual who was unaware of the RFQ. Finally, the back-translated English version was translated back into Turkish by a native Turkish speaker. In the final stage, the two Turkish translations were compared, and any discrepancies were corrected.

Data Analysis

The long version (54-item) of the RFQ was used to collect data from both groups, but the initial statistical analysis was conducted with data from the 8-item RFQ version. First, the internal consistencies of the certainty and uncertainty subscales were tested. Confirmatory Factor Analysis (CFA) was conducted to examine the proposed two-factor model in both groups, followed by a multi-group CFA to test a configural invariance model. Maximum Likelihood Estimation (MLE) was used. In line with recent recommendations, error correlations were allowed based on theoretical grounds (Brown 2006, Hermida 2015). Six error correlations were permitted between items that shared similar meanings or formulations.

The goodness-of-fit indices used in the analysis included both absolute and incremental fit indices: the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) with a 90% confidence interval, and the chi-square statistic. For a good model fit, CFI and TLI values should be close to 0.95, while RMSEA values should be below 0.08 for a reasonable fit and below 0.05 for a good fit (54). To assess the reliability of the subscales, Cronbach's alpha coefficients and mean inter-item correlations were calculated. Temporal stability was evaluated by calculating test-retest correlations after a 3-week interval in the control group (n=46) and the substance-using group (n=70). Construct validity was further examined by calculating Pearson correlations between the RFQ subscales and measures of related constructs. For criterion validity, analyses of covariance (ANCOVA) were performed on the entire sample, with RFQc and RFQu scores as dependent variables, substance use as a factor, and education and income scores as covariates, as significant group differences were found for these variables. Data analyses were conducted using SPSS 20.0 (SPSS Inc., Chicago, IL, USA) and AMOS (Version 25.0) for demographics, psychological, and psychopathological measures.

RESULTS

Demographics

The control group was approximately 2.5 years older than the substance-using males. In terms of marital status, the proportion of single participants was higher than that of married participants in both groups, with no significant difference observed between the groups (p=0.157). The control group also had a higher socioeconomic status and education level compared to the substance-using group. The differences in income and education levels were statistically significant (p<0.001 and p=0.016, respectively). The substance-using group had an average of 76 months of substance use, and the average score on the Substance Use Disorder Identification Test (DUDIT) was above the critical threshold of 10, indicating that these individuals had a substance use problem (Evren et al. 2014) (Table 1).

Correlations between demographic features and the two subscales were not significant in the control group. However, in the substance-using group, RFQc was positively correlated with income (r=0.170, p=0.016) and education (r=0.154,

Table 1. Demographic Characteristics of Control And Substance-Using Groups

	Control group	Substance-users	p (t-test)
N	219	205	
Gender (male %)	54.1	100	0.015
Age	32.94 (11.1)	30.75 (6.4)	0.016
Education (years)	12.06 (4.0)	8.59 (3.2)	< 0.001
Income (tl/month)	5094.07 (4507)	3659.68 (4282)	0.157
Married (%)	43.2	33	< 0.001
Substance use (month)	-	77.24 (79.8)	
DUDIT*	-	11.65 (11.30)	

*DUDIT: The Drug Use Disorders Identification Test (DUDIT)

p=0.024), while RFQu showed a significant negative correlation with years of education (r=0-.334, p<0.001).

Reliability

Estimates of internal consistency for the original 8-item version were satisfactory for the control sample, with Cronbach's alpha coefficients of 0.669 for RFQc and 0.612 for RFQu, and average inter-item correlations of 0.314 and 0.214, respectively. However, in the substance-use sample, the internal consistency was slightly below commonly expected levels, with Cronbach's alpha coefficients of 0.667 for RFQc and 0.579 for RFQu, and average inter-item correlations of 0.310 and 0.159, respectively.

Item-factor correlations revealed that all items, except for item c1 of the certainty subscale and item u7 of the uncertainty subscale, contributed sufficiently to the related factors. The correlations between these two items and their corresponding subscales were below the desired threshold of 0.2, as suggested by Everitt (1998) (r=0.121 / 0.057 for c1; r=0.045 / 0.065 for u7 in the control group and substance users, respectively). These two items were further examined for possible translation issues, but no problems were detected in the translation. Thus, cultural factors may explain the low correlations with their subscale. The wording of item u7 (I always know what I feel / Ne hissettiğimi her zaman bilirim) might have been confusing for Turkish participants, as the definitive verb 'to know,' with strong cognitive connotations, is used for feelings, which are generally considered non-cognitive constructs. To test this hypothesis, we replaced item u7 with other items from the 54-item version that carried the same meaning and repeated the analyses. Replacing item u7 with item u12 (I often get confused about what I am feeling / Ne hissettiğim konusunda sıklıkla kafam karışır) resulted in a significant increase in the correlation between the item and the uncertainty factor. Therefore, we suggest using item u12 instead of item u7 for the Turkish version.

We followed the same procedure for item c1; however, item-factor correlations remained below the desired threshold for all substitute items. Consequently, item c1 was removed from the scale. Internal consistency estimates were then recalculated for the revised 7-item version, and all subsequent analyses were conducted using this updated version.

The 7-item Turkish RFQ subscales now demonstrated good internal consistency in the control group, with Cronbach's alpha coefficients of 0.716 for RFQc and 0.730 for RFQu (mean inter-item correlations of 0.342 and 0.319, respectively). In the substance-using group, the internal consistency was adequate, with Cronbach's alpha coefficients of 0.717 for RFQc and 0.665 for RFQu (mean inter-item correlations of 0.312 and 0.233, respectively).

To assess temporal stability, the RFQ was administered a second time to subgroups of control (n=70, 38 males, Mage =37.20, SDage =10.63) and substance-using participants

Table 2. Item-Factor Correlations for Certainty and Uncertainty Factors (7-items)

	Control group		Substance-users	
	RFQc	RFQu	RFQc	RFQu
kes2(c2)	0.483		0.380	
kes3(c3)	0.482		0.528	
kes4(c4)	0.487		0.497	
kes5(c5)	0.374		0.437	
kes6(c6)	0.537		0.523	
kar2(u2)		0.454		0.358
kar4(u4)		0.484		0.297
kar5(u5)		0.440		0.384
kar6(u6)		0.555		0.487
kar8(u8)		0.367		0.430
kar12(u12)		0.480		0.391

RFQc: Certainty subscale of RFQ /RFQu: Uncertainty subscale of RFQ

Table 3. Internal Consistency and Temporal Stability Across Groups (7-items)

		Reliability		Temporal stability
		Cronbach's Alpha	Mean Inter-item	
Control group	RFQc	0.716	0.341	0.589**
	RFQu	0.730	0.319	0.591**
Substance-users	RFQc	0.717	0.410	0.403**
	RFQu	0.665	0.311	0.412**

RFQc: Certainty subscale of RFQ /RFQu: Uncertainty subscale of RFQ
** p<0.01

Table 4. Initial and Second Measurement RFQ Values for the Control Group and Substance-Using Groups

		Test		Re-test	
		Mean	SD	Mean	SD
Control group	RFQ-c	1.103	0.791	1.118	0.698
	RFQ-u	0.688	0.686	0.594	0.412
Substance-users	RFQ-c	1.101	0.743	1.167	0.719
	RFQ-u	0.610	0.570	0.434	0.470

RFQc: Certainty subscale of RFQ /RFQu: Uncertainty subscale of RFQ

Table 5. Goodness of Fit Indices of the Turkish Reflective Functioning Questionnaire Across Groups (7-items)

Group	X^2	df	CMIN/DF (p)	CFI/GFI	TLI	RMSEA (90% CI)
Control group (n=219)	72.499	38	0.001	0.958/0.942	0.939	0.064
Substance-users (n=207)	44.175	38	0.002	0.990/0.963	0.986	0.028
Multi-group	67.653	74	0.002	0.979/0.972	0.970	0.043

(n=46, Mage =30.23, SDage =5.25) three weeks after the initial administration. Correlations revealed significant positive relationships between the first and second RFQ administrations in the control group, with values of 0.589 for RFQc and 0.591 for RFQu. Temporal stability was somewhat lower but still significant in the substance-using group, with correlations ranging from 0.403 to 0.412 (all p's <0.001 for RFQc and RFQu) (Table 4).

Measurement Invariance of the RFQ Scores Across Groups/Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) demonstrated a good fit to the data for both the control and substance-using samples separately, while multi-group CFA showed an adequate fit to the data (Table 5). All items had substantial and significant loadings in the expected direction on their respective factors in both samples, although item loadings varied between the control and substance-using groups (Table 6).

Construct Validity

Control Group: Regarding construct validity, the RFQc subscale showed significant negative correlations with two subscales of alexithymia and three subscales of impulsivity. Additionally, moderate positive correlations were found between RFQc and mindfulness, empathic concern, and perspective taking. No significant correlation was observed between the Reading the Mind in the Eyes Test (RMET) and RFQc. Conversely, the RFQu subscale exhibited significant positive correlations with two alexithymia subscales and three impulsivity subscales. It also showed moderately negative correlations with mindfulness, empathic concern, perspective taking, and theory of mind (RMET) (Table 7).

Substance-using Group: In the substance-using group, the results for construct validity largely mirrored those observed in the control group. The RFQc subscale was positively correlated with mindfulness and empathy, while showing negative associations with all three impulsivity subscales and three alexithymia subscales. In contrast, the RFQu subscale demonstrated positive correlations with two alexithymia subscales and three impulsivity subscales, while being negatively correlated with mindfulness and empathic concern. No significant correlations were found between RFQ subscales and perspective taking or theory of mind in the substance-using group. (Table 7)

Criterion Validity and Group Differences

The ANCOVAs revealed no significant effect of substance use on RFQc and RFQu scores after controlling for demographic differences (education and income) (RFQc: F=1.915,

Table 6. Standardize Regression Weights of Items for Proposed 7-items Turkish Version CFA

	Control group		Substance-users	
	RFQc	RFQu	RFQc	RFQu
c2	0.620		0.530	
c3	0.494		0.547	
c4	0.489		0.528	
c5	0.506		0.578	
c6	0.721		0.680	
u2		0.593		0.496
u4		0.435		0.543
u5		0.669		0.621
u6		0.555		0.489
u8		0.625		0.439
u12		0.509		0.398

RFQc: Certainty subscale of RFQ /RFQu: Uncertainty subscale of RFQ

Table 7. Construct Validity Indices for Non-Clinical and Substance-Using Groups

	Control group		Substance-users	
	RFQc	RFQu	RFQc	RFQu
TASid	-0.480**	0.470**	-0.492**	0.390**
TASdf	-0.288**	0.299**	-0.383**	0.283**
MAAS	0.282**	-0.302**	0.305**	-0.224**
BISatt	-0.284**	0.284**	-0.478**	0.308**
BISmt	-0.260**	0.284**	-0.435**	0.287**
BISnp	-0.205**	0.144*	-0.329**	0.255**
IRIec	0.183*	-0.139*	0.121	-0.103
IRIPt	0.183*	-0.173*	0.134	-0.060
RMET	0.070	-0.133*	0.067	-0.093

RFQc: Certainty subscale of RFQ /RFQu: Uncertainty subscale of RFQ
TAS: Toronto Alexithymia Scale (TASid: difficulty in identifying feelings, TASdf: describing feelings)/ MAAS: Mindful Attention Awareness Scale/ BIS: Barratt Impulsiveness Scale (attentional, motor, non-planning)/ IRI: Interpersonal reactivity Index (empathic concern, perspective taking) / RMET: Reading the Mind in the Eyes Test

Table 8. Effects (ANCOVA*) of Substance Use on the Scores for RFQ, TAS, MAAS, BIS, IRI and RMET

	MS	df	F	p	eta
RFQc	1.467	1	2.913	0.089	0.008
RFQu	1.125	1	3.285	0.071	0.009
TASid	73.108	1	2.187	0.140	< 0.001
TASdf	98.464	1	8.914	0.003	0.042
MAAS	12.964	1	23.818	< 0.001	0.054
BISatt	212.618	1	15.931	< 0.001	0.037
BISmt	2576.873	1	57.946	< 0.001	0.123
BISnp	26.703	1	1.458	0.228	0.004
IRIec	0.191	1	0.008	0.969	< 0.001
IRIPt	55.539	1	3.119	0.078	0.007
RMET	225254.862	1	.972	0.325	0.002

* Income and education data were entered as covariates.

p=0.167, partial eta squared =0.06; RFQu: F=1.636, p=0.167, partial eta squared =0.05).

To further explore the relationship between substance use and RFQ scores, we calculated the correlations between RFQ subscales and both substance use duration and DUDIT scores. Although none of the correlations reached statistical significance, a consistent pattern emerged: RFQc scores were negatively correlated with substance use duration and DUDIT scores, while RFQu scores showed positive correlations with both variables.

Furthermore, we conducted additional ANCOVAs to test whether related constructs could differentiate between the control and substance-using groups. Statistically significant differences between the two groups were observed in two BIS subscales (motor and attentional impulsivity), MAAS, and TASdf. However, only the TASdf scores were consistent with

our hypotheses: substance users showed a lower capacity to differentiate feelings compared to the control group. Contrary to our expectations, substance users had lower scores on both attentional and motor impulsivity and higher mindfulness scores compared to the control group (Table 8).

DISCUSSION

The primary aim of the current study was to assess the psychometric properties of the Turkish version of the RFQ in both a clinical and control group of Turkish-speaking adults. Additionally, by exploring the reflective functioning capacities of substance-using males, this study sought to deepen our understanding of the relationship between substance use and the ability to mentalize.

The two-factor model was confirmed across both control and substance-using samples, with the RFQ subscales demonstrating expected patterns of associations with measures of closely related constructs. However, when retaining the original number of items, internal consistency estimates were found to be inadequate. Specifically, for two items (u7 and c1), the anticipated correlations with their associated factors were not achieved.

A detailed content analysis revealed that item u7 was not culturally appropriate. As a result, the original item was replaced with item u12 from the long version of the RFQ, which conveyed the same content. This substitution led to a significant increase in the correlation between the item and its associated factor. A similar process was applied to item c1, but no significant correlation was found between alternative items with similar meanings from the long version and the RFQ-c subscale. Consequently, item c1 was removed from the scale. Following these revisions, estimates of internal consistency were found to be sufficient for the final 7-item version across both groups.

Confirmatory factor analysis demonstrated measurement invariance between the control and substance-using groups. Internal consistency estimates were satisfactory for both the "certainty about mental states" and "uncertainty about mental states" subscales in the control group, and slightly lower but still acceptable for the substance-using group. Additionally, the mean inter-item correlations fell within the recommended range, indicating adequate item homogeneity (Piedmont 2014).

The expected correlations between the RFQ subscales and related constructs such as alexithymia, empathy, mindfulness, theory of mind, and impulsivity were largely confirmed, supporting the construct validity of the translated scale. As anticipated, the correlations between the RFQ subscales and measures of internally-based mentalization concerning the self (alexithymia, mindfulness, and impulsivity) were higher than those with scales assessing externally-based mentalization concerning others (perspective taking, empathy). The correlations between the RFQ subscales and theory of mind scores followed the expected direction, although they were statistically significant only in the control group. This result aligns with expectations, as the RMET measures mentalizing abilities based on external features, while the RFQ focuses on internal mentalization. These findings further support the notion that internal and external mentalization are relatively distinct constructs. The pattern of results regarding the RMET's relationship with the RFQ was consistent with those observed in the original and Italian versions of the scale (Fonagy et al. 2016, Morandotti et al. 2018).

Correlations between the perspective-taking subscale and the RFQ subscales were significant for the control group but not for the substance-using group. The perspective-taking subscale is designed to assess the cognitive component of empathy, which typically develops later than the emotional component. The French version of the RFQ yielded similar results with cognitive empathy subscales and reflective functioning associations in their adolescent sample (Badoud et al. 2015). The fact that the perspective-taking subscale assesses a different dimension of mentalization (cognitive mentalization with respect to others) compared to the RFQ may explain the relatively lower correlations observed in the present study. These findings underscore the importance of conducting further research to better understand the multidimensional nature of mentalizing capacity and the relationships between its various dimensions in different populations.

Contrary to our expectations, the scale did not discriminate between the substance-using and control participants. Moreover, substance use duration and the severity of the substance-using problem, as assessed via DUDIT, did not reveal significant correlations between substance use and mentalizing capacity. Interestingly, the RFQ was not the only scale that failed to distinguish between the groups. The ANCOVA results for RMET, PT, and EC also did not show differences between the groups. Additionally, contrary to our hypotheses, substance users appeared to have lower scores on motor and attentional impulsivity and higher scores on mindfulness compared to the control group. Considering that impulsivity is recognized as a significant factor in initiating and sustaining substance use (Perry and Carroll 2008, Verdejo-Garcia et al. 2008) and is also seen as a possible consequence of substance use (Goldstein and Volkow 2002), this outcome is counterintuitive. With respect to mindfulness, growing literature indicates the role of mindfulness deficits in substance use (Shorey et al. 2013), and mindfulness-based interventions have been shown to be effective in treating substance use disorders (Li et al. 2017).

One possible explanation for the lack of a significant difference in RFQ scores between the control group and the substance-using group could be gender differences in the mechanisms underlying substance use. Research on mentalizing capacity and substance use has typically focused on mothers and revealed significant findings regarding deficiencies in mentalizing among them (Macfie et al. 2020, Håkansson et al. 2017). In contrast, studies on men who use substances are limited (Stover and Kiselica 2014). Moreover, some studies suggest that traumatic events increase the risk of substance use in women but do not have a similar effect on men (Widom et al. 2006, Lansford et al. 2010, Kobulsky 2017). These findings highlight the need for further research examining the cognitive and social impacts of childhood trauma on substance use, as well as gender-specific psychological mechanisms (Üçok 2015, Mansueto et al. 20019).

These unexpected findings, which contradict the literature, may also be attributed to several limitations of the study. First, the substance-using sample in our research was not evaluated based on the diagnostic criteria for "substance use disorder" and consisted of a heterogeneous group of men undergoing probation. While the participants' DUDIT scores indicated substance use problems across the group, the average score was below the clinical cutoff of 25 (Evren et al. 2014, Berman et al. 2005). These low scores can be interpreted in two ways. First, the substance-using group may have mild substance use problems. Alternatively, the results may have been influenced by social desirability bias, which refers to participants' tendency to present themselves in ways that align with societal and cultural expectations (Paulhus 2017). Self-report measures are particularly susceptible to this bias, especially in studies addressing sensitive topics, such as substance use, or when specific social groups are examined (Ivar 2013).

Participants may have aimed to present themselves in a more favorable light or may have held an exaggeratedly positive view of themselves (Paulhus, 1984). Additionally, difficulties in self-awareness among substance users may further amplify this bias (Moeller & Goldstein 2014, Maremmani et al. 2012). Consequently, it should be considered that the participants in the substance-using group may not have accurately reflected their true conditions.

One of the strengths of the current study is the use of two distinct groups for validation purposes. However, we acknowledge several methodological limitations. First, the use of convenience sampling resulted in a sample that was limited in terms of key variables such as age, gender, income, and education level. Moreover, the heterogeneous nature of the substance-using group, which included both heavy and experimental users, may restrict the generalizability of the findings. When examining test-retest reliability, low correlations were observed in the substance-using group. As previously mentioned, this may be attributed to fluctuations in mentalizing capacity among substance users (Parrott 2018) or the insufficient representativeness of our substance-using sample. To gain a deeper understanding of the impact of substance use on reflective functioning and to better assess the measurement power of the RFQ in this group, future studies should consider using more homogeneous samples that meet the diagnostic criteria for 'Substance Use Disorder'.

Given the high comorbidity often observed in individuals using substances (Armstrong and Costello 2002, Struzik et al. 2017), exploring potential comorbid psychiatric conditions in participants could provide a more comprehensive understanding of the relationship between substance use and reflective functioning. While it was emphasized that the data provided by participants was independent of their probation process, the fact that data collection occurred in an environment where supervised probation tests were conducted may have increased the social desirability bias previously discussed. Additionally, as the RFQ is a self-report measure, it is important to consider that individuals with limited mentalization capacity may struggle to accurately reflect on their emotions and thoughts. This limitation should be acknowledged and addressed in future research to better understand the potential biases involved.

In conclusion, the current study offers preliminary evidence supporting the reliability and validity of the Turkish version of the Reflective Functioning Questionnaire (RFQ) as a self-report tool for assessing mentalizing capacity in Turkish-speaking individuals. Additionally, it contributes to our understanding of the relationship between substance use and reflective functioning. While the Turkish version of the RFQ demonstrated good psychometric properties for the control group, its discriminative capacity warrants further investigation in more homogeneous substance-use groups and other clinical populations with varying psychiatric conditions. The availability of the Turkish RFQ will facilitate mentalization research within Turkish-speaking clinical settings, ultimately advancing our understanding of the role mentalizing capacity plays in different psychiatric disorders.

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