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Original Research Article

Psychometric Properties of the Hindi Version of Metacognition Tools for Clinical and Non-Clinical Samples

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ABSTRACT

Background: Metacognition Questionnaire (MCQ)-30 and MCQ-Short and Modified (MCQ-S&M) are widely used psychometric tools to measure the metacognitive beliefs of clinical as well as non-clinical populations. However, there is a lack of Hindi psychometric tools of metacognition with evident psychometric properties. Therefore, the present study aimed to translate the existing metacognition questionnaires viz. MCQ-30 and MCQ-S&M into Hindi language, and further evaluate its psychometric properties in the Indian setting.

Method: Based on purposive sampling technique, MCQ-30 and Hospital and Anxiety and Depression Scale (HADS) were administered on 145 patients diagnosed with depression and anxiety and 355 non-clinical participants. Similarly, MCQ-S&M and HADS were administered on 126 patients with schizophrenia disorder. After collection of the data, internal consistency, test-retest reliability, and convergent validity of both MCQ-30 and MCQ-S&M were examined. Lastly, the factor structure of MCQ-30 and MCQ-S&M were evaluated using Exploratory and Confirmatory Factor Analysis.

Results: Hindi versions of MCQ-30 and MCQ-S&M have good internal consistency and temporal stability. The alternate form reliability of MCQ-30 was statistically significant. Both MCQ-30 and MCQ-S&M indicated significant convergent validity as the subscales had significant correlations with depression and anxiety. Lastly, the factor analysis of MCQ-30 yielded the five-factor model through both EFA and CFA. The EFA of MCQ-S&M identified the seven-factor model as in the original scale, however, the results of CFA did not fit the seven-structure model.

Conclusion: The results suggest that the Hindi-translated versions of MCQ-30 and MCQ-S&M have sound psychometric properties to measure the metacognitive beliefs of participants of anxiety and depression and schizophrenia disorder respectively.

Keywords: *Metacognition Questionnaires, Hindi Adaptation, Factor Structure*

INTRODUCTION

Metacognition is a higher-order cognitive function that encompasses one's awareness about own thoughts and cognitive functions (Crick & Clark, 1994; Dienes & Perner, 1999). Wells and Purdon (1999) defined 'metacognition as "the aspect of information processing that monitors, interprets, evaluates and regulates the content, and process of its organization" (Wells & Purdon, 1999).

Recent conceptualization of cognitive behavior therapy (CBT) focuses on 'metacognition' apart from the beliefs regarding one's inner and the external world. Researchers have postulated a cognitive model that integrates researches related to information processing with Beck's schema theory (Wells & Matthews, 1996), and the model is termed as the Self-Regulatory Executive Function (S-REF) model (Wells, 1995; Wells & Matthews, 1996). The Self-Regulatory Executive Function (S-REF) model explains how Metacognitions provide top-down generic procedures for inflexible and maladaptive coping responses (Kraft, Jonassen, Stiles, & Landrø, 2017).

The S-REF model posited a cognitive framework that comprises three interrelated levels namely, automatic processing, attention-driven voluntary processing, and belief structure. As per the model, perseveration of certain thoughts, threat monitoring, and failure in the modification of problematic beliefs play a significant role in amplifying and maintaining psychological symptoms (Matthews & Wells, 2016; Wells, 2007; Wells & Carter, 2001; Wells & Matthews, 1996). This top-down cognitive architecture has been incorporated in understanding the development of several psychological problems such as Generalized Anxiety Disorder (Wells, 2005, 2007; Wells & Carter, 1999), Obsessive-Compulsive Disorder (Fisher & Wells, 2008; Wells & Papageorgiou, 1998), Post-traumatic Stress Disorder (Holeva & Tarrier, 2001; Reynolds & Wells, 1999), social phobia (Wells, 2007; Wells & Carter, 2001); panic disorder (Wells, 2007; Wells & Carter, 2001); depression (Papageorgiou & Wells, 2003), substance abuse (Toneatto, 1999), hypochondriasis (Bouman & Meijer, 1999), psychosis (Palmier-Claus, Dunn, Taylor, Morrison, & Lewis, 2013), schizophrenia (Hill, Varese, Jackson, & Linden, 2012; Lobban, Haddock, Kinderman, & Wells, 2002; Perona-Garcelán et al., 2012; van Oosterhout, Krabbendam, Smeets, & Van Der Gaag, 2013), hallucination proneness (Larøi, Van der Linden, & Marczewski, 2004), presence of hallucinations (A. Morrison & Wells, 2003; A. P. Morrison, Wells, & Nothard, 2000), anorexia nervosa (Cooper, Grocutt, Deepak, & Bailey, 2007) and gastrointestinal disorders (Lenzo et al.,

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2013). Moreover, the role of metacognitive beliefs has been reported in non-clinical samples also in the perception of stress (Spada, Nikčević, Moneta, & Wells, 2008).

There are several questionnaires designed to assess metacognitive beliefs such as Anxious Thoughts Inventory (Wells, 1994); Though Control Questionnaire (Reynolds & Wells, 1999), and Metacognition Questionnaire (MCQ) (Cartwright-Hatton & Wells, 1997). The latter has been most widely used by researchers because of its sound validity in assessing metacognitive beliefs (Larøi, Van der Linden, & d'Acremont, 2009). The MCQ initially had 65 items, which was time-consuming due to its length; therefore, the authors further designed a brief version of the questionnaire which is known as Metacognition Questionnaire – 30 (MCQ-30) (Wells & Cartwright-Hatton, 2004). The tool has five subscales with six items each, namely positive beliefs about worry, cognitive self-consciousness, cognitive confidence, negative beliefs about the uncontrollability of thoughts and corresponding danger, and need to control thoughts (Wells & Cartwright-Hatton, 2004). The questionnaire has been found highly relevant for patients with anxiety and mood disorders (Sharma, Mehta, & Sagar, 2016) and healthy controls (Gupta & Bashir) in assessing their metacognitive beliefs. Keeping in view the relevance of MCQ-30, it has been adapted in eight different languages e.g. French (Larøi et al., 2009), Greek (Typaldou et al., 2010), Korean (Cho, Jahng, & Chai, 2012), Russian (Sirota, Moskovchenko, Yaltonsky, & Yaltonskaya, 2018), Serbian (Marković, Purić, Vukosavljević-Gvozden, & Begović, 2019), Spanish (Ramos-Cejudo, Salguero, & Cano-Vindel, 2013), Turkish (Tosun & Irak, 2008) and Italian (Quattropani, Lenzo, Mucciardi, & Toffle, 2014).

Furthermore, from the original MCQ 65-item questionnaire, a short and modified version (MCQ-S&M) was created to assess the metacognitive beliefs in patients with psychotic disorders, specifically those with auditory hallucinations (Lobban et al., 2002). This tool has 28 items, divided into seven subscales viz. positive beliefs about worry, cognitive self-consciousness, cognitive confidence, negative beliefs about the uncontrollability of thoughts and corresponding danger, the importance of consistency of thoughts, beliefs about normal experiences of unwanted intrusive thoughts, and unwanted thoughts (Lobban et al., 2002). The tools MCQ-30 and MCQ-S&M have twenty common items.

Review of literature suggests that there have been several researches in India that have identified the role of metacognition in the symptomatic manifestations of patients with major depressive disorder (Sharma et al., 2016), obsessive-compulsive disorder (Tarafder & Mukhopadhyay, 2018), learning (Jaleel, 2016) and academic procrastination (Gupta & Bashir). However, no attempt has been made to adapt MCQ-30 and MCQ-S&M in Hindi and validate it for the Hindi-speaking population. Therefore, the purpose of the present study was to translate MCQ-30 and MCQ-S&M into Hindi language. Further, to evaluate the psychometric properties of MCQ-30 and MCQ- S&M in non-clinical as well as patients with anxiety or depressive disorder and patients with schizophrenia respectively.

METHOD:

Participants: Purposive sampling technique was used for the selection of sample. The present study was conducted on three groups in the year 2019 from July-October. The socio-demographics of the three groups are presented in Table 1. The inclusion and exclusion criteria for the groups are as follows:

Group A: It consisted of 126 patients with schizophrenia selected from the psychiatric ward of recognized hospitals in India. The inclusion criteria were as follows: (a) Patients were diagnosed by the concerned psychiatrist according to ICD-10 Diagnostic Criteria for Research. (b) Patients were educated above Class 8th standard, with an understanding of Hindi language. (c) The age range of the participants was between 18-65 years. Patients with co-morbidity of any other significant physical, neurological and psychiatric conditions like history of substance abuse, mental retardation and epilepsy were excluded. Patients who had undergone ECT in last one week were also excluded from the study.

Table 1: Sample Characteristics

Socio-Demographics		Schizophrenia (N=126)		Anxiety Or Depression (N=145)		Non-Clinical (N=355)	
		Male	Female	Male	Female	Male	Female
Marital Status	Unmarried	29	17	34	25	117	98
	Married	26	54	49	37	69	71
Education	Secondary	46	58	22	17	18	18
	Higher Secondary	6	8	49	36	21	17
	College And Above	3	5	12	9	147	134
Age Group	18-25	27	19	12	12	101	93
	26-35	11	17	27	15	37	20
	36-45	11	17	19	21	17	26
	46-55	4	10	13	9	14	21
	56-65	2	8	12	5	17	9

Group B: It consisted of 145 patients suffering with anxiety and/or depressive disorder selected from the psychiatric ward of recognized hospitals in India. The inclusion criteria were as follows: (a) Patients were diagnosed by the concerned psychiatrist according to ICD-10 Diagnostic Criteria for Research. (b) Patients were educated above Class 8 with an understanding of both Hindi and English language. (c) The age range of the participants was between 18-65 years. Patients with co-morbidity of any other significant physical, neurological and psychiatric conditions like history of substance abuse, mental retardation and epilepsy were excluded. Patients who had undergone ECT in last one week were also excluded from the study.

Group C: This group constituted of 355 non-clinical participants mainly students and research scholars and non-teaching staff residing at the campus of a University. The inclusion criteria were as follows: (a) The age range of the

participants was between 18-65 years. (b) Participants with an understanding of both English and Hindi language. Lastly, participants with a history of any psychiatric illness were not included in the study.

Tools:

Metacognition Questionnaire – Short and Modified (Lobban et al., 2002): The MCQ-S&M is a short and modified version of MCQ-65, assesses individual differences in seven factors important in the metacognitive model of psychological disorders. It has 28 items and the responses are measured on a 4-point Likert scale. The seven subscales of the MCQ-S&M are: cognitive confidence, positive beliefs about worry, cognitive self-consciousness, negative beliefs about uncontrollability of thoughts and danger, experiencing unwanted thoughts, importance of consistency of thoughts, and beliefs about normal experience of unwanted thoughts. The scale has high face validity and internal consistency reliability (0.7).

Metacognition Questionnaire-30 - (Wells & Cartwright-Hatton, 2004): The MCQ-30 is a brief version of MCQ-65, measures metacognitive beliefs in five subscales namely – positive beliefs about worry, cognitive self-consciousness, cognitive confidence, negative beliefs about uncontrollability of thoughts and danger, need to control. The responses are measured on 4-point Likert scale. The scale is good internal consistency reliability (ranging from 0.72-0.93), test-retest reliability (ranging from 0.59-0.87). The scale has good construct and convergent validity.

Hospital Anxiety and Depression Scale –(Rishi et al., 2017)

It is a self-administered rating scale assessing the presence and severity of anxiety and depression through seven items each in Hindi language. Scoring for each item ranges from 0-3, wherein three denotes highest anxiety or depression level. The scale is internally consistent with values of 0.76 & 0.80 for anxiety and depression respectively.

Statistical Analysis:

To calculate factor structure of the questionnaires, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were carried out using SPSS 20.0 and IBM SPSS Amos (version 24) respectively. Cronbach's Alpha was computed to measure internal consistency reliability of MCQ 30 and MCQ S&M. Pearson's Product Moment Correlation was calculated to assess the alternate form reliability and test-retest reliability of MCQ-30. Lastly, convergent validity of both the tools were measured by computing correlation coefficients between the scores of the translated tool and scores of tool measuring anxiety and depression.

Procedure:

The permission had been sought from the author of the scales (MCQ-30 and MCQ-S&M) for Hindi translation and psychometric validation of the said tools. Thereafter, ethical approval was obtained from the Human Ethical Committee of the institute from where data was collected. Subsequently, the original version of MCQ-30 and MCQ-S&M were given to three bilingual mental health professionals for Hindi translation. Of the three translations, the most suitable translation was selected and given to another three bilingual mental health professionals for back-translation. These back-translated statements were compared with the original scales, and necessary modifications were made wherever applicable. The tools did not have any culturally-sensitive item; therefore, cultural adaptation of any item was not required. Patients with schizophrenia were selected on the basis of the above-mentioned inclusion and exclusion criteria for the assessment of psychometric properties of MCQ-S&M. Similarly, patients with anxiety and/or depressive disorders, and non-clinical controls were selected for adaptation of MCQ-30. Initially, the written informed consent was obtained from each participant, and the socio-demographic details were also recorded.

For the adaptation of MCQ-S&M, the Hindi-translated version of MCQ-S&M along with HADS was administered on patients with schizophrenia (Group A). For the adaptation of MCQ-30, the Hindi-translated version of MCQ-30, the original version of MCQ-30 along with HADS were administered on patients with anxiety and mood disorders (Group B) and non-clinical controls (Group C). In addition, it was carefully noted that if any participant had any difficulty in understanding any particular word or phrase during the time of administration of the translated tools. Furthermore, to assess the test-retest reliability of MCQ-30, the translated tool was re-administered on non-clinical controls after the temporal interval of thirty days. Finally, obtained responses were statistically analyzed for the estimation of the psychometric properties, i.e., reliability and validity of Hindi translated version of MCQ-S&M and MCQ-30.

RESULTS

Factor structure of MCQ-30 and MCQ-S&M

To assess the factor structure, and consequent construct validity, both exploratory and confirmatory factor analyses were conducted. Exploratory factor analysis of the Hindi version of MCQ-30 using principal component analysis was carried out. To identify the suitability of data to conduct factorial analysis – Bartlett's and KMO tests were conducted and scree plot was used to identify the number of factors. On the clinical sample, the findings indicated a significant Bartlett's test (χ^2= 6096.34, p= 0.0001) and a KMO measure of 0.91. The scree plot (Figure 1) revealed a break of slope after five factors and the component matrix (Table 2) extracted five factors. The five factors had the following eigen values 10.6, 6.2, 4.5, 3.2, and 1.9, and explained 88.13% of total variance. Similarly, on the non-clinical sample, the analysis indicated significant results on the pre-requisite measures, i.e., Bartlett's test (χ^2= 8722.61, p= 0.0001) and a KMO measure of 0.89. The scree plot (Figure 2) and component matrix (Table 2) identified five factors with eigen values 5.4, 5.1, 4.5, 4.0, and 3.2 respectively. The factors explained 74.36% of total variance. On conducting exploratory factor analysis of MCQ-S&M, it was observed that the Bartlett's test (χ^2= 3520.70, p= 0.0001) and KMO measure (0.74) were significant, the scree plot (Figure 3) and component matrix

(Table 3) indicated seven possible factors of MCQ-S&M. The eigen values of the seven factors were 7.3, 4.2, 3.1, 2.7, 2.1, 1.9, and 1.6 respectively, contributing to 83.15% of variance.

According to Byrne (2010) (Byrne, 2010) and Joreskog and Sorbom (1993) (Jöreskog & Sörbom, 1993), the most common fit indices are χ^2, GFI, CFI and RMSEA. On the other hand, Kline (2005) (Kline, 2005) suggests that at a minimum, the following indices should be reported – the model chi-square, RMSEA, CFI and SRMR. The results of the CFA on the clinical sample (Figure 4) indicated an acceptable level of goodness of fit index as per the following measures – χ^2/df = 1.62, RMSEA= 0.06, CFI= 0.96, GFI= 0.89, and RMR= 0.04 (Table 4). Similarly, on the non-clinical sample (Figure 5), the dimensions of Hindi version of MCQ-30 indicated satisfactory goodness of fit as measured by the following indices - χ^2/df = 1.69, RMSEA= 0.04, CFI= 0.97, GFI= 0.91, and RMR= 0.02 (Table 4). On the other hand, the results of the confirmatory factor analysis of MCQ-S&M (χ^2/df = 3.97, RMSEA= 0.15, CFI= 0.72, GFI= 0.65, and RMR= 0.09) (Table 4 and Figure 6) indicated that the factor structure of the tool is unsatisfactory and does not fit the model.

Reliability and Validity of Hindi version of MCQ-30 on Clinical and Non-Clinical Participants

The psychometric validation of the Hindi version of MCQ-30 was conducted on both clinical and non-clinical participants. Internal consistency was examined using Cronbach's α coefficients and for the participants with anxiety and/or depression the values ranged between 0.89-0.95 for the five subscales (Table 5). Similarly, the coefficients for internal consistency among the non-clinical participants ranged between 0.88-0.94 (Table 6). The values demonstrate very high internal consistency reliability of the five dimensions of Hindi version of MCQ-30 among both clinical and non-clinical participants.

The results of the alternate forms reliability indicated that the correlation valued between the original and the translated tool ranged between 0.81-0.92 for participants with anxiety and depression (Table 5) and 0.86-0.94 for non-clinical participants (Table 6). Furthermore, test-retest reliability was examined on the non-clinical participants and the scores ranged between 0.62-0.88 (Table 6). It suggests that the Hindi translated version of MCQ-30 has high temporal reliability on the non-clinical participants.

FIGURE 1: SCREE PLOT OF HINDI VERSION OF MCQ-30 (Clinical)

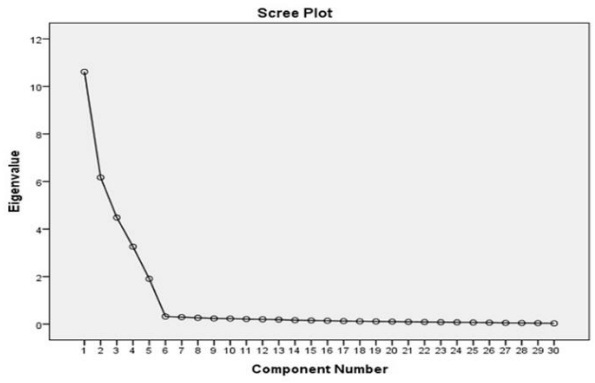


Table 2: Factor loadings of items included in the analysis (MCQ-30 – both clinical and non-clinical)

Items	Anxiety or Depression Factors					Non-Clinical Factors				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Positive Beliefs About Worry										
Item 1	.341	.003	.151	**.948**	-.318	.063	.012	-.002	**.861**	-.020
Item 7	.378	.037	.128	**.946**	-.364	.093	.020	.036	**.859**	-.090
Item 10	.351	.002	.183	**.952**	-.408	.152	-.018	-.031	**.868**	-.048
Item 19	.323	.043	.119	**.914**	-.370	.153	-.090	.004	**.825**	-.043
Item 23	.158	.088	.101	**.895**	-.269	.048	-.036	.051	**.769**	.010
Item 28	.222	.071	.116	**.941**	-.294	.117	-.064	.064	**.808**	-.017
Negative Beliefs About Uncontrollability										
Item 2	.517	-.334	.123	.254	**-.937**	.130	.046	.024	-.070	**.872**
Item 4	.523	-.295	.173	.251	**-.945**	.131	.104	-.001	.016	**.849**
Item 9	.586	-.356	.098	.294	**-.956**	.131	.075	.002	-.056	**.820**
Item 11	.523	-.346	.133	.360	**-.936**	.063	.114	.065	-.055	**.738**
Item 15	.553	-.260	.226	.470	**-.906**	.039	.042	-.047	-.014	**.723**
Item 21	.505	-.306	.204	.418	**-.920**	.090	.052	.037	-.013	**.729**
Cognitive Confidence										
Item 8	**.936**	-.179	.048	.219	-.493	**.880**	-.040	.000	.011	.162
Item 14	**.942**	-.177	.105	.277	-.534	**.918**	-.013	-.040	.107	.149
Item 17	**.956**	-.178	.120	.309	-.575	**.937**	-.074	-.015	.173	.085
Item 24	**.914**	-.097	.036	.343	-.479	**.882**	-.015	-.048	.073	.091
Item 26	**.907**	-.213	.183	.208	-.586	**.864**	-.039	.097	.157	.100
Item 29	**.922**	-.127	.134	.374	-.553	**.913**	.001	.026	.151	.063
Need to Control										
Item 6	.180	**-.943**	-.116	-.080	-.284	-.032	**.876**	-.072	-.081	.073
Item 13	.184	**-.965**	-.081	-.047	-.308	-.031	**.868**	-.026	-.050	.099
Item 20	.192	**-.971**	-.062	-.043	-.354	-.028	**.889**	-.114	-.025	.066
Item 22	.157	**-.951**	-.038	-.041	-.328	-.018	**.872**	-.080	-.045	.091
Item 25	.126	**-.952**	-.062	-.036	-.338	-.047	**.857**	-.060	.019	.066
Item 27	.118	**-.967**	-.072	-.039	-.320	-.016	**.897**	-.091	-.007	.083
Cognitive Self-Consciousness										
Item 3	.073	.108	**.917**	.071	-.103	-.032	-.106	**.799**	.043	-.035
Item 5	.058	.036	**.892**	.103	-.150	-.030	-.063	**.873**	-.018	.011
Item 12	.088	.078	**.906**	.124	-.141	.032	-.081	**.918**	.032	-.005
Item 16	.169	.049	**.926**	.176	-.177	.011	-.031	**.915**	.032	.006
Item 18	.084	.053	**.928**	.144	-.206	.021	-.083	**.929**	.021	.076
Item 30	.088	.096	**.940**	.136	-.136	.024	-.085	**.929**	.028	.043

Table 3: Factor loadings of items included in the analysis (MCQ-S&M)

Items	Factors						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Positive Beliefs About Worry							
item 1	**.781**	.246	.021	.091	.348	-.066	.124
item 2	**.890**	.285	.276	.046	.363	.088	.003
item 3	**.914**	.206	.211	.041	.385	-.012	.041
item 4	**.877**	.309	.177	-.001	.512	.244	.094
item 5	**.915**	.290	.256	.088	.374	.107	.074
Negative Beliefs About Uncontrollability							
item 6	.438	.074	.235	-.012	**.937**	.115	.103
item 7	.358	.144	.060	.001	**.925**	.069	.021
item 8	.438	.186	.150	-.058	**.923**	.230	.097
item 9	.395	.130	.153	-.068	**.943**	.104	.121
item 10	.425	-.013	.130	-.091	**.914**	.107	.078
Cognitive Confidence							
item 11	.128	.108	**.836**	-.025	.066	.039	-.179
item 12	.200	.145	**.883**	.210	.134	-.037	.076
item 13	.281	.216	**.814**	.174	.215	.104	.204
item 14	.230	.201	**.886**	.144	.093	.172	.042
item 15	.123	.193	**.843**	.162	.214	.160	.212
Cognitive Self-Consciousness							
item 16	.182	**.828**	.215	.237	.181	.026	.358
item 17	.341	**.864**	.120	.152	.237	.070	.109
item 18	.263	**.847**	.188	-.007	.058	-.061	.246
item 19	.209	**.871**	.172	.017	-.014	.033	.193
item 20	.306	**.887**	.149	.243	.100	-.005	.160
Importance of Consistency of Thoughts							
item 21	.044	.076	.092	**.913**	-.069	-.149	-.047
item 22	.009	.093	.021	**.909**	-.128	-.134	-.100
item 23	.123	.144	.223	**.882**	.019	.108	.154
item 24	.041	.187	.204	**.870**	.005	.087	.146
Beliefs About Normal Occurrence Of Unwanted Thoughts							
item 25	.079	-.003	.110	-.039	.136	**.988**	-.003
item 26	.021	-.004	.055	-.020	.101	**.987**	.014
Unwanted Thoughts							
item 27	.047	.273	.095	.049	.095	-.023	**.966**
item 28	.095	.217	.028	.012	.067	.039	**.967**

FIGURE 2: SCREE PLOT OF HINDI VERSION OF MCQ-30 (Non-Clinical)

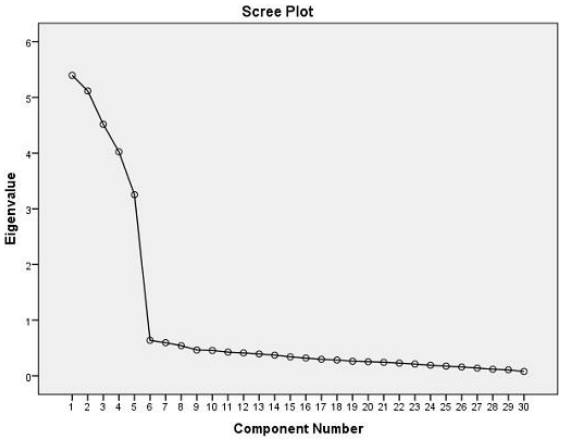


FIGURE 3: SCREE PLOT OF HINDI VERSION OF MCQ-S&M (Psychosis)

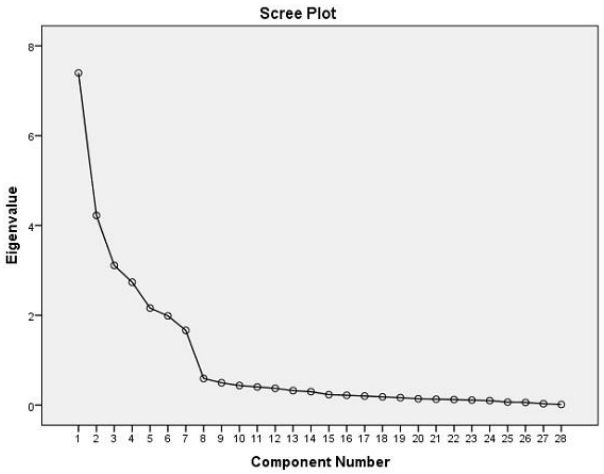


FIGURE 4: PATH DIAGRAM (CFA) OF HINDI VERSION OF MCQ-30 (Clinical)

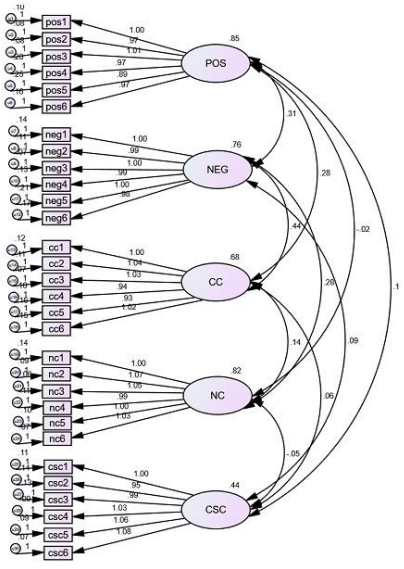
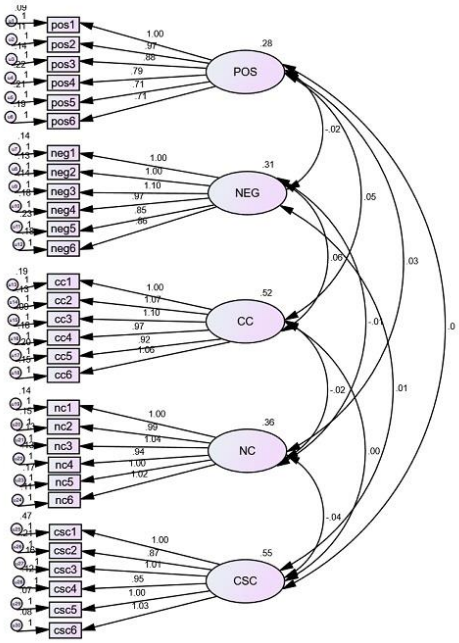


FIGURE 5: PATH DIAGRAM (CFA) OF HINDI VERSION OF MCQ-30 (Non-Clinical)



Convergent validity of Hindi version of MCQ-30 was examined by calculating Pearson Product Moment Correlation Coefficients between the subscales of the tool and the related constructs, i.e., anxiety and depression. For the non-clinical sample, all the five subscales significantly correlated with anxiety (Table 6). Similarly, significant correlations were reported between the dimensions of Hindi version of MCQ-30 and depression, except for the subscale measuring cognitive self-consciousness (Table 6). Regarding the clinical participants, significant correlations were observed between the dimensions of Hindi version of MCQ-30 and depression and anxiety, except for the subscales measuring cognitive self-consciousness and cognitive confidence (Table 5).

FIGURE 6: PATH DIAGRAM (CFA) OF HINDI VERSION OF MCQ-S&M (Psychosis)

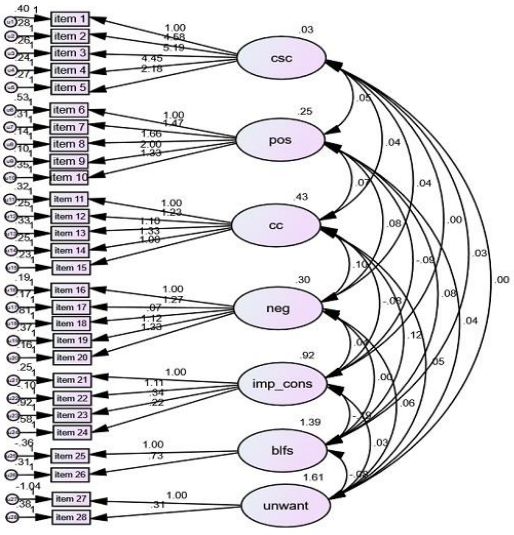


Table 4: Indices of Confirmatory Factor Analysis of Hindi Version of MCQ-30 and MCQ-S&M

SCALES	χ^2	Df	χ^2/df	RMSEA	CFI	GFI	AGFI	RMR	NFI
MCQ-30 (Anxiety or Depression)	641.54	395	1.62	0.06	0.96	0.89	0.74	0.04	0.90
MCQ-30 (Non-Clinical)	668.15	395	1.69	0.04	0.97	0.91	0.87	0.02	0.93
MCQ-S&M (Schizophrenia)	1248.29	329	3.97	0.15	0.72	0.65	0.57	0.09	0.65

RMSEA = Root mean Square Error of Approximation; CFI = Comparative Fit Index; GFI = Goodness of Fit; AGFI = Adjusted Goodness of Fit; RMR = Root Mean Square Residual; NFI = Normed-Fit Index

Table 5: Reliability and Validity of Hindi Version of MCQ-30 (Clinical Population – Diagnosed with Anxiety or Depression)

Dimensions	Cronbach's Alpha	Alternate Forms	Anxiety	Depression
Positive Beliefs About Worry	0.93	0.90	0.18*	0.17*
Negative Beliefs About Uncontrollability	0.91	0.91	0.37**	0.39**
Cognitive Confidence	0.94	0.81	0.14	0.13
Need to Control	0.89	0.81	0.45**	0.30**
Cognitive Self-Consciousness	0.95	0.92	0.12	0.12

*significant at 0.05, **significant at 0.01

Table 6: Reliability and Validity of Hindi Version Of MCQ-30 (Non-Clinical)

Dimensions	Cronbach's Alpha	Alternate Forms	Test-Retest	Anxiety	Depression
Positive Beliefs About Worry	0.88	0.86	0.62	0.44**	0.30**
Negative Beliefs About Uncontrollability	0.91	0.91	0.83	0.14*	0.13*
Cognitive Confidence	0.92	0.94	0.78	0.46**	0.42**
Need To Control	0.90	0.92	0.88	0.14*	0.15**
Cognitive Self-Consciousness	0.94	0.93	0.79	0.13*	0.09

*Significant At 0.05, **Significant At 0.01

Psychometric Properties of MCQ-S&M on Patients diagnosed with Schizophrenia

To assess the psychometric properties of Hindi version of MCQ-S&M, internal consistency reliability was calculated. The Cronbach's α for the seven dimensions indicated a range of 0.75-0.94 (Table 7). Convergent validity, as calculated by computing correlation between the dimensions of Hindi version of MCQ-S&M and depression and anxiety, indicated that the additional dimensions – the

importance of consistency of thoughts and beliefs about normal experience of unwanted thoughts had a significant association with depression and anxiety (Table 7). Additionally, the pre-existing dimensions of the original version of MCQ-65 such as – negative beliefs about controllability of thoughts, cognitive confidence and cognitive self-consciousness also had a statistically significant association with depression and anxiety for the patients diagnosed with schizophrenia.

Table 7: Reliability and Validity of Hindi Version of MCQ-S&M (Schizophrenia)

Dimensions	Cronbach's Alpha	Anxiety	Depression
Positive Beliefs About Worry	0.89	0.30**	0.22*
Negative Beliefs About Uncontrollability	0.76	0.28**	0.27**
Cognitive Confidence	0.91	-0.21*	0.18
Cognitive Self-Consciousness	0.81	0.23*	0.20*
Importance Of Consistency Of Thoughts	0.75	0.27**	0.40**
Beliefs About Normal Occurrence Of Unwanted Thoughts	0.91	-0.27**	-0.20*
Unwanted Thoughts	0.94	-0.14	0.16

*significant at 0.05, **significant at 0.01

DISCUSSION

The present study aimed to translate the Metacognition Questionnaires viz. MCQ-30 and MCQ-S&M into the Hindi language and determine its psychometric properties for Hindi speaking population. The psychometric properties of Metacognition Questionnaires were assessed with three groups of participants, namely, patients diagnosed with depression or anxiety, healthy controls having no history of psychiatric disorders and patients with psychotic disorders such as schizophrenia, to have a broader generalization of the findings.

As MCQ-30 is a more applicable psychometric tool to measure metacognition of the persons with anxiety and depression (Wells & Cartwright-Hatton, 2004) and the general population (Wells & Cartwright-Hatton, 2004); therefore, measures of reliability such as internal consistency and alternate form reliability of the MCQ-30 were assessed on patients with anxiety and depression, and non-clinical participants. As, MCQ-S&M is suitable for measuring the metacognitive beliefs of psychotic patients (Lobban et al., 2002); therefore, reliability measures of the Hindi version of MCQ-S&M have been examined on patients with psychotic disorders such as schizophrenia

The present study identified the factor structure of MCQ-30 and MCQ-S&M by calculating both exploratory and confirmatory factor analysis. The results of the construct validity of MCQ-30 highlights that the five-factor model fit the data for both clinical and non-clinical participants, as in the original version of MCQ-30 and other translated versions (Cho et al., 2012; Larøi et al., 2009; Marković et al., 2019; Quattropani et al., 2014; Ramos-Cejudo et al., 2013; Sirota et al., 2018). The five-factor solution offers more than 50 % variance which is far more than the original version (Wells & Cartwright-Hatton, 2004) of the tool. Regarding the construct validity of MCQ-S&M, the results of the exploratory factor analysis using the method of the principal component analysis revealed seven distinct and inter-correlated factors reflecting different aspects of metacognition as identified in the original scale (Lobban et al., 2002). However, the result of the confirmatory factor analysis does not fit the seven-structure model. It is probable that the lesser sample size is to blame for the poor model fit as the standard sample size recommendation is a 1:10 item-to-participant ratio. (Brown, 2015; Harrington, 2009). Apart from the sample size, other possible reason behind the results could be the inclusion of patients with schizophrenia disorder only. There are several extraneous factors involved while working with patients with schizophrenia, for example, studies have showed deficits in vigilance, slowed reaction time, selective attention and sustained attention (Elvevåg, Duncan, & McKenna, 2000; Fioravanti, Carlone, Vitale, Cinti, & Clare, 2005; Perlstein, Carter, Barch, & Baird, 1998) in patients diagnosed with schizophrenia.

The internal consistency of the Hindi translated tool was measured by Cronbach's Alpha and the computed values for MCQ-30 were higher than the original MCQ-30 (Wells & Cartwright-Hatton, 2004) and the other adapted versions of the scale (Cho et al., 2012; Cook, Salmon, Dunn, & Fisher, 2014; Fisher, Cook, & Noble, 2016; Grøtte et al., 2016; Marković et al., 2019; Martín et al., 2014; Spada et al., 2008; Yılmaz, Gençöz, & Wells, 2008). The alternate form reliability of MCQ-30 was also satisfactory on both clinical and non-clinical groups. Similarly, the internal consistency reliability of MCQ-S&M was also at par with the original version of the tool (Lobban et al., 2002). The test-retest reliability of MCQ-30 was assessed on non-clinical participants, and findings indicate the presence of its temporal stability of all five dimensions of MCQ-30. However, many previous MCQ-30 adaptation studies did not assess test-retest reliability (Cho et al., 2012; Larøi et al., 2009; Marković et al., 2019).

Convergent validity of the Hindi translated tools was assessed by computing the correlation coefficients between the dimensions of MCQ-30/ MCQ-S&M and the dimensions of HADS. The subscales of MCQ-30 viz. pertaining to uncontrollability and need to control the thoughts showed high correlations with total HADS score for the participants diagnosed with depression or anxiety. The findings are at par with the previous studies conducted in this line (Cho et al., 2012; Cook et al., 2014; Fisher et al., 2016; Grøtte et al., 2016; Marković et al., 2019; Martín et al., 2014; Quattropani et al., 2014; Ramos-Cejudo et al., 2013; Spada et al., 2008; Yılmaz et al., 2008). Therefore, it would be reasonable to interpret that, individuals who

believe that they need to be in control of their thoughts and pay detailed attention to how their mind operates, subsequently intensify the importance of worrying, which may in turn strengthen the beliefs that worrying is uncontrollable and dangerous. As hypothesized in the S-REF model, development and activation of beliefs related to uncontrollability of thoughts lead to unhealthy coping strategies such as though suppression and anxiety (Cartwright-Hatton & Wells, 1997; Wells & Carter, 2001). Thus, the findings of the present study reveal that there is a significant relationship between MCQ-30 and the tendency to feel depressed and anxious.

The non-clinical group also presented a significant and positive relationship between the dimensions of MCQ-30 viz. positive beliefs about worry as well as cognitive confidence and depression and anxiety. The present findings have been corroborated in Spanish population (Ramos-Cejudo et al., 2013), wherein positive beliefs about worry had the strongest relationship with pathological worry. Thus, from the present findings suggest that individuals who believe that the process of rumination is a useful coping strategy and they have a tendency to use this strategy to face anxiety-provoking situations (Spada et al., 2008).

Moving on to the convergent validity of the Hindi translated version of MCQ-S&M; as hypothesized in the original scale (Lobban et al., 2002), the modified subscales – the importance of consistency of thoughts and beliefs about the normal experience of unwanted thoughts had a significant relationship with both anxiety and depression. The findings can be linked to the cognitive consistency theory of auditory hallucinations (A. P. Morrison, Haddock, & Tarrier, 1995). When the need to maintain consistency among thoughts is over-emphasized, the thoughts and beliefs those are not similar to the existing belief structure may be misattributed to an external source which is further turned into experiences such as auditory hallucinations and the consequent distress. Therefore, the subscale of the importance of consistency of thoughts can help in understanding the occurrence and maintenance of hallucinations and the depression related to hallucination.

Although the study covers both clinical and non-clinical participants, it has certain limitations. Temporal stability of MCQ-S&M and MCQ-30 on clinical participants could not be assessed due to the non-availability of the participants. Alternate form reliability of the Hindi translated version of MCQ-S&M could also not be calculated due to lack of bilingual participants. Moreover, there was no screening tool used to recruit participants for the non-clinical group, the participants were only clinically interviewed regarding the history of psychiatric illnesses and further included in the non-clinical group. Lastly, future studies on the psychometric evaluation of the MCQ-S&M should incorporate samples from other psychotic disorders also, so as to confirm the seven-structure model of the scale.

Nonetheless, the Hindi version of the metacognition questionnaires can help researchers better understand the mechanism of action behind MCT for emotional disorders. Future research on treatment changes in metacognitive beliefs could help researchers better understand how MCT minimizes the symptoms of emotional disorders in Hindi-speaking adults.

CONCLUSION

The Hindi translated version of MCQ-30 and MCQ-S&M both are brief, reliable and valid instruments to measure metacognitive beliefs of their target population. These scales would be extremely valuable and successful for therapists and academics working in the fields of cognition, metacognition, and cognitive therapy, particularly in India and its subcontinent's Hindi-speaking regions.

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