Believability of negative automatic thoughts: Psychometric properties of the Automatic Thoughts Questionnaire – Modified Version

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Forewords and acknowledgments

Submitted in partial fulfilment of the requirements of the MSc Clinical Psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal. The research that this thesis presents is the culmination of work over three semesters. In the first semester, literature review was written about the Automatic Thought Questionnaire (ATQ), and the blueprint for the research drafted. The second semester involved writing proposals to the National Bioethics Committee of Iceland for permission to conduct the study, and other governing entities, and the first draft of the method section for the thesis. Data collection took place in the third semester along with the writing of the final draft of this thesis.

This research was a part of a larger study conducted by my principal advisor, Magnús Blöndahl Sighvatsson. His doctoral research in psychology is about mechanism of change in transdiagnostic cognitive behavioural therapy, i.e. how and why therapy works. One of the advisors for his project is Jón Friðrik Sigurðsson, also served as advisor to this present thesis. The work of this thesis will be submitted to peer-reviewed journal. Magnús and Jón will be co-authors to the article.

The main purpose of this study was to gather preliminary data about the psychometric properties of the modified version of the Automatic Thoughts Questionnaire (ATQ-MV) in an Icelandic sample of university students. ATQ is a self-report measures that assesses how often 30 negative automatic thoughts that are typical for depression, occurred to respondents in the last week. The modified version also asks respondents how much they believed these thoughts the last time they felt depressed or sad. The modification to the ATQ is built on the proposed mechanism of change in cognitive behavioural therapy but forward by Paul Salkovskis (the principal advisor to Magnús): that decreased believability in negative, unrealistic thinking pattern, and increased believability in alternative, realistic thinking

pattern will alleviate symptoms of mental problems, e.g. depression. To test this hypothesis a measurement like ATQ-MV is needed. ATQ-MV measures negative cognitions that are thought to cause and/or maintain depression, and how much each respondent believes them. This measurement is conceptually sound for testing the aforementioned hypothesis, and it also allows for testing temporal relationship between therapeutic procedures that are proposed to induce cognitive change (i.e. decreased believability in negative cognition and increased believability in alternative cognitions), which are in return proposed to lead to decrease in depressive symptoms. The results of this study will benefit the study conducted by Magnús in his doctoral project and hopefully other studies concerning mechanism of change in CBT in the future.

The research was conducted at Reykjavik University and the University of Iceland. Time is scarce commodity in the life of any student and I acknowledge how precious their time is. The students at both institutions receive my highest gratitude for participation in the study. Furthermore, Ragnar Pétur Ólafsson, at University of Iceland, and Jack James, at Reykjavik University, receive special thanks for allowing me to interrupt their class sessions and offer their students to participate in this study.

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be colleague, is to thank for that I'm now graduating with MSc degree in Clinical Psychology. Without her encouragement, my track of study would have been, without doubt, different. In those two years that have passed since my enrolment in the MSc program I have made many friends. I am especially grateful for having meet Birta, Óttar and Thelma. They are in so many ways the pieces of the puzzle that I have been missing all my life. With them I have now begun an adventure that will occupy my mind and life for many years to come.

I want to give my outmost gratitude to my advisors Magnús and Jón Friðrik. I first met Magnús when he was teaching undergraduates about psychological assessment. I remember that his first impression upon me was "that guy curses a lot". Which was, for me, evidence for that he knew what he was talking about. No need of sugar-coating it. His assistance, driving force and encouragement has prepared me for the job of being a clinical psychologists and researcher. I could write a book about all the things that Jón has done for me and all the other students in the program. It suffices to say that I will never forget his part in making my dreams come true.

The final words are dedicated to my fiancé, Ólöf. She has been with me through thick and thin. Most importantly she believed in me when I was feeling like I could not go on any longer. She has provided me with the alternative view to my own negative, self-debilitating thoughts. Because of here I can grow in the face of adversity. She is the piece that has made me anti-fragile. Her biggest gift is though, without doubt, our baby boy that will join us this summer. I dedicate this work to my fiancé and my son.

Abstract

The cognitive theory of depressions proposes that depression is maintained by maladaptive thinking patterns that affect how persons understand their experiences. Cognitive behavioural therapy is supposed to alleviate the symptoms of depression by cognitive change, and the evidence suggests that cognitive change leads to symptom reduction. However, it is poorly understood what psychological interventions are necessary and sufficient for this cognitive change. One hypothesis of how cognitive change occurs is through reducing believability of negative, unrealistic thoughts and increasing believability of alternative more realistic thoughts. To test this hypothesis of mechanism of change in treatment of depression a measurement is needed that measures believability of negative thoughts. This study reports information about preliminary validation of a modified version of the Automatic Thoughts Questionnaire (ATQ-MV) in a sample of university students in Iceland. The ATQ-MV assesses frequency of negative automatic thoughts, as well as measuring how much the respondent believed those thoughts the last time he was depressed/sad on a scale from 0% to 100%. The results indicate that the ATQ-MV is a reliable measurement, but further research is needed to further establish its reliability. The ATQ-MV has adequate convergent validity, but discriminant validity needs to be assessed further. Exploratory factor analysis indicated that one factor solution was the most appropriate in the sample used in the study. Questions are raised about the reliability of the response format of the ATQ-MV because respondents did not seem to fully understand the instructions. Alterations to the ATQ-MV are proposed and further research's discussed.

Keywords: depression, cognitive behavioural therapy, negative automatic thoughts

Believability of negative automatic thoughts in depression: Psychometric properties of the

Automatic Thoughts Questionnaire – Modified Version

Depression is a mental disorder characterised by episodes of sadness, loss of interest, pessimism, negative beliefs about the self, others and the world, decreased activity, changes in sleep, appetites and interest in sexual activities and in more severe cases suicidal thoughts (Driessen & Hollon 2010).

According to the cognitive theory of depression, maladaptive thinking patterns affect how individuals interpret their experiences (Beck, 1976; Beck, Rush, Shaw, & Emery, 1979). These maladaptive thinking patterns are characterized by core beliefs, which the individual holds about himself, others, and the world in general, called the cognitive triad. The individual also holds certain assumptions that are in line with these core beliefs. These dysfunctional assumptions are often in the form of demands and expectations, and function as rules of thump of how to understand and interpret experiences (Beck, 1976; Beck, et al., 1979). The cognitive theory of emotional disorders proposes that when people interpret their experiences in negative and/or exaggerated and/or unrealistic way, their emotional response will be negative, excessive and out of proportion to circumstances (Beck, 1976, Beck & Haigh, 2014). Attentional and memory biases (Mathews & MacLeod, 2005; Gotlib & Joormann, 2010) help to maintain these core beliefs by filtering out information and experiences that are not compatible with those negative views the person holds of himself, others and the world in general (Beck & Haigh, 2014). For example, according to the cognitive theory of depression, a depressed person which holds the belief that he or she is unworthy of anything good holds the dysfunctional assumption that he or she must excel at everything to be worthy of something. If this person fails to "excel" at some task her behaviour fails to meet the demands of the dysfunctional assumption, which activates the core belief. When this core belief is activated by a certain event or circumstances (e.g.

dysfunctional assumption is not met) negative automatic thoughts go through the person's mind: "Why can't I do anything right?" "What is wrong with me?" These thoughts lead to affections, sensations, and behaviours that are in logical context with the negative, exaggerated and unrealistic meanings that people attach to their experiences (Beck, et al., 1979).

In line with the cognitive theory of psychological disorders, cognitive behavioural therapy (CBT) aims to help patients to understand how their negative core beliefs, interpretations of experiences, cognitive processes like attention and memory, and behaviours, maintain their emotional problems. In treatment, the therapist and the patient work in collaboration to discuss and test whether these negative beliefs and negative automatic thoughts are realistic and sensible (Beck, et.al., 1979; Hofmann, Asmundson, & Beck, 2013). Along with this, alternative interpretations of the patient's experience are developed and considered. Salkovskis (1996) framed this in the proposition "the difference between theory A vs. theory B". According to him the beliefs that the patient holds are treated as "theory A" and the alternative more realistic beliefs that the therapist teaches the patient in treatment are treated as "theory B". The therapist and the patient then collect data and evidence in an empirical fashion with cognitive change procedures and behavioural experiments, to evaluate theory A and theory B. The aim of therapy is therefore to decrease believability in theory A and increase believability in theory B, and according to Salkovskis this is a general mechanism of change for CBT in general (Salkovksis, 1996). According to the cognitive theory of depression (Beck, et al., 1979; Beck & Haigh, 2014), the proposed mechanism of change (MOC) in CBT for depression is that change in cognition will lead to change in affections and behaviours, and the alleviation of mental problem. Therefore, Salkovskis (1996) hypothesis might be an interesting MOC for CBT for depression but has yet to be empirically evaluated.

CBT is the most extensively researched psychotherapy for emotional disorders. The efficacy of CBT for depression has been thoroughly established (Hollon, et al., 2005; Fournier, et al., 2010; Cuijpers, et al., 2013), but what components of CBT drive change in depressive symptoms (or psychopathology in general) is poorly understood (Kazdin, 2007). The theory behind CBT explicitly states that symptoms should reduce through cognitive change, and in result, people will interpret their experiences in a more balanced and realistic way. However, the efficacy of any given therapy does not establish evidence of its proposed theoretical model (Salkovsis, 2002).

Indeed, claims have been made against the need to challenge thoughts in CBT (Longmore & Worrell, 2007). Similarly, Kazdin (2007) claimed that changes in cognition are not the reason CBT works and in another paper, Kazdin (2009) stated that changes in cognition are not necessary for therapeutic change. However, Hofman (2007), in a commentary to Longmore and Worrell (2007), pointed out that cognitive restructuring is not the only way that can generate change in cognition. Reduction in depressive symptoms, followed by therapy, which does not involve cognitive restructuring, is not an evidence against the cognitive theory of depression. The reduction of depressive symptoms could well be mediated through reduction in NAT's and changes in core beliefs even though they were not explicitly restructured with cognitive interventions as Hofmann (2007) pointed out.

In a recent review by Lorenzo-Lucaes, German, & DeRubeis (2015) cumulative evidence are reported, which indicates that cognitive change do lead to symptom change in depression. Furthermore, according to the review, cognitive changes are not "CBT specific", but happens in other psychotherapies for depression as well. Even though the literature is sparse on what interventions are necessary and sufficient to produce cognitive change (Lorenzo-Lucaes, et al., 2015; Kazdin, 2007; Murphy, Cooper, Hollon, & Fairburn, 2009), the effects of specific therapeutic procedures that are theoretically proposed to lead to

symptom change should be isolated to investigate MOC of any given therapy (Lorenzo-Lucaes, et al., 2015).

The evidence suggests, according to Lorenzo-Lucaes et al. (2015) that cognitive change can be produced with other procedures than specific cognitive change procedures typical for CBT, as Hofmann (2007) pointed out. This makes things even more complicated. Not only do we not know what procedures in CBT for depression are necessary or sufficient for cognitive change, but other procedures as well can produce cognitive change, such as behavioural activation or aspects of interpersonal psychotherapy.

Research of MOC in CBT for depression need to be designed in a way that allows to infer about the temporal relationship between cognitive change and symptom change (Kazdin, 2007; Lorenzo-Lucaes, et al., 2015), which means that cognitive change, e.g. reduction in frequency and believability of negative automatic thoughts, should precede changes in depression symptoms. To test the effects of the theory A vs. theory B procedure, as described by Salkovskis (1996), on symptom change, it would be essential to control for the temporal relationship between cognitive change and symptom change, and the proposed mechanism (believability in theory A and theory B) should be measured frequently (Kazdin, 2007).

When investigating the effects of cognitive change on symptom change, experiments need to involve accurate measurements for symptoms of depression and also measurements that assesses cognitions logically and conceptually related to depression, such as the Automatic Thoughts Questionnaire (Hollon & Kendall, 1980). The ATQ has been used extensively in researches investigating cognitive change in CBT for depression (for review, see Garratt, Ingram, Rand, & Sawalani, 2007). Measuring frequency of thoughts in depression has been shown to be an accurate measure of cognitive change in depression (Lorenzo-Lucaes, et al., 2015). However, a measure of frequency is not sufficient to

investigate the specific effects of the theory A vs. theory B procedure on symptom change.

To evaluate that concept, a measure that would look both at frequency as well as believability

of negative thoughts would be more appropriate (i.e., Theory A). The proposed theoretical

MOC of CBT in depression stated in this article is the decreased believability in theory A and

increased believability in theory B. Therefore, it is necessary to use a measurement that

purports to measure believability in NAT's.

Hence, the aim of the current study was to collect data for a preliminary validation of

a modified version of the ATQ (ATQ-MV) in a sample of Icelandic university students. The

ATQ-MV assesses frequency of NAT's as the original version, as well as measuring how

much the respondent believed those NAT's the last time he was depressed/sad on a scale

from 0% to 100%. Validation entailed assessment of the ATQ-MV internal consistency,

convergent and discriminant validity, and test-retest reliability. Convergent validity was

assessed with comparison with the Patient Health Questionnaire-9 (PHQ-9; Kroenke &

Spitzer, 2002), and the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). It was

expected that the ATQ-MV would have stronger relationship with the PHQ-9 and both forms

of the DAS than the anxiety measures included in the study. Furthermore, low correlation

was expected between believability of thoughts and frequency of thoughts on the ATQ-MV,

because of the different time frame which was inquired about on the scales. Divergent

validity was assessed with the Automatic Thoughts Questionnaire – Positive (ATQ-P;

Ingram, & Wisnicki, 1988), the GAD-7 (Spitzer, Kroenke, Williams og Löwe, 2006), the

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), the

Intolerance of Uncertainty Scale (IUS; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur,

1994; Buhr, & Dugas, 2002), the Social Interaction Anxiety Scale (SIAS; Mattick, & Clarke,

1998), and the Social Phobia Scale (SPS; Mattick, & Clarke, 1998). The ATQ-MV was

expected to have stronger relationship with measures for generalized anxiety (PSWQ; IUS,

GAD-7) than social anxiety (SIAS and SPS), but, as stated before, stronger relationship with

depression measures than all anxiety measures. Furthermore, it was expected that the ATQ-

MV would produce negative correlation coefficient with the ATQ-P. This current study also

assessed the psychometric properties of the Icelandic versions of the ATQ-P and the IUS for

the first time, as well as the modified version of the ATQ-P (ATQ-P-MV) and the IUS (IUS-

MV).

Method

Participants

Participants were recruited via university settings from February 2016 to April 2016 at

Reykjavik University and University of Iceland. The current sample comprised 78 university

students (psychology = 75, sport science = 3) with mean age of 23.4 (SD = 3.7), ranging from

19 to 38 years. The mean age of females (N = 70) was 23.9 (SD = 3.9), and for males (N =

16) 22.1 (SD = 2.4). Two participants did not report information about their gender and age.

The three participants that were studying sport science in this research were enrolled in

psychology courses as their optional courses in their program of study. Out of 78 participants,

17 answered the questionnaires again after two weeks to assess test-retest reliability.

Measures

Automatic Thoughts Questionnaire

The Automatic Thoughts Questionnaire (ATQ) (Hollon & Kendall, 1980) is a 30-item self-

report measure, which purports to measure the frequency of cognitions associated with mild

to moderate depression. The ATQ was designed to assess progress in therapy, and to be used

in theoretical studies concerning MOC in CBT. The respondent is asked to rate how often

he/she had a given thought last week (e.g., "I´m worthless"), on a 5-point scale (1 = *Not at*

all, to 5 = *All the time)* and scores range from 30 to 150. The original study by Hollon and

Kendall (1980) reported excellent coefficient alpha of .96, and a split-half reliability

coefficient of .97. Good convergent and discriminant validity has been reported (see review; Dozois, Covin & Brinker, 2003). Psychometric properties of the Icelandic version of the ATQ can be seen in Kjartansdóttir (2005).

The modified version of the ATQ (ATQ-MV) used in this study, has the same 30-items as the original version of the ATQ, and asks in addition to how often respondent had a given thought for the last week how much he believed the thought when he felt depressed/sad on a scale from 0% to 100%. Steven D. Hollon, one of the authors of the ATQ, approved the aforementioned addition to the ATQ.

Automatic Thoughts Questionnaire – Positive

The Automatic Thoughts Questionnaire – Positive (ATQ-P) is a self-report measurement with 30 automatic positive thoughts and respondents report how often they experienced them the last week on a 5-item Likert scale (1 = *Never,* to 5 = *All the time*) (Ingram & Wisnicki, 1988). The ATQ-P was constructed to measure positive automatic thoughts, as opposed to negative automatic thoughts in the ATQ. The ATQ-P has been reported to have excellent psychometric properties (Ingram & Wisnicki, 1988; Dozois, et al., 2003).

The ATQ-P has never before been studied in Iceland. Two separate translations were conducted by two of the authors (M.B.S & S.M.G.) and then the most appropriate translation for each questions were selected by conversation by all of the three authors (J.F.S, M.B.S. & S.M.G.). The same modification was done on the ATQ-P as with the ATQ-MV, with the permission of Rick E. Ingram.

Dysfunctional Attitude Scale (Form A and B)

The Dysfunctional Attitude Scale (DAS) (Weissman & Beck, 1978) contains 40 statements which are answered on a 7-item Likert scale, ranging from 1 (*Totally disagree*) to 7 (*Totally agree*). The 40 statements in the DAS are supposed to measures respondent's depressive beliefs and cognitions. Both forms (A and B) have been reported to have good reliability

(Beck, Epstein, & Harrison, 1983). The DAS-A has been reported to have good psychometric properties (Dozois, et al., 2003). Psychometric properties of the Icelandic version of DAS (form A and B) has been found to be similar to the English version (Kjartansdóttir, 2005; Rögnvaldsdóttir & Guðmundsdóttir, 2015)

GAD-7

GAD-7 (Spitzer, et al., 2006) is a 7-item self-report measures which assesses symptoms on a 4-item Likert scale, over the last 2 weeks that are characteristic for generalized anxiety disorder (GAD). Studies have reported good reliability and validity (Spitzer, et al., 2006; Löwe, et al., 2008). The psychometric properties of the Icelandic version are presented in Ingólfsdóttir (2014).

Intolerance of Uncertainty Scale

The Intolerance of Uncertainty Scale (IUS) (Buhr & Dugas, 2002) is a 27-item self-report measure which measures respondents' beliefs and attitudes to uncertainty in life. The statements are answered on 5-item Likert scale ranging from 1 (*Not at all characteristic of me*) to 5 (*Entirely characteristic of me*). The questionnaire has high internal consistency (α = .94) and good convergent validity with other anxiety measures (Buhr & Dugas, 2002). However, discriminant validity is questionable due to high correlation with depression measures.

The IUS has never been studied before in Iceland. The authors of this paper translated the questionnaire to Icelandic, where separate translations were conducted by two of the authors (M.B.S. & S.M.G) and then the most appropriate translation for each questions were selected by all of the three authors (J.F.S, M.B.S. & S.M.G.). The same modification was done to the IUS as to the ATQ-MV, by the permission of Michel Dugas one of authors of the IUS.

Penn State Worry Questionnaire

The Penn State Worry Questionnaire (PSWQ) (Meyer, et al., 1990) is 16-item questionnaire that assesses respondent's tendency to worry. The items are in a form of statement and respondents answer them on a 5-item Likert scale. The PSWQ has been found in studies to have good psychometric properties (Brown, Antony, & Barlow, 1992; Meyer, et.al., 1990). The Icelandic version of the PSWQ has been found to have similar psychometric properties as the English version (Jónsdóttir & Smári, 2000; Kjartansdottir, 2005).

Patient Health Questionnaire

The Patient Health Questionnaire (PHQ-9) is a 9-item questionnaire, which assesses depressive symptoms over the last 2 weeks (Kroenke & Spitzer, 2002). Respondents answer the questions on a 4-item Likert scale, ranging from 0 to 3. The questionnaire has been reported to have good reliability and validity (Kroenke, Spitzer, & Williams, 2001). One Icelandic study, an unpublished thesis, has assessed the psychometric properties of the Icelandic version of the PHQ-9, and were they found to be similar to the English version (Pálsdóttir, 2007).

Social Interaction Anxiety Scale

The Social Interaction Anxiety Scale (SIAS) (Mattick & Clarke, 1998) is a self-report measure that assesses fear of social interaction. It includes 20 statements that are answered on a 5-item Likert Scale. The study by Mattick & Clarke (1998) reported adequate internal consistency, and good convergent and discriminant validity. The psychometric properties of the Icelandic version can be seen in three unpublished thesis Eggertsdóttir (2004), Hauksdóttir (2005), and Ólafsdóttir (2012).

Social Phobia Scale

The Social Phobia Scale (SPS) measures fear of performing or of being observed by others in social situations (Mattick & Clarke, 1998). The SPS and the SIAS were constructed to be administered together to assess social anxiety. The SPS consists of 20 statements with 5-item

Likert scale. Good psychometric properties were reported by Mattick and Clarke (1998) The

Icelandic version of the SPS was found to have similar psychometric properties as the

English version (Eggertsdóttir, 2004; Hauksdóttir, 2005; Ólafsdóttir, 2012).

Procedure

The study was approved by The National Bioethics Committee of Iceland (approval no. 15-

142-S1). Before participants participated in the study they gave an informed consent. Nine

questionnaires were administrated to all participants and they asked to answer all of them

during class section. Participant also reported demographic information concerning their age,

gender, where in Iceland they lived and what they were studying at the time. Participants at

Reykjavik University were asked to answer the nine questionnaires for the second time after

two weeks to assess test-retest reliability.

Data Analysis

All data analyses were conducted with SPSS, version 23. Analyses were conducted to assess

the reliability (internal consistency, test-retest) and validity (discriminant and convergent) of

all questionnaires. Spearman's rho correlation was used to assess validity and reliability

because it was assumed that none of the questionnaires had normal distribution of variance

(Field, 2009). Principal axis factor analysis with oblique rotation (Oblimin) was conducted to

assess the factorial structure of ATQ-MV, as former studies have indicated $1 - 5$ factors to

accurately describe the measurement variance (e.g. Kazdin, 1990; Sahin & Sahin, 1992;

Zettle, Webster, Gird, Wagener & Burdsdal, 2013).

Results

Descriptive statistics, including mean, standard deviation, standard error, 95% confidence

interval, and test of internal consistency using Cronbach's alpha for all self-report measures

are presented in Table 1.

Reliability

Table 1 shows the internal consistency coefficients for all the questionnaires included in the study. ATQ-MV was found to have excellent internal consistency. Spearman's rho two weeks' test-retest coefficient for the ATQ-MV was .82 ($p < .001$).

Validity

Table 2 shows Spearman's rho correlation coefficients between all the measures. The DAS-A, the DAS-B, and the PHQ-9 correlated positively with the ATQ-MV, but these correlations were lower than the correlations between the ATQ-MV and the three anxiety measures; GAD-7, IUS, and PSWQ. Furthermore, correlations between the ATQ-MV and the social anxiety measures (SIAS and SPS) were similar to the correlations with the DAS (both forms). In the test-retest group ($N = 17$) the correlation between the ATQ-MV and the ATQ was .66 ($p < .001$), which is lower than in the initial phase, ($\rho = .77$). These results report mixed information about the convergent and discriminant validity of the ATQ-MV.

Exploratory factor analysis of ATQ-MV

Principal axis factor analysis using oblique rotation (Oblimin) was conducted to assess the factorial structure of the ATQ-MV. The Kaiser-Meyer-Olkin (KMO) measure indicated the sampling was adequate for factor analysis, KMO = .89 (Field, 2009), and all KMO values were adequate (< .81). Bartlett's test of sphericity was statistically significant, χ^2 (435) = 2662.52, $p < .001$. Two factors had initial eigenvalues greater than 1. Factor 1 had an eigenvalue of 72.10 and explained 71.34% of the variance. Factor 2 had an eigenvalue of 1.54 and explained 4.45% of the variance. Parallel analysis indicated that only one factor should be extracted (O'Connor, 2000). Hence, principal axis factor analysis indicated that one factor solution was the most appropriate for the ATQ-MV in this sample of university students.

Table 1

Descriptive statistics for self-report measures

Measure	*N*	*M*	*SD*	*SE*	Observed range	95% CI	Cronbach's alpha
ATQ	78	45.44	19.20	2.17	30-132	(41.11, 49.77)	.97
ATQ-MV	59	23.65	26.79	3.49	0-95	(16.67, 30.63)	.99
ATQ-P	76	100.61	30.13	3.46	42-148	(93.72, 107.49)	.98
ATQ-P-MV	55	62.66	27.61	3.72	3-100	(55.19, 70.12)	.98
DAS-A	71	117.96	28.43	3.40	49-180	(111.18, 124.74)	.93
DAS-B	72	118.67	24.64	2.90	60-160	(112.88, 124.46)	.91
GAD-7	78	5.44	3.88	0.44	0-17	(4.56, 6.31)	.86
IUS	76	56.61	22.02	2.51	27-107	(51.62, 61.61)	.96
IUS-MV	54	41.32	29.47	4.01	0-100	(33.27, 49.36)	.98
PHQ-9	78	5.31	4.31	0.49	0-21	(4.34, 6.28)	.84
PSWQ	74	47.54	14.31	1.66	22-78	(44.22, 50.86)	.94
SIAS	76	21.99	16.29	1.87	0-63	(18.26, 25.71)	.94
SPS	76	12.03	13.09	1.50	0-55	(9.03, 15.02)	.94

Note. ATQ = Automatic Thoughts Questionnaire; ATQ-MV = Automatic Thoughts Questionnaire-Modified Version; ATQ-P; Automatic Thoughts Questionnaire-Positive; ATQ-P-MV; Automatic Thoughts Questionnaire-Positive-Modified Version; DAS-A; Dysfunctional Attitude Scale Form A; DAS-B = Dysfunctional Attitude Scale Form B; IUS = Intolerance of Uncertainty Scale; IUS-MV = Intolerance of Uncertainty Scale-Modified Version; PHQ-9 = Patient Health Questionnaire-9; PSWQ = Penn State Worry Questionnaire; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale.

Discussions

Validation results

The purpose of this study was assess the psychometric properties of the ATQ-MV in a sample of Icelandic university students. The ATQ-MV was found to have comparable reliability as the original version of the ATQ, both English and Icelandic. Furthermore, two weeks' test-retest reliability was found to be adequate. However, only 17 participants were included in the test-retest analysis and these results should be confirmed in a larger sample. Mixed results were reported for convergent and discriminant validity for the ATQ-MV. In terms of validity, the ATQ-MV was found to have somewhat comparable validity to the original version of the ATQ. The correlation of the ATQ-MV with the DAS-A in this study was similar to what has been reported for the correlation between the ATQ and the DAS-A in

Table 2.

Spearman's rho correlation among self-report measures

	ATQ-MV	ATQ-P	ATQ-P-MV	DAS-A	DAS-B	GAD-7	IUS	IUS-MV	PHQ-9	PSWQ	SIAS	SPS
ATQ	.77**	-.45**	-.41**	.50**	.39**	.67**	.63**	.36**	.68**	.63**	.49**	.51**
ATQ-MV		-.50**	-.56**	.53**	.43**	.66**	.72**	.48**	.60**	.66**	.44**	.49**
ATQ-P			.68**	-.54**	-.47**	-.44**	-.46**	-.38**	-.45**	-.43**	-.38**	-.41**
ATQ-P-MV				-.55**	-.54**	-.41**	-.39**	-.24	-.35**	-.45**	-.51**	-.49**
DAS-A					.85**	.50**	.58**	.10	.47**	.52**	.34**	.35**
DAS-B						.38**	.53**	.38**	.35**	.37**	.37**	.29*
GAD-7							.66**	.52**	.75**	.72**	.39**	.47**
IUS								.75**	.64**	.79**	.48**	.59**
IUS-MV									.42**	.48**	.34*	.33*
PHQ-9										.70**	.44**	.46**
PSWQ											.45**	.63**
SIAS												.73**

Notes: ATQ = Automatic Thoughts Questionnaire; ATQ-MV = Automatic Thoughts Questionnaire-Modified Version; ATQ-P; Automatic Thoughts Questionnaire-Positive; ATQ-P-MV; Automatic Thoughts Questionnaire-Positive-Modified Version; DAS-A; Dysfunctional Attitude Scale Form A; DAS-B = Dysfunctional Attitude Scale Form B; IUS = Intolerance of Uncertainty Scale; IUS-MV = Intolerance of Uncertainty Scale-Modified Version; PHQ-9 = Patient Health Questionnaire-9; PSWQ = Penn State Worry Questionnaire; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale. *$p < .05$. **$p < .001$.

other studies (e.g. Kjartansdóttir, 2005; Chioqueta & Stiles, 2004). The relationship of the ATQ-MV with the PHQ-9 was rather lower than reported relationship between ATQ and BDI-II in another Icelandic study (Kjartansdóttir, 2005).

In that study a correlation coefficient of .79 with BDI-II was reported in a sample of university students, compared with the .60 coefficient with PHQ-9 in this study. This difference can be caused by the fact that the PHQ-9 measures only depressive symptoms, but the BDI-II measures the severity of depressive syndromes.

The ATQ-MV had higher correlation with measures of generalized anxiety (GAD-7, IUS, and PSWQ) than it had with measures of depression. High correlation coefficients between the ATQ-MV and the cognitive measures which are conceptually related to generalized anxiety disorder (GAD-7, IUS, and PSWQ) raises questions about the construct validity of the ATQ-MV. However, it is possible that the two forms of the DAS are not measuring dysfunctional attitudes typical only for depression. The design of the ATQ and the DAS was based on the cognitive model of depression. The ATQ-MV purports to measure believability of negative automatic thoughts and the DAS dysfunctional attitudes. Therefore, conceptually and theoretically it would be expected that these measures would correlate strongly with one another, and that they had lower correlation with anxiety measures. However, as mentioned before, this study and others (Kjartansdóttir, 2005; Chioqueta & Stiles, 2005) reported only moderate correlation, and similarly high correlation with measures that purport to assess cognitive factors in anxiety. In this study, the IUS, which measures intolerance of uncertainty, had higher correlation with the ATQ-MV than the DAS did. This indicates that further research regarding the conceptual validity of questionnaires that purports to measure cognitive factors in depression is needed.

It is acknowledged that there is lack of evidence-based assessment of depression symptoms in adults (Joiner, Walker, Pettit, Perez, & Cukrowicz, 2005). The many studies

that have been conducted on the DAS and the ATQ seem to indicate that the evidence-base of cognitive measures in depression is also somewhat lacking. An effort is needed to do an extensive analysis of cognitive measures for depression to determine how their evidence-based can be further improved. High comorbidity between depression and anxiety is a fact (e.g. Brown, Laura, Campell, Lehman, Grisham, & Mancill, 2001). So it is possible that negative automatic thoughts should be thought of as a transdiagnostic phenomenon, which occurs both in depression and anxiety, and not only in depression. That could explain why measures such as the ATQ-MV and the DAS produce only moderate evidence of convergent and discriminant validity. To test this hypothesis, the ATQ-MV should be used as a MOC measure in transdiagnostic CBT for depression and anxiety where temporal relationship between cognitive change and symptom change is established.

Response format of the ATQ-MV

The ATQ-MV asks respondents to state how much they believed the thought the last time they felt depressed/sad on a scale from 0% to 100%, and the ATQ asks how often each NAT occurred to them in the last week. The ATQ-MV asks respondents about "*the last time they you felt depressed/sad*" but the ATQ asks about *"last week"*. For example, a person that experienced a depressive episode 10 months ago, resulting from losing her job, but has not felt sad or depressed for the last couple of months is supposed to answer the ATQ-MV with the depressive episode 10 months ago in mind, and the ATQ with the last week in mind. If she has not felt depressed in the last week her answers would lead to low correlation between the ATQ-MV and the ATQ, because the time frame for the questionnaires is different. This means that the correlation between the ATQ-MV and the ATQ is not expected to be high in a non-clinical sample as in this study. Therefore, the correlation produced between the ATQ-MV and the ATQ in this study, $\rho = .77$, was higher than researchers expected when beginning the study. Therefore, data collection in a clinical sample is of utmost importance.

The ATQ-MV first asked participants to report the frequency of how often any given thought occurred to them in the last week. When respondents had finished stating the frequency of thoughts further instructions were issued at the bottom of the page. Those instructions told participants to indicate how much they believed the thought by writing the percentage on an empty line on the right to the frequency scale. There was some evidence that participants in this current study did not fully understand what was expected of them when answering the ATQ-MV. Most participants (54 out of 59) answered the ATQ-MV in line with how they answered ATQ, that is if a thought on the ATQ never occurred to them in the last week their answers on the ATQ-MV was always zero. This indicates that participants answered the ATQ-MV with the last week in mind but not "*the last time they you felt depressed/sad*" as expected. This explains why the correlation between the ATQ-MV and the ATQ was higher than expected. Furthermore, fewer participants answered or completed the modified versions included in this study (ATQ-MV = 59, ATQ-P-MV = 55, IUS-MV = 54) than other questionnaires (*Range* = 71 - 78). This further indicates that the directions and response format for the ATQ-MV (and other modified versions) was not explicit enough which lead participants to omit answers.

Further research

This study reports results of preliminary validation for the ATQ-MV. The most notable information in the study was that the response format on the ATQ-MV was too complicated and it produced different results than expected. Furthermore, the results confirmed the findings of other studies, that the discriminant validity of the ATQ with measures designed for generalized anxiety is not adequate.

Two alterations are proposed to the ATQ-MV to make answers more reliable: 1) the ATQ-MV and the ATQ were combined on a single page in this study, but they should be kept on separate pages in further studies, 2) before respondent answers the ATQ-MV he is asked

how long it is since he felt symptoms of depression for considerable time, and then he is

asked to answer the ATQ-MV with that time period in mind. These alterations should result

in lower correlation coefficients between the frequency and believability scales on the ATQ-

MV in non-clinical sample than was reported in this study. It is important to test the

psychometric properties of the ATQ-MV in a larger non-clinical sample as well as in a

clinical sample to test further the convergent and convergent validity. Further studies should

include the proposed alterations to the ATQ-MV, as well as for the ATQ-P-MV, and the IUS-

MV. A study that will use the improved version of the ATQ-MV, as well as all other

questionnaires included in this study, in a larger non-clinical sample and a sample of

outpatients with depression as primary or secondary diagnoses has been proposed and is

expected to begin in this fall. Considerations about whether the ATQ-MV should be thought

of as measuring transdiagnostic phenomena instead of being explicitly measure of cognitive

factors in depression should be addressed further in future studies.

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