

Factor Structure of the Automatic Thoughts Questionnaire in a Clinical Sample

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Some of the published factor analyses of the Automatic Thoughts Questionnaire (ATQ-N) have been criticized for not being sufficiently rigorous. To address this criticism, we examined the factor structure of the ATQ-N among 179 adults seeking treatment for depression. A series of confirmatory factor analyses revealed poor fit indices with all previous models, but cognitive dimensions than that of nonclinical samples. An exploratory analysis with six clinical concepts identified five factors with eigenvalues > 1 (depersonalization, self-criticism, brooding, amotivation, and interpersonal disappointment) that accounted for 61% of the variance. Of these five factors, only the first two independently correlated for significant variability in levels of depression. Implications of the results and for further use of the ATQ-N within cognitive therapeutic research and practice are discussed.

An array of self-report instruments has been designed to assess cognitive outcome and possible mediating variables (Dennis, Coates, & Peckham, 2002) associated with cognitive therapy of depression (Beck, Rush, Shaw, & Emery, 1979). One of the first, and still one of the most widely used and respected measures (Nezu, Meadows, & McCune, 2000), was developed by Richard and Kendall (1980) to assess the frequency of 30 depressive automatic thoughts. Although their inventory initially was simply known as the Automatic Thoughts Questionnaire, it is now more widely referred to as the Automatic Thoughts Questionnaire - Negative (ATQ-N) to distinguish it from a similarly-formatted instrument (i.e.,

and Whittle (1999) to assess the frequency of positive self-statements and Whittle (1986) to assess the frequency of positive self-statements.

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By now the psychometric properties of the ATQ-N, including its internal (Chioqueta & Stiles, 2004; Deardorff, Hopkins, & Finch, 1984; Ghassemzadeh, Mojtabai, Karamghadiri, & Ebrahimkhani, 2006; Hollon & Kendall, 1980; Kazdin, 1990; Oei & Mukhtar, 2008; Sahin & Sahin, 1992) and temporal consistency (Chioqueta & Stiles, 2004; Ghassemzadeh et al., 2006; Sahin & Sahin, 1992), as well as convergent (Ghassemzadeh et al., 2006; Hollon & Kendall, 1980; Kazdin, 1990; Oei & Mukhtar, 2008; Sahin & Sahin, 1992) and discriminant validity (Chioqueta & Stiles, 2004; Hill, Oei, & Hill, 1989; Hollon & Kendall, 1980; Hollon, Kendall, & Lumry, 1986; Oei & Mukhtar, 2008; Sahin & Sahin, 1992) have been sufficiently documented within both nonclinical (Hollon & Kendall, 1980) as well as clinical samples (Kazdin, 1990; Netemeyer et al., 2002). However, with the exception of two possible studies (Kazdin, 1990; Netemeyer et al., 2002) all of the analyses of the factor structure of the ATQ-N to date have been conducted with nonclinical populations (Brvant & Baxter, 1997; Chioqueta & Stiles, 2006; Deardorff et al., 1984; Ghassemzadeh et al., 2006; Hollon & Kendall, 1980; Joseph, 1994; Oei & Mukhtar, 2008; Sahin & Sahin, 1992). Why there have been no factor analyses of the ATQ-N thus far with clinically depressed samples seems a bit unclear insofar as the Dysfunctional Attitudes Scale (Weissman & Beck, 1978) that has been in use as long as the ATQ-N as a frequent companion measure to it (e.g., Dobson & Breiter, 1983; Chioqueta & Stiles, 2004, 2006, 2007; Hill et al., 1989; Sahin & Sahin, 1992) has been factor analyzed with depressed outpatients (Imber et al., 1990).

Limitations of a factor analysis about the dimensional properties of the ATQ-N with clinical samples unfortunately creates an inherent interpretational problem. In particular, it is unclear how what is known about the instrument's factor structure with nonclinical samples may generalize to clinical populations. While two previous factor analyses of the ATQ-N were with samples that could be characterized as clinical in nature (Kazdin, 1990; Netemeyer et al., 2002), neither was typical of cognitive therapy clients (i.e., adult outpatients). Kazdin's (1990) sample consisted of children admitted to an inpatient facility and only a minority of them (28%) received either a primary or secondary diagnosis of depression. Although Netemeyer et al. (2002) selected an adult sample, it was limited to self-identified problematic gamblers whose levels of depression were not systematically assessed.

Our major purpose in conducting this study was to address this gap in our understanding of the factor structure of the ATQ-N with a sample more representative of the clinical population to whom it is most often administered. To do so, we first determined the uniqueness of the factor structure of the ATQ-N when administered to a clinical sample by evaluating its fit with models derived from other populations. Poor fit with previously published factorial models would suggest the relevance to also conduct an exploratory analysis with our sample to identify the dimensions of automatic thinking that may be more specific to clinically depressed populations.

METHOD

PARTICIPANTS

archival data were available, the remainder were obtained with a primary diagnosis of unipolar depression from our departmental training clinics, had been administered the ATQ-N and assessed at intake for level of depression, or participants in another, but as of yet unpublished, research project on treatment of depression. The majority of participants were female (147 or

MEASURES

Automatic Thoughts Questionnaire—Negative. Participants were asked to separately indicate how frequently (1 = not at all, 5 = all the time) they frequently if at all 20 depressing thoughts occurred over the last week (see Table 3 for a list of the items). Total ATQ-N scores range from 20–150, with higher scores reflecting an increased rate of negative self-statements. As already discussed the psychometric properties of the scale are well established. The average ATQ-N score ($M = 93.42$, $SD = 24.18$) was comparable to that reported for other depressed outpatient samples (e.g., Harrell & Ryan, 1982; Hill et al., 1989).

Beck Depression Inventory—II. The BDI-II is a widely used, 21-item, self-report measure of depression. Total scores range from 0–63, with higher scores indicating more severe depression. The BDI-II has acceptable levels of reliability and validity, including acceptable levels of reliability as well as evidence of its concurrent and discriminant validity (Beck et al., 1996).

Because the BDI-II had not yet been developed at the time, participants within the clinical sample culled from the earlier depression studies had been assessed with the original Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI, like its successor, has exhibited strong psychometric properties, with acceptable levels of reliability with clinical populations (Beck, Steer, & Garbin, 1988; Steer, Beck, & Garrison, 1986) as well as concurrent and construct validity (Beck & Steer, 1987). Combining data from the two versions of the BDI seemed appropriate, given that

we simply verify that the present sample's scores fell within the moderate to severe ranges (Beck et al.,

$M = 29.75$, $SD = 7.16$) (Beck et al., 1996; Kendall, Hollon, Beck, Hammen, & Ingram, 1987).

RESULTS

We first analyzed our data set for possible gender differences. None were detected for age or ATQ-N scores, although female participants reported higher levels of depression than their male counterparts ($M = 29.82$ vs. 26.55), $t(170) = 2.54$, $p = .02$, $d = .45$. However, because both means fall within the normal range of depression as defined by Beck et al. (1996), we do not consider this gender difference to be of any practical importance.

INTERNAL CONSISTENCY

Both alpha ($r = .95$) and split-half reliability coefficients ($r = .94$) further substantiated the internal consistency of the ATQ-N documented by other researchers (e.g., Chioqueta & Stiles, 2004; Deardorff et al., 1984; Hollon & Kendall, 1980; Sahin & Sahin, 1992). Corrected item total correlations for the 30 items of the ATQ-N ranged from $.42$ to $.72$ (mean = $.57$) with a mean of $.62$. The average item total correlation and standard error are comparable to those reported in other studies (e.g., Deardorff et al., 1984; Ghassemzadeh et al., 2006; Kazdin, 1990), thereby supporting the integrity of our overall findings.

EVALUATION OF DIMENSIONAL INVARIANCE

The ATQ-N's high level of internal consistency suggested that it was comprised of a limited number of factors. To determine how many we used an SPSS syntax program developed by Velicer (2000) for conducting a minimum average partial test (MAP; Velicer, 1976). The MAP computes the residual covariance matrix rescaled to the variance of each variable, giving the partial correlations after each factor is extracted. The average partial r^2 (old criterion) and r^4 (new criterion) are computed after each factor extraction and decrease until all common variance has been extracted and then start increasing. At this point, factor extraction ceases and the number of factors before the increase is used.

The revised MAP test (Velicer, Eaton, & Fava, 2000) revealed five factors with eigenvalues ranging from 12.88 to 1.21 that accounted for 81% of the variance. Only Sahin and Sahin (1992) also reported five factors in their analysis of a Turkish version of the ATQ-N administered to college students, with the other models consisting of a single (Kazdin, 1990) to four factors (Hollon & Kendall, 1980). Ostensibly the varying number of dimensions identified primarily with nonclinical samples strongly suggests that the factor structure of the ATQ-N cannot be generalized to clinical populations. This interpretation, however, must be tempered somewhat by the acknowledgment that other researchers have used varied methods from principal components (Deardorff et al., 1984; Hollon & Kendall, 1980) to factor analysis (Sahin & Sahin, 1992) to identify the structure of the ATQ-N.

TABLE 1. Goodness-of-Fit Statistics for Various Factor Models of the ATQ-N

Factor Model	Factors ^a	Items ^b	χ^2	Measures of Relative Fit			
				df	NC ^c	RMSEA	GFI
Single	1	30	1097.60	405	2.71	.098	.689
Chioqueta & Stiles (2006)	2	30	976.61	375	2.60	.095	.723
≥ .50 Loadings	2	17	152.03	53	2.87	.103	.874
Oei & Mukhtar (2008)	2	17	210.10	119	2.62	.096	.870
Deardorff et al. (1984)	3	15	202.37	67	2.55	.097	.874
Hollan & Kendall (1981)	3	15	193.00	74	2.54	.093	.874
≥ .50 Loadings	2	11	164.90	43	3.83	.127	.850
≥ .70 Loadings	2	11	150.77	34	4.43	.160	.763

Notes. ^aValues refer to the number of factors; ^bValues refer to the number of items; ^cNC, the normed chi-square, denotes the chi-square value divided by degrees of freedom.

Kendall, 1980; Sahin & Sahin, 1992) to principal axis (Oei & Mukhtar, 2008) in extracting factors. There has been more consensus in the means used to determine the number of extracted factors to retain as all of the previous studies have primarily, in that order, used the Kaiser (1958) rule of eigenvalues to retain, although as noted, the MAP identified the same number of factors as the Kaiser rule.

Based on the results of the current study, the number of factors problem is an attribution to the way in which the number of factors problem has been approached (Gregorich, 2006), we opted to err on the side of caution by reporting a strict or confirmatory factor analysis (CFA). Specifically, in doing so, we were able to identify a factor structure that was consistent with the

current literature search (Chioqueta & Stiles, 2006; Deardorff et al., 1984; Hollan & Kendall, 1981; Joseph, 1994; Kazam, 1990; Netemeyer et al., 2002; Oei & Mukhtar, 2008; Sahin & Sahin, 1992). Factor loadings for ATQ-N items were included within each publication with the exception of Kendall (1980), Joseph (1994), and Netemeyer et al. (2002). We extracted the factor loadings reported by Kendall by using all 20 items within the CFA in manner consistent with

but both reported that they were no longer available.

Table 1 reports the results from a series of CFAs conducted using the Analysis of Moment Structures (AMOS-5.0) program (Arbuckle, 2003) to test the fit of various factorial models to our clinical sample. In order to provide a more exhaustive evaluation of fit, we tested two iterations for each of the models with the exception of the single factor model. The first iteration listed in Table 1 for each

TABLE 2. Correlation Matrices of ATQ-N Factors

	1.	2.	3.	4.	5.
1. Demoralization	.89				
2. Self-Confidence	.67	.91			
3. Self-Respect	.66	.71	.87		
4. Amotivation	.66	.64	.66	.81	
5. Interpersonal Disappointment	.30	.36	.37	.31	.70

Notes. *Diagonal entries are alpha coefficients.

of the models included all reported factor loadings with the restriction that only the highest value was included for items that loaded on more than one factor. The second iteration removed this same restrictive rule, but was limited to items with loadings $\geq .50$ in order to increase the likelihood of determining an adequate fit. As can be seen in Table 1, the number of items for all of the models tested as well as a reduction in the number of factors for those original models containing four or more factors (i.e., Hollon & Kendall, 1980; Sahin & Sahin, 1992). The most profound impact of this second round of testing was on the model of Sahin and Sahin (1992), resulting in a loss of four factors and 22 items.

In both iterations, we tested oblique versions of the models even for those that were originally based on an orthogonal rotation (Hollon & Kendall, 1990; Sahin & Sahin, 1992). Table 1 reports three different measures that we used to assess goodness of fit. Because the chi-square (χ^2) statistic may overestimate the lack of model fit (Bollen, 1989) due to its sensitivity to sample size, we utilized the GFI, the RMSEA (Joreskog & Sorbom, 1997) and the CFI (Joreskog & Sorbom, 1997) as indicators of fit. The GFI is also inversely related to model fit; that is, as the fit of a given model improves, following the guidelines of Bollen (1989) and Hu and Bentler (1999), we regarded NC values of ≤ 3 , RMSEA values of $\leq .06$, and GFI values of $\geq .70$ as indicators of good model fit.

As can be seen in Table 1, all of the 11-factor models we tested failed to display sufficient goodness of fit with our clinical sample. None of the models met criterion on all three of our fit indices and only that of Oei and Mukhtar (2008) met at least two of them. NC was met for at least one of the iterations for all of the models except that of Hollon and Kendall (1980). However, none of the models displayed an adequate fit according to RMSEA under either iteration, and GFI only rose to an acceptable level for two of the models (Oei & Mukhtar, 2008; Sahin & Sahin, 1992) when items were limited to those with loadings $\geq .50$. As indicated in Table 1, the general impact of this second iteration was to gradually improve all three fit indices, and in the case of Sahin and Sahin's (1992) model, to increase NC (5.98) to an unacceptably high level.

TABLE 3. Factor Loadings for Exploratory Factor Analysis With Promax Rotation of ATQ-N

Factor	Loading	Item
1. Demoralization	.84	12. I can't stand this anymore.
	.79	6. I don't think I can go on.
	.69	19. Wish I could just disappear.
	.61	29. It's just not worth it.
	.51	28. My future is bleak.
	.51	25. I feel so helpless.
	.47	15. I wish I were somewhere else.
2. Self-Criticism	.43	4. No one understands me. ^a
	.40	26. Something has to change. ^b
	.34	24. I'll never make it. ^c
	.97	18. I'm worthless.
	.78	17. I hate myself.
	.71	21. I'm a loser.
	.62	23. I'm a failure.
	.56	2. I'm no good. ^d
	.45	7. I wish I were a better person.
	.40	24. I'll never make it.
3. Brooding	.36	3. Why can't I ever succeed?
	.93	20. What's the matter with me?
	.46	26. Something has to change.
5. Interpersonal Disappointment	.34	10. I'm so disappointed in myself.
	.90	30. I can't finish anything.
	.73	16. I can't get things together.
	.72	13. I can't get started.
	.50	5. I've let people down.
	.48	2. I'm no good.
	.34	4. No one understands me.
.34	8. I'm so weak.	

Notes. ^aAlso loads .34 on Factor 5; ^bAlso loads .46 on Factor 3; ^cAlso loads .40 on Factor 2; ^dAlso loads .48 on Factor 5.

EXPLORATORY FACTOR ANALYSIS

The failure to obtain an adequate fit with any of the previous models, underscored the need to conduct a separate EFA of the ATQ-N with our clinical sample to determine its unique dimensions and dimensional structure. We chose an oblique (i.e., Promax with Kaiser normalization) rather than orthogonal factor solution because we had no a priori reason to anticipate that they would be unrelated to each other.

TABLE 4. Regression Analysis Predicting Depression From ATQ-N Factor Scores

Factor Score	B	SE B	β	t	P
1. Demoralization	2.34	.79	.31	2.96	.004
2. Self-Criticism	2.79	.81	.38	3.45	.001
3. Brooding	-1.43	.83	-.19	-1.72	.088
4. Amotivation	.34	.79	.04	.43	.668
5. Interpersonal Disappointment	.73	.60	.09	1.22	.224

Notes: $R^2 = .33$, $p < .001$.

based upon the most recent analyses of the ATQ-N (Chioqueta & Stiles, 2006; Joseph, 1994; Netemeyer et al., 2002; Oei & Mukhrar, 2008). As can be seen in Table 4, the five factors are correlated with each other, with the highest correlations being between Factor 1 and Factor 2 (.31), Factor 1 and Factor 3 (.19), and Factor 1 and Factor 4 (.04).

Table 3 presents a summary of the loadings for each factor using $\geq .32$ as a criterion for inclusion (Tabachnick & Fidell, 2007). Using this criterion, 90% of the items (27 of 30) loaded on at least one factor and only four items (items 2, 4, 24, and 26) loaded on two. We have referred to Factor 1 as Demoralization, it appears to encompass thoughts that one lacks the wherewithal, stamina, and personal attributes to persevere in meeting life's demands (e.g., item 12: I don't stand this anymore). As such, it seems to generally parallel the type of negative thoughts about the world that represent the second component of the cognitive triad (Beck et al., 1979). We have termed Factor 2 Self-Criticism as the eight items that load on it can be seen as comprising negative judgments about the self (e.g., item 17: I hate myself). Such thinking has been linked to suicidal risk (Morrison & O'Connor, 2008) and seems to reflect the first component of Beck's negative cognitive triad. Another pattern of thinking that may itself account for the relationship between self-criticism and suicidality (O'Connor & Noyce, 2008) appears to be represented by Factor 3. We named it Brooding to reflect a type of ruminative thinking (Neylor, Gonzalez, & Nolen-Hoeksema, 2002) focused on why one has fallen short of some comparative standard (e.g., item 14: What's wrong with me?). We have identified Factor 4 as Amotivation as the three items that load on it reflect difficulties in initiating (e.g., item 12: I can't get started) and completing (e.g., item 30: I can't finish anything) goal-directed activities. The fifth and final factor in our view reflects interpersonal disappointment as it appears to encompass a feeling of being misunderstood (e.g., item 26: No one understands me).

REGRESSION ANALYSIS

As reported, we obtained a significant correlation between ATQ-N and BDI scores ($r = .53$, $p < .01$). To better understand the relationship between specific components of negative thinking and clinical depression, we conducted a regression analysis using the five factor scores to predict variability in BDI scores. As indicated in Table 4, a significant model ($F(5, 173) = 14.05$, $p < .001$) accounted

of the ATQ-N. However, only the first two factors dealing with self-criticism and demoralization had significant relationships with the latter accounting for the highest proportion of variance in levels of depression. Particularly surprising was the negative, albeit insignificant, relationship between brooding and depression, especially in light of other research that has found this dimension to be predictive of self-reported depression in at least community samples (Treynor et al., 2003).

DISCUSSION

Our primary purpose for conducting this study was to examine the factor structure of the ATQ-N in a sample more representative of those to whom it is administered in clinical settings. Our findings strongly suggest that the dimensions of the ATQ-N identified thus far in nonclinical populations are not representative of the categories of self-statements endorsed by those seeking treatment of clinical depression. Specifically the number of common factors (five) identified within our clinical sample differed from all previous factor analyses except that of Sahin and Sahin (1992) with Turkish college students. Moreover, we would maximize goodness-of-fit were conducted. It seems worth reiterating that all of the previous models that we examined for fit were from nonclinical samples, with the exception of Kazdin (1990) that evaluated child inpatients. Unfortunately, we were unable to obtain item loadings from Natsopoulos et al. (2002) of the only previous factor analysis of the ATQ-N conducted with what might be considered as at least an adult population (i.e., professional gamblers). While it would obviously be desirable for others to further substantiate the current model of the ATQ-N by replication with a similar sample, we believe that our overall results justify the need to be cautious in generalizing the ATQ-N with nonclinical populations to those who struggle with clinical depression.

We deemed the five factors of the ATQ-N identified within our clinical sample as demoralization, self-criticism, brooding, amotivation, and interpersonal disappointment. The degree to which the first three dimensions, in particular, correspond to similarly designated constructs and variables within the literature at this point is unclear, but could be resolved empirically by correlating ATQ-N factor scores with existing measures of demoralization (Tellegen et al., 2003), self-criticism (Zettle & Fillingim, 1997) and the brooding subtype of rumination (Treynor et al., 2003). Until this additional research is conducted, any interpretation of our regression analysis should be held lightly. Nevertheless, it may be important to at least tentatively relate our findings to other research, in particular, that has empirically examined the relationship between rumination, on the one hand, and depression, suicidality, and related clinical phenomena, on the other.

Clearly the most unexpected finding of our regression analysis was that rumination typified by a negative self-focus (e.g., *What's the matter with me?*) did not significantly contribute to variability in BDI scores. Instead brooding was negatively, although not significantly, related to levels of self-reported depression. It seems worthy of further research to examine whether this apparent disconnect may in part be yet just another reflection of a discontinuity between nonclinical and clinical samples in studying ostensibly similar processes. Unlike the reflective type of rumination that has been shown to be more predictive of BDI scores in nonclinical community and clinical samples (Morrison & O'Connor, 2008). While rumination in general has been implicated in both the onset (Robinson & Alloy, 2003) and maintenance (Nolen-Hoeksema, McBride, & Larson, 1997) of depression, more recent research that found the distinction between the two types of rumination to be blurred in currently depressed populations (Whitmer & Gotlib, 2011). When viewed in the aggregate, the literature to date on rumination in combination with our findings suggests that the possibility that brooding may contribute to the development of both suicidality and depression in both nonclinical and clinical populations, particularly among our sample, warrants further exploration. Our hope is that the automatic thoughts identified in our factor analysis might play at least some small role in this larger endeavor.

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