J Rat-Emo Cognitive-Behav Ther (2018) 36:137–162
https://doi.org/10.1007/s10942-017-0278-y

The Relationship Between Automatic Thoughts and Irrational Beliefs Predicting Anxiety and Depression

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Published online: 28 July 2017

Abstract Cognitive behavioral approaches differ in their views on core cognitions and their hypothesized role in the etiology of depression and anxiety. The present study provides empirical evidence regarding the relationship between irrational beliefs and components of automatic thoughts and their role in the etiology of depression and anxiety. The present study utilized newer and improved questionnaires to assess components of irrational belief. Based on prior research by Safren et al. (Cogn Ther Res 24(3):327–344, 2000), a three-factor structure of the combined automatic thought questionnaires were utilized to measure components of automatic thoughts as they relate to depression and anxiety. Factor analytical methods were utilized to confirm the factor structure of the irrational beliefs and automatic thoughts components. Advanced path modeling was utilized to model the relationship between irrational beliefs and automatic thoughts in predicting anxiety and depression. The study used a sample of N = 542 undergraduate psychology students during stressful exam times. Results indicated that the irrational belief Demandingness represents a primary factor, followed by the secondary irrational beliefs as proposed by Rational Emotive Behavioral Theory. Selfdowning beliefs

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were fully mediated by depressive automatic thoughts in the case of depressive affect. Low frustration tolerance contributed unique variance to anxious and depressive affect that was not fully mediated by automatic thoughts. Results from the present study add empirical evidence that irrational beliefs indeed represent core and intermediary beliefs that lead to specific automatic thoughts, which is congruent with cognitive behavioral theory as proposed by Rational Emotive Behavioral Therapy.

Keywords CBT · REBT · Irrational beliefs · Automatic thoughts · Depression · Integrative

Introduction

Cognitive behavioral therapy (CBT) approaches are considered empirically validated treatments, especially for depressive and anxiety disorders (Beck 1979; David and Szentagotai 2006; Ellis 2004). Common among the Cognitive Behavioral Therapies is the assumption that behavioral and emotional responses are the outcomes of cognitive processing that can be influenced through various interventions at the cognitive level, therefore changing the emotional/behavioral response (David and Szentagotai 2006). The various CBT schools differ, however, as to how the various types of cognitions, targeted during the intervention, play a role as etiologic factors regarding psychopathology. As of now, very little research exists that investigates the relationship between these crucial cognitions. Integrative approaches are a modern topic of psychotherapy research and one can argue that integration cannot be achieved if the uniqueness of the cognitive constructs proposed in the different CBT schools are not better understood, especially in relation to each other (e.g., David and Szentagotai 2006). As part of this effort, this study focused on the two traditional cognitive-behavioral therapies, Rational Emotive Behavioral Therapy (REBT; Ellis 1958) and Cognitive Therapy (CT-Beck; Beck 1964).

Beck's Cognitive Behavioral Therapy (CT-Beck)

Beck's View of Psychopathology

Beck identifies faulty information processing as a cause of psychopathology and implies that humans can be understood by the cognitive processing constructs they build. Throughout development, biased perceptions in form of stimuli, ideas, experiences and beliefs are stored accumulatively as part of these cognitive processing structures called schemas (Beck and Haigh 2014).

The inference of meaning is influenced by the idiosyncratic schemas the person has established. Since cognitive constructs are subjective and established by the individual's experiences and interpretations thereof, such meaning generation may be highly unrealistic, since it is very difficult to verify their authenticity against reality. If the meaning generation process, influenced by such maladaptive schemas, deviates

significantly from reality, cognitive distortions and emotional disorders follow (Beck 1979). More specifically, schemas influence the appraisal mechanism that is responsible for the affective response based on the individual's appraisal of an external event. Emotional disorders are characterized by appraisal and subsequent emotional reactions that are incongruent to the individual's external reality (Beck 1979).

Beck extended his initial theoretical model by incorporating the concept of schema activation. Schemas are strengthened by repeated and potent life events especially when such events are adverse and stressful. Strengthened schemas are easily activated and take control over the information processing system. If dysfunctional or maladaptive schemas become activated the probability of the individual experiencing psychopathological symptomatology is increased. (Beck and Haigh 2014).

As part of the cognitive model, representations of abstract schema content exist in the form of beliefs. As such, beliefs contain assumptions, expectancies, fears, rules, and evaluations. Clark et al. (1999) differentiate a hierarchy of beliefs according to three levels of cognition. Core beliefs represent the inner most level of beliefs, tend to be absolutistic, and contain underling views about ourselves, others and the world. Intermediary beliefs reside at a higher level in consciousness and influence a person's view of a situation, ultimately affecting thinking, affect and behavior. Automatic thoughts are viewed as a derivative of beliefs influenced by core and intermediary beliefs (Clark et al. 1999). As such, automatic thoughts tend to be specific, discrete and occur in "telegraphic style" (Beck 1979, p. 36) alongside the mainstream of thought. Automatic thoughts occur in an autonomous manner, are difficult to suppress, and are idiosyncratic among other individuals with similar psychopathology. Clark and Beck (2011) summarized this specificity, that content and orientation of automatic thoughts and processing bias differ between the disorders, as part of the content specificity hypothesis.

Albert Ellis' Rational Emotive Behavioral Therapy (REBT)

Ellis' View of Psychopathology

Congruent with other cognitive behavioral therapy approaches, Ellis views cognition as the "most important proximal determinant of human emotion" (DiGiuseppe et al. 2014, p. 21). Emotional distress is caused by dysfunctional thought processes, which include exaggeration, overgeneralization, oversimplification, and faulty or untested assumptions. Central to REBT theory is the ABC model, which states that an activating event (A) causes emotional, behavioral, and cognitive consequences (C), a process that is mediated by the person's rational or irrational beliefs (B). Rational beliefs can be distinguished from irrational beliefs by the fact that they cause functional and healthy consequences, which are flexible, logical, and foster goal achievement. Irrational beliefs, on the other hand, are non-pragmatic, rigid, not consistent with reality, and lead to emotional disturbance (DiLorenzo et al. 2006). These rigid beliefs, as part of rigid demanding core schemas, lead to extreme beliefs and subsequently to distorted inferences about external reality. Thus, REBT views cognitive rigidity as the root cause of emotional and psychological disturbance (DiGiuseppe et al. 2014).

REBT distinguishes between three levels of cognitions; the first level of cognition is related to surface cognitions that can be easily accessed and tested against reality. First level cognitions are related to inference generation that can be faulty and are related to automatic thoughts (Beck et al. 2005). Second level cognitions are evaluative cognitions, which appraise the "badness" of the inferences of the first level cognitions and include the individual's evaluation of coping resources and ability to tolerate the inference. Third level cognitions, according to REBT, involve central imperative demands, which are schematic representations of how the individual wants the world to be. Imperative demands refer to the rigid adherence to an unrealistic and absolute expectation of the world, the self, and other individuals. People construct their representation of reality in the form of schemas. If individuals perceive an inconsistency of incoming information that conflict with their expectations of the world, emotional arousal occurs, causing assimilative or accommodative efforts to resolve this discrepancy (DiGiuseppe 1996; DiGiuseppe et al. 2014). *Demandingness* (*DEM*), so REBT postulates, is indicative that the person perseverates assimilative efforts to cope with schema discrepant information, resulting in continued arousal and perception of threat.

According to REBT theory, demandingness leads to second level irrational beliefs that are evaluative in nature. REBT distinguishes between the second-level irrational beliefs *awfulizing* (AWF), *frustration intolerance* (FI) and global evaluation of worth such as *self/others/world-downing* (SD). *Awfulizing* is characterized by exaggerated negative thoughts about self, others, or the world, often represented by language such as "terrible, awful, or catastrophic" (DiGiuseppe et al. 2014, p. 46). *Awfulizing* represents beliefs that something is awful or catastrophic and as such represent extreme evaluations that stem from absolutistic beliefs. *Frustration Intolerance* refers to the irrational belief that one can't stand and endure the activating event and contains the belief that happiness could not exist if a specific situation were to occur. *Frustration Intolerance* is related to one's appraisal of one's strength and effort that can be mustered despite pain, discomfort and threat. *Global evaluation of worth* refers to the absolutistic evaluation of human worth toward self, others, or toward the world. REBT posits that a person cannot be rated dichotomously as good or bad since human beings are too complex to be evaluated in such a manner; instead, evaluation could only occur regarding specific behaviors of an individual in a specific situation (DiGiuseppe et al. 2014).

Providing quantitative evidence for the centrality of the demandingness belief has been challenging. Some evidence however appears to confirm the central role of demandingness as proposed by the REBT-I model. Sava (2009), for example, suggests that Demandingness represents a qualitatively different cognitive process as compared to the secondary irrational beliefs. DiLorenzo et al. (2006) investigated the interrelations between the irrational beliefs dependent on academic stress levels of students during the first semester and before a midterm exam. Results showed a best fit for the REBT-I model, with demandingness playing a central role in relation to secondary irrational beliefs and distress. A similar study by Hyland et al. (2014) investigated the organization of irrational beliefs related to posttraumatic stress

disorder (PTSD). Results were consistent with the REBT-I model of irrational thoughts indicating that Demandingness indeed presents a primary irrational belief.

Investigating the Relationship Between Irrational Beliefs and Automatic Thoughts

According to REBT theory, irrational beliefs are hypothesized to lead to automatic thoughts. (DiGiuseppe 1996; Ellis 1994; Beck 2008; Szentagotai and Freeman 2007). Szentagotai and Freeman (2007) examined the relationship between irrational beliefs and automatic thoughts in their relation to distress, depression, and anxiety using a mediational analysis. Figure 1 represents the mediational diagram; values represent standardized parameter estimates. While the researchers proposed that automatic thoughts would account for the effect of irrational beliefs on distress, only partial mediation could be confirmed. Results indicated that a direct effect of irrational beliefs on depression remains after the mediator variable automatic thoughts is added into the model, which could indicate that irrational beliefs directly affect negative emotions, not caused by automatic thoughts. Szentagotai and Freeman (2007) point out that, after examining the items of the various assessments, an overlap between items of the irrational beliefs scale and automatic thought scales existed. Such item overlap could result in overlapping constructs, which could produce spurious correlation between the cognitive concepts. Szentagotai and Freeman (2007) point out that further investigation between the cognitive constructs is necessary especially exploring the cognitive constructs in more detail. David et al. (2005a, b; David and Szentagotai 2006) believe that for further advancement of the cognitive behavioral therapies, cognitive constructs need to be examined comprehensively especially from a theoretical point of view.

With these limitations in mind, the purpose of this present study was to assess the effects of the irrational beliefs and automatic thoughts on depression and anxiety, especially in view of the construct validity of the proposed crucial cognitions. More specifically, the study investigated: (1) To what extent do automatic thoughts, as

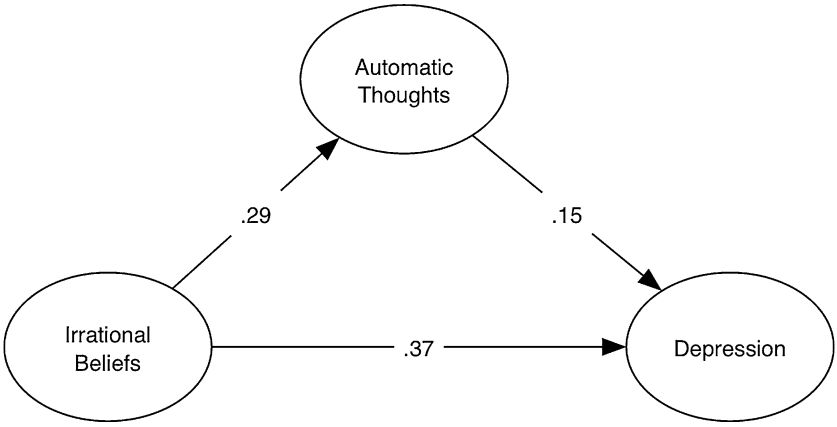

Fig. 1 Mediation diagram according to Szentagotai and Freeman (2007)

assessed by the Automatic Thoughts Questionnaire, mediate the effect of irrational beliefs on depression and anxiety? and (2) Using the latent factor structure of the irrational beliefs and the Automatic Thought Questionnaire, what is the relationship between irrational beliefs and automatic thoughts on depression, anxiety and stress in view of the content specificity hypothesis that states that automatic thoughts contain different content for anxiety and depression (Beck 1964; Beck et al. 2005)?

Method

Sample

The study targeted college students between the ages 18 and 60, who were enrolled in a 4-year undergraduate psychology program in the United States of America. Out of the $N = 541$ participants, 480 participants (88.7%) were between 18 and 29 years old, 54 participants (10.0%) were between 30 and 49 years old, and seven participants (1.3%) were between 50 and 60 years old. One hundred six participants identified their biological gender as male (19.6%), but the majority of participants were female (433; 80%). The primary cultural background for this study was largely white (359, 66.4%), with 95 (17.6%) Hispanic/Latino, 35 (6.5%) Black or African-American, 26 (4.8%) Asian/Pacific Islander, 7 (1.3%) Native American or American Indian. Fifteen (2.8%) identified as Other, and 3 (.6%) did not want to specify, and one (.2%) had no response.

Measures

Since the intent is to verify the construct validity of the cognitive constructs investigated in this study, great care was taken to choose adequate instruments that measure the cognitive constructs with high statistical fidelity. After extensive literature research and discussing the suitability of some of the instruments with the original publishers, the following instruments were chosen for this study.

The Attitudes and Belief Scale-2 Abbreviated Version (ABS2-AV)

According to David (2014), the abbreviated version of the Attitudes and Beliefs Scale is considered a reliable and valid measure of irrational beliefs as proposed by the REBT model. Hyland et al. (2013) developed the abbreviated version of the Attitudes and Beliefs Scale (AV-ABS2) using rigorous statistical methods to derive a statistically sound instrument with high construct validity. The resulting 24-item instrument yielded five models that included a two-factor solution measuring irrationality and rationality as well as a four-factor solution yielding the irrational belief processes demandingness (DEM), catastrophizing (CAT; related to the REBT irrational belief AWF), frustration intolerance (FI), and depreciation (DEP; related to the REBT irrational belief SD). Lastly, an eight-factor solution with satisfactory model fit statistics could be determined that represents the four irrational belief processes and additionally four rational belief processes named preferences, non-

catastrophizing, high frustration tolerance, and acceptance (Hyland et al. 2013). The AV-ABS2 showed satisfactory internal consistency for all subscales, which yielded Cronbach's alpha levels above .80 (Hyland et al. 2013). For the purpose of this study, the four-factor solution of this instrument was utilized to measure the irrational belief processes. The total irrationality score was obtained by summing the score of all irrationally worded items (12 items total). The AV-ABS2 questionnaire was administered as part of an online survey.

Depression-Anxiety-Stress Scale (DASS-21)

The DASS-21 is a self-reported measure that contains three scales intended to assess the negative emotional states of depression, anxiety, and stress. The DASS-21 is especially applicable to measuring clinically significant emotional states as they relate to depression, anxiety, and stress in a research setting. The DASS-21 is the short version of the original 42-item questionnaire, representing each subscale with seven items (Lovibond and Lovibond 1995). The DASS-21 assesses the three dimensions depression, anxiety, and stress as they relate to the tripartite model of depression and anxiety; all three scales index a substantial common latent factor related to general psychological distress, but also account for variance that is specific for each scale (Henry and Crawford 2005; Lovibond and Lovibond 1995).

The DASS-21 shows good convergent and discriminant validity when compared with other validated measures of depression and anxiety. The DASS-21 yields adequate to high internal reliability; Cronbach's alpha yielded an $\alpha = .88$ (95% CI .87–.89) for the Depression subscale, $\alpha = .82$ (95% CI .80–.83) for the Anxiety subscale, $\alpha = .90$ (95% CI .89–.91) for the Stress subscale, and $\alpha = .93$ (95% CI .93–.94) for the total scale (Henry and Crawford 2005).

The DASS-21 can be scored separately for each of the subscales to obtain a depression, anxiety, and stress score. The publishers of the DASS-21 recommend statistically controlling for the stress variable if only the subscales depression and anxiety are used.

Combined Automatic Thought Questionnaire (ATQC-24)

Safren et al. (2000) combined the Automatic Thought Questionnaire (ATQ-R) and the anxious self-statements questionnaire (ASSQ) with the attempt to both verify the content specificity of both instruments and to distinguish both anxious and depressive self-talk. Using confirmatory factor analysis, the hypothesized two factor structure for anxiety and depression could not be established. Instead, exploratory factor analysis yielded a three-factor solution representing negative affect self-statements. All three factors loaded on a common higher order factor and were labeled as (1) "self-statements reflecting depression/hopelessness," (2) "self-statements reflecting one's inability to cope," and (3) "self-statements reflecting anxiety/uncertainty about the future" (Safren et al. 2000, p. 335).

Safren et al. (2000) conclude that the occurrence of three factors is congruent with Beck's content-specificity hypothesis (Beck 1979; Clark and Beck 2011). For the purpose of this study, items from the combined ATQ-R and ASSQ were chosen

that (a) have unique factor loadings on each of the three previously determined factors of .50 or above, (b) represent the original content domain of each factor, and (c) represent an equal item count for each factor while reducing redundancy in the items that greatly overlap (e.g., "I can't stand it" and "I can't stand it anymore," Safren et al. 2000, p. 337).

Safren et al. (2000) determined a Cronbach's alpha coefficient for the above three factors of .90 and above. Since both the ASSQ (Cronbach's alpha $\alpha = .94$; Kendall and Hollon 1989) and ATQ-R showed strong validity and internal reliability, it is expected that the above items will show similar psychometric properties, especially since the selected items from the ASSQ and the ATQ-R remain factor specific. As part of this study, the measurement model of the proposed three-factor combined Automatic Thought Questionnaire were verified using confirmatory factor analytical methods.

The resulting scale contains three subscales consisting of eight items each. According to Safren et al. (2000), all three factors of the ATQC-24 scale loaded onto a single higher order factor using hierarchical factor analysis. Therefore, a single score representing a general negative automatic thought construct will be obtained by summing all subscales. The ATQC-24 questionnaire was offered as part of an online survey.

Data Collection Procedure

Data for this study were collected using the above measures in an online format. Offering research in form of online surveys appears to be a valid form of data collection in the field of psychology with little differences between online versus face-to-face data collection (see for example Shapka et al. 2016). Following the approval of the Institutional Review Board (IRB), a list of 4-year colleges across the United States was generated that offered an undergraduate Psychology program. Beck (2008) proposed that cognitive processing changes during stressful times; more rigid and inflexible schemas become activated, which represent a more autonomous and faster response system. Once activated, such schemas tend to influence our information processing system and redirect our attention (Beck 2008). For this reason, students were requested to participate in this study during midterm and final exam times, which are likely stressful for students (Zunhammer et al. 2013; DiLorenzo et al. 2006).

Up to three colleges in each state were contacted twice (midterm and finals exam times) either through their administrative faculty, department chair, and/or a psychology professor depending on which contact information was available. A request for research participation was sent along with the invitation to forward the request to their undergraduate email list serve. As part of the request, a link to the survey, hosted via Survey Monkey Inc. (http://www.surveymonkey.com), was provided. The survey was not made available to the open public and students could only participate in this survey via the unique link provided as part of the invitation request. The various assessments were presented in a random order to compensate for fatigue effects.

Data Analysis

Data were imported to IBM SPSS using the export utility provided by the online survey service Survey Monkey. Subsequently, data were analyzed to investigate if the statistical data fulfill the statistical assumptions necessary to run the intended statistical analyses. Mediational analysis was run using Hayes (2013) PROCESS module, which is an add-on macro to SPSS that calculates statistical mediation using either single or multiple mediators. PROCESS features bootstrap sampling methods to estimate bias-corrected confidence intervals to make statistical inferences about the indirect effects. The PROCESS method of estimating a mediational model is considered a more optimal method compared to traditional methods such as the Sobel test (Sobel 1982) or Baron and Kenny's (1986) method, which are afflicted with methodological problems (Hayes 2013). Further, using bootstrapping methods for confidence interval estimation increases power to assess the significance of the mediation (Hayes 2013).

Exploratory Factor Analysis (EFA)

For this study, exploratory factor analysis was used in preparation for Structural Equation Modeling (SEM) in order to derive a clean measurement model. Each measurement model was verified to detect problematic variables that could confound the model fit and may indicate the use of composite variables. Exploratory factor analysis was further utilized to verify the factor structure of the combined automatic thought questionnaire as proposed by Safren et al. (2000). Lastly, factor analytical methods were used to extract a parsimonious latent factor structure representing the core cognitions as proposed by the various cognitive-behavioral therapies. Exploratory Factor Analysis was run as part of the IBM SPSS software.

Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) is a path-analytical statistical method that allows the causal modeling of various independent variables onto one or many dependent variables. SEM can be considered a statistic of the general linear model that combines exploratory factor analytical methods with regression analysis. SEM is more powerful than simple mediational analysis and allows for the causal modeling of latent unobserved factors while estimating error terms for the observed variables (Tabachnick and Fidell 2006). SEM is prone to confirmatory bias, especially when studies favor an explicit model and neglect to consider alternative models. SEM modeling is a large sample technique; the required sample size depends on the degrees of freedom of the model and the effect size (Kline 2011; MacCallum and Austin 2000; Tabachnick and Fidell 2006). Using the a priori sample size calculator (effect size = .1, statistical power level = .8, and $a = .05$ probability level), a minimum sample size of $N = 290$ is recommended (Soper 2014). For the purpose of this study, structural equation modeling was performed using IBM SPSS AMOS.

Results

Irrational Beliefs and Automatic Thoughts in Relation to Depression

Szentagotai and Freeman (2007) examined the relationship between irrational beliefs and automatic thoughts (see Fig. 1) in their relation to distress, depression, and anxiety. While the researchers proposed that automatic thoughts would account for the effect of irrational beliefs on distress, only partial mediation could be confirmed. The intent of the first research question was to replicate the findings using more empirically validated instruments and more up-to-date mediational analysis.

Development of a Revised Multifactor Automatic Thought Scale (ATQ5)

In this study, a new automatic thought scale was derived based on the results of the combined automatic thought questionnaire for depression (ATQ-R) and anxiety (ASSQ). The scale is consistent with the factor loadings as determined in Safren et al.'s (2000) study. This updated scale provides higher internal consistency than the original Automatic Thought Questionnaire, which contains automatic thoughts related to both depression and anxiety. Bivariate correlations were obtained for the scales. The bivariate correlation coefficient between the DASS21-DEP scale, representing depressive automatic thoughts and the irrational belief scale (ABS2AV-IBS) is .534. Respectively, the correlation coefficient between the DASS21-DEP scale and the ATQ5-DEP scale is .742. The correlation coefficient between the irrational belief scale (ABS2AV-IBS) and the ATQ5-DEP scale was .596. All correlation coefficients were significant at the $p < .001$ level. Verifying the measurement model, an exploratory factor analysis confirmed the three factors of the scale. Scale reliability indices were calculated yielding .908 for the ATQ5 depression scale, .889 for automatic thoughts related to anxiety, and .915 for automatic thoughts related to one's inability to cope. The total scale yielded a Cronbach's alpha of .958.

Simple Mediation Analysis for Depression

For the mediational model, based on Szentagotai and Freeman's proposed model (2007), the antecedent variable is irrational beliefs, as measured by the Abbreviated Attitude and Belief Scale (ABS2AV-IBS). The consequential variable is depression. Automatic thoughts are hypothesized to mediate the causal relationship between irrational beliefs and depression.

Table 1 shows results from the initial mediation analysis using the PROCESS (Hayes 2013) SPSS macro. Table 2 shows a second mediation analysis using the DASS21-STRESS scale as covariate.

A simple mediation analysis was conducted using ordinary least squares path analysis with bias-corrected bootstrap sampling to determine the bias corrected confidence intervals. The mediational model yielded similar results as the original

Table 1 Mediation analysis with depression as consequent

Antecedent		Consequent						
		M(ATQ5-D)				Y(DEP)		
		Coeff.	SE	*p*		Coeff.	SE	*p*
X(IBS)	a	.305	.018	< .001	c′	.066	.016	< .001
M(ATQ5-D)		–	–	–	b	.593	.032	< .001
Constant	i_1	−1.09	.638	.088	i_2	−3.08	.476	< .001
		$R^2 = .356$				$R^2 = .563$		
		$F(1, 537) = 296.32$,				$F(2, 536) = 345.897$,		
		$p < .001$				$p < .001$		

Table 2 *Mediation Analysis with stress as covariate*

Antecedent		Consequent						
		M(ATQ5-D)				Y(DEP)		
		Coeff.	SE	*p*		Coeff.	SE	*p*
X(IBS)	a	.219	.020	< .001	c′	.020	.016	.206
M(ATQ5-D)		–	–	–	b	.491	.0316	< .001
C(Stress)	C_1	.367	.044	< .001	C_2	.326	.034	< .001
Constant	i_1	−.763	.602	.205	i_2	−2.90	.441	< .001
		$R^2 = .430$				$R^2 = .627$		
		$F(2, 536) = 201.767$,				$F(3, 535) = 299.623$,		
		$p < .001$				$p < .001$		

study by Szentagotai and Freeman's (2007). Automatic depressive thoughts partially mediated the effect of irrational beliefs on depressive affect. Despite the mediating effect of automatic thoughts, the effect of irrational beliefs on depression remained significant at the $p < .001$ level (see Fig. 2).

From the hypothesis that stress affects cognitive processes and the cognitive organization of schemas, a repeated mediation analysis was conducted controlling for the effects of stress in this simple mediation model. When adding stress as a covariate into the simple mediation model (Fig. 3), automatic thoughts fully mediated the effects of irrational beliefs on depression.

Participants with more irrational beliefs experienced higher levels of automatic depressive thoughts ($a = .219$), and participants who experienced higher automatic depressive thoughts experienced higher depressive affect ($b = .491$). A biased-corrected bootstrap confidence interval for the indirect effect ($ab = .108$) based on 50,000 bootstrap samples at the 95% confidence interval was entirely above zero (.0937–.1617). Using automatic depressive thoughts as mediator, there was no

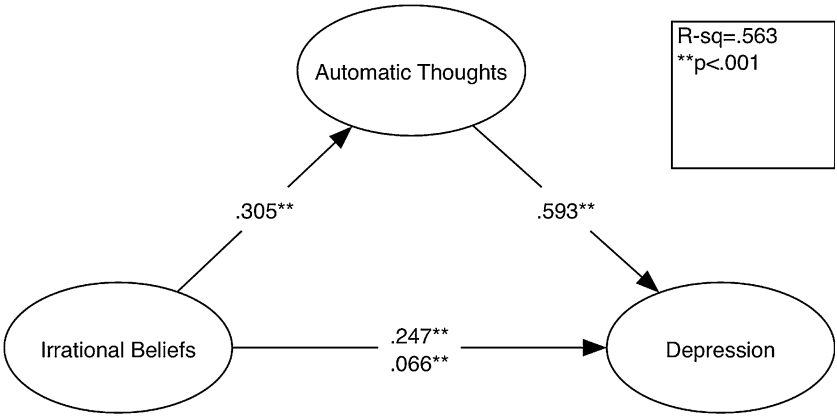

Fig. 2 Mediation diagram

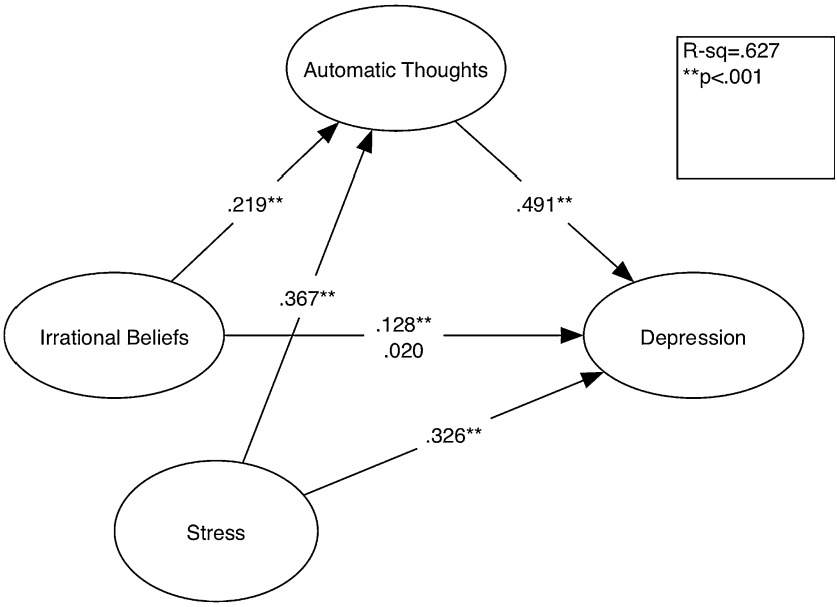

Fig. 3 Mediation diagram with stress as covariate

evidence that irrational beliefs influenced depressive affect ($c' = .020$, $p = .206$). Figure 3 above illustrates the simple mediation model, whose coefficient of determination ($R^2 = .627$) indicates that 62.7% of the variance in depressive affect can be explained by variation in stress symptoms and automatic depressive thoughts. Forty-three percent ($R^2 = .430$) of the participants' variance in depressive automatic thoughts can be explained by variation in stress and irrational beliefs.

In summary, when controlling for stress symptoms, the results of this mediation analysis provide further support for the proposed REBT model (DiGiuseppe 1996;

Szentagotai and Freeman 2007). Within this REBT model, it is proposed that irrational beliefs are core beliefs that result in specific automatic thoughts. After controlling for stress, there was no significant evidence for a direct relationship between irrational beliefs and depression, which was fully mediated by depressive automatic thoughts.

Irrational Beliefs and Automatic Thoughts in Relation to Anxiety

A second aspect of this study was to investigate the relationship between irrational beliefs and anxiety as mediated by automatic thoughts. For this analysis, the scales Attitude and Belief Scale (ABS2AV-IBS), the Automatic Thought Questionnaire (ATQ5-ANX), and the anxiety subscale of the DASS21 (DASS21-ANX) were used. The stress scale (DASS21-STRESS) was used as covariate.

Mediation Analysis Anxiety

Using the PROCESS plugin (Hayes 2013), a mediation analysis was run using irrational beliefs as independent variable (X), anxiety as outcome variable (Y), and the Automatic Thought Questionnaire (ATQ5-ANX) as mediator variable. The stress scale (DASS21-STRESS) was used as covariate. The mediation analysis follows model number 4 (Hayes 2013) with 50,000 bias-corrected bootstrap samples. Results are shown in Table 3.

A simple mediation analysis was conducted using ordinary least squares path analysis with bias-corrected bootstrap sampling to determine the confidence intervals. As can be seen in Table 3, the effect of irrational beliefs on anxiety was not fully mediated by the automatic thoughts questionnaire-anxiety scale (ATQ5-ANX). The effect of irrational beliefs on anxiety stayed significant at the $p < .05$ level. As shown in Fig. 4, automatic thoughts (ATQ5-ANX) partially mediate the effects of irrational beliefs on anxiety. Participants with more irrational beliefs experienced higher levels of automatic anxious thoughts ($a = .165$), and

Table 3 Mediation Analysis with stress as covariate and anxiety as consequent

Antecedent		Consequent						
		M(ATQ5-A)				Y(ANX)		
		Coeff.	SE	*p*		Coeff.	SE	*p*
X(IBS)	a	.165	.024	< .001	c′	.031	.016	.048
M(ATQ5-A)		–	–	–	b	.148	.027	< .001
C(Stress)	C_1	.289	.054	< .001	C_2	.559	.034	< .001
Constant	i_1	2.983	.735	< .001	i_2	−2.28	.462	< .001
		$R^2 = .230$				$R^2 = .529$		
		$F(2, 536) = 80.002$,				$F(3, 535) = 200.174$,		
		$p < .001$				$p < .001$		

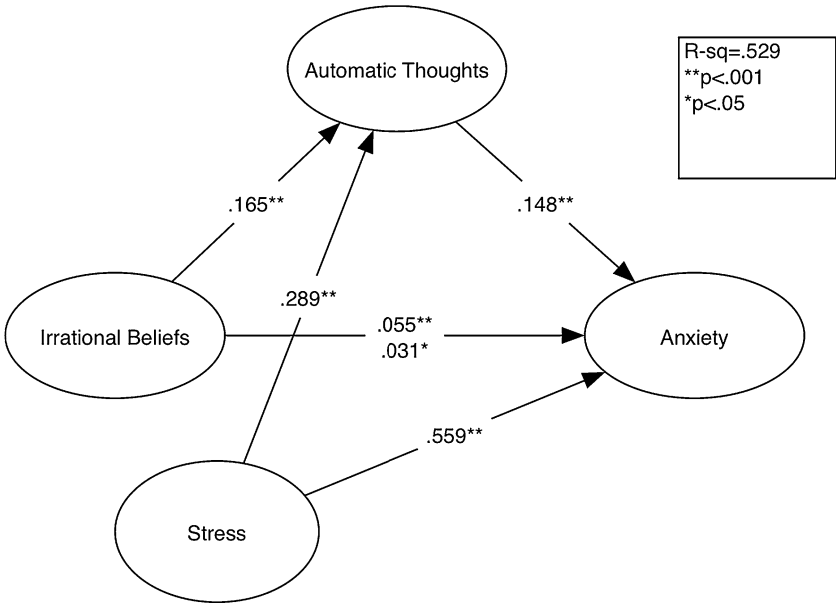

Fig. 4 Mediation diagram with anxiety as outcome

participants who experienced higher automatic anxious thoughts experienced higher anxious affect ($b = .148$). A bias-corrected bootstrap confidence interval for the indirect effect ($ab = .025$) based on 50,000 bootstrap samples at the 95% confidence interval was entirely above zero (a: .0147 to .037). Using automatic anxious thoughts as a mediator indicated that irrational beliefs influenced anxious affect ($c' = .031$, $p = .048$). Figure 4, below, illustrates the simple mediation model, whose coefficient of determination ($R^2 = .529$) indicates that 59.2% of the variance in depressive affect can be explained by variation in stress symptoms and automatic depressive thoughts, and 50.2% ($R^2 = .502$) of the participants' variance in anxious automatic thoughts can be explained by variation in stress and irrational beliefs.

Using anxiety as the outcome variable, automatic anxious thoughts do not fully mediate the effect of irrational beliefs on anxiety. This result indicates that irrational beliefs contribute some unique effect on anxiety as measured by the anxiety subscale of the depression, anxiety and stress scale (DASS21), even when controlling for stress by using the stress scale (DASS21-STRESS) as covariate. Nevertheless, irrational beliefs significantly influence automatic anxious thoughts, which in turn significantly influence anxious affect. Some of the effects of irrational beliefs on anxiety have not been accounted for by automatic anxious thoughts and might instead be accounted for by another mediator that was not specified in the model.

Structural Equation Modeling of the Cognitive Core Constructs

Results from the previous section indicated differences in the mediational effect of automatic thoughts in the case of depression versus anxiety. As part of the second research question, the intent was to investigate the closer relationship between irrational beliefs and depressive or anxious affect especially in view of the content specificity hypothesis, which indicates that both anxiety- and depression-specific cognitions exist (see Beck 1979).

Before continuing to the mediational model, it was necessary to verify the measurement model to confirm the hypothesized latent factor structure of the instruments used in this study. Since the surveys contain survey items of cognitions, cross-loadings may occur, which would negatively affect the structural equation modeling for the proposed model (Byrne 2010).

Exploratory Factor Analysis (EFA)

An exploratory factor analysis was used to verify the factor structure of the combined instruments. The intent was to obtain a measurements model that affords cleaner structural equation modeling. In order to maximize differences between factors (discriminant validity) and prepare a solution of SPSS AMOS, a Maximum Likelihood (ML) factoring method was used. An initial solution attempted to extract the following latent factors: DASS21-ANX, DASS21-DEP, the automatic thought items ATQ5-ANX, ATQ5-DEP, ATQ5-COPE, as well as the irrational beliefs ABS2AV-SD, ABS2AV-LFT, ABS2AV-CAT, ABS2AV-DEM, yielding a total of 10 factors. Oblique rotation (PROMAX) was used to assess unique relationships between each factor. The initial solution indicated that a lesser number of factors existed as could be derived from the cross-loadings and the scree plot. Scree plot and patterns of the initial pattern matrix indicated the existence of eight factors. Subsequently, another dimension reduction was run, with the attempt to extract eight unique factors. Factors that showed loadings below .40 were removed, as were factor loadings that did not uniquely load onto a latent factor. Single scale items that loaded inconsistently to the latent factor structure of the original scales were removed as well.

It is important to note that most scales could be confirmed in this analysis. The DASS21 Depression subscale and DASS21 Anxiety subscale especially yielded most of their scale items on the proposed factors. Only the stress scale did not load on a unique factor and most items loaded onto the latent factor of the anxiety scale. Since the DASS21 scale originally yielded an orthogonal three factor structure, and stress represents a unique factor that contributes to overall negative affect (Henry and Crawford 2005), items from the stress scale were not included in further analysis to preserve the original depression and anxiety scales of the DASS21. The revised *Automatic Thought Questionnaire* (ATQ5; see above) loaded all of its items consistently with the proposed subscales. Two items of the ATQ5-DEP subscale were removed due to small factor loadings (<.40).

The *Irrational Belief Scale* (ABS2AV) demonstrated issues with the proposed subscales. This was to be expected, since similar issues occurred during the initial

scale development (see Hyland et al. 2013). Nonetheless, unique loadings could be extracted for the demandingness (DEM) subscale, the self-downing (SD) subscale, and the low frustration tolerance (LFT) subscale. Since items from the catastrophizing (CAT/AWF) subscale cross-loaded or indicated small loadings (<.40), the catastrophizing subscale could not be included in the further analysis. Kaiser–Meyer–Olkin Measure shows a sampling adequacy of .940 ($X^2 = 11{,}078.867$, $df = 528$, $p < .0001$), indicating marvelous sampling adequacy.

Confirmatory Factor Analysis

Using the results from the exploratory factor analysis (EFA), the final derived pattern matrix was imported into SPSS AMOS23 for a confirmatory analysis (see Amos EFA/CFA plugin; Gaskin 2016). A significant and over-identified model was confirmed ($X^2 = 1002.258$, $df = 560$, $p < .0001$). Fit indices showed a good model fit (CFI = .967; CMIN/DF = 1.76; RMSEA = .038). All factor loadings were significant at the .001 level. Modification indices indicated acceptable values between the error covariances. In order to further confirm the measurement model, reliabilities of the derived latent factors were determined. Figure 5 shows the final measurement model obtained during CFA. The reliability indices of the proposed scales were in the expected ranges and sufficient to continue the path analysis, as shown in Table 4.

Structural Equation Modeling

Using the latent factor structure from the confirmatory factor analysis (CFA), path analysis was performed using structural equation modeling (SPSS, AMOS 23). Various models consistent with the proposed theory were analyzed to determine the best model fit. Since the scale items did not fulfill the stringent determinants of normality, bootstrap sampling methods were implemented to determine bias corrected bootstrap confidence intervals at the .95 level.

Various measures were used to assess the goodness of fit of the model. The comparative fit index (CFI) indicates a good model fit for values >.95. The CFI for the final resulting model was .968, indicating a good fit. Root mean square error of approximation (RMSEA) is an estimate for the lack of fit; RMSEA is sensitive to the number of estimated parameters, and values below .05 indicate good fit. The RMSEA for the proposed model was .038, further indicating good fit. The Goodness of fit index (GFI) resulted in .916, indicating a fair fit (> .90). Finally, the minimum discrepancy divided by the degrees of freedom (CMIN/DF) was less than the recommended threshold of two (CMIN/DF = 1.74). In summary, the model represents an overall good fit of the obtained data (Byrne 2010).

Figure 6 shows the final structural equation model, indicating only the latent factor structure and the significant paths. The model shows the standardized regression weights, which improves interpretability, while considering the differences in scale ranges between the factors. Regression weights and confidence intervals were determined using bias-corrected bootstrap sampling to determine the confidence intervals. Bootstrap sampling was conducted using 2000 samples and a

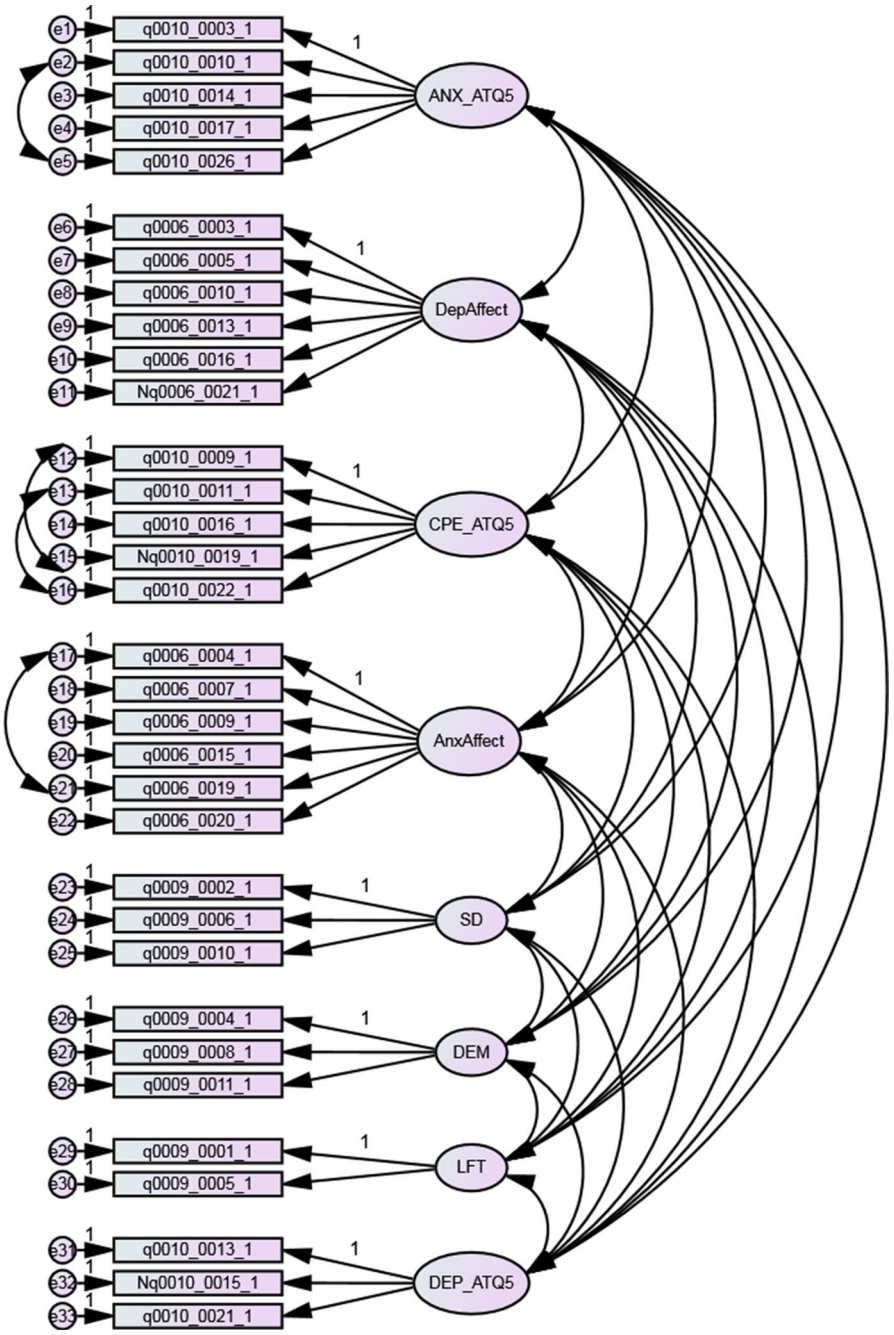

Fig. 5 Final measurement model containing the 8-factor structure

Table 4 Reliability indices, with Cronbach alphas and scale loading ranges

Scale	Alpha	No. items	Loading range
Depressive affect	.853	6	.423–.874
Anxious affect	.830	6	.501–.847
ATQ5 Depr./hopelessness	.910	3	.732–.798
ATQ5 worry future	.897	5	.559–.929
ATQ5 inability to cope	.916	5	.515–.944
Demandingness beliefs	.796	3	.688–.820
Self-downing beliefs	.893	3	.766–.877
Low frustration tolerance	.841	2	.838–.861

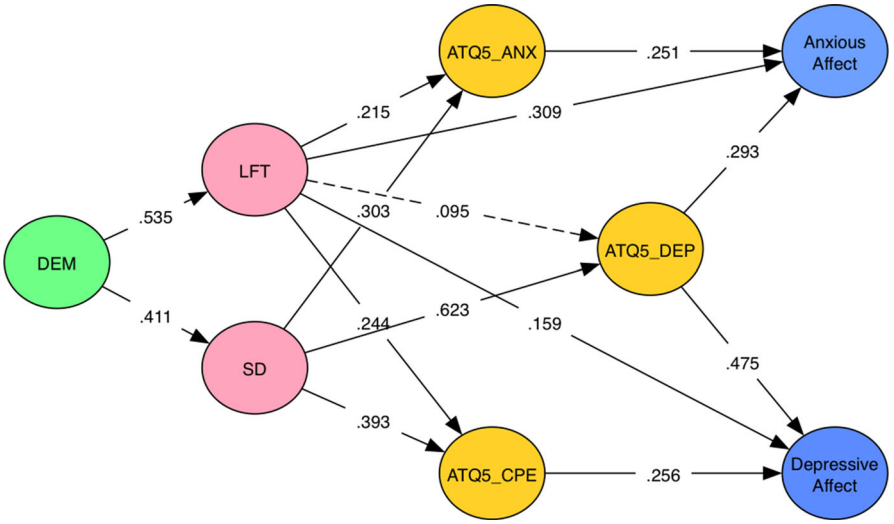

Fig. 6 Structural equation model integrating all core cognitions. All solid paths are significant at the $p \leq .001$ level; *dashed lines* indicate significant paths at the $p < .05$ level

95% bias corrected confidence interval as part of SPSS AMOS 23. Table 5 summarizes the significant paths, including confidence intervals and alpha probability level.

Another useful statistic to assess the fidelity of the structural equation model includes the squared multiple correlation (SMC) that AMOS provides for each endogenous variable. The SMC provides a measure of the variance explained by the predictors of the endogenous variable and therefore represents a measure of effect size. The SMC values for the endogenous variables of the above model were LFT (.286), SD (.169), ATQ5-DEP (.446), ATQ5-CPE (.293), ATQ5-ANX (.192), Anxiety (.440), and Depression (.593). As can be inferred from these results, 59.3% of the variance proportion of depressive affect is explained by its predictors ATQ5-DEP, ATQ5-COPE and LFT. For the endogenous anxiety factor, 44% of the variance proportion of anxious affect is explained by its predictors ATQ5-ANX, ATQ5-DEP and LFT.

Table 5 Stand. regression weights of the final structural equation model

Parameter		Estimate	Bias corrected Confidence Interval		
←		(stand.)	Lower	Upper	*p*
SD	DEM	.411	.334	.491	.001
LFT	DEM	.535	.441	.616	.001
ATQ5-DEP	LFT	.095	.014	.181	.023
ATQ5-CPE	LFT	.244	.146	.342	.001
ATQ5-ANX	LFT	.215	.108	.319	.001
ATQ5-DEP	SD	.623	.514	.703	.002
ATQ5-CPE	SD	.393	.277	.510	.001
ATQ5-ANX	SD	.303	.192	.407	.001
Depressive affect	ATQ5-CPE	.256	.119	.417	.001
Anxious affect	ATQ5-DEP	.293	.170	.405	.001
Depressive affect	ATQ5-DEP	.475	.322	.608	.001
Anxious affect	ATQ5-ANX	.251	.129	.379	.001
Anxious affect	LFT	.309	.210	.398	.001
Depressive affect	LFT	.159	.074	.243	.001

Safren's et al. (2000) explored the combined automatic thought items from the *Automatic Thought Questionnaire* (ATQ) and the *Anxious Self-Statements Questionnaire* (ASSQ) to investigate the content specificity of automatic thoughts in respect to depression and anxiety. According to Safren et al. (2000), "self-statements reflecting depression and hopelessness" (ATQ5-DEP) explained unique variance of depressive affect. For anxiety scores using the *State Trait Anxiety Inventory* (STAI-T), results were not as unique; both self-statements reflecting "depression/hopelessness" as well as "self-statements reflecting anxiety/uncertainty about the future" contributed unique variance to anxiety. The third factor, "self-statements reflecting one's inability to cope," (p. 342) did not account for unique variance after the other factors were accounted for (Safren et al. 2000).

The structural equation model, as part of the second research question, investigated a similar relationship between automatic thoughts (revised) in relation to depression and anxiety as measured by the DASS21. After using the revised automatic thought subscales (ATQ5-DEP, ATQ5-ANX, ATQ5-CPE), similar results were found to the Safren et al. (2000) study regarding depression and anxiety. Automatic thoughts related to "self-statements reflecting anxiety/uncertainty about the future" (ATQ5-ANX) contributed to unique variance to anxious affect as measured by the DASS21 anxiety subscale. Automatic thoughts related to "self-statements reflecting depression/hopelessness" (ATQ5-DEP) contribute to unique variance in both depressive as well as anxious affect. This result was also seen in Safren's et al. (2000) study.

A difference between the current and Safren's et al. (2000) study was observed in the ATQ5-CPE factor representing *automatic thoughts reflecting one's inability to cope*, which was uniquely associated with depressive affect. Effects of ATQ5-CPE on anxiety did not stay significant after bootstrapping confidence interval estimation when other factors were accounted for. It is worth noting that the items representing the ATQ5-CPE subscale were originally derived from the Anxious Self-Statements Questionnaire (ASSQ), which would seem to indicate a relationship between the ATQ5-CPE scale and anxiety.

In summary, automatic thoughts related to anxiety/uncertainty about the future, as well as automatic thoughts related to depression/hopelessness, both contributed to unique variance explaining anxious affect. Automatic thoughts related to one's inability to cope, as well as automatic thought reflecting depression/hopelessness, contributed to unique variance explaining depressive affect. Whereas these results suggest the existence of content specific self-statements that are uniquely associated with depression (ATQ5-CPE) as well as anxiety (ATQ5-ANX), it appears that automatic thoughts reflecting depression (ATQ5-DEP) contribute to both anxiety and depression and represent a common factor.

Content specificity is also partly reflected in the secondary irrational beliefs. Unfortunately, since the awfulizing factor could not be established in the measurement model, the unique contribution of awfulizing beliefs on anxiety or depression could not be analyzed. When integrating both the irrational beliefs and automatic thoughts into the same structural equation model, a few interesting results emerged. First, direct effects of self-downing irrational beliefs on depression were fully mediated by automatic thoughts that reflected depression/hopelessness. In regard to depression, the model provides further evidence that irrational beliefs reflect a causal mechanism in automatic depressive thoughts, which in turn contribute to depressive affect. The direct effect of SD irrational beliefs on anxiety was also fully mediated by anxious and depressive automatic thoughts. This result provides further evidence that self-downing irrational beliefs contribute to an underlying mechanism behind both depressive and anxious automatic thoughts. Second, low-frustration tolerance (LFT) appears to play a unique role affecting both depression and anxiety. The direct effect of LFT is not fully mediated by the respective automatic thoughts and thus represents some unique variance in explaining depressive and anxious affect. The direct effect of LFT on anxiety ($\beta = .309$, $p < .0001$) exceeds the direct effect of LFT on depression ($\beta = .150$, $p < .0001$) and thus indicates that it is associated stronger with anxious affect. In summary, low frustration tolerance is more strongly associated with anxious affect, whereas self-downing beliefs are more strongly associated with self-statements reflecting depression/hopelessness and depressive affect. This is consistent with the results from the first research question. Whereas SD beliefs are fully mediated in the case of depression, LFT retains a significant effect on anxiety, thus explaining the not fully mediated result from the initial mediation analysis in the case of anxiety.

A third important result is the differentiation between primary and secondary irrational beliefs in relation to automatic thoughts and anxious/depressive affect. The effects of DEM on automatic thoughts and depressive/anxious affect are fully mediated by the secondary irrational beliefs SD and LFT. These findings provide

further evidence for the central importance of DEM beliefs. Demandingness is strongly associated with the secondary irrational beliefs LFT and SD. The secondary irrational beliefs in turn affect the automatic thought components ATQ5-ANX, ATQ5-CPE, ATQ5-DEP.

Results from the second research question are consistent with findings from the initial mediation analysis. In the case of depressive affect, demandingness and self-downing beliefs especially affect depression via automatic thoughts reflecting statements related to depression (ATQ5-DEP). In the case of anxiety, paths are not as specific; demandingness affects the secondary irrational beliefs SD and LFT, which directly influence automatic thoughts as indicated through self-statements reflecting anxiety/uncertainty about the future and self-statements reflecting depression. Different from depression, LFT shows a direct effect on anxious affect, which is not mediated through automatic thoughts.

The model remains fairly parsimonious, only including the irrational beliefs and automatic thoughts subscales when predicting anxiety and depression; subsequently, only 59.3% of the variance proportion of the depression factor is explained through the model, and only 44% of the variance proportion is explained in the case of anxiety.

Discussion

The first research question was concerned with the mediated relationship between the irrational beliefs as proposed by Albert Ellis' Rational Emotive Behavior Therapy and automatic thoughts as part of Beck's Cognitive Therapy. Using different, but statistically more sound instruments, the current study yielded similar results as were reported in the original study from Szentagotai and Freeman (2007). Results indicated that automatic depressive thoughts only partially mediated the effect of irrational beliefs on depressive affect, but irrational beliefs still maintained a direct significant effect on depression. When adding stress as covariate, therefore controlling for the effect of stress on the mediator and outcome variable, automatic thoughts fully mediated the effects of irrational beliefs on depression. Results indicate that participants who identified more irrational beliefs also experienced higher levels of automatic thoughts. Higher automatic thoughts were in turn associated with higher depressive affect.

The model's coefficient of determination indicated that 62.7% of the variance of depressive affect could be explained by the model, including the irrational beliefs, automatic thoughts, and stress. In a subsequent analysis, a similar mediation model was calculated to determine the effects of irrational beliefs and anxious automatic thoughts on anxiety. The effect of irrational beliefs on anxiety was only partially mediated by anxious automatic thoughts that contained worry about the future, even when controlling for stress as covariate. An increase in irrational beliefs is associated with an increase in anxious automatic thoughts as well as an increase in anxious affect. The difference in mediation results between anxiety and depression indicate that the irrational belief components (DEM, SD, LFT, CAT) play a different role regarding depression and anxiety.

Addressing the limitations of simple mediation analyses, more complex mediation models were utilized to further investigate the closer relationship between the irrational belief components and the automatic thoughts components specific to anxiety and depression with the intent to better understand the differing results from the previous mediation analysis. The resulting structural equation model indicated some interesting results. In view of the content specificity hypothesis (Beck 1979), it appears that anxious automatic thoughts (i.e., "worry about the future") are specific to anxious affect. Automatic thoughts related to one's inability to cope appear specific to depressive affect. Automatic depressive thoughts appear to represent a common denominator, since depressive automatic thoughts are significantly correlated to both anxious as well as depressive affect. This result at first appears counterintuitive, but findings are in line with previously published research. For example, the original ATQ scale (which items mostly represent depressive automatic thoughts) not only showed high convergent validity with depression and hopelessness measures (Kazdin 1990), but also showed high correlation with the state trait anxiety inventory (STAI; Spielberger 1989) as shown in the Hollon and Kendall (1980) study (see also Calvete and Connor-Smith 2005).

Interesting results also emerged from the second part of this study, explaining in more detail the different mediation effects of automatic thoughts on depression and anxiety as found in the previous research question: (1) Direct effects of self-downing irrational beliefs on depressive affect were fully mediated by automatic thoughts reflecting depression/hopelessness explaining why automatic thoughts fully mediated the effect of irrational beliefs on depression. (2) Low frustration tolerance accounted for unique variance to both depressive affect and anxious affect that is not fully mediated by the automatic thoughts providing an explanation why automatic thoughts did not fully mediate the effect of irrational beliefs on anxiety as discussed in the previous Sect. (3) Modeling the irrational belief demandingness as primary irrational beliefs yielded a better model fit indicating that indeed the REBT-I model seemed to be the best model fit. Demandingness significantly predicts the secondary irrational beliefs (SD, LFT) but does not indicate significant paths to the automatic thought components and the affective scales depression and anxiety. This result provides more evidence that indeed Demandingness represents a primary irrational belief as originally proposed as part of the REBT-I model. (4) Lastly, both the secondary irrational beliefs SD and LFT show significant paths to the three automatic thought components. Self-downing irrational beliefs are associated more strongly with automatic thoughts related to depression and one's inability to cope and subsequent depressive affect. Low frustration tolerance is more related to automatic anxious thoughts and anxious affect although regression weights are also significant for automatic thoughts related to one's inability to cope and depressive affect. This result provides more evidence that an increase of irrational beliefs is associated with an increase of automatic thoughts. Furthermore, it appears that there is some content specificity of the irrational beliefs in view of the emotional disorders as has initially been proposed by David (2014).

Overall, results of this study suggest that the proposed cognitive core constructs held up well using factor analytical methods from our sample data. This suggests a few interesting implications for use in practice and research: (a) Irrational beliefs

and automatic thoughts indeed represent different core cognitions that play a role in the etiology of depression and anxiety, and can both be addressed as part of the therapeutic process, (b) Demandingness appears to play a primary role that when targeted will both affect secondary irrational beliefs and automatic thoughts. (c) The model implicates a tier of the cognitions with demandingness playing a primary role, followed by secondary irrational beliefs and automatic thoughts at the third tier. REBT theory proposes that irrational beliefs are considered deeper cognitions that are not easily brought into consciousness, whereas automatic thoughts represent more superficial (consciously easier to access) thoughts, since they are easily accessed consciously. REBT proposes that, as part of therapy, both the deeper level cognitions (referred to as the elegant solution) and the more superficial automatic thoughts (inelegant solution) can be addressed during the therapeutic process (DiGiuseppe et al. 2014). Results from this study appear to be in line with this view.

Another important result emerged from the more thorough investigation of the core cognitions as part of the second research question in view of the content specificity. Results provide evidence of content specificity of the automatic thoughts regarding depressive and anxious affect as proposed by Beck (1979). The specificity of the automatic thoughts regarding depression and anxiety may be useful for future research, especially since there is further evidence that automatic depressive thoughts indeed correlate with depression and anxiety; thus, it appears that the original automatic thought questionnaire (ATQ-R; Hollon and Kendall 1980) is a useful measure of automatic thoughts in relation to both affective disorders.

Except for Awfulizing, most irrational belief components could be verified as part of the measurement model. Results indicated that low frustration tolerance was associated with both depressive and anxious affect as well as their associated automatic thought components, which may implicate the importance of this irrational belief in therapy. Weinrach et al. (2007) considers the low frustration tolerance belief responsible for preventing people from being happy and the lack of improvement during counseling. Self-downing beliefs appear to play an especially important role in relation to depressive affect, which is in accordance with the proposed REBT theory.

Of course, this study was not without its limitations. First and foremost, this study utilized a cross-correlational design and not a randomized experimental design, which implies that causality cannot be established. Even though advanced path-analytical statistical methods were used and causal assumptions are part of the modeling effort, causal inferences cannot be concluded from this study.

A further limitation results from how the participants were sampled as part of the current study. This study utilized convenience sampling by targeting undergraduate psychology college students that were willing to answer the lengthy questionnaire. Convenience sampling limits the generalizability of the results, since we have not obtained a true sample representation of the real world—the interpretation is reduced to the sample that was obtained during the study. The generalizability of the results in this study is therefore limited to the similar characteristics of the sample as described in the results above.

In view of the limitations, the study would greatly benefit from replication. The use of randomization would increase the generalizability of the results of this

current study, which is limited to highly functioning students during stressful exam times. Given the difficulty measuring the demandingness construct, future research may be well focused towards creating better assessments to measure this central REBT construct in its facets. Future research could also benefit from additional validation of the revised automatic thought questionnaire.

In conclusion, we hope that results from this study contribute to the existing literature by providing empirical evidence that the competing cognitive behavioral therapies can be viewed in an integrative manner. Overall, findings of this study provided implications for use in practice and psychotherapy. Results further indicate that integrative efforts are possible, given that the cognitive core constructs derived from separate theories present as separate and orthogonal constructs. Results have a direct clinical application regarding the more underlying irrational beliefs as well as the more accessible automatic thoughts. It is important to continue this integrative effort to further explore the core cognitions and their relationships in view of other cognitive behavioral therapies such as schema therapy, Dialectic Behavioral Therapy, and Acceptance and Commitment Therapy. Albert Ellis has always believed in the integrative power of REBT and hopefully this study contributes in the effort to establish a more integrative model between the cognitive behavioral therapies (see Weinrach et al. 2007).

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