Journal of Rational-Emotive & Cognitive-Behavior Therapy (2019) 37:338–357
https://doi.org/10.1007/s10942-019-00315-5

Dysfunctional Beliefs and Personality Traits

Wilson McDermut[1] · **Gerald Pantoja**[1] · **Yosef Amrami**[1]

Published online: 14 March 2019

Abstract
This study examined the pattern of associations between dimensions of personality dysfunction, dysfunctional beliefs, and adverse emotional outcomes. We recruited two samples of undergraduates (n = 167; n = 104). Dysfunctional beliefs showed positive correlations with pathological personality dimensions Negative Emotionality, Introversion, and Psychoticism, and negative correlations with Big Five dimensions of Emotional Stability, Conscientiousness, Openness, and Conscientiousness. Hierarchical regression analyses showed that dysfunctional beliefs are predictive of adverse emotional outcomes above and beyond dimensions of personality dysfunction. Dysfunctional beliefs also mediated the relationship between personality traits (Negative Emotionality, Emotional Stability) and important emotional outcomes like depression, anxiety, anger, demoralization and cynicism. The implication of the mediation analyses is that dimensions of personality (i.e., Negative Emotionality, Emotional Stability) have their effect on a variety of affective outcomes by operating through the mechanism of dysfunctional beliefs.

Keywords Dysfunctional beliefs · Irrational beliefs · Personality traits · Personality pathology · Personality dysfunction

According to cognitive models of psychopathology, innate temperament interacts with adverse developmental events to engender basic psychological structures made up of affective, cognitive, and motivational components (Beck et al. 2015). These basic structures, or schemas, are fundamental components of personality. Elements of normal and abnormal personality represent the overt manifestations of underlying schemas. In cognitive theories, the information processing aspects of schemas are particularly important because they determine the meanings attached to experiences, which in turn generate emotional and behavioral responses congruent with those interpretations. In the case of disordered personality, schema-driven interpretations

✉ Wilson McDermut
McDermuW@stjohns.com

[1] Department of Psychology, St. John's University, 8000 Utopia Parkway, Queens, NY 11439, USA

are often faulty, distorted, or dysfunctional and lead to negative emotional outcomes (e.g., depression, anxiety, anger) and ineffective behavioral strategies (Beck 2005). In sum, maladaptive schemas and associated dysfunctional beliefs both characterize personality dysfunction and perpetuate it by generating interpretations that are molded to fit with those existing schemas (Pretzer and Beck 1996).

Although the bodies of research on cognitive models of psychopathology, and trait models of personality are well developed, there is surprisingly little overlap between these two active research domains. Specifically, very little is known about the patterns of associations between dysfunctional beliefs and dimensions of personality as conceptualized within the Big Five (Goldberg 1993; John and Srivastava 1999), or pathological personality traits such as those formulated in the Alternative DSM-5 Model for Personality Disorders (American Psychiatric Association 2013). However, as the field of psychopathology moves toward dimensional models of personality it makes sense to make a more concerted effort to describe the relations between dimensions of personality and dysfunctional beliefs.

Pursuing this line of research is important for two reasons. First, it will help researchers and theorists achieve a better understanding of personality and personality problems. The DSM-5, and many prominent research groups have made the point that the major elements of personality and personality disorders (PDs) are behaviors, emotions, motivations, and cognitions. However, even a cursory examination of diagnostic criteria for DSM-5 personality disorders reveals that they are heavily weighted toward capturing behavioral and emotional markers. For example, eight of nine criteria for dependent personality contain content describing behaviors, while three contain reference to emotion (fear), three criteria reference motivations, and only one criterion, which references low self-confidence, implies the presence of beliefs. Thus, while cognition is purported to be a fundamental aspect of personality pathology, the criteria used to diagnose PDs fail to adequately capture key cognitions that are likely present in PDs. Second, understanding the link between personality problems and cognitions will improve case conceptualization and provide targets for therapeutic intervention, especially for rational-emotive behavioral, cognitive, and cognitive-behaviorally oriented clinicians.

Extending research on the Beliefs Questionnaire, which measures specific dysfunctional beliefs matched to corresponding DSM-5 PDs (Trull et al. 1993), Beck and colleagues conducted a series of studies utilizing the Personality Belief Questionnaire (PBQ; Beck et al. 2001; Butler et al. 2007; Fournier et al. 2012; Bhar et al. 2012). This line of research has shown that specific PDs tend to manifest specific types of beliefs that characterize the disorder and exert a maintaining role (Beck et al. 2015). For example, people with Paranoid PD hold core beliefs such as "If people act friendly, they may be trying to use or exploit me," whereas people with Avoidant PD hold beliefs like "If people get close to me, they'll discover the 'real' me and reject me."

Fournier et al. (2012) factor analyzed the PBQ and found six factors representing dysfunctional belief themes that correspond to DSM-5 recognized PDs (Dependent/avoidant, Obsessive–Compulsive, Narcissistic, Paranoid, Histrionic, and Schizoid) and one factor (Autonomous) that corresponded with Passive-Aggressive (Negativistic) Personality (American Psychiatric Association 2000). Fournier et al. (2012)

concluded that the convergent validity of the empirically identified factors was quite good. That is, patients with a specific PD scored significantly higher on the factors representing the beliefs for that disorder, than on any other belief factor. Bhar et al. (2012) summarized the research on the PBQ and noted that its discriminant validity is also quite good, demonstrated by the fact that between-group comparisons showed PD diagnostic groups scored higher on measures of dysfunctional beliefs characteristic of their disorder, than did any other diagnostic group. Despite the mounting evidence of the PBQ's validity, Fournier et al. (2012) acknowledged that all PD groups endorsed dysfunctional beliefs across an array of dysfunctional beliefs factors. In other words, clinical groups endorsed many kinds of dysfunctional beliefs, including beliefs that were not limited exclusively to their specific PD diagnosis.

Using the Personality Disorder Belief Questionnaire (PDBQ) in the Netherlands, Arntz et al. (2004) obtained results quite similar to Beck and colleagues'. The PDBQ was also developed to measure dysfunctional beliefs that are posited to be highly characteristic of specific PDs. These authors compared non-patient controls, axis-I patients, and axis II patients. Arntz et al. (2004) found that patients with PDs tend to endorse a broad spectrum of dysfunctional beliefs, but above and beyond that they endorse most strongly beliefs that are putatively unique to their specific PD diagnosis. Their findings were consistent with the pattern observed by Fournier et al. (2012). One implication of such a finding is that PD-specific beliefs might best be conceived of as a continuum. Given the current zeitgeist of psychopathology research (in part reflected by the DSM-5 authors increasing willingness to conceptualize PDs along dimensions), it seems timely to also try to link those personality dimensions to dysfunctional belief systems like those captured by the PBQ and PDBQ.

Hopwood et al. (2013), have conducted research along those lines. They examined the relations between dysfunctional beliefs and dimensions of personality pathology as reflected in the DSM-5's personality trait system (American Psychiatric Association 2013). In their study of 616 nonclinical individuals they attempted to connect dysfunctional beliefs (measured by the PBQ) to the five empirically supported (Harkness et al. 2012; Kreuger and Markon 2014) dimensions of pathological personality outlined in the DSM-5 (Negative Affectivity, Detachment, Psychoticism, Antagonism, and Disinhibition). They assessed pathological personality traits using the Personality Inventory for DSM-5 (PID-5; Krueger et al. 2012). Hopwood et al. (2013) produced a structural equation model with 25 PID-5 trait facets and the seven PBQ scales loading onto five higher-order personality trait dimensions (CFI = .90, RMSEA = .08, SRMR = .03) consistent with the DSM-5 alternative model for PDs, thus showing that pathological personality trait and dysfunctional belief data could be interwoven into a higher-order factor model that fit the data reasonably well. The results revealed wide-ranging associations between dysfunctional belief sub-scales of the PBQ and the higher-order pathological personality trait domains. Notably, the dysfunctional beliefs had different patterns of correlation with the different higher-order traits. For example, Paranoid beliefs loaded on Psychoticism, Antagonism, Negative Affectivity, and Detachment, but not Disinhibition. In contrast, Dependent/Avoidant beliefs loaded on Negative Affectivity, Detachment, and Disinhibition, but not Antagonism or Psychoticism.

The aim of this study was to extend the work of previous research groups (cited above) who have examined the connections between personality pathology and dysfunctional beliefs. But this study is most particularly interested in ascertaining if dysfunctional beliefs are the mechanism by which personality leads to adverse emotional outcomes. Our measure of pathological personality trait domains was the Personality and Psychopathology-Five (Harkness et al. 2014) from the Minnesota Multiphasic Personality Inventory-2 Restructured Form (Ben-Porath and Tellegen 2008). We wanted to extend this line of research by also looking at the associations between dysfunctional beliefs and the Big Five personality dimensions of Emotional Stability, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (John and Srivastava 1999). Our measure of dysfunctional beliefs was the Dysfunctional Attitudes Scale-Short Forms 1 and 2 (Beevers et al. 2007). We hypothesized that all dimensions of personality pathology would be positively correlated with an overall measure of dysfunctional beliefs, but that correlations with Negative Emotionality would be stronger than correlations with the other personality dimensions. We planned to factor analyze our measure of dysfunctional beliefs and conduct exploratory analyses to look for unique patterns of association between dysfunctional belief sub-scales and personality traits. Based on prior research on the correlates of the Big Five (Samar et al. 2013), we hypothesized that dysfunctional beliefs would be inversely correlated with Emotional Stability, Extraversion, Agreeableness, and Conscientiousness. In addition we anticipated that dysfunctional beliefs would be positively correlated with all dimensions of personality pathology (Negative Emotionality, Introversion, Psychoticism, Aggressiveness, and Disconstraint). We also planned to explore unique associatons between sub-types of dysfunctional beliefs, Big Five personality traits, and pathological personality. Finally, we further hypothesized that dysfunctional beliefs would mediate the relationship between personality dimensions and important clinical and emotional outcomes like depressive symptoms, anxiety, anger, demoralization, cynicism, and satisfaction with life.

Study 1

Method

Participants

One hundred sixty-seven undergraduate psychology students participated in exchange for course credit. The sample was predominantly female (78.4%). Age of participants ranged from 17 to 38 (M = 19.4, SD = 2.8). The sample was noted to be racially diverse, with White/Non-Hispanic participants comprising only 32.3% of the sample. Participants in Study 1 and Study 2 comprised two separate samples. There was no overlap between these samples. When calculating estimated sample size using G*Power 3 (Faul et al. 2007), we used an effect size of $r = .27$, which is the average of correlations between personality traits and dysfunctional beliefs reported in Samar et al. (2013). For the regression analyses, with power of

at least .80 and eight predictor variables, a sample of 196 was suggested. For the mediation analyses with two predictors (predictor and mediator), the estimated samples size is 141. Thus the regression analyses reported in Study 1, may have been under-sampled.

Materials

Dysfunctional beliefs. Using item response theory (IRT) to select psychometrically strong items from the original 40-item Dysfunctional Attitude Scale (DAS; Weissman 1979), Beevers et al. (2007) developed two nine-item short-form versions of the DAS (DAS-SF1 and DAS-SF2). The DAS-SF1 and DAS-SF2 are highly correlated to each other ($r = .89$). The items on both short forms assess dysfunctional beliefs about need for approval from others, imperatives for self-worth, perfectionism, and critical self-appraisal regarding goal attainment. Each DAS Short Form consists of 9 items rated on a 4-point self-report scale ranging from 1 (Totally Disagree) to 4 (Totally Agree). The total score ranges from 9 to 36, with higher scores indicating more dysfunctional attitudes. The DAS-SF1 was used in study 1 (the DAS-SF2 was used in study 2). Items on the DAS-SF1 include statements such as "My value as a person depends greatly on what others think of me" and, "If I fail at my work, then I am a failure as a person." Both DAS short forms contain item content that overlaps with the constructs of Sociotropy (i.e., need for affiliation and approval) and Autonomy (i.e., importance of goal attainment) (Bieling et al. 2000). The reliability of the DAS-SF1 for this sample was very good ($\alpha = .90$). We elected to use short forms of dysfunctional beliefs to decrease the burden on the participants.

Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF). We used the revised Personality and Psychopathology-5 scales (Harkness et al. 2014) from the MMPI–2–RF (Ben-Porath and Tellegen 2008), which is comprised of 338 True–False questions. The revised PSY-5 scales are updated versions of the MMPI-2 (Butcher et al. 2001) PSY-5 scales representing Harkness and McNulty's (1994) dimensional model personality pathology. The PSY-5 scales are Negative Emotionality/Neuroticism (20 items; $\alpha = .80$), Introversion/Low Positive Emotionality (20 items; $\alpha = .84$), Psychoticism (26 items; $\alpha = .85$), Aggressiveness (18 items; $\alpha = .71$), and Disconstraint (20 items; $\alpha = .70$). The PSY-5 Scales are substantially similar to Negative Affectivity, Detachment, Psychoticism, Antagonism, and Disinhibition, respectively which are the personality pathology traits outlined in section III of the DSM-5 (Harkness et al. 2012). The number of participants with missing data on the PSY-5 scales was as follows: Negative emotionality (7 missing), Introversion (2 missing), Psychoticism (12 missing), Aggressiveness (2 missing), Disconstraint (7 missing). The full MMPI-2RF is 338 questions. To reduce participant burden we administered 300 of the 338 questions in order to obtain information for only those sub-scales that were needed to address our research questions.

Helplessness/Hopelessness, Self-Doubt, and Inefficacy, three "internalizing" scales from the MMPI-2-RF, were used as alternative measures of dysfunctional beliefs in secondary analyses. Helplessness/Hopelessness consists of five items such as "I recognize several faults in myself that I will not be able to change". Self-Doubt is made up of four items such as ("I am certainly lacking

in self-confidence"). Inefficacy consists of 9 items (e.g., "I feel like giving up quickly when things go wrong"). Internal consistency reliabilities in this sample were .62 for Helplessness/Hopelessness, .77 for Self-Doubt, and .77 for Inefficacy. Inefficacy was subsequently dropped from the analysis because it did not predict Depression.

Depression and Anxiety. To assess psychological symptoms we used the Symptom Check List-90-Revised (SCL-90-R; Derogatis 1983). The full SCL-90-R is a 90-item measure of psychological symptomatology. Respondents are asked to rate the extent to which they have been troubled "during the past week, including today," by specific symptoms along a 5-point Likert-type scale ranging from 0 (not at all) to 4 (extremely). For the present study, we used the Depression (13 items) and Anxiety (10 item) subscales of the SCL-90-R. Internal consistency coefficients for Depression and Anxiety in this sample were .94 and .96 respectively. To reduce participant burden, we did not employ the entire SCL-90-R, just selected subscales.

Anger. Anger was measured with the Anger Disorders Scale: Short (DiGiuseppe and Tafrate 2004). The ADS:S is an 18-item self-report questionnaire intended to assess clinically relevant aspects of anger and anger problems. Items are framed as questions with multiple-choice answers. For example, 'My anger has been a problem for me for (1) 'a week or less or not at all', (2) 'a month or less', (3) 'About three months', (4) 'About six months', (5) 'A year or more'. Test–retest reliability and internal consistency of the 134-item ADS parent scale is good. Cronbach's alpha in this study was .90. One participant was missing data for the ADS:S.

Satisfaction with Life. Global life satisfaction was measured with the self-administered Satisfaction with Life Scale (SWLS; Diener et al. (1985). Each item of this 5-item scale has response options ranging from 1 (strongly disagree) to 7 (strongly agree). An example is "So far, I have gotten the important things I want in life." Diener et al. (1985) reported that the SWLS has good test–retest reliability (e.g., greater than .82), and good internal consistency (alpha = .87). Correlations between the SWLS and selected personality measures indicated that individuals satisfied with their lives are generally free from psychopathology (Diener et al. 1985). Cronbach's alpha of the SWLS in this study was .89.

Procedure

The data were collected for a study previously approved by the Institutional Review Board at a large private metropolitan university in the Northeast. The study was approved by the Institutional Review Board at the university where it was conducted. Participants were provided with written informed consent for their involvement. Questionnaires were completed online at Qualtrics.com, which is a popular survey software system. Data were collected as part of a larger study consisting of a battery of self-report questionnaires. The two separate samples in Study 1 and Study 2 represented two separate rounds of data collection that are part of the overall mission of our research lab, which looks at the connections between personality, personality dysfunction, psychopathology, cognitive factors, and psychological assessment.

Data Analyses

Descriptive data, Pearson correlations, and hierarchical regression analyses were conducted using SPSS 21.0 (IBM, 2012). We used a p value of .05 for all analyses. Using principal axis factoring (PAF) and maximum likelihood (ML) factor estimation we attempted to factor analyze our measures of dysfunctional beliefs (DAS-SF1 and DAS-SF2) to extract factors that would enable us to look for unique patterns of association between personality dimensions and sub-types of dysfunctional beliefs. We used PAF and ML factor estimation because these methods are appropriate under most conditions for data typically analyzed by behavioral scientists (de Winter and Dodou 2012). Data analyses consisted of correlational analyses examining associations between personality and dysfunctional beliefs, and hierarchical multiple regression analyses where we controlled for age and gender in Step 1, entered all personality traits variables from the same scale in Step 2 (PSY5, or Big Five in Study 2), and then entered dysfunctional beliefs in Step 3. Based on the results of our initial regression analyses, we selected the personality trait variable with the strongest relationship to our outcome variables to serve as the predictor variable in mediation analyses. Outcome variables in regression analyses and mediation analyses were depression, anxiety, anger, satisfaction with life, demoralization and cynicism. Uniform T scores for the MMP-2-RF subscales were used in regression and mediation analyses (Tellegen and Ben-Porath 1992).

Mediation analysis of paths connecting predictor, mediator, and outcome variables were conducted using Hayes' (2018) PROCESS Macro. In the analyses, mediation was assumed to be partial, requiring specification of both total effect and direct effect pathways (Baron and Kenny 1986). Unobserved error terms were also specified for the mediator and outcome variables for all models. All analyses were conducted using bootstrapping in order to obtain bootstrapped confidence intervals of the unstandardized indirect effect as a measure of significance (Hayes 2018) as well as control for any issues of normality, and 95% confidence intervals were used. Pathways are compared and shown in the tables below as unstandardized regression coefficients. Preliminary analyses identified that the missing data within the study variables were missing completely at random per the results of Little's MCAR test ($\pi = 291.40$, $p = .09$), with no variable exceeding 5% of missing data. Cases with missing data were deleted listwise. The ranges and distributions of all variables were inspected and regression diagnostics were performed. The assumptions of linearity, homoscedasticity, multivariate normality, and independence were met. There was no evidence of multicollinearity nor were there outliers or excessively influential observations.

Results

Factor Analysis We first attempted to factor analyze the DAS-SF1 using principal axis factoring (PAF) with oblique rotation. This analysis produced only one factor with an eigenvalue greater than 1.0 (EV = 5.19). When we forced a two-factor solution, the analysis failed to converge in 25, 50, or 100 iterations. A three-factor

Table 1 Hierarchical regression analyses of demographic variables, personality pathology scales, and dysfunctional beliefs in the prediction of Depression, Anxiety, Anger, and Satisfaction with Life

Predictor	Dependent variable							
	Depression		Anxiety		Anger		SWLS	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.003		.021		.046*		.004	
Age		.037		.107		−.131		−.026
Gender		.017		−.053		−.089		.024
Step 2	.499***		.309***		.421***		.273	
Negative Emotionality		.423***		.333***		.344***		−.222*
Introversion		.224**		.185		.178*		−.319**
Aggressive.		−.027		−.020		.224**		.021
Psychoticism		.090		−.033		.105		−.181*
Disconstraint		.107		.084		.122		−.085
Step 3	.084***		.063***		.051***		.011	
DAS-SF1		.346***		.300***		.271***		−.127
Total R^2	.585***		.392***		.519***		.287***	

$\Delta R^2 = R^2$-Change; β = Standardized regression coefficients; Step 3 βs are reported. Aggressive. = Aggressiveness; *SWLS* satisfaction with life scale; *DAS-SF1* dysfunctional attitude scale-Short Form 1; Step 2 predictors are the MMPI-2-RF PSY-5 scales

*$= p < .05$; **$= p < .01$; ***$= p < .001$

solution successfully converged, but failed to produce interpretable factors because of high secondary loadings for all items. When we forced a two-factor solution using maximum likelihood (ML) estimation the factors were not interpretable, because there were eight items on factor 1, but only one item on factor 2. A three-factor solution produced by ML estimation was also not interpretable because of high secondary loading (> .50) for eight of nine items. In light of these difficulties, we elected to use the complete DAS-SF1 as our measure of dysfunctional beliefs.

Correlational Analyses Dysfunctional beliefs as measured by the DAS-SF1 were significantly correlated with the PSY-5 dimensions of Negative Emotionality ($r = .44$, $p < .001$), Psychoticism ($r = .23$, $p = .004$), and Introversion ($r = .20$, $p = .011$), but correlations with Aggressiveness and Disconstraint were not statistically significant.

Hierarchical regression analyses Results of hierarchical regression analyses are in Table 1, where R^2-change is reported at each of the three steps. Regression analyses revealed that gender and age were not significant predictors of Depression, Anxiety, Anger, or Satisfaction with Life. Regression coefficients reported in Table 1 are from Step 3 when all other variables were also in the model. Negative Emotionality was a significant predictor of all the outcome variables. Introversion was a significant predictor of Depression, Anger, and Satisfaction with Life, and Aggressiveness predicted Anger. The DAS-SF1 accounted for significant increases in explained variance (ΔR2) above and beyond the effect of the demographic and personality variables in the prediction of depression (.084), anxiety (.063), and anger (.051), but not life satisfaction (.011).

Table 2 Regression coefficients depicting relationship between Personality and Psychopathology-5 Negative Emotionality Scale and psychological/emotional outcomes as mediated by dysfunctional beliefs

Outcome	B Total effect	B Direct effect	B Indirect effect	Indirect effect LLCI	Indirect effect ULCI	*p*
Depression	**.58**	**.42**	.15	.10	.22	< .001
Anxiety	**.34**	**.23**	.11	.05	.19	< .001
Anger	**.54**	**.47**	.07	.01	.15	.011
Satisfaction with Life	**−.16**	−.11[a]	−.05	−.09	−.01	.021

B = unstandardized regression coefficient; *LLCI* lower limit of confidence interval; *ULCI* upper limit of confidence interval

Total and direct effect regression coefficients in bold are significant at ($p < .001$); [a]$p = .01$. Indirect effects are statistically significant if 95% confidence interval does not contain zero; $p = p$ value for normal theory test for specific indirect effects

Mediation Analyses Negative Emotionality was chosen as our predictor variable in the mediation analysis because it showed the strongest association with the Depression, Anxiety, Anger, and Satisfaction with Life in the hierarchical regressions. As noted previously DAS-SF1, was positively correlated with Negative Emotionality, and Table 2 shows that the total effects in all four mediation analyses are significant, thus the two preconditions for conducting mediation analyses were met. The association between negative emotionality and each of the outcome variables was significantly mediated (partially) by DAS-SF1, as the lower and upper confidence levels for the unstandardized indirect effect of DAS-SF1 did not include zero in any of the four mediation analyses reported in Table 2.

Secondary Mediation Analysis Although we could not extract more than one factor from the DAS-SF1, we had access to scores on the internalizing scales of the MMPI-2-RF. These scales included the Helplessness/Hopelessness and Self-Doubt, which are laden with substantial negatively themed cognitive content. This allowed us to compare the impact of alternative measures of dysfunctional beliefs to the DAS-SF1, with respect to mediating the association between Negative Emotionality and Depression. We decided to test these mediators because of their putative role in depressive disorders (Beck 1976; Beck et al. 1979). We conducted a 1-3-1 mediation analysis to examine indirect effects of cognitive variables on the association between Depression (outcome) and Negative Emotionality (predictor). Results can be seen in Table 3. Helplessness, Self-Doubt, and DAS-SF1 were mediators. The total effect (i.e., the effect of Negative Emotionality on Depression without considering mediators) was substantially larger than its direct effect (i.e., Negative Emotionality onto Depression, while controlling for mediators). Although both effects were positively predictive, the direct effect was no longer significant ($p = .06$) while controlling for the mediators. Indirect effects (the predictive effect of Negative Emotionality on Depression, through the mediating variables) were all significant and positive. The ratio of total indirect effects to the direct effect was 2.70, which indicates that the indirect effects account for a substantially larger effect on Depression than the direct effect of Negative Emotionality alone. The path that included Self-Doubt had the

Table 3 Mediating role of cognitive variables (dysfunctional beliefs, helplessness/hopelessness, and self-doubt) in explaining the association between negative emotionality and depression

Effect	B	LLCI	ULCI	*p*
Total	.56	.44	.67	< .001
Direct	.15	− .01	.31	.060

Mediator	B	LLCI	ULCI	Ratio indirect to direct	Normal theory tests for specific Indirect effects (z)	*p*
Total	.41	.27	.53	2.70	–	
DAS-SF1	.12	.06	.18	.79	3.60	< .001
Helplessness/ Hopelessness	.10	.02	.20	.69	2.36	.018
Self-Doubt	.18	.08	.30	1.22	3.01	.003

B unstandardized regression coefficient; *LLCI* lower limit of 95% confidence interval; *ULCI* upper limit of 95% confidence interval; *DAS-SF1* dysfunctional attitude scale-short form 1. *Z* quotient of Beta divided by standard error

largest indirect effect ($\beta = .18$, $p < .001$), and Self-Doubt's path was the only single indirect path with an indirect to direct effect ratio larger than 1, however 95% confidence intervals for contrasts between the indirect effect coefficients all straddled zero, therefore they were not significantly different. Normal theory tests for specific indirect effects (Hayes 2018) were imputed to measure if indirect effects were statistically greater than zero. All three paths were statistically significant (see Table 3).

Study 2

Method

Participants

Study 2 participants were undergraduate psychology students. The total sample included 104 subjects. The sample was predominantly female (77.9%). Age of participants ranged from 17 to 37 (M = 19.3, SD = 2.5). White/Non-Hispanic participants comprised 36.5% of the sample. Sample size estimates reported in Study 1 suggested a sample size of n = 196 for regression analyses, and n = 141 for mediation analyses. The number of participants recruited for Study 2 (n = 104) indicates that both the regression analyses and mediation analyses in Study 2 may have been under-sampled.

Materials

Dysfunctional Beliefs In study 2, dysfunctional beliefs were assessed by the Dysfunctional Attitudes Scale-Short Form 2 (DAS-SF2; Beevers et al. 2007). Items on the DAS-SF2 include statements such as "If you cannot do something well, there

is little point in doing it at all," and, "If I fail partly, it is as bad as being a complete failure." As noted above, the item content reflects the constructs of Sociotropy and Autonomy. The internal reliability for this sample of the 9 item DAS-SF2 was $\alpha = .75$. Reliability analysis revealed that Cronbach's alpha would increase by .03 if item 3 ("I do not need the approval of other people in order to be happy") were removed. The reliability of an 8-item DAS-SF2, without item 3, was .79. All subsequent analyses use the 8-item DAS-SF2, without item 3. Short Form assessments were selected to decrease participant burden.

MMPI-2-RF The revised PSY-5 scales from the MMPI-2-RF served as our measure of personality pathology traits in Study 2 (see Study 1 Method section for a more detailed discussion). Cronbach's alphas for the PSY-5 scales in this sample were as follows: Negative Emotionality/Neuroticism ($\alpha = .75$), Introversion/Low Positive Emotionality ($\alpha = .84$), Psychoticism ($\alpha = .82$), Aggressiveness ($\alpha = .65$), and Disconstraint ($\alpha = .64$). The number of participants missing data on the PSY-5 scales was as follows: Negative Emotionality/Neuroticism (3 missing), Introversion/Low Positive Emotionality (3 missing), Psychoticism (4 missing), Aggressiveness (2 missing), and Disconstraint (3 missing).

Demoralization and Cynicism were used as clinically relevant dependent variables. They represent two of the ten Restructured Clinical (RC) scales on the MMPI-2-RF. Demoralization (e.g., "I wish I could be as happy as others seem to be") consists of 24 items. Cronbach's alpha for the Demoralization was .89 in our sample. Cynicism (e.g., "I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others") consists of 15 items. Cronbach's alpha for Cynicism in this sample was .80. Data were missing for four participants on the Demoralization scale and three were missing the Cynicism scale. The Demoralization and Cynicism scales were selected for further analysis because there is no item overlap between them and any of the PSY-5 scales.

Big Five Personality The Ten-Item Personality Inventory (TIPI; Gosling et al. 2003) is a self-report inventory containing two items for each of the five domains of the Big Five model of personality (Goldberg 1993; John and Srivastava 1999), which includes Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Emotional Stability. These five dimensions are measured on a bipolar continuum, with higher scores interpreted as positive endorsement of each trait. Items are scored from 1 (Disagree Strongly) to 7 (Agree Strongly). Sample items are "dependable, self-disciplined" and "disorganized, careless" (reversed) for Conscientiousness. In the original scale development study, Cronbach's alphas were: Extraversion ($\alpha = .68$), Agreeableness ($\alpha = .40$), Conscientiousness ($\alpha = .50$), Emotional Stability ($\alpha = .73$), and Openness ($\alpha = .45$), and test–retest reliabilities were .77, .71, .76, .70, and .62, respectively. We chose to use the TIPI in order to decrease participant burden.

In this study, Cronbach's alphas were: Extraversion ($\alpha = .76$), Agreeableness ($\alpha = .42$), Conscientiousness ($\alpha = .63$), Emotional Stability ($\alpha = .63$), and Openness ($\alpha = .15$). Alphas for Agreeableness and Openness were below acceptable standards for reliability (Ponterotto and Ruckdeschel 2007). However, this issue may be mostly due to the limitations of using two items to define a construct within a relatively small sample, and it is noted that most of these results remain consistent

with the reliability coefficients in the original Gosling et al. (2003) validation study in their original development of the scale. One participant had missing data on the Conscientiousness scale.

Procedure

The Study 2 procedure was the same as Study 1. The study was approved by the Institutional Review Board at the university where it was conducted. Participants were provided with written informed consent. Questionnaires were completed online at Qualtrics.com. Data were collected as part of a larger study of personality and psychopathology. Participants received course credit in their psychology classes.

Data analysis

Correlations, hierarchical regression analyses, and mediation analysis using bootstrapping were conducted using the same procedures as in Study 1 (see Data Analyses description in Method section of Study 1), except where indicated below. In hierarchical multiple regression analyses we controlled for age and gender in Step 1, entered all personality trait variables from the same scale in Step 2 (PSY5, or Big Five), and then entered dysfunctional beliefs in Step 3. The rationale for including Big Five traits in a parallel set of regression and mediation analyses is based on the conceptualization of personality pathology as an extension of general personality (e.g., the Big Five). That is, as both normal and abnormal personality traits are posited to be extensions of the same continua of personality (e.g., Larstone et al. 2002), they should show a similar pattern of associations with dysfunctional beliefs and negative emotional outcomes.

Results

Factor Analysis Principle axis factoring methods could not converge on a two or three factor solution for the DAS-SF2, because of communalities > 1.0. We increased the number of iterations from 25 to 50 and then to 100, but the solution still failed to converge and extraction was terminated. We then attempted to use ML factor estimation. The two-factor solution produced by ML estimation was not interpretable, because there were seven items on factor 1, and two items on factor 2, but only one of the items on factor 2 had a primary factor loading greater than .3. When we forced a three-factor solution, the factors were difficult to interpret because items with similar content (e.g., approval, worth) were distributed across more than one factor. We were also unable to recover the same three-factor structure when we tried to replicate it with ML with Procrustes rotation and with principal component analysis. Consequently, we used the complete DAS-SF2 as our measure of dysfunctional beliefs in study 2.

Correlational Analyses Dysfunctional beliefs, as assessed by DAS-SF2, were significantly positively correlated with Negative Emotionality ($r = .42$, $p < .001$), Psychoticism ($r = .38$, $p < .001$), and Introversion ($r = .25$, $p = .012$). The DAS-SF2 was

Table 4 Hierarchical regression analyses of demographic variables, personality pathology scales, and dysfunctional beliefs in the prediction of Demoralization and Cynicism

Predictor	Dependent variables					
	Demoralization			Cynicism		
	ΔR^2	β	p	ΔR^2	β	p
Step 1	.001		.976	.051		.095
Age		.015	.826		−.154	.090
Gender		−.045	.557		.168	.089
Step 2	.600		< .001	.310		< .001
Negative Emotionality		.549	< .001		.259	.024
Introversion		.217	.026		−.056	.647
Aggressiveness		.004	.965		.210	.088
Dis-constraint		.022	.776		.243	.016
Psychoticism		.094	.262		.087	.420
Step 3	.022		.032	.005		.430
DAS-SF2		.172	.032		.080	.430
Total R^2	.622		< .001	.365		< .001

$\Delta R^2 = R^2$-change; β = Standardized regression coefficient; Step 3 βs are reported; Step 2 predictors are the MMPI-2-RF PSY-5 scales; DAS-SF2 = Dysfunctional Attitude Scale-Short Form 2

not significantly correlated with Aggressiveness or Disconstraint. With respect to Big Five traits, the DAS-SF2 was significantly negatively correlated with Emotional Stability ($r = -.35$, $p < .001$), Conscientiousness ($r = -.25$, $p = .01$), Openness to Experience ($r = -.24$, $p < .014$), and Extraversion ($r = -.20$, $p = .05$).

Hierarchical Regression Analyses Table 4 shows the results of two hierarchical regression analyses with demographic variables entered in Step 1, PSY-5 scales in Step 2, and DAS-SF2 in Step 3. The first regression model predicted Demoralization, and the second regression model predicted Cynicism. Dysfunctional beliefs accounted for a small increment in variance for Demoralization above and beyond the variance accounted for the PSY-5 scales, but not for Cynicism.

Table 5 contains results of two more regression analyses predicting Demoralization and Cynicism, but with Big Five traits entered in Step 2, instead of PSY-5 personality pathology traits. In the model predicting Demoralization, Emotional Stability, and Extraversion are inversely related to Demoralization, and the increment in variance in Demoralization accounted for by the addition of the DAS-SF2 is statistically significant. In the regression model predicting Cynicism, none of the personality traits were significant predictors of Cynicism, but the DAS-SF2 was significant, although the overall model was not significant.

Mediation Analyses Based on the results of the regression analyses Negative Emotionality and Emotional Stability were selected as our predictor variables for mediation analysis. As noted previously the DAS-SF2 was significantly correlated with Negative Emotionality and Emotional Stability; Negative Emotionality and Emotional Stability were significantly correlated with Demoralization and Cynicism as evidenced by significant total effects reported in Table 6. Thus the preconditions

Table 5 Hierarchical regression analyses of demographic variables, Big Five personality scales, and dysfunctional beliefs in the prediction of Demoralization and Cynicism

Predictor	Dependent Variables					
	Demoralization			Cynicism		
	ΔR^2	β	p	ΔR^2	β	p
Step 1	.016		.450	.004		.834
Age		−.003	.969		−.015	.887
Gender		−.092	.238		.039	.720
Step 2	.445		<.001	.034		.665
Emotional stability		−.312	.001		−.014	.912
Extraversion		−.266	.006		−.106	.416
Agreeableness		.018	.822		−.006	.955
Openness		.004	.961		.165	.160
Conscientiousness		−.184	.020		−.034	.751
Step 3	.070		<.001	.058		.017
DAS-SF2		.291	<.001		.265	.017
Total R^2	.531		<.001	.096		.305

$\Delta R^2 = R^2$ –Change; β = Standardized regression coefficients; βs from Step 3 are reported; Step 2 predictors are the Big Five scales from the Ten-Item Personality Inventory; DAS-SF2 = Dysfunctional Attitude Scale-Short Form 2

Table 6 Mediating effect of dysfunctional beliefs on associations between personality predictors (PSY-5 Negative Emotionality and TIPI Emotional Stability) and emotional outcomes (Demoralization and Cynicism)

Outcome	B Total effect	B Direct effect	B Indirect effect	Indirect effect LLCI	Indirect effect ULCI	p indirect effect
Predictor = negative emotionality						
Demoralization	**.76**	**.66**	.10	.04	.19	.012
Cynicism	**.41**	**.36**	.05	−.02	.15	.214
Predictor = emotional stability						
Demoralization	**−2.27**	**−1.81**	−.47	−.88	−.19	.008
Cynicism	−.43	−.03	−.32	−.81	−.03	.058

All regression coefficients (B) are unstandardized. Total and direct effects in bold are statistically significant at $p < .001$; Indirect effects are statistically significant if 95% confidence interval does not contain zero. LLCI = Lower Limit of Confidence Interval; ULCI = Upper Limit of Confidence Interval; PSY5 = Personality and Psychopathology - Five (PSY-5) of the Minnesota Multiphasic Personality Inventory-2 Restructured Form; TIPI = Ten-Item Personality Inventory; Dysfunctional beliefs assessed by Dysfunctional Attitudes Scale - Short Form 2. $p = p$-value for normal theory test for specific indirect effect. Note that 95% CI indicates DAS-SF1 significantly mediates effect of Emotional Stability on Cynicism, whereas the normal theory p-value (.058) was only marginally significant (se = .168; z = −1.89)

for conducting mediation analyses were met. Table 6 shows that DAS-SF2 mediated the relationship between Negative Emotionality and Demoralization, but not between Negative Emotionality and Cynicism. The DAS-SF2 mediated the relationship between Emotional Stability and Demoralization (i.e., confidence intervals for the indirect effect did not contain zero), and Emotional Stability and Cynicism (95% CI did not contain zero; though the normal theory test for indirect effects produced a *p* value of .058).

Discussion

Our results from both studies were generally consistent with the findings of prior research (Hopwood et al. 2013; Fournier et al. 2012; Bhar et al. 2012), with the caveat that we were not able to extract sub-factors of dysfunctional beliefs from our dysfunctional beliefs measure (possibly due to our use of a nonclinical sample). Both short forms of dysfunctional beliefs were correlated positively most strongly with Negative Emotionality, followed by Psychoticism, and Introversion. The positive correlations between dysfunctional beliefs and Negative Emotionality/Neuroticism and Introversion/Low Positive Emotionality is consistent with cognitive models of psychopathology (e.g., Beck 1976; Beck et al. 1979; Ellis 1994) and Vîsla et al. (2016) whose meta-analytic review found that irrational beliefs were positively associated with general distress, anxiety, depression, anger, and guilt ($r = .38$). In terms of Big Five personality traits, consistent with prior research (e.g., Samar et al. 2013), dysfunctional beliefs were significantly inversely correlated with Emotional Stability, Conscientiousness, and Extraversion, and also Openness to Experience (a pattern not consistently seen in past research).

Regression analyses also consistently showed that dysfunctional beliefs accounted for additional variance in depression, anxiety, anger, and demoralization above and beyond that which was accounted for by personality traits, which is also consistent with the cognitive model of psychopathology (Beck and Haigh 2014). Mediation analysis showed that dysfunctional beliefs played a substantial mediating role in the relationship between personality (i.e., Negative Emotionality, Emotional Stability) and important psychological outcomes, as evidenced by the substantial indirect effects on depression, anxiety, and anger. Interestingly, though dysfunctional attitudes did not account for significantly more incremental variance in life satisfaction or cynicism in the regression analyses, it did mediate the relationship between Negative Emotionality and life satisfaction. Similarly, dysfunctional attitudes mediated the relationship between personality and Cynicism, despite not accounting for substantial incremental variance in Cynicism above and beyond personality variables in the regression analyses.

On balance, our findings yielded generally good evidence that personality traits are intimately connected to dysfunctional beliefs, thus supporting the key role that cognitions theoretically play in our understanding of personality and perhaps personality dysfunction as well. Mediation Models are causal models (Hayes 2018), and they are intended to answer questions about how independent variables exert their effect on dependent variables. The results of our analyses are consonant with

a model positing that dimensions of personality produce a variety of negative emotional outcomes by operating *through* a dysfunctional belief system. As noted by other authors (Bhar et al. 2012; Fournier et al. 2012), although conceptualizations of personality pathology acknowledge the importance of cognition, such as in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, (DSM-5; American Psychiatric Association 2013), clinical descriptions and methods of diagnosing personality pathology lean much more heavily on behavioral and emotional markers, as illustrated by a remarkable dearth of DSM-5 diagnostic criteria that are primarily cognitive in nature. Perhaps future refinements of diagnostic depictions should include more cognitive content, especially if more evidence accumulates to support dysfunctional beliefs as the mechanism of action through which temperament and personality engender negative emotional outcomes.

Our findings bolster the notion that the identification of dysfunctional beliefs may facilitate case conceptualization of patients with prominent personality pathology and highlight targets for psychotherapeutic intervention. Thus our findings are broadly consistent with the underlying principles of cognitive therapy for personality disorders, which other research-clinicians such as Beck et al. (2015) and Young et al. (2003) have written extensively about. Our measure of dysfunctional beliefs primarily assessed self-criticism stemming from perceived failure, and the necessity of obtaining approval from others as an imperative for psychological well-being. Thus, although our study suggests that dysfunctional beliefs play a role in emotional distress in individuals with personality dysfunction, it falls short of identifying which specific types of beliefs are associated with which specific personality disorders. Future research should develop a more fine-grained analysis of which types of beliefs are associated with which specific dimensions of personality pathology and/or personality disorders.

Methodological limitations suggest cautious interpretation of some of our findings. First, as noted above, perhaps because we used a brief measure of dysfunctional beliefs, we were not able to extract sub-factors of dysfunctional beliefs. This may have limited our ability to find unique belief patterns corresponding to each personality dimension.[1] The measure of dysfunctional beliefs we used contained

[1] We conducted post hoc regression analyses of study 1 data and study 2 data to examine the associations between personality dimensions and dysfunctional attitudes. In a multiple regression analysis with all five pathological personality dimensions as predictors and DAS-SF1 as the dependent variable, only Negative Emotionality ($p < .001$) and Introversion ($p = .024$) had Beta values that were positive and significant. Using study 2 data we conducted a parallel multiple regression analysis with all five pathological personality dimensions as predictors and DAS-SF2 as the dependent variable. Only Negative Emotionality ($p = .002$) was significant. Also using study 2 data we ran a separate multiple regression analysis with the Big Five dimensions as predictors of DAS-SF2. Emotional Stability, which was negatively related to dysfunctional attitudes, was the only predictor that was significant ($p = .01$). Thus, we have good evidence that dysfunctional attitudes are positively associated with Negative Emotionality, modest evidence of an association with Introversion, and good evidence of a negative association with Emotional Stability. This study provides little evidence about which specific types of dysfunctional beliefs, if any, are associated with the other dimensions of personality and personality pathology. As noted previously, our measures of dysfunctional beliefs reflected a composite of 'need for approval' and 'need for achievement', and we were unable to extract sub-factors of dysfunctional beliefs. Future research should explore unique associations between other classes of dysfunctional beliefs (e.g., pessimism, demandingness, condemnation of others, etc.) and dimensions of personality other than Negative Emotionality, Introversion, and Emotional Stability.

content primarily related to need for approval and need for achievement. Perhaps if we had measured other domains of cognition, such as irrational beliefs reflecting demandingness (i.e., should statements), condemnation others, or discomfort intolerance we would have found significant correlations between personality pathology traits of Aggressiveness, and Disconstraint. Measures of more specific classes of dysfunctional beliefs would also help us to ascertain which types of dysfunctional beliefs are uniquely associated with dimensions of personality pathology like Negative Emotionality, Introversion, and Psychoticism. Second, we used a very brief measure the Big Five, and the internal consistency was not acceptable for the Agreeableness scale or the Openness to Experience scale. Unreliability in these measures may have accounted for the lack of significant correlations with our other measures. Because we relied on two-item measures of broad personality factors, the observed correlations, regression weights, and various effect sizes yielded by the analyses in our study should be approached with some caution. The unfortunate problem with measures that have low reliability is that it constrains validity (Anastasi and Urbina 1997). Thus, we would encourage future researchers to employ brief personality measures (e.g., the 20 item Mini-International Personality Item Pool; Donnellan et al. 2006) with acceptable reliabilities to minimize having to attenuate effect sizes and regression weights in understanding relationships among variables. Future research would also benefit by using measures that assess personality at the facet level. Third, some findings were difficult to explain. For example, it is unclear why we obtained a negative correlation between dysfunctional beliefs and Openness to Experience. The correlation suggests that Openness partly reflects psychological health, but it is uncertain why that would be so.

Fourth, this study lacks the robustness of longitudinal designs and multi-method measures of predictor and outcome constructs that would further validate these findings. Furthermore, the low sample size (especially in Study 2) may have made smaller effects, such as with the other personality traits, difficult to uncover. This study would benefit from a replication with larger sample, ideally across time. Our sample size estimates indicated that Study 1, and especially Study 2, may have been under-sampled. Overall, it seemed like a goal of $n = 200$ would have been ideal for both studies, but we were unable to achieve that. Finally, our study recruited a college age, mostly female, nonclinical sample. This sample is neither representative of the general population nor representative of clinical populations. The results and conclusions cannot be generalized with certainty to other populations or settings different from college (psychology) students. Future research should see if these findings can be replicated in a clinical sample.

Despite these limitations, we want to emphasize that this research provides some empirical validation of the theoretical claims of cognitive models of psychopathology. Up until now, no studies in the existing research literature have specifically looked at how dysfunctional attitudes mediate clinically relevant targets and personality. Our findings have theoretical, diagnostic, and clinical significance. In terms of theory, our findings are consistent with the idea that dysfunctional beliefs are an important feature of personality and should be given weight in theory-based conceptualizations of personality and personality pathology. Clinical case conceptualization it seems would benefit by trying to formulate the role of dysfunctional

beliefs in the clients' personality structure. Our findings support the idea that dysfunctional beliefs are intertwined with personality and should be the targets of intervention, because they seem to provide a pathway to alleviating the distress seen in the form of depression, anxiety, anger, demoralization etc., experienced by people seeking treatment. Finally with respect to diagnosis, our findings are consistent with the notion that understanding, describing, identifying, and diagnosing personality pathology could be further refined and perhaps improved by embedding cognitive content in our diagnostic criteria.

In sum, the primary implication of the results of the mediation analyses is that personality variables operate *through* dysfunctional beliefs to exert their effect on a variety of affective outcomes. Continuing to pursue this line of research in the future is important because it will help researchers and clinicians (1) achieve an expanded, more elaborate understanding of the phenomenology of personality and personality dysfunction; (2) improve our understanding of the cognitive mechanisms through which personality traits lead to adverse emotional outcomes; and (3) provide targets for therapeutic intervention.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual—Text revision (DSM-IV-TR) (4th ed., revised)*. Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual, Fifth Edition (DSM-5)*. Washington, DC: American Psychiatric Association.

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Arntz, A., Dreessen, L., Schouten, E., & Weertman, A. (2004). Beliefs in personality disorders: A test with the Personality Disorder Belief Questionnaire. *Behaviour Research and Therapy, 42,* 1215–1225. https://doi.org/10.1016/j.brat.2003.08.004.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Beck, A. T. (1976). *Cognitive therapy for emotional disorders*. New York, NY: International University.

Beck, J. S. (2005). *Cognitive therapy for challenging problems: What to do when the Basics Don't Work*. New York: Guildford Press.

Beck, A. T., Butler, A. C., Brown, G. K., Dahlsgaard, K. K., Newman, C. F., & Beck, J. S. (2001). Dysfunctional beliefs discriminate personality disorders. *Behaviour Research and Therapy, 39*(10), 1213–1225. https://doi.org/10.1016/S0005-7967(00)00099-1.

Beck, A. T., Davis, D. D., & Freeman, A. (2015). *Cognitive therapy of personality disorders* (3rd ed.). New York: Guilford Press.

Beck, A. T., & Haigh, E. A. P. (2014). Advances in cognitive theory and therapy: The generic cognitive model. *Annual Review of Clinical Psychology, 10,* 1–24. https://doi.org/10.1146/annurev-clinpsy-032813-153734.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: The Guilford Press.

Beevers, C. G., Strong, D. R., Bjorn, M., Pilkonis, P. A., & Miller, I. W. (2007). Efficiently assessing negative cognition in depression: An item response theory analysis of the dysfunctional attitude scale. *Psychological Assessment, 19*(2), 199–209. https://doi.org/10.1037/1040-3590.19.2.199.

Ben-Porath, Y. S., & Tellegen, A. (2008). *MMPI–2–RF: Manual for administration, scoring, and interpretation*. Minneapolis, MN: University of Minnesota Press.

Bhar, S. S., Beck, A. T., & Butler, A. C. (2012). Beliefs and personality disorders: An overview of the personality beliefs questionnaire. *Journal of Clinical Psychology, 68*(1), 88–100. https://doi.org/10.1002/jclp.20856.

Bieling, P. J., Beck, A. T., & Brown, G. K. (2000). The sociotropy-autonomy scale: Structure and implications. *Cognitive Therapy and Research, 24*(6), 763–780. https://doi.org/10.1023/A:1005599714224.

Butcher, J. N., Graham, J. R., Ben-Porath, Y. S., Tellegen, A., Dahlstrom, W. G., & Kaemmer, B. (2001). *MMPI-2: Manual for administration and scoring* (Rev ed.). Minneapolis: University of Minnesota Press.

Butler, A. C., Beck, A. T., & Cohen, L. H. (2007). The personality belief questionnaire-short form: Development and preliminary findings. *Cognitive Therapy and Research, 31*, 357–370. https://doi.org/10.1007/s10608-006-9041-x.

de Winter, J. C. F., & Dodou, D. (2012). Factor recovery by principal factor analysis as a function of factor pattern and sample size. *Journal of Applied Statistics, 39*(4), 695–710. https://doi.org/10.1080/02664763.2011.610445.

Derogatis, L. R. (1983). *The SCL-90 R: Administration, scoring, and procedures manual II*. Baltimore, MD: Clinical Psychometric Research.

Diener, E., Emmons, R., Larsen, R., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49,* 71–75. https://doi.org/10.1207/s15327752jpa4901_13.

DiGiuseppe, R., & Tafrate, R. C. (2004). *Anger disorders scale: Manual*. Toronto, ON: Multi Health Systems, Inc.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The mini-IPIP scales: Tiny-yet-effective measures of the Big Five Factors of Personality. *Psychological Assessment, 18*(2), 192–203. https://doi.org/10.1037/1040-3590.18.2.192.

Ellis, A. (1994). *Reason and emotional in psychotherapy: A comprehensive method of treating human disturbance. Revised and updated*. New York: Birch Lane Press.

Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146.

Fournier, J. C., DeRubeis, R. J., & Beck, A. T. (2012). Dysfunctional cognitions in personality disorder: The structure and validity of the Personality Belief Questionnaire. *Psychological Medicine, 42,* 795–805. https://doi.org/10.1017/s0033291711001711.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48,* 26–34. https://doi.org/10.1037/0003-066X.48.1.26.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37,* 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1.

Harkness, A. R., Finn, J. A., McNulty, J. L., & Shields, S. M. (2012). The personality psychopathology—Five (PSY-5): Recent constructive replication and assessment literature review. *Psychological Assessment, 24*(2), 432–443. https://doi.org/10.1037/a0025830.

Harkness, A. R., McNulty, J. L., Finn, J. A., Reynolds, S. M., Shields, S. M., & Arbisi, P. (2014). The MMPI–2–RF personality psychopathology five (PSY–5–RF) scales: Development and validity research. *Journal of Personality Assessment, 96*(2), 140–150. https://doi.org/10.1080/00223891.2013.823439.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis* (2nd ed.). New York: The Guilford Press.

Hopwood, C. J., Schade, N., Kreuger, R. F., Wright, A. G. C., & Markon, K. (2013). Connecting DSM-5 personality traits and pathological beliefs: Toward a unifying model. *Journal of Psychopathology and Behavioral Assessment, 35,* 162–172. https://doi.org/10.1007/s10862-012-9332-3.

IBM Corp. Released. (2012). *IBM SPSS Statistics for Windows, Version 210*. Armonk, NY: IBM Corporation.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102–138). New York: Guilford.

Kreuger, R. F., & Markon, K. E. (2014). The role of the DSM-5 personality trait model in moving toward a quantitative and empirically based approach to classifying personality and psychopathology.

Annual Review of Clinical Psychology, 10, 477–501. https://doi.org/10.1146/annurev-clinpsy-032813-153732.

Krueger, R. F., Derringer, J., Markon, K. E., Watson, D., & Skodol, A. E. (2012). Initial construction of a maladaptive personality trait model and inventory for DSM-5. *Psychological Medicine, 42*(9), 1879–1890. https://doi.org/10.1017/S0033291711002674.

Larstone, R. M., Jang, K. L., Livesley, W. J., Vernon, P. A., & Wolf, H. (2002). The relationship between Eysenck's P–E–N model of personality, the five factor model of personality, and traits delineating personality dysfunction. *Personality and Individual Differences, 33,* 25–37. https://doi.org/10.1016/S0191-8869(01)00132-5.

Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and Motor Skills, 105,* 997–1014. https://doi.org/10.2466/pms.105.3.997-1014.

Pretzer, J. L., & Beck, A. T. (1996). A cognitive theory of personality disorders. In J. F. Clarkin & M. F. Lenzenweger (Eds.), *Major theories of personality disorder* (pp. 36–105). New York: Guilford Press.

Samar, S. M., Walton, K. E., & McDermut, W. (2013). Personality traits predict irrational beliefs. *Journal of Rational Emotive and Cognitive Behavioral Therapy., 31,* 231–242. https://doi.org/10.1007/s10942-013-0172-1.

Tellegen, A., & Ben-Porath, Y. S. (1992). The new uniform T scores for the MMPI-2: Rationale. *Derivation, and Appraisal Psychological Assessment, 4*(2), 145–155.

Trull, T. J., Goodwin, A. H., Schopp, L. H., Hillenbrand, T. L., & Schuster, T. (1993). Psychometric properties of a cognitive measure of personality disorders. *Journal of Personality Assessment, 61*(3), 536–546. https://doi.org/10.1207/s15327752jpa6103_10.

Vîslă, A., Flückiger, C., Grosse Holtforth, M., & David, D. (2016). Irrational beliefs and psychological distress: A meta-analysis. *Psychotherapy and Psychosomatics, 85*(1), 8–15. https://doi.org/10.1159/000441231.

Weissman, A. (1979). Dysfunctional attitude scale: A validation study. Unpublished doctoral dissertation, University of Pennsylvania, Philadelphia. http://repository.upenn.edu/edissertations/1182.

Young, J. E., Klosko, J., & Weishaar, M. E. (2003). *Schema therapy: A practitioner's guide*. New York: The Guilford Press.