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Measuring the Role of Psychological Inflexibility in Trichotillomania

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Abstract

Psychological Inflexibility (PI) is a construct that has gained recent attention as a critical theoretical component of Acceptance and Commitment Therapy (ACT). PI is typically measured by the Acceptance and Action Questionnaire-II (AAQ-II). However, the AAQ-II has shown questionable reliability in clinical populations with specific diagnoses, leading to the creation of content-specific versions of the AAQ-II that show stronger psychometric properties in their target populations. A growing body of literature suggests that PI processes may contribute to hair pulling, and the current study sought to examine the psychometric properties and utility of a Trichotillomania-specific version of the AAQ-II, the AAQ-TTM. A referred sample of 90 individuals completed a battery of assessments as part of a randomized clinical trial of Acceptance-Enhanced Behavior Therapy for Trichotillomania. Results showed that the AAQ-TTM has two intercorrelated factors, adequate reliability, concurrent validity, and incremental validity over the AAQ-II. Furthermore, mediational analysis between emotional variables and hair

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pulling outcomes provides support for using the AAQ-TTM to measure therapeutic process. Implications for the use of this measure will be discussed, including the need to further investigate the role of PI processes in Trichotillomania.

Keywords

Obsessive-Compulsive Disorder; ACT; Impulse Control Disorders; Behavior Therapy; Measurement

1. Introduction

Trichotillomania (TTM), or hair pulling disorder, is an obsessive-compulsive spectrum disorder characterized by the repeated pulling of one's own hair, resulting in significant hair loss (American Psychiatric Association [APA], 2013). Research has revealed two styles of pulling: "automatic" and "focused" (Christenson et al., 1991). "Automatic" pulling is performed with little control or awareness, whereas "focused" pulling appears to be a more purposeful process. Some have suggested that "focused" pulling may function to regulate affect and/or aversive cognitions (Begotka et al., 2004; Woods et al., 2006). Supporting this idea, Diefenbach et al. (2002) found that people with TTM report reductions in anxiety, tension, and boredom following pulling episodes.

The most empirically supported behavioral intervention for TTM is Habit Reversal Training (HRT; Azrin et al., 1980; Rosenbaum and Ayllon, 1981; Tarnowski et al., 1987; Mouton and Stanley, 1996; Stoylen, 1996; Rapp et al., 1998), which consists of awareness training, competing response training, and social support. Unfortunately, evidence suggests that while effective at reducing pulling, HRT does not address the aversive cognitions and emotional states that often trigger pulling episodes (Woods et al., 2006). One factor that links emotions to pulling may be psychological inflexibility (PI), which is a generalized, maladaptive strategy used to regulate affect and unwanted cognitions resulting in reductions in meaningful life activities. Not to be confused with problems with cognitive flexibility (which involves the ability to shift attentional focus and does not appear to be dysfunctional in TTM; see Chamberlain et al., 2006), PI involves problems in resisting maladaptive behaviors that are triggered by aversive cognitions and emotions (Hayes et al., 2006). PI has been associated with increased hair pulling severity and pulling urges (Begotka et al., 2004). Therefore, interventions that include techniques that target PI may be effective in reducing TTM symptoms.

Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) is an empirically supported form of behavior therapy that attempts to reduce PI and increase individuals' engagement in valued behavior while also experiencing negative private events (e.g., not responding to the urge to pull hair because doing so takes one away from doing things more consistent with one's values). ACT has been found generally effective for a variety of mental health issues (Hayes et al., 2006), and components have been successfully incorporated into HRT for TTM (Twohig and Woods, 2004; Woods et al., 2006; Flessner et al., 2008a).

Psychological flexibility is thought to mediate successful outcomes in ACT (Ciarrochi et al., 2010) and is typically measured by the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011). Because the AAQ-II is a general measure of PI, the measure's utility in clinical populations with specific psychopathologies can sometimes be limited. Thus, specific versions based on the AAQ-II have been created for diabetes (Gregg et al., 2007), epilepsy (Lundgren et al., 2008), substance abuse (Luoma et al., 2011), weight (Lillis and Hayes, 2008), cigarette smoking (Gifford et al., 2004), body image (Sandoz et al., 2013), chronic pain (McCracken et al., 2004), social anxiety (MacKenzie and Kocovski, 2010), tinnitus (Westin et al., 2008), and auditory hallucinations (Shawyer et al., 2007). These disorder-specific versions have shown increased precision for measuring PI in specific clinical and research contexts. For instance, when compared to the original measure, the AAQ for tinnitus more successfully predicted treatment outcomes (Westin et al., 2008), and the AAQ for substance abuse showed considerably stronger psychometric properties in its targeted population (Luoma et al., 2011).

Cognitive-affective variables, such as anxiety and mood, are linked to TTM (Diefenbach et al., 2002). According to ACT theory, it is the struggle to control inner experiences (i.e., avoidance) rather than the content of the experience itself (i.e., valence) that fuels psychological distress (Hayes et al., 1999). Individuals who are more psychologically inflexible would then be at risk for developing psychopathology in response to aversive inner experiences. Therefore, individuals with TTM might show a link between emotional variables and hair pulling that is mediated by PI, as has been reported in a previous study (Norberg et al., 2007). By extension, improving psychological flexibility through ACT or similar treatments could decrease pulling by making the behavior less susceptible to aversive inner experiences.

The current study examines the psychometric properties and mediational effects of a novel disorder-specific version of the AAQ for TTM. Specifically, it was hypothesized that the AAQ-TTM would demonstrate acceptable reliability and concurrent validity, adequate incremental validity over the AAQ-II on relevant indices, and potential utility as a process of change measure.

2. Methods

2.1 Participants

From March 2009 until January 2013, 274 adults were screened for possible participation in a randomized clinical trial of Acceptance-Enhanced Behavior Therapy (AEBT) for Trichotillomania through newspaper ads, the Trichotillomania Learning Center, and clinic referrals at a Trichotillomania Specialty Clinic. Ninety participants (83 females; Mean Age = 35.16) completed the baseline assessment battery and constituted the cross-sectional data for this study.

2.2 Measures

2.2.1 Psychological inflexibility—*The Acceptance and Action Questionnaire – Trichotillomania* (AAQ-TTM) is a 10-item self-report measure of PI within the context of TTM. The third author (Dr. Twohig), a TTM and ACT expert, created the items based off

the AAQ-II (Woods and Twohig, 2008). Individuals are provided a list of statements describing how they interact with their urges to pull hair, and they rate each statement on a 7-point Likert scale (1 = “never true”, 7 = “always true”). Scale scores are created by summing the items, and higher scores are intended to indicate greater psychological *flexibility* in the presence of hair pulling-related cognitions and affect. See Table 1 for a list of items.

The Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) is a 10-item self-report measure of overall PI. Analysis of the AAQ-II showed that the scale demonstrates adequate psychometric properties, as evidenced by an alpha coefficient of .87 and acceptable convergent and divergent validity (Bond et al., 2011). The structure is similar to the AAQ-TTM, with statements about one’s experiential avoidance/acceptance being scored on a 7-point Likert scale, and higher scores indicate higher global psychological *flexibility*.

2.2.2 Hair Pulling—*The Massachusetts General Hospital Hairpulling Scale* (MGH-HPS; Keuthen et al., 1995; O’Sullivan et al., 1995) is the most widely used self-report outcome measure of TTM, and demonstrates satisfactory psychometric properties (Keuthen et al., 1995; O’Sullivan et al., 1995; Diefenbach et al., 2005; Keuthen et al., 2007). The MGH-HPS has 7 items that are scored on a 5-point Likert scale for a total ranging from 0–28, with higher scores reflecting greater hair pulling severity.

The Milwaukee Inventory of Subtypes of Trichotillomania-Adult Version (MIST-A; Flessner et al., 2008b) is a 24-item self-report measure designed to assess different pulling styles in adults with TTM. It consists of two subscales corresponding to “automatic” and “focused” pulling, and has demonstrated adequate internal consistency and good construct and discriminant validity (Flessner et al., 2008b).

The NIMH Trichotillomania Scale (Swedo et al., 1989) is a semi-structured clinical interview consisting of two clinical indices: the NIMH Trichotillomania Severity Scale (NIMH-TSS) and the NIMH Trichotillomania Impairment Scale (NIMH-TIS). The scales ask questions about time spent pulling, resistance to pulling urges, distress, and impairment. The scales have shown adequate psychometric properties in both adults and children (Diefenbach et al., 2005; Franklin et al., 2011; Stanley et al., 1999; Swedo et al., 1989).

2.2.3 Impairment—*The Clinical Global Impression – Severity Scale* (CGI-S; Guy, 1976) consists of a single 7-point Likert scale with which the clinician rates the overall severity of a person’s illness at the time of assessment. The CGI-S has good reliability (Dahlke et al., 1992), strong convergent validity (Leon et al., 1993), and has been used as a treatment outcome measure for adults with TTM (Ninan et al., 2000; Diefenbach et al., 2006).

2.2.4 Depression and anxiety—*The Beck Anxiety Inventory* (BAI; Beck et al., 1988a) is a 21-question multiple-choice self-report measure of anxiety severity. It is one of the most widely used anxiety measures, and demonstrates strong psychometric properties (Frydreich et al., 1992).

The Beck Depression Inventory (BDI; Beck, 1972) is a 21-question multiple-choice self-report measure of depression severity. It is one of oldest and most widely used measures of depression, and has strong psychometric properties (Beck et al., 1988b).

2.3 Procedure

IRB approval for this project was obtained at Texas A&M University (IRB2013-3025), and the study is publicly listed on the U.S. National Institutes of Health human subject trials forum (ClinicalTrials.gov; #NCT00872742). The study was performed in compliance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). Participants were screened through phone interviews for the opportunity to participate in a randomized clinical trial of psychotherapy for TTM. Inclusion criteria consisted of age 18 and 65, a TTM diagnosis according to criteria of the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition-Text Revision (APA, 2000), an MGH-HPS score of 12, a score of 85 on the Wechsler Test of Adult Reading (Holdnack, 2001), currently taking no medication or on stable medication (e.g., psychotropics) for at least 8 weeks, and fluency in English. Exclusion criteria included a positive diagnosis of bipolar disorder, psychotic disorder, current diagnosis of substance dependence (with the exception of nicotine dependence), a pervasive developmental disorder, currently receiving psychotherapy for TTM or any other psychiatric conditions, currently ingesting hair, or a current mood or anxiety disorder with active suicide risk. Upon meeting criteria, participants reported to the research center, where they provided informed consent and were administered the MGH-HPS, BDI, BAI, AAQ, AAQ-TTM, MIST-A, CGI-S, and NIMH-TSS. Data for this study were taken from the baseline assessment of the larger clinical trial.

3. Results

3.1 Factor Analysis

In order to determine the factor structure of the AAQ-TTM, we performed a common factor analysis (Floyd and Widaman, 1995) and used parallel analysis (Horn, 1965) in order to determine number of factors to extract. Parallel analysis ensures that all factors which have eigenvalues greater than 1 are not based on sampling error, and is a recommended procedure for ensuring extraction accuracy (Zwick and Velicer, 1986). Based on this, we retained 2 factors. Because we expected that these two factors would be derivatives of a higher order one, PI, and therefore would be correlated, an oblique rotation (Direct Oblimin) was employed (Nunnally, 1978). Examination of the pattern matrix was performed, and factor loadings less than .4 were suppressed (Ferguson and Cox, 1993). Item 10 was not loading on either factor, and therefore was excluded from analysis and the procedure re-performed. Results of the updated pattern matrix are shown in Table 1.

The first factor had an eigenvalue of 4.21 and accounted for 42.83% of the variance, and the second had an eigenvalue of 1.56 and accounted for 11.12% of the variance. Factor 1, labeled “interference,” consisted of items relating to the relationship between general functioning and urges. The second, labeled “control,” consisted of items relating to management of and attitudes toward urges. Factors 1 and 2 were moderately intercorrelated

at .26, supporting the notion that the factors might represent two manifestations of a higher-order construct.

3.2 Reliability

Internal consistency on the entire AAQ-TTM was found to be satisfactory, with a Cronbach's Alpha of 0.84. However, the internal consistencies of Factors 1 and 2 slightly differed at .90 and .66, respectively. Internal consistency of the AAQ-II was also satisfactory ($\alpha = 0.85$).

3.3 Validity

The AAQ-TTM, both as a whole and separated into individual factors, and the AAQ-II were compared to several indices of TTM and psychosocial functioning in order to measure concurrent validity (see Table 2). Analysis of correlational data generally supports the notion that AAQ-TTM factors are measuring different facets of the same construct, as both are correlated with each index of hair pulling, albeit at different magnitudes and levels of significance. The greatest differences in correlational strength between the two factors were with BAI and BDI scores, which in theory should indeed be more related to hair pulling interference than control of urges per say. As for the whole scale, significant correlations were found between the AAQ-TTM and all measures of hair pulling other than the MIST-A automatic scale, which is consistent with theory. Although future research replicating the factor structure of the AAQ-TTM is needed and may elucidate ways in which the factors can be interpreted individually, at this time, our findings suggest that interpreting the scale as a single entity is appropriate and perhaps more clinically useful than interpreting the subscales independently.

As such, we directly compared concurrent validity between the AAQ-TTM total score and the AAQ-II. The AAQ-II and AAQ-TTM were both significantly correlated with the MGH-HPS, NIMH-TSS, MIST-A "focused" subscale, BAI, and BDI, but the AAQ-II was not significantly correlated with the CGI-S. See Table 2. Steiger's Z-tests were performed to test for significant differences between the magnitude of correlations. The AAQ-TTM was more strongly correlated with the MGH-HPS ($Z = -2.04, p < .05$), while the AAQ-II was more strongly correlated with the BAI ($Z = 2.32, p < .05$) and the BDI ($Z = -2.59, p < .01$). These results are consistent with the prediction that the AAQ-TTM is more strongly correlated with TTM, and the general AAQ-II is related to more general psychopathology. Neither the AAQ-II nor the AAQ-TTM was correlated with the MIST-A "automatic" subscale; showing divergent validity.

3.4 Process

The AAQ-II is often used as a process of change measure in treatment. According to ACT theory, the AAQ-TTM should mediate the relationship between affect and TTM symptom severity, as people may pull, in part, to control or regulate emotions and other negative private events (Norberg et al., 2007).

The relationship between depression (as measured by the BDI) and hair pulling (as measured by the MGH-HPS) was fully mediated by TTM-specific PI (as measured by the

AAQ-TTM). As Figure 1 illustrates, the regression coefficient between depression and hair pulling becomes non-significant when controlling for TTM-specific PI. Additionally, depression predicted TTM-specific PI and hair pulling, and TTM-specific PI was a significant predictor of hair pulling while controlling for depression, meeting the other conditions for mediation (Baron and Kenny, 1986). The same analysis, using NIMH-TSS as the outcome variable, showed the same mediational pathway. Alternatively, the relationship between depression and hair pulling (as measured by the either the MGH-HPS or the NIMH-TSS) was not mediated by the AAQ-II.

The relationship between anxiety (as measured by the BAI) and hair pulling was not significant (as measured by the MGH-HPS), thus, no mediational analysis was conducted. However, the relationship between anxiety and hair pulling as measured by the NIMH-TSS score was fully mediated by TTM-specific PI. See Figure 2. Generalized PI (i.e., AAQ-II) did not mediate this relationship.

The relationship between depression and global disorder severity (as measured by the CGI-S) was fully mediated by TTM-specific PI. See Figure 3. Generalized PI (i.e., AAQ-II) did not mediate this relationship. There was no significant relationship between anxiety and global disorder severity ($F(1, 87) = 3.45, p = .07$), thus, no mediational analysis was conducted for these variables.

4. Discussion

The current study sought to examine the psychometric properties of the Acceptance and Action Questionnaire-Trichotillomania (AAQ-TTM). It was hypothesized that the AAQ-TTM would demonstrate adequate internal consistency and concurrent validity, incremental validity over the AAQ-II, and potential utility as a process of change measure.

Factor analysis of the AAQ-TTM showed two intercorrelated factors, “interference” and “control.” After examining how these two factors and the entire scale compared to measures of hair pulling and psychosocial functioning, it was determined that interpretation of the whole scale was a valid and possibly more clinically useful approach than considering the subscales separately. However, should the factor structure be replicated in future research, the distinction in flexibility could be used to measure specific facets of TTM psychopathology within an acceptance-based framework.

The AAQ-TTM demonstrated adequate reliability and validity. The measure showed convergent validity with the AAQ-II, but the two scales are not redundant. The AAQ-TTM demonstrated incremental validity over the AAQ-II in predicting all TTM outcome measures as well as a measure of focused hair pulling. Although both measures were highly correlated with measures of mood and anxiety, the AAQ-II had stronger associations with these scales. These findings suggest the AAQ-II is more related to generalized depression and anxiety, whereas the AAQ-TTM is more effective for measuring PI in the presence of TTM-specific cognitions and affect. Convergent and divergent validity was also demonstrated through theoretically consistent associations, or lack thereof, between the AAQ-TTM and the MIST-A “focused” and “automatic” subscales. Taken together, preliminary evidence suggests that the AAQ-TTM is a reliable and valid instrument.

Just as previous disorder-specific modifications to the AAQ have been successful, the AAQ-TTM appears to provide better measurement of PI in adults with TTM than the original AAQ-II. As such, future adaptations of the AAQ to related disorders (e.g., obsessive-compulsive disorder, skin picking, body dysmorphic disorder) are warranted. Our results suggest the AAQ-II is a useful addition to a clinical scientist's assessment battery where no such disorder-specific version exists for the targeted condition.

The AAQ-TTM, but not the AAQ-II, was significantly correlated with all measures of TTM pathology, supporting the hypothesized role of PI in hair pulling. Previous research has argued that hair pulling might theoretically function to regulate aversive internal states (though this was not specifically tested in this study), but this relationship is heavily influenced by how people interact with inner experiences. Taking a psychologically inflexible approach to emotional experiences may lead to increased pulling, whereas being more flexible in the presence of unpleasant inner experiences within the context of TTM may decrease an individual's propensity to engage in an emotion-regulating style of pulling.

Not only are PI and TTM severity associated, but higher levels of inflexibility may constitute a risk factor for higher levels of TTM-related impairment. For instance, high focused pulling, which was associated with higher PI in this study, has shown an association with higher TTM severity, depression, and functional impact (Flessner et al., 2008b). A potential target of future research studies might involve determining if reductions in PI impact the frequency of focused pulling, which should subsequently affect overall TTM severity and impairment.

ACT theory views psychosocial difficulties, in part, as a function of PI. Although these results can neither confirm nor deny this broad claim, they do provide support for PI as an important construct in TTM psychopathology. Mediation analyses showed indirect effects of TTM-specific PI on the relationships between emotional variables and hair pulling severity. Although there was inconsistency in these findings (i.e., lack of relationship between anxiety and MGH-HPS), results may be explained by the use of different measurement methods (e.g., self-report vs. clinician-administered TTM severity measures). In the future, longitudinal research should be undertaken in order to test the temporal association between PI and the onset of TTM symptoms. Perhaps individuals who are more prone to behave inflexibly in the presence of negative affect are more likely to develop TTM.

Implications also include maladaptive affect regulation as a central target of effective TTM interventions. Interventions that target cognition and affect regulation, such as ACT, Dialectical Behavior Therapy (DBT), and Cognitive Behavior Therapy (CBT) should be investigated in adequately-powered studies, with particular attention on mediational processes and treatment component analysis. Several preliminary studies of these treatments in TTM have been undertaken (Ninan et al., 2000; Woods et al., 2006; Keuthen et al., 2010; Keuthen et al., 2011), but all suffer from methodological shortcomings including small sample size and/or lack of a control group. Nevertheless, in a recent randomized controlled trial of DBT, changes in AAQ scores predicted reductions in hair pulling at 6-month follow-up (Keuthen et al., 2011). Also, in a pilot study of ACT plus HRT for TTM, moderate

correlations between improvements in AAQ scores and decreases in MGH-HPS scores following treatment suggested that decreases in PI are related to decreases in TTM symptoms (Woods et al., 2006). The results of the current study along with previous findings linking AAQ changes to TTM symptom reduction suggests that future trials be conducted on acceptance-based interventions for TTM.

Limitations of this study include the cross-sectional design. While the study represents the largest known behavioral treatment-seeking sample of individuals with TTM to date, the data were only sampled at one time point. Longitudinal studies should be undertaken to track emotional and psychological variables over time and make more reliable conclusions regarding the development of TTM psychopathology.

4.1 Conclusions

Emerging evidence suggests that TTM serves multiple functions, one being the regulation of aversive cognitions, emotions, and other internal experiences. Future research should investigate whether manipulating the manner in which individuals interact with negative inner experiences affects treatment outcomes for TTM and other body-focused repetitive behaviors (e.g., skin picking),

Results of this study further support the notion that PI should be targeted as a possible process of TTM in future research studies. Experimental treatment packages for TTM that include components designed to manipulate emotion and/or thought regulation, such as ACT, DBT, and CBT, might consider employing the AAQ-TTM as a process measure. Furthermore, these studies might also consider conducting additional criterion-related validation of the AAQ-TTM by performing comparisons to measures of distress tolerance, such as the Difficulty in Emotion Regulation Scale (Gratz and Roemer, 2004), the Generalized Expectancy for Negative Mood Regulation Scale (Catanzaro and Mearns, 1990), and the Affective Regulation Rating (Keuthen et al., 2012). Psychological inflexibility may not be the only TTM-relevant emotion regulation process.

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Highlights

- A new trichotillomania-specific version of the AAQ-II is evaluated.
- The AAQ-TTM demonstrates two factors and satisfactory psychometric properties.
- Psychological Inflexibility mediates the affect and hair pulling relationship.
- Psychological Inflexibility might be a core feature of trichotillomania.

Figure 1.

Standardized regression coefficients for the relationship between depression and hairpulling (as measured by the MGH-HPS shown in plain text; as measured by the NIMH total shown in bold) as fully mediated by TTM psychological flexibility. The standardized regression coefficients between depression and hair pulling while controlling for TTM psychological flexibility are shown in parentheses. (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$)

Figure 2.

Standardized regression coefficients for the relationship between anxiety and hair pulling as fully mediated by TTM psychological flexibility. The standardized regression coefficients between anxiety and hair pulling while controlling for TTM psychological flexibility are shown in parentheses. ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$)

Figure 3.

Standardized regression coefficients for the relationship between depression and global severity as fully mediated by TTM psychological flexibility. The standardized regression coefficients between depression and global severity while controlling for TTM psychological flexibility are shown in parentheses. ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$)

Table 1

Pattern Matrix of AAQ-TTM

Item Number	Factor 1	Factor 2
Item 2: My urges to hair pull make it difficult for me to live a life I would value. (R)	0.90	
Item 5: My urges to hair pull prevent me from having a fulfilling life. (R)	0.87	
Item 9: Urges to pull get in the way of my success. (R)	0.86	
Item 8: It seems like most people are handling their lives better than I am. (R)	0.69	
Item 7: Urges to pull cause problems in my life. (R)	0.64	
Item 4: I worry about not being able to control my urges to hair pull. (R)		0.71
Item 6: I am in control of my pulling.		0.53
Item 3: I'm afraid of my urges to hair pull. (R)		0.52
Item 1: It's OK if I experience the urge to pull my hair.		0.43

Note. R = Item reversed for scoring purposes.

Table 2

Correlation Matrix

Measure	AAQ-TTM	Factor 1	Factor 2	AAQ-II
AAQ-II	0.62***	0.65***	0.30**	-----
MGH-HPS	-0.49***	-0.38**	-0.53***	-0.220*
NIMH-TSS	-0.37***	-0.31**	-0.31**	-0.225*
MIST-A “focused” subscale	-0.46***	-0.44***	-0.28**	-0.423***
MIST-A “automatic” subscale	-0.03	-0.03	-0.02	-0.07
CGI-S	-0.37***	-0.38**	-0.21*	-0.15
BAI	-0.36**	-0.40***	-0.12	-0.62***
BDI	-0.61***	-0.60***	-0.37***	-0.79***

Note.

* $P < 0.05$,

** $P < 0.01$,

*** $P < 0.001$.