

Original Article

The mediating role of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression

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Abstract

Although the relationship between borderline personality traits and aggression is widely studied, there has been little attention to investigate the role of anger rumination and hostile attribution bias as mediators of this relationship. The aim of the present study was to investigate the mediating role of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression in a descriptive-correlational study. The population included all the students of the Islamic Azad University of Neyshabur in 2020, from whom 211 people were selected using convenience sampling. The participants completed aggression questionnaire, borderline personality scale, anger rumination scale and hostile attribution bias questionnaire. Data was analyzed by Lisrel and SPSS26 software, using structural equation modeling. The results of this study show that there is a significant relationship between the borderline personality traits, anger rumination, hostile attribution bias and aggression ($p < 0.05$). Also, anger rumination and hostile attribution bias mediated the relationship between borderline personality traits and aggression (CFI= 0.96, NFI= 0.95, NNFI= 0.95, IFI= 0.96, GFI= 0.90). The results of this study emphasize the importance of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression. As a result, using or developing appropriate educational and therapeutic interventions in this field can help reduce aggressive behaviors.

Keywords

Aggression
Borderline personality
Hostile
Rumination

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Introduction

Aggression is one of the most serious social problems in the world (Quan et al., 2019), which is still regarded as one of the main clinical, public health and safety subject (Soreff et al., 2025). Aggression refers to "any form of behaviour directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment" (Baron et al., 1994). It influences economic, social, legal and political issues (Cruz, de Castro-Rodrigues, & Barbosa, 2020). For instance, aggression affects the relationships between individuals, groups, and societies and its causes problems between them (Krahé, 2013). Biological (genetics, hormones, neurotransmitters, nervous system damages, drugs, substances use), psychological (affective states, cognitive processes, learning experiences, bipolar disorders, schizophrenia, post-traumatic stress disorder, antisocial personality disorder) and social (interpersonal, social, economic, and cultural conditions) factors play an important role in

aggressive behaviors (Cruz et al., 2020; Krahé, 2013; Soreff et al., 2025).

Another factor associated with aggression is borderline personality disorder (Mancke et al., 2017; Martino et al., 2015; Nelson et al., 2022; Scott et al., 2017; Sommerfeld & Shechory Bitton, 2020; Soreff et al., 2025). Borderline personality disorder is defined as a pervasive pattern of instability in interpersonal relationships, self-image and affects, and marked impulsivity (e.g. spending, sex, substance abuse, reckless driving) that begins at early adulthood and exists in a wide range of contexts (Abdi & Zamani Zargar, 2024; American Psychiatric Association, 2022; Rahmani et al., 2023). Aggression in individuals with this disorder occurs in the context of emotional reactivity such as anger and shame, and in response to perceived rejection (Scott et al., 2017). The results of a study showed that there is a significant relationship between the severity of BPD and aggression in adult women with a history of aggressive behavior (Scott et al., 2017). Other researchers have found that there is a

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relationship between the traits or symptoms of BPD and aggression in individuals with and without BPD (Sommerfeld & Shechory Bitton, 2020), female students (Turner, 2019; Zhu et al., 2020), people under treatment for a substance use disorder (Shorey et al., 2016), and individuals with BPD (Cackowski et al., 2017; Mancke et al., 2017; Martino et al., 2015). The results of a study indicated that women with BPD were more aggressive than healthy controls (Cackowski et al., 2017).

While the relationship between borderline personality traits and aggression has been well confirmed, little attention has been given to the mediating factors in this relationship. Anger rumination and hostile attribution bias can act as a mediator in this relationship. Anger is one of the predictors of aggressive behavior (Denson et al., 2011). In the Diagnostic and Statistical Manual of Mental Disorders, disproportionate and intense anger or difficulty in controlling anger is stated as one of the criteria of BPD (American Psychiatric Association, 2022). Anger rumination is also an inevitable and recurrent cognitive process that emerges during the experience of anger and continues after it and is responsible for the persistence of anger (Sukhodolsky et al., 2001). The results of a study showed that rumination after anger-inducing provocation reduced self-control and increased aggression (Denson et al., 2011). The emotional cascade model suggests that rumination can lead to inappropriate behaviour such as aggression and self-harm in people with BPD (Selby & Joiner Jr, 2009). In addition, many negative consequences of rumination, such as self-harm, eating disorders, substance use, disturbed relationships, aggressive behaviour, negative self-evaluation and post-traumatic stress disorder, are seen in people with this BPD (Baer et al., 2012). A review of the research literature shows that there is a relationship between anger rumination and aggression among students (Denson et al., 2011; Quan et al., 2022; Quan et al., 2019; Saeedi, Sabourimoghadam, & Hashemi, 2020; Turner, 2019; Wang et al., 2020; Zhu et al., 2020), national Iranian athletes (Besharat & Hoseini, 2011) and individuals with BPD (Martino et al., 2015; Martino et al., 2018). Borderline personality features are also associated with anger rumination among university students (Peters et al., 2017; Sauer-Zavala et al., 2013; Turner, 2019). Although previous studies have reported that anger rumination mediates the relationship between BPD diagnosis and aggressive behavior (Martino et al., 2015), little attention has been paid to the role of other factors, including hostile attribution bias. Anger rumination and hostile attribution bias are among the most important cognitive factors associated with aggression and may influence each other (Wang et al., 2019).

Hostile attribution bias refers to the tendency of people to interpret the ambiguous behaviour of others as their hostile intent (Krahe, 2013). Higher levels of hostile attribution bias are related to higher levels of aggressive behaviour among children and adults. This type of bias plays a significant role in the development and persistency of aggression, as well as understanding and treatment of aggressive behavior (Smeijers et al., 2017).

There is considerable evidence of an relationship between hostile attribution bias and aggression among university students (Quan et al., 2019; Zhu et al., 2020) and people with BPD (Smeijers et al., 2017). Individual with BPD believe others to be aggressive, hostile, rejecting, abandoning, dangerous and untrustworthy (Baer et al., 2012; Gutz et al., 2016). There is also a relationship between the borderline personality traits and hostile attribution bias (Gagnon et al., 2022; Gutz et al., 2016). Researchers found that individuals with BPD exhibited higher hostile attribution bias and tendency to more aggressive action than the healthy controls (Gutz et al., 2016). Other researchers found that there is a relationship between the borderline personality traits and hostile attribution bias, but hostile attribution bias dose not mediate the relationship between borderline personality traits and reactive aggression (Gagnon et al., 2022). Also, reported that hostile attribution bias mediated the links between personality (high heuroticism, low extraversion) and cyber-bullying (Kokkinos et al., 2019). Finally, the findings show that hostile attribution bias and anger rumination are related to each other (Quan et al., 2022; Quan et al., 2019; Wang et al., 2019).

Although the relationship between borderline personality traits and aggression is widely studied (Cackowski et al., 2017; Mancke et al., 2017; Martino et al., 2015; Scott et al., 2017; Shorey et al., 2016; Sommerfeld & Shechory Bitton, 2020; Turner, 2019; Zhu et al., 2020), there has been little attention to investigate the role of anger rumination and hostile attribution bias as mediators of this relationship. A review of research literature shows that anger of rumination (Besharat & Hoseini, 2011; Denson et al., 2011; Martino et al., 2015; Martino et al., 2018; Peters et al., 2017; Quan et al., 2022; Quan et al., 2019; Saeedi et al., 2020; Sauer-Zavala et al., 2013; Turner, 2019; Wang et al., 2020; Zhu et al., 2020) and hostile attributions bias (Baer et al., 2012; Cruz et al., 2020; Kokkinos et al., 2019; Quan et al., 2019; Smeijers et al., 2017; Zhu et al., 2020) are related to both borderline personality traits and aggression. It seems that people with borderline personality traits will experience more aggressive behaviors through anger rumination and hostile attribution bias. Therefore, the aim of the present study was to investigate the mediating role of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression (Figure1).

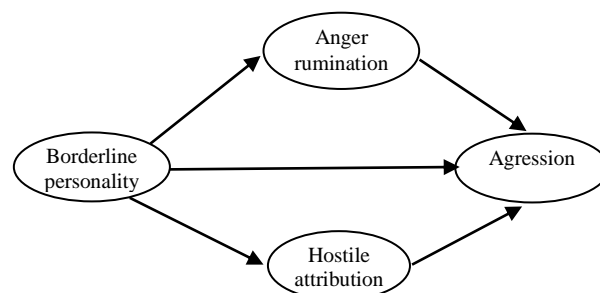


Figure 1. Conceptual model of model of mediation relationships

Method

Participants

This research was a fundamental and a descriptive correlational study. The population included all undergraduate and graduate students of Islamic Azad University of Neyshabur. The research sample included 211 undergraduate and graduate students. Due to the prevalence of the coronavirus disease (COVID-19), the participants answered the questions electronically (online). Ethical considerations included informed consent and confidentiality.

Instrument

Borderline Personality Scale:

The Borderline Personality Scale is a 18 item self-report measure developed by Claridge and Broks (1984) to assess the symptoms of borderline personality and then was revised by Rawlings et al. in 2001. This measure scored in a range from 0 (no) to 1 (yes). The STB has two subscales, including hopelessness (7 item) and impulsivity (7 item). The score range is between 0 and 14. The internal consistency (Cronbach alpha) for full STB was reported 0.80 (Rawlings et al., 2001). Mohammadzadeh et al. increased the number of items to 24 items. The STB has three subscales, including hopelessness (7 item), impulsivity (7 item), and stress related paranoid/dissociative symptoms (6 item). The Cronbach alpha coefficient for STB and the subscales of hopelessness, impulsivity, and stress-related paranoid/dissociative symptoms were 0.77, 0.64, 0.58 and 0.57, respectively. Also, test-retest reliability for STB and the subscales was reported 0.84, 0.53, 0.72 and 0.50, respectively (Mohammadzadeh et al., 2006). In the present study, the Cronbach alpha coefficient for STB was 0.82. The results of confirmatory factor analysis for the three-factor structure of the Persian version (CFI= 0.93, NFI= 0.84, IFI= 0.92, NNFI= 0.93, GFI= 0.88, RMSEA= 0.061) was good.

Hostile Attribution Bias Questionnaire:

The hostile attribution bias questionnaire is a 20 item self-report measure. Participants answer each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The score range is between 1 and 100. Some items of this questionnaire require reversed scoring. The test-retest reliability for HABS was reported 0.79 (Hoseini et al., 2017). In the present study, 10 items were selected, modified and used based on the age of students. The Cronbach alpha coefficient was 0.80. The results of the confirmatory factor analysis (CFI= 0.96, NFI= 0.92, NNFI= 0.94, IFI= 0.96, GFI= 0.94, RMSEA= 0.07) was good.

Anger Rumination Scale:

The anger rumination scale was developed by Sukhodolsky et al. (2001). It is a 19 item self-report measure scored on a 4-point scale ranging from 1 (almost never) to 4 (almost always). The score range is

between 19 and 76. This scale has four subscales: angry afterthoughts (6 item), thoughts of revenge (4 item), angry memories (5 item), and understanding of causes (4 item). The test-retest reliability for ARS was reported 0.77. Cronbach alpha for ARS and its subscales of angry were 0.93, 0.86, 0.72, 0.85, and 0.77, respectively (Sukhodolsky et al., 2001). The internal consistency of its Persian version was reported 0.95. The test-retest reliability was reported 0.74-0.83. It also has appropriate content, convergent and discriminant validity (Besharat, 2018). In the present study, Cronbach alpha coefficient for ARS and the subscales of angry afterthoughts, thoughts of revenge, angry memories, and understanding of causes were 0.93, 0.88, 0.77, 0.84, and 0.75, respectively. The results of confirmatory factor analysis (CFI= 0.97, NFI= 0.95, NNFI= 0.96, IFI= 0.97, GFI= 0.86, RMSEA= 0.08) was good.

Aggression Questionnaire:

The aggression questionnaire was developed by Buss and Perry (1992). It is a 29 item self-report measure scored on a 5-point scale ranging from 1 (not at all like me) to 5 (completely like me). This questionnaire has four subscales; physical aggression (9 item), verbal aggression (5 item), anger (8 item) and hostility (8 item). The score range is between 29 and 145. Cronbach alpha coefficient for AQ and for the subscales of physical aggression, verbal aggression, anger and hostility were 0.89, 0.85, 0.72, 0.83 and 0.77, respectively. The test-retest reliability for STB and the subscales was reported from 0.72 to 0.80. The correlation between subscales was reported from 0.25 to 0.48 (Buss & Perry, 1992). The test-retest reliability its Persian version was reported 0.78 (Samani, 2008). In the present study, Cronbach alpha coefficient for AQ and the subscales of physical aggression, verbal aggression, anger, and hostility was 0.86, 0.75, 0.35, 0.73, and 0.73, respectively. The results of confirmatory factor analysis, after removing the verbal aggression subscale and 12 and 16 items (CFI= 0.94, NFI= 0.88, NNFI= 0.93, IFI= 0.94, GFI= 0.85, RMSEA= 0.067) was good.

Procedure

The collected data was analyzed using descriptive statistics (mean, and standard deviation), Pearson correlation coefficient, structural equation modeling through SPSS and Lisrel software.

Results

The mean and standard deviation of age were 25.65 and 4.94, respectively. One hundred and seventy people were women (80.6%) and 41 (19.4%) men. All participants were psychology undergraduate (157, 74.4%) and graduate (54, 25.60%) students. Descriptive results are presented in Table 1.

Table 1. The mean and standard deviation of the variables

Variable	Mean±SD	Variable	Mean±SD
Physical aggression	15.29±5.59	Angry afterthoughts	11.66±4.09
Verbal aggression	13.46±3.26	Thoughts of revenge	6.86±2.56
Anger	15.54±5.12	Angry memories	10.18±3.23
Hostility	19.66±6.04	Understanding the causes	9.49±2.58
Aggression	63.84±15.71	Anger rumination	38.19±10.64
Hopelessness	2.38±2.05	Package 1	10.70±3.49
Impulsivity	2.51±2.008	Package 2	15.96±3.67
Dissociation	0.77±1.03	Hostile attribution	26.66±6.17
Borderline personality traits	5.66±4.05		

The results in Table 2 show that there is a significant positive relationship between borderline personality traits with hostile attribution bias, anger rumination, and aggression ($p<0.01$). There is also a significant positive

correlation between hostile attribution bias and anger rumination with aggression ($p<0.01$). Finally, there is a significant positive relationship between hostile attribution bias and anger rumination ($p<0.01$).

Table 2. The Pearson correlation coefficients related to research variables

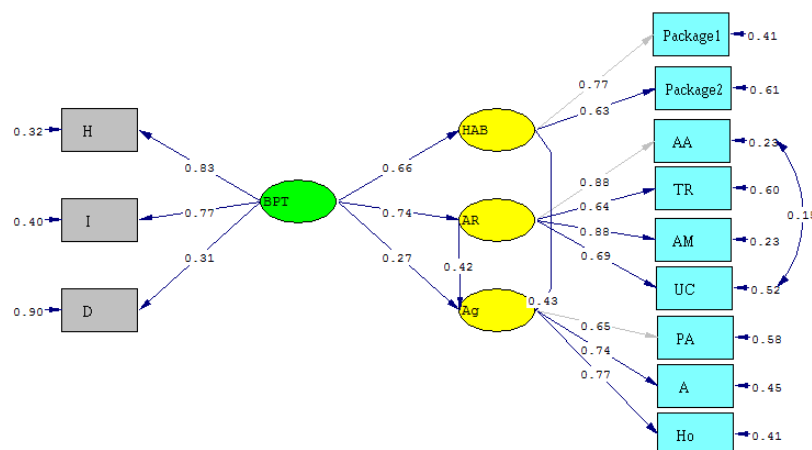
variable	BPT	HAB	AR
Borderline personality traits	—		
Hostile attribution bias	0.423**	—	
Anger rumination	0.579**	0.528**	—
Aggression	0.639**	0.621**	0.676**

The results of structural equation modeling showed that borderline personality traits predict hostile attribution bias ($t= 7.33$, $\beta= 0.66$, $p<0.01$), anger rumination ($t= 9.97$, $\beta= 0.74$, $p<0.01$), and aggression ($t= 2.12$, $\beta= 0.27$, $p<0.05$). Hostile attribution bias ($t= 3.69$, $\beta= 0.43$, $p<0.01$) and anger rumination ($t= 4.28$, $\beta= 0.42$, $p<0.01$) are predictors of aggression. The direct effect of borderline personality traits on hostile attribution bias, anger rumination and aggression is 0.66, 0.74 and 0.27;

respectively. The indirect effect of borderline personality traits on aggression by hostile attribution bias and anger rumination is 0.59 (Table 3). Chi-square, CFI, NFI, NNFI, IFI, GFI and RMSEA indicators for the final model was 146.24 ($p= 0.001$), 0.96, 0.95, 0.95, 0.96, 0.90 and 0.09; respectively (Figure 2). Therefore, anger rumination and hostile attribution bias mediate the relationship between borderline personality traits and aggression.

Table 3. Direct and indirect effects of variables

Effects	β	T	P
Borderline personality traits \rightarrow Aggression	0.27	2.12	0.05<
Borderline personality traits \rightarrow Hostile attribution bias	0.66	7.33	0.01<
Borderline personality traits \rightarrow Anger rumination	0.74	9.97	0.01<
Hostile attribution bias \rightarrow Aggression	0.43	3.69	0.01<
Anger rumination \rightarrow Aggression	0.42	4.28	0.01<
Borderline personality \rightarrow Hostile attribution bias \rightarrow Anger rumination	0.59	4.91	0.01<

**Figure 2.** The final model of mediating role of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression

Note: BPD= Borderline personality traits, H= Hopelessness, I= Impulsivity, D= Dissociation, HBA= Hostile attribution bias, AR= Anger rumination, AA= Angry afterthoughts, TR= Thoughts of revenge, AM= Angry memories, UC= Understanding the causes, Ag= Agression, PA= Physical aggression, A= Anger, Ho= Hostility

Discussion

The main aim of this study was to investigate the mediating role of anger rumination and hostile attribution bias in the relationship between borderline personality traits and aggression. The preliminary results have shown that there is a relationship between borderline personality traits, anger rumination, hostile attribution bias, and aggression. Previous studies have shown that there is a significant relationship between the traits of borderline personality and aggression in individuals with and without BPD (Sommerfeld & Shechory Bitton, 2020), female students (Turner, 2019; Zhu et al., 2020), people in treatment for substance use disorder (Shorey et al., 2016) and individuals with BPD (Cackowski et al., 2017; Mancke et al., 2017; Martino et al., 2015). The results of present study was similar to recent researches. Hence, higher levels of borderline personality traits are related to higher levels of aggressive behaviour among students. Also, similar to previous researches (Besharat & Hoseini, 2011; Denson et al., 2011; Martino et al., 2015; Martino et al., 2018; Quan et al., 2022; Quan et al., 2019; Saeedi et al., 2020; Turner, 2019; Wang et al., 2020; Zhu et al., 2020), shows that there is a significant relation between anger rumination and aggression. Therefore, people who ruminate more about their anger experiences experience more aggression. Finally, results showed that there is a relationship between hostile attribution bias and aggression among students. This results are similar to previous researches on students (Quan et al., 2019; Zhu et al., 2020) and people with BPD (Smeijers et al., 2017). So, higher levels of hostile attribution bias are related to higher levels of aggressive behaviour among students.

The results of the present study indicate that anger rumination and hostile attribution bias mediate the relationship between borderline personality traits and aggression. Although there was no research on the mediating role of two variables in the relationship between borderline personality traits and aggression, but but Martino et al. showed that anger rumination mediates the relationship between BPD diagnosis and aggressive behavior (Martino et al., 2015). They showed that anger rumination mediates the relationship between difficulty in emotion regulation and aggressive behavior among patients with personality disorders. Also, BPD diagnosis and anger rumination were predictors of aggression proneness. The recent research was conducted on a group of patients with personality disorders (93 with BPD), but the current study was conducted on a group of students. Mancke et al. found that emotion regulation and trait anger mediate the relationship between borderline personality disorder and aggression in female and male BPD patients (Mancke et al., 2017). Gagnon et al. report that hostile attribution bias dose not mediate the relationship between

borderline personality traits and reactive aggression. The sample of recent research consisted of 63 adults that complete online questionnaires and brain activity them was recorded (Gagnon et al., 2022). Kokkinos et al. found that hostile attribution bias mediated the links between personality (high neuroticism, low extraversion) and cyber-bullying among Greek students (Kokkinos et al., 2019).

To explain the above results, first mention the characteristics of BPD, which underlie the occurrence of aggression. People with BPD have unstable interpersonal relationships, self-image and affects, impulsivity, identity disturbance, recurrent suicidal behavior, gestures or threats, self-mutilating behavior, inappropriate, severe anger or difficulty controlling anger it, stress-related paranoid ideation or severe dissociative symptoms, chronic feeling of emptiness and trying to avoid real or imagined abandonment (AmericanPsychiatricAssociation, 2022). The symptoms of BPD, in particular the fear of rejection and abandonment, play an important role in the experience of severe and inappropriate anger, as well as difficulty in controlling it (AmericanPsychiatricAssociation, 2022; Scott et al., 2017). During or after the experience of inappropriate anger, anger rumination emerges as an inevitable and a repetitive cognitive process (repetitive thinking about anger experiences, causes and consequences of angry), continues and causes the maintain of anger (Sukhodolsky et al., 2001). Finally, repetitive thinking about anger leads to aggression. Anger rumination can influence angry affect, aggressive cognition, and physiological arousal. Since individual with high levels of anger rumination are more sensitive to threats and are more hostile towards others, they are more likely to act aggressively in such situations. Also, anger rumination may lead to aggression through impaired self-regulation/self-control (Wang et al., 2020). Denson et al. based on their temporal model, stated that rumination after anger-provoking events causes a decrease in self-control, followed by an increase in aggression (Denson et al., 2011). Researches have shown that there is a relationship between anger rumination and aggression among students (Denson et al., 2011; Quan et al., 2022; Quan et al., 2019; Saeedi et al., 2020; Turner, 2019; Wang et al., 2020; Zhu et al., 2020), national Iranian athletes (Besharat & Hoseini, 2011) and individuals with BPD (Martino et al., 2015; Martino et al., 2018). Also, borderline personality features are also associated with anger rumination among university (Basharpoor, et al., 2014; Peters et al., 2017; Sauer-Zavala et al., 2013; Turner, 2019). In the emotionl cascade model, it is believed that subsequent to an emotional stimulus and negative affects, ruminative processes lead to a positive feedback loop that increases the intensity of emotion and this leads to dysregulated behavior such as aggression and self-harm in people with BPD (Selby &

Joiner Jr, 2009). As mentioned, traits of BPD may lead to subsequent aggression due to anger rumination. Dysregulation of emotion and behavior is associated with various cognitive biases such as HAB. The results demonstrate that hostile attribution bias mediates the relationship between borderline personality traits and aggression. In ambiguous situations, people with BPD tend to interpret rejection as a threatening factor. This makes them overly sensitive to rejection, impulsive behavior, and negative emotions (Gagnon et al., 2022). People with BPD believe that others to be aggressive, hostile, rejecting, abandoning, dangerous and untrustworthy (Baer et al., 2012; Smeijers et al., 2017). Baer et al. found that people with BPD attend to negative stimuli, have disproportionate access to negative memories, endorse a range of BPD-consistent negative beliefs about themselves, the world, and other people, and make negatively biased interpretations and evaluations of neutral or ambiguous stimuli (Baer et al., 2012). These beliefs, and people tendency to attribute intentional and hostile motives to the actions of others, lead to aggression. Researches have also shown a link between hostile attribution bias and aggression (Gagnon et al., 2022; Gutz et al., 2016). Gutz et al. found that individuals with BPD exhibited more hostile attribution bias and a more tendency to aggressive behavior than healthy people (Gutz et al., 2016). Likewise, in the general aggression and social information processing models, hostile attributions play an important role in aggression (Krahé, 2013). In summary, these results similar to previous findings (Wang et al., 2019) shows that rumination and hostile attribution bias are important cognitive factors in aggressive behavior. This study was conducted on a group of students. Therefore, these results cannot be generalized to other groups. Variables were measured by self-report instruments, which in turn could affect the results of the research for various reasons such as bias or social desirability. A paper-and-pencil self-administered questionnaire was used to measure variables. Therefore, further research can use other methods, including interviews.

Conclusion

The results indicate that anger rumination and hostile attribution bias mediate the relationship between borderline personality traits and aggression. Therefore, it seems necessary to pay attention to these variables by researchers and specialists in the field of mental health. In addition, using or developing appropriate educational and therapeutic interventions effective on anger rumination and hostile attribution bias can help reduce aggressive behaviors.

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Disclosure Statement

There are no conflict of interest.

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