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## The Mediating Effect of Aggressive Motivation on the Relationship Between Trait Anger and Reactive Aggression: A Longitudinal Study

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### Abstract

Trait anger represents a significant personality factor influencing reactive aggression. Although the construct of reactive aggression is predicated upon aggressive motivation, the motivational mechanisms through which trait anger impacts reactive aggression remain unclear. This study hypothesized that trait anger longitudinally predicts reactive aggression by enhancing both the specific motivation for reactive aggression (i.e., hostile motivation) and the common motivation shared by reactive and proactive aggression (i.e., moral licensing motivation). To test this hypothesis, three-wave longitudinal surveys were conducted on trait anger, hostile attribution bias (representing hostile motivation) and moral disengagement (representing moral licensing motivation), as well as reactive aggression and proactive aggression, among a total of 1,007 college students from five provinces and municipalities. The results revealed that: (1) after controlling for gender, trait anger at Time 1 predicted reactive aggression at Time 3 via hostile attribution bias and moral disengagement at Time 2; (2) hostile attribution bias longitudinally predicted reactive aggression but did not predict proactive aggression across time; (3) moral disengagement longitudinally predicted both reactive aggression and proactive aggression. These findings support a motivational model of trait anger influencing reactive aggression, advance theory and research on the relationship between personality and aggression, and contribute positively to elucidating the motivational mechanisms underlying the formation of reactive aggression.

## Full Text

# The Mediating Role of Aggressive Motivation in the Relationship Between Trait Anger and Reactive Aggression: A Longitudinal Study

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## Abstract

Trait anger is a crucial personality factor influencing reactive aggression. Although reactive aggression is defined based on its underlying motivations, the motivational mechanisms through which trait anger affects reactive aggression remain unclear. This study hypothesized that trait anger could longitudinally predict reactive aggression by enhancing both the specific motivation for reactive aggression (i.e., hostile motivation) and the shared motivation for reactive and proactive aggression (i.e., moral approval motivation). To test this hypothesis, we conducted three waves of longitudinal surveys among 1,007 college students from five provinces, measuring trait anger, hostile attribution bias (representing hostile motivation), moral disengagement (representing moral approval motivation), reactive aggression, and proactive aggression. The results showed that: (1) after controlling for gender, trait anger at Time 1 predicted reactive aggression at Time 3 through hostile attribution bias and moral disengagement at Time 2; (2) hostile attribution bias longitudinally predicted reactive aggression but not proactive aggression across time; and (3) moral disengagement longitudinally predicted both reactive and proactive aggression. These findings support a motivational model of trait anger influencing reactive aggression, advance theory and research on the relationship between personality and aggression, and contribute to revealing the motivational mechanisms underlying the formation of reactive aggression.

**Keywords:** trait anger, reactive aggression, motivation, hostile attribution bias, moral disengagement

## 1. Problem Statement

Aggression refers to harmful behavioral responses or tendencies with intent to injure others (Anderson & Bushman, 2002; Buss & Perry, 1992). Based on different motivations, aggression can be divided into reactive aggression and proactive aggression (Dodge & Coie, 1987; Wang et al., 2020). Reactive aggression, also known as hostile aggression, is a behavior or tendency to respond to perceived provocation or threat with harm driven by hostility and anger (Dodge & Coie, 1987; Smeijers et al., 2018). Typical manifestations include road rage, crimes of passion, and self-defense counterattacks. Reactive aggression causes harm to both victims (Hammock et al., 2015; Martinelli et al., 2018) and per-

petrators (Babcock et al., 2014; Crick & Nelson, 2002). Moreover, reactive and proactive aggression differ significantly in their harmful effects, influencing factors, and formation mechanisms (Dambacher et al., 2015; Hubbard et al., 2010). Therefore, it is essential to specifically explore the influencing factors and mechanisms of reactive aggression to comprehensively and deeply understand the mechanisms of aggression, develop aggression theories, and implement targeted prevention and intervention.

Personality is widely recognized as an important factor influencing aggression (Ferguson & Dyck, 2012; Tackett et al., 2014). Among personality traits, trait anger is a well-established susceptibility factor for reactive aggression, leading scholars to propose the Integrative Cognitive Model (ICM) of trait anger and reactive aggression (Wilkowski & Robinson, 2010). However, to date, the longitudinal predictive effect of trait anger on reactive aggression and its underlying psychological mechanisms remain unclear. Therefore, this study attempts to further explore the longitudinal relationship between trait anger and reactive aggression and its mediating mechanisms based on existing theories and research.

### 1.1 Trait Anger and Reactive Aggression

Trait anger refers to the tendency to easily experience anger in daily life and represents a relatively stable personality trait (Spielberger et al., 1999). Cross-sectional surveys have shown significant correlations between trait anger and reactive aggression (Bondü & Richter, 2016), and experimental studies have found that trait anger can significantly predict reactive aggression behavior in the Taylor Aggression Paradigm under conditions of low provocation and alcohol consumption (Giancola, 2002). Building on previous research and theory, the Integrative Cognitive Model of trait anger and reactive aggression (Wilkowski & Robinson, 2010) proposes that hostile interpretation, ruminative attention, and effortful control mediate the relationship between trait anger and reactive aggression.

Although valuable work has been done on the relationship between trait anger and reactive aggression, several aspects warrant further development. First, in terms of research methodology, previous studies have predominantly used cross-sectional surveys and experimental methods, lacking longitudinal research on the relationship between trait anger and reactive aggression. Second, regarding mediating mechanisms, while the Integrative Cognitive Model identifies cognitive pathways through which trait anger triggers reactive aggression, no theory or research has yet revealed the motivational pathways. As noted, reactive and proactive aggression differ in their motivations; therefore, examining the relationship from a motivational perspective can better reveal the psychological mechanisms through which trait anger triggers reactive aggression and distinguish them from general mediating mechanisms of personality influencing aggression. This has important theoretical value for revealing the fundamental psychological mechanisms underlying the generation and formation of reactive

aggression and practical significance for guiding prevention and intervention efforts. Consequently, this study aims to explore the motivational pathways through which trait anger predicts reactive aggression.

## 1.2 The Motivation of Reactive Aggression

Reactive aggression is driven by two primary motivations. The first is hostile motivation, which refers to the need or tendency to eliminate provocative or threatening stimuli through harmful behavior to protect oneself, driven by emotions such as hostility, anger, or fear. This motivation arises from retaliatory and defensive motives triggered by threat or provocation (Anderson & Bushman, 2002; Smeijers et al., 2018) and includes both cognitive and emotional components. Hostile motivation is the unique motivation that distinguishes reactive aggression from proactive aggression (Crick & Dodge, 1994, 1996; Dodge & Coie, 1987).

Hostile attribution bias is the main cognitive component of hostile motivation (Crick & Dodge, 1994, 1996; Dodge & Coie, 1987), representing the tendency to interpret others' behavioral intentions as deliberately harmful in ambiguous situations (Crick & Dodge, 1994). The Social Information Processing (SIP) model (Crick & Dodge, 1994, 1996) proposes that hostile attribution bias is the primary cognitive factor triggering reactive aggression and has little relationship with proactive aggression, making it a unique motivation for reactive aggression. This view has been supported by numerous studies (e.g., Babcock et al., 2014; Wilkowski & Robinson, 2010). Therefore, it can be argued that hostile motivation, as a distinctive motivation for reactive aggression, typically forms and develops as individuals attribute hostile intent to others' provocative actions. Consequently, hostile attribution bias can serve as a representative factor of hostile motivation.

The second motivation for reactive aggression is moral approval motivation (Lagerspetz et al., 1988; Lagerspetz & Westman, 1980), which refers to the need or tendency to avoid, reduce, or eliminate the potential or actual inhibitory effects of morality on immoral behaviors such as aggression. This motivation typically emerges when individuals desire or are engaged in harmful behaviors toward others, aiming to reduce moral pressure and internal conflict (Bandura, 1999). Moral approval motivation is a shared motivation for both reactive and proactive aggression because both involve harmful intent and behavior (Anderson & Bushman, 2002; Wang et al., 2020), which typically conflicts with individual or societal moral standards and creates psychological conflict. To restore psychological balance, remove moral inhibition, and further drive aggressive behavior, individuals develop moral approval motivation. In other words, moral approval motivation represents the desire to avoid, reduce, or eliminate the moral pressure brought by aggressive behavior (e.g., condemnation from conscience or society) and to provide moral justification for one's aggressive actions.

Moral disengagement is the primary cognitive component of moral approval motivation, referring to the cognitive reconstruction of harmful behavior as good or appropriate to help individuals escape moral self-punishment or control (Bandura, 1999, 2002). It is both a moral cognition and a moral motivation, as individuals typically obtain moral approval through moral disengagement (Bandura et al., 2001; Caprara et al., 2014; Pornari & Wood, 2010). According to cognitive dissonance theory (Festinger, 1957) and moral disengagement theory (Bandura, 1999, 2002), when individuals develop aggressive intentions due to provocation, they experience cognitive conflict between beliefs such as “harmful behavior is necessary” and “harmful behavior is immoral.” To restore cognitive balance and facilitate the implementation of aggressive behavior, individuals develop a need for moral approval, manifested through moral disengagement. Therefore, moral disengagement can serve as a representative variable of moral approval motivation.

In summary, the motivations underlying reactive aggression include hostile motivation and moral approval motivation, which jointly drive the emergence and development of reactive aggression. These two motivations may influence each other to some extent because hostile motivation prompts individuals to retaliate or defend through harmful behavior, which typically involves moral risk and may trigger moral approval motivation to reduce moral pressure and internal conflict. Meanwhile, moral approval motivation may help individuals rationalize their harmful intentions, potentially strengthening hostile motivation.

### **1.3 Hypothesized Motivational Pathways of Trait Anger Influencing Reactive Aggression**

Based on the above analysis, we first hypothesize that trait anger can promote the formation and development of reactive aggression through hostile motivation, represented by hostile attribution bias. This hypothesis involves the relationships between trait anger and hostile attribution bias, as well as between hostile attribution bias and reactive aggression.

Previous research has supported the notion that trait anger can promote hostile attribution bias (e.g., Gagnon et al., 2016; Veenstra et al., 2017). Trait anger may influence hostile attribution bias for two reasons. First, trait anger prompts individuals to negatively evaluate their environment and others (Hazebroek et al., 2001), and hostile interpretation of others’ behavior and intentions in ambiguous provocative situations constitutes such a negative evaluation. Second, individuals high in trait anger exhibit perceptual biases when facing threat-related information, and trait anger has been found to be associated with selective attention to hostile social cues (Wenzel & Lystad, 2005; Wilkowski et al., 2007). Therefore, it can be inferred that trait anger leads individuals to pay more attention to hostile cues in ambiguous situations and make negative evaluations of others, making it easier to interpret others’ behavioral intentions as hostile. The notion that hostile attribution bias leads to reactive aggression is a fundamental proposition of the social information processing model (i.e.,

when individuals perceive hostility from others, they tend to use aggression to retaliate) and has been supported by numerous studies (e.g., AlMoghrabi et al., 2018; Thomas & Weston, 2019; Wilkowski et al., 2015). For example, participants trained to exhibit hostile attribution bias showed significantly increased reactive aggression in experimental tasks (AlMoghrabi et al., 2018; Wilkowski et al., 2015). Thus, trait anger increases the likelihood that individuals will interpret others' behavior or intentions as hostile, and hostile attribution bias subsequently increases the frequency or likelihood of reactive aggression following provocation or threat.

Second, we propose that trait anger can promote the formation and development of reactive aggression by enhancing moral approval motivation, represented by moral disengagement. This view includes two inferences: trait anger can increase moral disengagement, and moral disengagement can facilitate reactive aggression.

The General Aggression Model (Anderson & Bushman, 2002) states that aggression-related personality factors such as trait anger influence psychological activities including moral justification and dehumanization, which are mechanisms of moral disengagement. This may explain why trait anger can promote moral disengagement. We argue that moral disengagement can influence reactive aggression because: first, numerous studies have shown that moral disengagement increases various forms of aggression, including physical, verbal, and social aggression (Anderson & Bushman, 2002; Wang et al., 2017), most of which involve reactive aggression; second, as mentioned earlier, moral disengagement reduces the inhibitory effect of the moral system on aggressive behavior, thereby alleviating the moral pressure individuals experience when engaging in reactive aggression and facilitating such behavior. Thus, trait anger prompts individuals to cognitively restructure their reactive aggression as justified to reduce moral pressure and psychological conflict, and enhanced moral disengagement subsequently drives the formation and development of reactive aggression.

In summary, trait anger may increase the likelihood or frequency of reactive aggression in daily life by enhancing the motivations for reactive aggression (i.e., hostile motivation and moral approval motivation). Hostile attribution bias and moral disengagement serve as representative variables of these two motivations.

#### 1.4 The Present Study

This study employed a three-wave longitudinal survey with six-month intervals among college students from five provinces to examine the longitudinal predictive effect of trait anger on reactive aggression and the mediating roles of hostile motivation (represented by hostile attribution bias) and moral approval motivation (represented by moral disengagement). Additionally, based on the aforementioned view that hostile and moral approval motivations can influence each other, we hypothesized that hostile attribution bias and moral disengage-

ment would be reciprocally predictive and serve as two parallel mediating factors in the prediction of reactive aggression by trait anger.

## 2. Method

### 2.1 Participants

The data for this study were derived from a large-scale joint longitudinal survey based on the motivational model of reactive aggression. Using cluster sampling, the survey targeted undergraduate students from five universities in Beijing, Chongqing, Guizhou, Guangxi, and Sichuan provinces. The initial assessment included 1,100 participants with a mean age of  $19.00 \pm 0.99$  years (range: 16.67–25.17 years). Subsequent assessments were conducted every six months, resulting in three waves of data collection. The final sample consisted of 1,007 participants (71.1% female, 28.9% male) with valid data on the variables of interest, yielding a retention rate of 91.55%. Tests for differences between retained and attrited participants on trait anger, hostile attribution bias, moral disengagement, reactive aggression, and proactive aggression at Time 1 revealed no significant differences (trait anger:  $t(1098) = -0.55$ ,  $p = 0.583$ ; hostile attribution bias:  $t(1097) = 1.16$ ,  $p = 0.246$ ; moral disengagement:  $t(1098) = 0.66$ ,  $p = 0.510$ ; reactive aggression:  $t(1098) = -0.63$ ,  $p = 0.532$ ; proactive aggression:  $t(1098) = 1.11$ ,  $p = 0.266$ ), indicating no systematic attrition. The study was approved by the Ethics Committee of the Faculty of Psychology at Southwest University.

### 2.2 Measures

**2.2.1 Trait Anger** Trait anger was measured using the Trait Anger subscale of the State-Trait Anger Expression Inventory (STAXI-2) developed by Spielberger et al. (1999). This subscale comprises 10 items (e.g., “I have a fiery temper”) rated on a 4-point Likert scale from 1 (almost never) to 4 (almost always). Mean scores were calculated, with higher scores indicating higher levels of trait anger. The scale has demonstrated good reliability and validity in Chinese research (Hou et al., 2017). Confirmatory factor analysis indicated that the single-factor structure fit the data well:  $\chi^2 = 3.354$ – $6.994$ ,  $df = 2$ ,  $\chi^2/df = 1.677$ – $3.497$ , RMSEA (90% CI) = 0.026–0.050 (0.000, 0.092), CFI = 0.995–0.999, TLI = 0.986–0.996, SRMR = 0.008–0.012. In this study, Cronbach’s  $\alpha$  coefficients were 0.78, 0.82, and 0.83 at the three time points, respectively.

**2.2.2 Hostile Attribution Bias** Hostile attribution bias was measured using the Hostile Attribution Bias subscale of the Word Sentence Association Paradigm-Hostility Scale (WSAP-Hostility) developed by Dillon et al. (2015). This subscale includes 16 items (e.g., “Someone slams the door in front of you …insulting”) that require participants to rate the relatedness of each sentence-word pair on a 6-point Likert scale from 1 (completely unrelated) to 6 (very related). Mean scores were calculated, with higher scores indicating a greater tendency toward hostile attribution. The scale has demonstrated good reliabil-

ity and validity (Quan & Xia, 2019). Confirmatory factor analysis showed that the single-factor model fit the data well:  $\chi^2 = 7.996-9.370$ ,  $df = 2$ ,  $\chi^2/df = 3.998-4.685$ , RMSEA (90% CI) = 0.055-0.061 (0.019, 0.102), CFI = 0.995-0.996, TLI = 0.985-0.989, SRMR = 0.008-0.011. In this study, Cronbach's  $\alpha$  coefficients were 0.87, 0.89, and 0.92 at the three time points, respectively.

**2.2.3 Moral Disengagement** Moral disengagement was measured using the Civic Moral Disengagement Questionnaire (CMD) developed by Caprara et al. (2009). This 32-item questionnaire (e.g., "It is reasonable to use tough measures to quiet down annoying people") asks participants to respond based on their actual circumstances using a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree). Mean scores were calculated, with higher scores indicating higher levels of moral disengagement. The questionnaire has demonstrated good reliability and validity (Fang & Wang, 2020). Confirmatory factor analysis indicated that the single-factor structure fit the data well:  $\chi^2 = 6.458-7.935$ ,  $df = 2$ ,  $\chi^2/df = 3.229-3.968$ , RMSEA (90% CI) = 0.047-0.054 (0.009, 0.096), CFI = 0.997-0.998, TLI = 0.992-0.994, SRMR = 0.006-0.008. In this study, Cronbach's  $\alpha$  coefficients were 0.92, 0.91, and 0.93 at the three time points, respectively.

**2.2.4 Reactive and Proactive Aggression** Reactive and proactive aggression were measured using the Reactive-Proactive Aggression Questionnaire developed by Raine et al. (2006). This 23-item scale includes 11 items measuring reactive aggression (e.g., "Hitting someone in self-defense") and 12 items measuring proactive aggression (e.g., "Getting into gang fights to look cool"). Participants responded using a 6-point Likert scale from 1 (completely uncharacteristic) to 6 (completely characteristic). Mean scores were calculated, with higher scores indicating higher levels of aggression. The scale has demonstrated good reliability and validity in Chinese research (Quan & Xia, 2019). Confirmatory factor analysis showed that the two-factor model fit the data well:  $\chi^2 = 3.235-7.117$ ,  $df = 2$ ,  $\chi^2/df = 1.618-3.559$ , RMSEA (90% CI) = 0.025-0.051 (0.000, 0.097), CFI = 0.997-0.999, TLI = 0.992-0.998, SRMR = 0.004-0.010. In this study, Cronbach's  $\alpha$  coefficients for the reactive aggression subscale were 0.84, 0.87, and 0.87 at the three time points, respectively, while coefficients for the proactive aggression subscale were 0.90, 0.95, and 0.95.

### 2.3 Procedure

Trained research assistants administered the questionnaires to participants in classroom settings after obtaining informed consent. Participants completed a series of questionnaires including the four measures described above, followed by demographic questions. Questionnaires were collected immediately upon completion, and participants received monetary compensation. The interval between adjacent assessments was six months, with three waves of data collected in total.

## 2.4 Data Processing and Analysis

Data were analyzed using SPSS 20.0 and Mplus 7.0. Participants who failed to complete all three surveys, admitted to careless responding, or exhibited patterned responding were excluded. SPSS 20.0 was used for descriptive statistics, correlation analysis, and common method bias testing. Mplus 7.0 was employed for confirmatory factor analysis and structural equation modeling. To simplify the models and improve fit, item parceling was performed using random parceling for all variables. Full Information Maximum Likelihood (FIML) estimation was used to handle non-normal data and missing values. Bias-corrected Bootstrap methods with 5,000 resamples were used to test mediation effects in latent variable models.

## 3. Results

### 3.1 Common Method Bias Test

Since all data were self-reported by college students, Harman's single-factor test was used to assess common method bias. The results showed that the first factor explained 19.01%, 21.06%, and 23.26% of the variance across the three measurement waves, respectively, all below the 40% critical value. Therefore, no serious common method bias was present in this study.

### 3.2 Descriptive Statistics and Correlation Analysis

The means, standard deviations, and Pearson correlations for all study variables are presented in Table 1. All variables were significantly positively correlated across the three time points.

### 3.3 Cross-Lagged Model Analysis

First, we constructed a cross-lagged model including trait anger, hostile attribution bias, moral disengagement, and reactive aggression across three time points. After sequentially deleting non-significant paths, the final model fit the data well:  $\chi^2 = 3652.634$ ,  $df = 1091$ ,  $\chi^2/df = 3.348$ , RMSEA (90% CI) = 0.048 (0.047, 0.050), CFI = 0.916, TLI = 0.909, SRMR = 0.056. As shown in Figure 1 [Figure 1: see original paper], after controlling for gender, trait anger at Time 1 predicted hostile attribution bias ( $\beta = 0.10$ ,  $p = 0.003$ ) and moral disengagement ( $\beta = 0.12$ ,  $p < 0.001$ ) at Time 2. Hostile attribution bias ( $\beta = 0.11$ ,  $p = 0.001$ ) and moral disengagement ( $\beta = 0.09$ ,  $p = 0.007$ ) at Time 2 predicted reactive aggression at Time 3. Additionally, moral disengagement at Time 1 predicted hostile attribution bias at Time 2 ( $\beta = 0.10$ ,  $p = 0.001$ ), and hostile attribution bias at Time 2 predicted moral disengagement at Time 3 ( $\beta = 0.09$ ,  $p = 0.005$ ). Bootstrap analysis revealed significant indirect effects of hostile attribution bias at Time 2 ( $ab = 0.01$ ,  $p = 0.026$ , 95% CI = 0.001-0.020) and moral disengagement at Time 2 ( $ab = 0.01$ ,  $p = 0.033$ , 95% CI = 0.001-0.021) in the prediction of reactive aggression at Time 3 by trait anger at Time 1.

Second, we replaced reactive aggression with proactive aggression in the model and conducted cross-lagged analysis again. The results showed that the paths from trait anger, hostile attribution bias, and moral disengagement to proactive aggression were all non-significant.

Finally, we conducted a three-wave cross-lagged analysis of moral disengagement and proactive aggression, which revealed that moral disengagement at Time 1 significantly predicted proactive aggression at Time 2 ( $\beta = 0.076$ ,  $p = 0.022$ ).

## 4. Discussion

### 4.1 The Mediating Role of Hostile Attribution Bias

The results shown in Figure 1 indicate that trait anger predicts hostile attribution bias six months later, consistent with previous experimental findings (Gagnon et al., 2016; Hazebroek et al., 2001; Wilkowski & Robinson, 2007) and supporting the basic proposition of the General Aggression Model (Anderson & Bushman, 2002) that personality traits can influence aggression-related cognition as input variables. To our knowledge, no previous study has revealed the longitudinal relationship between trait anger and hostile attribution bias, making this study a novel contribution. Trait anger may predict hostile attribution bias primarily because it prompts individuals to process events with hostile cognition (Veenstra et al., 2018), leading them to interpret perceived provocation and 挑衅 from a negative perspective and attribute hostile intent to others' behavior.

This study also found that hostile attribution bias can predict reactive aggression across time but cannot longitudinally predict proactive aggression, consistent with previous research (Gagnon & Rochat, 2017; Martinelli et al., 2018). For example, hostile attribution bias can predict long-term aggressive behavior, including reactive aggression, one year later (Dodge et al., 2015). Hostile attribution bias may predict reactive aggression because when individuals perceive external hostility, they attempt to defend against, retaliate against, or resist perceived provocation (e.g., harm, threat, and frustration caused by others) through aggression (Gagnon et al., 2016).

Furthermore, the results show that hostile attribution bias at Time 2 mediates the relationship between trait anger at Time 1 and reactive aggression at Time 3. This finding supports our hypothesis and aligns with the basic propositions of both the General Aggression Model (Anderson & Bushman, 2002) and the Integrative Cognitive Model of trait anger and reactive aggression (Wilkowski & Robinson, 2010). It suggests that trait anger increases the frequency or likelihood of hostile attribution of others' behavioral intentions in ambiguous situations, which in turn leads individuals to more frequently or readily engage in reactive aggression when encountering provocation or threat in daily life.

## 4.2 The Mediating Role of Moral Disengagement

The cross-lagged model analysis shown in Figure 1 indicates that trait anger can longitudinally predict moral disengagement. This may be because trait anger influences cognitive processing of information related to immoral behavior, prompting individuals to change moral standards and interpret immoral behavior as reasonable or moral. This result supports our research hypothesis and extends research on the functions of trait anger, suggesting that trait anger influences not only emotion-related psychological factors but also individuals' moral psychology.

Figure 1 shows that moral disengagement can predict reactive aggression six months later. Additionally, cross-lagged analysis of moral disengagement and proactive aggression revealed that moral disengagement at Time 1 significantly predicted proactive aggression at Time 2. While some studies have explored the relationship between moral disengagement and aggression (e.g., Hymel et al., 2005; Perren & Gutzwiller-Helfenfinger, 2012; Wachs, 2012), to our knowledge, only one cross-sectional study has directly examined the relationship between moral disengagement and reactive aggression (Zhang & Wang, 2013), and no study has explored their longitudinal relationship. Our findings support and extend previous research. Moral disengagement may longitudinally predict both reactive and proactive aggression because it helps individuals alleviate the moral pressure associated with aggressive intentions or behavior, reduces the inhibitory effect of the moral system on aggressive behavior, and facilitates or promotes the enactment of both reactive and proactive aggression.

Figure 1 also demonstrates that moral disengagement at Time 2 mediates the relationship between trait anger at Time 1 and reactive aggression at Time 3. This supports our hypothesis and suggests that trait anger prompts individuals to cognitively restructure aggressive behavior, perceiving harmful and immoral actions as appropriate or reasonable to avoid moral punishment such as self-blame, guilt, and public condemnation. The moral disengagement enhanced by trait anger then increases the frequency or tendency of individuals to respond to provocation with aggression.

## 4.3 The Predictive Relationship Between Hostile Attribution Bias and Moral Disengagement

The cross-lagged model analysis shown in Figure 1 indicates that moral disengagement at Time 1 significantly predicts hostile attribution bias at Time 2, and hostile attribution bias at Time 2 significantly predicts moral disengagement at Time 3. These results partially support the hypothesis of a reciprocal predictive relationship between hostile attribution bias and moral disengagement. This reciprocal relationship may exist because: first, moral disengagement rationalizes harmful intentions, which may strengthen and consolidate individuals' harm/aggression schemas, thereby promoting the development of hostile attribution bias; second, hostile interpretation of others' behavioral inten-

tions can provide justification and rationale for moral disengagement, making it easier for individuals to reframe immoral harmful behavior as reasonable or non-violative of moral standards, thereby increasing moral disengagement. Additionally, hostile attribution bias may promote the development and strengthening of harm/aggression schemas while simultaneously increasing moral disengagement. Based on this, we can further speculate that hostile motivation and moral approval motivation may predict each other to some extent.

#### **4.4 Analysis of Motivational Pathways in Trait Anger Predicting Reactive Aggression**

In summary, trait anger can increase the frequency or tendency of reactive aggression by enhancing individuals' hostile motivation and moral approval motivation. Hostile motivation is the unique motivation for reactive aggression, whereas moral approval motivation is shared by both reactive and proactive aggression. This study examined this proposition using hostile attribution bias and moral disengagement as representative variables of these two motivations. The results partially support our hypothesis and suggest that hostile motivation and moral approval motivation constitute two parallel mediating pathways through which trait anger predicts reactive aggression.

In addition to enhancing hostile attribution bias as the cognitive component of hostile motivation, trait anger may also directly strengthen the emotional experience associated with hostile motivation. Both the cognitive and emotional components of hostile motivation may lead individuals to use aggression more frequently to cope with provocation in daily life. Therefore, trait anger increases the frequency or likelihood of reactive aggression by enhancing individuals' hostile motivation. Whether trait anger can directly predict or influence reactive aggression through emotional factors of hostile motivation such as anger and resentment requires further investigation.

Beyond enhancing moral disengagement, the promoting effect of trait anger on moral approval motivation may also manifest in facilitating moral foundation and standard switching, enhancing moral cleansing, and reducing or eliminating the moral conflict and dissonance caused by aggressive intentions or behavior. Enhanced moral approval motivation makes it easier for individuals to engage in reactive aggression when encountering provocation. Future research should explore what other factors of moral approval motivation may mediate the relationship between trait anger and reactive aggression.

#### **4.5 Research Significance**

Theoretically, this study proposes mediating mechanisms of trait anger enhancing reactive aggression from a motivational perspective and constructs a motivational model of personality and reactive aggression. This model develops and deepens theories on the relationship between personality and aggression, providing a theoretical framework for understanding the motivational mecha-

nisms through which personality promotes aggressive behavior. It can be used not only to integrate and explain existing mediating mechanisms of personality influencing aggression but also to inspire further empirical research.

Additionally, the findings have practical implications for the prevention and intervention of aggression in two ways. First, this study suggests that parents and educators should pay attention to college students' personality characteristics, particularly aggression-related susceptibility factors such as trait anger, and should focus on personality cultivation in early childhood to prevent the development of aggressive personalities. Second, prevention and intervention efforts can target the motivations for reactive aggression (including hostile motivation and moral approval motivation) to reduce aggression, particularly among students high in trait anger. For example, cognitive correction methods can be used to guide students toward comprehensive and reasonable attribution, reducing hostile attribution to inhibit hostile motivation, while moral education can be strengthened to reduce moral disengagement and inhibit moral approval motivation. These educational measures can help reduce the likelihood of intense reactive aggression when students encounter provocation.

#### 4.6 Limitations and Future Directions

This study has several limitations that warrant improvement. First, the motivational model of trait anger longitudinally predicting reactive aggression was not fully supported by the cross-lagged model analysis. Specifically, the paths from trait anger at Time 1 to reactive aggression at Time 2, from trait anger at Time 2 to hostile attribution bias and moral disengagement at Time 3, from hostile attribution bias at Time 1 to moral disengagement at Time 2, and from moral disengagement at Time 2 to hostile attribution bias at Time 3 were all non-significant. These unexpected results may be due to the large number of variables included in the cross-lagged model, where some longitudinal predictive effects were relatively weak and may have become non-significant due to measurement and random error. Additionally, the six-month interval between assessments may have been insufficient for substantial change in the predicted variables, resulting in relatively small predictive effects. Future research should increase the time interval between assessments. In conclusion, the motivational model of trait anger predicting reactive aggression requires further testing.

Second, the participants were college students, so whether the motivational mechanisms through which trait anger enhances reactive aggression apply to other populations remains to be explored. Future research should examine these mediating mechanisms in other groups such as children, adolescents, and community adults. Third, this study relied solely on self-report measures. Future research should combine self-report with other-report and experimental tasks to test these motivational pathways. Fourth, this study only examined the mediating roles of hostile attribution bias and moral disengagement as two typical motivational factors for reactive aggression. Future research could explore whether other motivational factors such as hostility, fear, anger, anger rumination, moral

standard switching, and moral cleansing also have (chained) mediating effects.

Motivation is the core concept defining reactive aggression, and revealing the motivational mechanisms through which personality predicts aggression has important theoretical and practical significance. Through a three-wave longitudinal study, we found that trait anger can longitudinally predict reactive aggression through the parallel mediating effects of two reactive aggression motivations: hostile motivation (represented by hostile attribution bias) and moral approval motivation (represented by moral disengagement).

*Note: Figure translations are in progress. See original paper for figures.*

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