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Emotion Differentiation Moderates Aggressive Tendencies in Angry People: A Daily Diary Analysis

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Anger is commonly associated with aggression. Inefficient anger-coping strategies increase negative affect and deplete the regulatory resources needed to control aggressive impulses. Factors linked with better emotion regulation may then weaken the relationship between anger and aggression. The current work explored one factor associated with emotion regulation—differentiating one's emotions into discrete categories—that may buffer angry people from aggression. Three diary studies ($N = 628$) tested the hypothesis that emotion differentiation would weaken the relationship between anger and aggression. In Study 1, participants high in emotion differentiation reported less daily aggressive tendencies when angry, compared to low differentiators. In Study 2, compared to low differentiators, high differentiators reported less frequent provocation in daily life and less daily aggression in response to being provoked and feeling intense anger. Study 3 showed that high daily emotional control mediated the interactive effect of emotion differentiation and anger on aggression. These results highlight the importance of considering how angry people differentiate their emotions in predicting their aggressive responses to anger.

Keywords: emotion, affect, categorization, anger, aggression

The potential for anger pervades daily life. Drivers pound their horns instead of politely honking, coworkers make biting remarks instead of offering constructive criticism, and close relationship partners criticize their loved ones instead of supporting them. Anger has long been associated with aggressive behavior (Berkowitz, 1983, Berkowitz, 1990; Dollard, Doob, Miller, Mower, & Sears, 1939). Moreover, angered people often aggress when doing so can change their mood (Bushman, Baumeister, & Phillips, 2001). Despite widespread acceptance of the role of anger in predicting aggression, it is unclear why some angry people become aggressive while others do not. The current research focuses on one factor—the ability to differentiate one's negative emotional experiences into discrete categories—that might make people resilient to aggression following anger provocation. We propose that emotion differentiation improves coping and allows for greater regulatory control over one's emotional state, due to an enhanced capacity for understanding, clarifying, and describing what one feels at any point in time. We predict that such better emotional control would have implications for buffering angry people from aggressive behavior.

Anger and Poor Emotion Regulation

When people feel angry or upset, they are motivated to improve their mood (Morris & Reilly, 1987). Indeed, emotion regulation efforts occur so rapidly after an upsetting event that it is difficult to keep participants in a bad mood (Isen, 1984, Isen, 1987; Taylor, 1991; Worth & Mackie, 1987). However, anger is linked to poor strategies for emotion regulation. For instance, angry people often ruminate over the experience that provoked them; they turn their attention inward, either reliving the angry experience itself or focusing attention on how bad they feel (Caprara, 1986; Lyubomirsky & Nolen-Hoeksema, 1995). Anger rumination is not an effective coping strategy because it ultimately increases aggression, even against innocent bystanders (Bushman, 2002; Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005; Denson, Pedersen,

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Friese, Hahm, & Roberts, 2011). For instance, anger rumination plays a major role in displaced aggression (e.g., road rage; Denson, Pedersen, & Miller, 2006). Rumination processes also increase angry affect, physiological arousal, and aggressive cognition (Pedersen et al., 2011). Anger rumination also depletes precious regulatory resources needed to suppress aggressive impulses (Denson, 2009; Denson et al., 2011).

Venting is another poor emotion regulation strategy linked to anger. Venting involves acting out aggressive impulses on people or inanimate objects (e.g., punching a pillow, screaming, hitting a punching bag). Angered people expect to feel better after venting. In fact, if angered people believe their mood is unchangeable, they are much less likely to behave aggressively (Bushman et al., 2001). Although some people take pleasure in venting their frustrations, venting increases aggression because it cues aggressive cognition and behavior (Bushman, 2002; Bushman, Baumeister, & Stack, 1999; Hornberger, 1959). In effect, rumination and venting represent poor anger regulation strategies, if one's goal is to reduce or even prevent aggressive behavior.

Emotion Differentiation as a Marker for Resiliency

The preceding research implies that anger is associated with ineffective emotion regulation strategies that increase aggression. Traits associated with effective emotion regulation may therefore buffer angered people from behaving aggressively. Emotion differentiation is a promising candidate for an individual difference factor associated with effective emotion regulation, which may have implications for weakening the relationship between anger and aggression.

Emotion differentiation, also known as *emotional granularity,* refers to how much a person is aware of and able to classify experiences into discrete emotion categories (Barrett, Gross, Christensen, & Benvenuto, 2001; Kashdan, Ferssizidis, Collins, & Muraven, 2010; Tugade, Fredrickson, & Barrett, 2004). People who show a diminished capacity for understanding, clarifying, and describing what they are feeling at a given point of time (i.e., low emotion differentiators) have difficulty discerning more detail about an emotional state beyond the presence of positive or negative valence (i.e., feeling "good" or "bad"). This lack of understanding may lead low emotion differentiators to misinterpret and ruminate about negative arousal states. Moreover, low differentiators may become susceptible to binge eating, substance abuse, and other self-destructive strategies to down-regulate negative emotions (Kashdan et al., 2010; Taylor, Bagby, & Parker, 1997). Parker, Taylor, and Bagby (1998) suggest that people with little ability to distinguish their emotions have less capacity for emotion regulation. On the other hand, people who fare better in discerning emotions are more adept at regulating emotions and possess fewer negative attitudes and less distress about intense emotions; thus, they may be more resilient when confronting stress (Barrett et al., 2001; Kang & Shaver, 2004; Kashdan et al., 2010; Tugade et al., 2004).

Preliminary evidence for the association between low emotion differentiation and aggression stems from the literature on alexithymia. People with alexithymia—who are less able to identify and describe emotions, and less able to discern emotions from bodily sensations—report similar or more intense physiological arousal to unpleasant stimuli (e.g., Luminet, Rime, Bagby, & Taylor, 2004). People who have difficulty identifying feelings are also prone to engage in impulsive aggression (Fossati et al., 2009; Teten, Miller, Bailey, Dunn, & Kent, 2008). However, this research is difficult to interpret due to the reliance on people's responses to global questionnaires on their metacognitive ability to differentiate emotions. People asked to respond to broad statements (e.g., "I have feelings that I can't quite identify") may provide answers based on limited insight, influenced by social desirability. Some novel approaches from neuroimaging (e.g., New et al., 2002) and interview transcript analyses (Villemarette-Pittman, Stanford, & Greve, 2003) have also shown that deficits in the ability to recognize and articulate emotional experiences also predicted impulsive aggression.

Emotion differentiation may be better captured with a skills-based measurement, such as observing how people discriminate their emotional experiences over multiple occasions (Dunning, Heath, & Suls, 2004). Only a few studies have examined daily variations in emotions as they relate to daily experiences (e.g., Kashdan et al., 2010; Swendsen et al., 2000; Tennen, Affleck, Armeli, & Carney, 2000). To better understand how emotional experiences influence the tendency to aggress, as well as possible buffers to this relationship, it is crucial to employ a methodology that captures feelings and events across time in a person's natural environment. From this perspective, emotion differentiation shows promise as a component of resilience. For example, Ong and Bergeman (2004) found that higher levels of trait resilience predicted greater emotion differentiation and a higher co-occurrence of positive and negative emotions over a 30-day sampling period. Kang and Shaver (2004) found high emotion differentiators had better interpersonal relationships (both self- and partner-rated). Ong, Bergeman, and Boker (2009) argued that "emotional complexity may be a resource that resilient people draw upon during times of challenge and adversity" (p. 1784). Consistent with this argument, the current investigation addresses how emotion differentiation may buffer angry people against aggressive responding.

Emotional Control Underlies Emotion Differentiation Effects

Why might emotion differentiation buffer angered people from aggression? Better emotional control is one possibility. People who are high in emotion differentiation, particularly the differentiation of intense negative emotions, have more emotional intelligence, a greater sensitivity to internal and situational cues, and a larger inventory of adaptive emotion regulation strategies at their disposal (Barrett & Gross, 2001; Barrett et al., 2001; Kashdan & Rottenberg, 2010). In fact, people who are better at differentiating their emotional experience also report less self-distraction and more engagement during times of stress, as well as a greater ability to think carefully about their behavioral options in the stressful situation (Tugade et al., 2004). Thus, high emotion differentiators may spend less time and self-regulatory resources on counterproductive anger-regulation strategies that ultimately increase angry affect and aggression (Bushman, 2002; Bushman et al., 1999; Denson et al., 2011).

The Present Research

The present research tested the dual hypothesis that emotion differentiation moderates aggressive responding in angry people,

and that greater emotional control mediates this effect. To provide converging evidence in support of our hypothesis, we conducted three diary studies examining negative emotion differentiation and aggression. We predicted that on days when people feel more intense anger, high emotion differentiators will report less daily aggression, compared to low differentiators. In Study 3, we tested whether greater emotional control mediates the interactive effect of emotion differentiation and anger on aggression.

Study 1: Emotion Differentiation Predicts Less Daily Aggressive Tendencies in Angry People

Study 1 provided an initial test of the hypothesis that emotion differentiation predicts less aggression in people who feel angry. Participants completed daily measures of negative emotion and aggressive tendencies three times a week for a 25-day period (total of 10 waves). We predicted that high emotion differentiators would be less susceptible to aggression when they felt angry, compared to people who were less adept at differentiating their negative emotions.

Method

Participants

Participants consisted of 199 undergraduate students (76% women) at a large, Southern-Atlantic university. With a mean age of 19.42 (SD = 1.54), 70.4% of participants were Caucasian, 13.1% were Hispanic, 2.0% were Asian American, 18.2% were African American, and 9.3% of participants reported their race as "other." Students received research credit for participation.

Measures

Negative emotion differentiation. Participants completed the negative affect subscale of the PANAS (NA; Watson, Clark, & Tellegen, 1988), which assessed the intensity of negative emotions (e.g., nervous, distressed, scared, hostile) participants experienced each day. Each item was measured on a 5-point scale (from *very slightly or not at all* to *extremely*). An index of negative emotion differentiation was computed by calculating average intraclass correlations with absolute agreement between the negative emotion adjectives across the assessment period for each participant (Barrett, 1998; Kashdan et al., 2010; Tugade et al., 2004). Larger correlation scores indicated less differentiation of emotions. A Fisher r to z transformation was computed on all intraclass correlations before any additional analyses.[1]

Daily intensity of anger experience. Participants completed four items measuring how much within the past 24 hours a close friend has made them feel angry, frustrated, provoked, and hostile, relative to other days. The items were assessed on a 9-point scale from −4 (*Far less than usual*) to +4 (*Far more than usual*) and were summed to form a composite of daily anger intensity. Higher numbers indicated greater feelings of anger.

Daily aggressive tendencies. Participants completed an abbreviated form of the physical (e.g., "Given enough provocation today, I might hit another person") and verbal (e.g., "If people were annoying me today, I would tell them what I think of them") aggression subscales of the Aggression Questionnaire (AQ; Buss & Perry, 1992), which was modified for daily use. This measure was used because self-reported propensities toward physical and verbal aggression are strongly related to behavioral aggression (Giancola & Parrott, 2008). Responses across the items were summed to form a composite measure of daily aggressive tendencies. Higher numbers indicated greater aggression.

Procedure

Participants were given a URL to record their feelings and behaviors three times each week for 25 days, which included the measures of negative affect, anger intensity, and aggression. Participants were instructed to complete their daily surveys at the end of each day before midnight. To increase compliance, researchers stressed that receiving full participation credit was contingent on timely reporting, and that a time-date stamp would be recorded on each log. All information submitted via online survey was confidential and stored on a secure server. A debriefing followed.

Results

Preliminary Analyses

Our main prediction was that among people who reported feeling more intense anger, those who were better at differentiating among their negative emotions would be less susceptible to aggression. Because the data violated the assumption of independence in ordinary least squares regression (i.e., daily measures nested within individual participants), we used multilevel modeling techniques to account for their nested structure, using HLM Version 6.08 (Nezlek, 2001; Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, & Congdon, 2000). A total of 1,928 days of data were provided by 199 participants (M = 9.69). Participants followed proper protocol for timely daily responses for 94.4% of the entries (i.e., completed entries at the end of each day before midnight).

The average intraclass correlation for the differentiation of negative emotions was .84 (SD = .47), indicative of an acceptable level of variability. To improve the interpretation of findings, we reverse-scored the scale of emotion differentiation (i.e., multiplied scores by −1), so that larger scores reflected greater emotion differentiation in subsequent analyses.

Our initial analyses focused on the reliability of the daily measures for anger intensity and aggressive tendencies. We followed procedures recommended by Nezlek (2007, 2011) for assessing scale reliability with nested data. Using a three-level unconditional model with items (Level 1) nested within days (Level 2) and days nested within people (Level 3) (see Raudenbush & Bryk, 2002 for formal rationale), analyses showed that the four items for daily intensity of experienced anger and the four items for daily aggressive tendencies had adequate reliability (0.91 and 0.66, respec-

[1] Studies 1 and 3 also included measures of positive emotion (PA: Watson, Clark, & Tellegen, 1988), which permitted us to create positive emotion differentiation indices. Neither Study 1 nor Study 3 showed significant positive emotion differentiation × daily anger interactions to predict aggressive tendencies (p's = .30 and .90, respectively). Additionally, there were no main effects for positive emotion differentiation in Studies 1 and 3 (p's = .07 and .65, respectively).

tively). The intraclass correlation coefficient (ICC) for daily aggressive tendencies was 0.52, suggesting that 48% of the variability in aggressive responding was within-person.

Next, prior to our primary analyses, we examined whether anger intensity varied as a function of emotion differentiation (grand-mean centered). These analyses consisted of a two-level model with days (Level 1) nested within people (Level 2). The main effect for negative emotion differentiation did not reach significance, $b = 0.41$, $t(197) = 0.41$, $p = .68$, suggesting that daily anger intensity did not vary as a function of emotion differentiation.

We then constructed a multilevel model to test our primary hypothesis, with negative emotion differentiation as a Level 2 predictor, daily anger intensity as a Level 1 predictor, a cross-level interaction term between negative emotion differentiation and daily anger intensity, and daily aggressive tendencies as the outcome of interest. In these analyses, the Level 2 predictor (negative emotion differentiation) was grand-mean centered (Aiken & West, 1991). Daily anger intensity was group-mean centered (i.e., person-centered), thereby eliminating the influence of person-level differences on parameter estimates of mean daily anger (Nezlek, 2001). This meant that in within-person analyses, an individual's coefficient described the relationship between deviations from his or her mean anger intensity level and deviations from his or her mean daily aggression level.

Moderating Effect of Negative Emotion Differentiation on the Association Between Anger and Aggressive Tendencies

As expected, analyses revealed a significant Negative Emotion Differentiation × Anger Intensity interaction, $b = -0.13$, $t(197) = -1.97$, $p = .05$ (see Figure 1). The main effect for negative emotion differentiation did not reach significance, $b = 0.27$, $t(197) = 0.52$, $p = .61$. The main effect for anger intensity was significant, such that, on average, participants who reported feeling more daily anger from a close friend also reported greater daily aggressive tendencies, $b = 0.07$, $t(197) = 2.54$, $p = .01$.

To evaluate the nature of our interaction effect, we examined the association between daily anger intensity and daily aggressive tendencies among participants relatively low (−1 *SD*) and high (+1 *SD*) in emotion differentiation (Aiken & West, 1991). Among participants low in emotion differentiation, anger intensity predicted increased daily aggressive tendencies, $b = 0.20$, $t = 2.74$, $p = .007$. However, among participants who expressed a greater tendency to differentiate their emotions, there was not a significant association between anger intensity and aggression, $b = -0.05$, $t = -0.77$, $p = .44$. On days defined by extreme anger, people high in emotion differentiation reported 17% fewer aggressive tendencies than did people low in emotion differentiation.

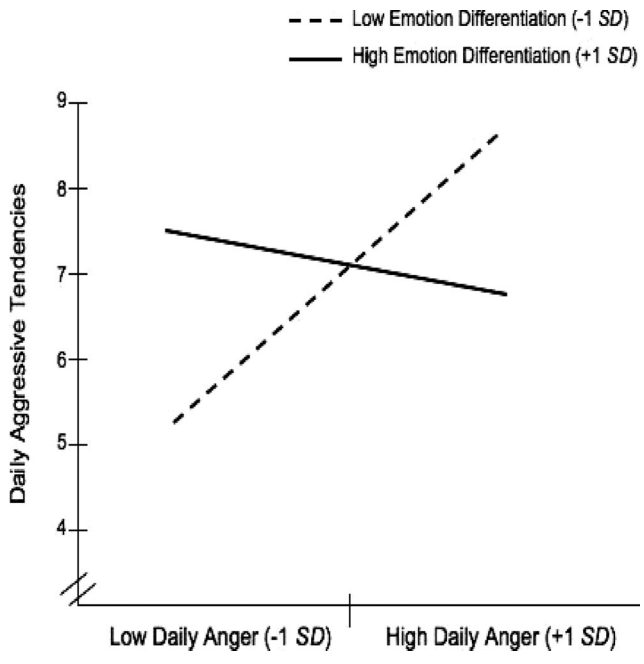

Figure 1. Interactive effect between daily anger intensity and negative emotion differentiation on daily aggressive tendencies, Study 1.

Discussion

Study 1 offers initial evidence that identifying and responding to negative emotions in distinct ways is a protective factor against aggressive behavior, even when one reports feeling angry, a common elicitor of aggression (Berkowitz, 1983, Berkowitz, 1990). Participants' capacity for emotion differentiation weakened the relationship between daily anger provoked by a close friend and daily aggressive tendencies. That is, daily anger predicted fewer aggressive tendencies among participants high in emotion differentiation than participants low in emotion differentiation. Although Study 1 shows that greater emotion differentiation weakens the relationship between anger and aggression, it is unclear whether emotion differentiation moderates the effect of anger on aggression in response to direct provocation. We explore this effect in Study 2.

Study 2: Emotion Differentiation Predicts Less Aggression in Response to Direct Provocation

Study 1 showed that people who uniquely clarify and distinguish among their felt emotional experiences are less susceptible to daily aggression when they feel angry. We sought to expand on the association between emotion differentiation and aggressive behavior in Study 2 by exploring how emotion differentiation alters behavioral responses in circumscribed social contexts. Unlike Study 1, Study 2 participants reported whether or not someone hurt their feelings (i.e., provocation) and if so, whether they behaved aggressively. This can be construed as an explicit, contextualized approach to studying the potential value of emotion differentiation in understanding the link between anger and aggression. To provide a more sensitive measure of the association between emotion differentiation and aggression, participants completed measures of negative emotion and aggressive behavior each day for a 3-week period (total of 21 waves). We predicted that, compared to low differentiators, high differentiators would be less susceptible to aggression in response to being provoked to feel angry by another person.

Method

Participants

Participants consisted of 186 undergraduate students (62% women) at a large, mid-Atlantic university. With a mean age of 23.99 ($SD = 9.14$), 53.7% of participants were Caucasian, 11.8% were Hispanic, 11.3% were Asian American, 7.0% were African American, 1.6% were Middle Eastern, 1.1% were American Indian, and 6.5% participants reported their race as "other." Students received research credit for participation.

Measures

Negative emotion differentiation. Participants reported how much they felt embarrassed, disappointed, bored, anxious/nervous, and sad each day. Each item was measured on a 7-point scale (from *not at all* to *very much*). A measure of negative emotion differentiation was computed using the same procedure as in Study 1. Larger correlation scores indicated less differentiation of emotions. A Fisher *r* to *z* transformation was computed on all intraclass correlations before further analysis.

Whereas Study 1 used a measure of negative affect circumscribed to high energy negative emotion adjectives, Study 2 measured negative emotion using adjectives that spanned both of the negative valence quadrants in the circumplex model of emotion (i.e., low vs. high energy; e.g., Barrett, 1998; Russell, 1980; Watson & Clark, 1997). Several of the items were negative in valence and high in energy (embarrassed, anxious/nervous) and other items were negative in valence and low in energy (i.e., bored, sad). For this reason, we expected that the average intraclass correlation in Study 2 would be lower than that from Study 1.

Daily intensity of anger. Each day, participants were asked if someone or something caused them to feel angry and then participants responded to how angry they felt. Participants completed a one-item measure that assessed how angry they felt on a 7-point scale (from *not at all* to *extremely*). If nothing caused them to feel angry, they received the lowest possible response when asked about the intensity of their anger (i.e., score of 1 reflecting *not at all*).

Daily aggression. Participants were given a probe asking them if someone provoked them, hurting their feelings. If they answered yes, subsequent questions were asked about their reaction. Participants completed three items each day that assessed their aggressive behavior when provoked (i.e., "if someone annoyed me, I was aggressive toward them," "I said nasty or critical things when I was upset," and "I did things like slammed the door when I was upset"). Each item was measured on a 7-point scale (from *not at all* to *very much*). Responses across the three items were summed to form a composite measure of daily aggression, with higher numbers indicating greater aggressive behavior.

Procedure

Participants were given a URL to record their feelings and behaviors each day for three weeks. Following an initial training session in which participants learned how to complete their daily questionnaires, participants completed self-report questionnaires reflecting demographic information and personality traits, and were given a secure website link for an online survey to be completed nightly. For the next 21 days, they were instructed to complete the online survey after 6 p.m. To increase compliance, researchers stressed that receiving full participation credit was contingent on timely reporting and were then shown the automatic time-and-date stamping of each day of data. All information submitted via online survey was confidential and stored on a secure server. A debriefing followed.

Results

Preliminary Analyses

We again used multilevel modeling to accounted for the data's nested structure (HLM Version 6.08, Raudenbush & Bryk, 2002; Raudenbush et al., 2000). Participants provided a total of 3,790 days of data ($M = 20.38$). Participants followed proper protocol for timely daily responses for 93.7% of entries (i.e., after 6 p.m. on the same day and before 9 a.m. the next day).

The average intraclass correlation for differentiation of negative emotions was .39 ($SD = .25$), indicative of an acceptable level of variability. To better interpret subsequent findings, we again reverse-scored the scale (multiplying scores by -1), such that larger scores reflected greater emotion differentiation.

As with Study 1, our initial analyses focused on the reliability of the daily measure for aggression. Using a three-level unconditional model with items (Level 1) nested within days (Level 2) and days nested within people (Level 3), analyses showed that the three items for daily aggression had adequate reliability (0.81). The intraclass correlation coefficient (ICC) for daily aggression was 0.33, indicating that 67% of the variability in aggressive reactions is within-person.

Next, prior to our primary analyses, we conducted analyses to examine whether the presence of provocation episodes varied as a function of emotion differentiation (grand-mean centered). These analyses included people who reported episodes of being provoked by another person and those who did not, with days (Level 1) nested within people (Level 2). The prime dependent measure was dichotomous: Did a participant have an episode where they were provoked by another person on a day or not? These data were analyzed with a nonlinear (Bernoulli) multilevel model that is sometimes referred to as multilevel logistical regression. These analyses estimate two types of coefficients: a unit-specific and a population average. We used unit-specific estimates instead of population averages, but it should be noted that the two sets of coefficients provided very similar results. The analyses estimated a log-odds for each person that was converted to a probability. We found that greater emotion differentiation was associated with a lower probability of being provoked by another person in daily life.

These analyses resulted in an inverse relationship between negative emotion differentiation scores and frequency of provocation episodes ($b = -.16$, $t(184) = -2.15$, $p = .03$). This provided a starting point to examining whether emotion differentiation altered behavioral responses to provocation.

Next, following procedures in Study 1, we employed a multilevel model to test our primary hypothesis, with negative emotion differentiation as a Level 2 predictor, daily anger intensity as a Level 1 predictor, a cross-level interaction term between negative

emotion differentiation and daily anger intensity, and daily aggression as the outcome of interest. In these analyses, the Level 2 predictor (negative emotion differentiation) was grand-mean centered (Aiken & West, 1991). Daily anger intensity was group-mean centered (i.e., person-centered), thereby eliminating the influence of person-level differences on parameter estimates of mean daily anger (Nezlek, 2001).

Moderating Effect of Negative Emotion Differentiation on the Association Between Anger and Aggression

Our main prediction was that among people who feel greater anger, being more adept at differentiating negative emotional states would reduce their aggressive behavior. As expected, analyses revealed a significant Negative Emotion Differentiation × Anger Intensity interaction, $b = -0.38$, $t(184) = -2.68$, $p = .009$ (see Figure 2). Main effects for negative emotion differentiation, $b = -1.29$, $t(184) = -2.56$, $p = .01$, and anger, $b = 0.84$, $t(184) = 17.94$, $p < .001$, were also significant such that participants showing greater differentiation among their negative emotional states reported behaving less aggressively when provoked on average, and participants showing greater anger reported greater aggression when provoked on average.

Next, we examined the association between anger and self-reported aggressive behavior among participants relatively low (−1 *SD*) and high (+1 *SD*) in emotion differentiation (Aiken & West, 1991). Among participants low in emotion differentiation, there was a strong positive association between anger and aggression, $b = 1.28$, $t = 7.14$, $p < .001$. Among participants who expressed greater emotion differentiation, there was a weaker, positive association between anger and aggression, $b = 0.40$, $t = 2.21$, $p = .03$. People with high emotion differentiation reported 43% less daily aggression when they were angry, compared to people with low emotion differentiation.

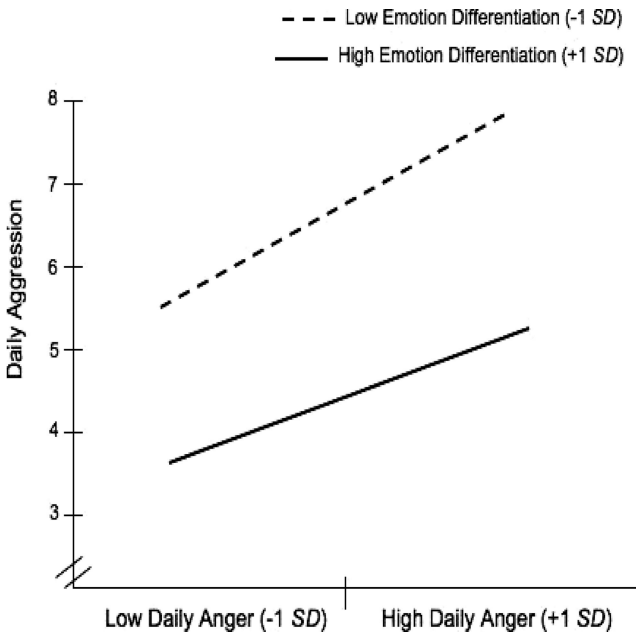

Figure 2. Interactive effect between daily anger and negative emotion differentiation on daily aggression, Study 2.

Discussion

The results of Study 2 replicate and extend our previous findings, suggesting that people who differentiate among their negative emotions are relatively resilient to the risk of provocation. People with greater precision in describing and clarifying felt experiences report less frequent provocation by other people in daily life. Moreover, people who fail to adequately differentiate their emotional states are prone to aggression in the specific situation where they are provoked by another person and experience intense angry emotions.

Although Studies 1 and 2 showed that emotion differentiation moderated the association between anger and aggression, it remains unclear what may mediate this moderating effect. Emotion differentiation is associated with adaptive coping strategies, such as better regulation of intense emotions (Barrett et al., 2001; Kashdan et al., 2010). High emotion differentiators may then have more control of their emotional and behavioral responses in stressful situations. Our final study examined this possibility.

Study 3: Emotional Control Mediates the Moderating Effect of Emotion Differentiation on Aggressive Tendencies

In Study 3, we explored the mechanism underlying the moderating effect of emotion differentiation on the relationship between anger and aggression. Specifically, we examined whether relatively high levels of emotional control mediated the interactive effect of emotion differentiation and anger intensity on aggression. Because high emotion differentiators are more effective at emotion regulation, compared to low differentiators, they may experience greater control of their emotions under conditions of high anger. Participants completed daily measures of negative emotion, emotional control, and aggressive tendencies three times a week for a 25-day period (total of 10 waves). We predicted that people who differentiated more among their negative emotions would be less susceptible to aggression when they felt angry, compared to low differentiators, and that this interaction would be mediated by higher levels of daily emotional control.

Method

Participants

Participants consisted of 243 undergraduate students (78% women) at a large, Southern-Atlantic university. With a mean age of 19.34 (*SD* = 2.27), 79% of participants were Caucasian, 13.8% were Hispanic, 2.0% were Asian American, 14.2% were African American, .4% were American Indian or Alaskan Native, and 4.4% of participants reported their race as "other." Students received research credit for participation.

Measures

Negative emotion differentiation. As in Study 1, participants completed the negative affect subscale of the PANAS (Wat-

son et al., 1988). The same procedure for calculating negative emotion differentiation in Studies 1–2 was used. Smaller intraclass correlations among discrete affects indicated greater emotion differentiation. A Fisher r to z transformation was computed on all intraclass correlations before any additional analyses.

Daily anger intensity. Participants completed a one-item measure that assessed how angry they felt that day on a 7-point scale (from *not at all* to *extremely*).

Daily emotional control. Participants completed a one-item measure assessing how much control they had over their emotions that day. Participants were asked to indicate how much they agreed with the statement "My emotions got the best of me today" on a 7-point scale (from *not at all* to *extremely*). Responses were reverse-scored such that larger numbers indicate greater levels of emotional control.[2]

Daily aggressive tendencies. Participants completed the same abbreviated form of the physical and verbal aggression subscales of the Aggression Questionnaire (AQ; Buss & Perry, 1992) that was used in Study 1. The items needed rescaling at Level 1, in order to achieve approximately equal error variances (Raudenbush & Bryk, 2002). Thus, the items were standardized prior to forming the composite of aggressive tendencies.

Procedure

Participants were given a URL to record their feelings and behaviors three times each week for 25 days, which included the negative emotion, emotional control, and aggression items. Participants were instructed to complete their daily surveys at the end of each day before midnight. To increase compliance, researchers stressed that receiving full participation credit was contingent on timely reporting, and that a time-date stamp would be recorded on each log. All information submitted via online survey was confidential and stored on a secure server. A debriefing followed.

Results

Preliminary Analyses

Our main prediction was that people who show more differentiation among their negative emotional states, compared to low differentiators, will be less susceptible to aggressive tendencies when they are angry, which would be mediated by higher levels of emotional control. We again used multilevel modeling to account for the data's nested structure (Nezlek, 2001; Raudenbush & Bryk, 2002; Raudenbush et al., 2000). Participants provided a total of 1,864 days of data ($M = 7.67$). Participants followed proper protocol for timely daily responses for 93.3% of the entries (i.e., completed entries at the end of each day before midnight).

The average intraclass correlation for differentiation of negative emotions was .84 ($SD = .62$), which indicates an acceptable level of variability. As with Studies 1–2, we reverse-scored the scale of emotion differentiation (i.e., multiplied scores by -1), so that larger scores reflected greater emotion differentiation.

As in Studies 1 and 2, our initial analyses focused on the reliability of the daily measure for aggressive tendencies. We again used a three-level unconditional model with items (Level 1) nested within days (Level 2) and days nested within people (Level 3). Analyses showed that the four items for daily aggressive tendencies had adequate reliability (0.55). The intraclass correlation coefficient (ICC) for daily aggressive tendencies was 0.68, suggesting that 32% of the variability in aggressive tendencies is within-person.

Next, prior to our primary analyses, we conducted analyses to examine whether anger intensity varied as a function of emotion differentiation (grand-mean centered). These analyses consisted of a two-level model with days (Level 1) nested within people (Level 2). The main effect for negative emotion differentiation significantly predicted daily anger intensity, $b = -0.37$, $t(242) = -4.00$, $p < .001$, such that participants showing greater differentiation among their negative emotional states generally reported less intense daily anger.

Following procedures in Studies 1–2, we employed a multilevel model to test our primary hypothesis, with negative emotion differentiation as a Level 2 predictor, daily anger intensity as a Level 1 predictor, a cross-level interaction term between negative emotion differentiation and daily anger intensity, and daily aggressive tendencies as the outcome of interest. In these analyses, the Level 2 predictor (negative emotion differentiation) was grand-mean centered (Aiken & West, 1991). Daily anger intensity was group-mean centered (i.e., person-centered), thereby eliminating the influence of person-level differences on parameter estimates of mean daily anger (Nezlek, 2001).

Moderating Effect of Negative Emotion Differentiation on the Association Between Anger and Aggressive Tendencies

As expected, analyses revealed a significant Negative Emotion Differentiation $\times$ Anger Intensity interaction, $b = -0.22$, $t(241) = -2.56$, $p = .01$ (see Figure 3). The main effect for negative emotion differentiation was marginally significant, $b = -0.58$, $t(241) = -1.89$, $p = .06$, such that participants showing greater differentiation among their negative emotional states reported fewer aggressive tendencies on average. The main effect for daily anger intensity was significant, $b = 0.58$, $t(241) = 10.62$, $p < .001$, such that participants reporting greater anger also reported more aggressive tendencies on average.

We next examined the association between anger and daily aggressive tendencies among participants relatively low (-1 *SD*) and high ($+1$ *SD*) in the tendency to differentiate their emotions (Aiken & West, 1991). Among participants low in emotion differ-

[2] We conducted additional analyses to establish the validity of the emotion control measure in Study 3. Participants completed a daily measure of cognitive reappraisal, which is one type of emotion regulation strategy (Gross, 2008). Participants were asked, "How much did you think about the positive aspects of negative events or situations in your life since the last log?" This item was measured on a 1 (*Not at all*) to 5 (*I was constantly thinking these thoughts*) scale. Our emotional control item significantly related to this type of cognitive reappraisal, $b = 0.05$, $t = 2.84$, $p = .005$, such that participants who reported greater control over their emotions also reported thinking more daily about the positive aspects of the negative events in their life. Additionally, a subsample of 164 participants completed the Brief COPE (Carver, 1997) before taking part in Study 3. Negative coping strategies at the trait level, such as venting, self-distraction, and denial, were negatively related to our daily emotional control item (p's $< .0001$).

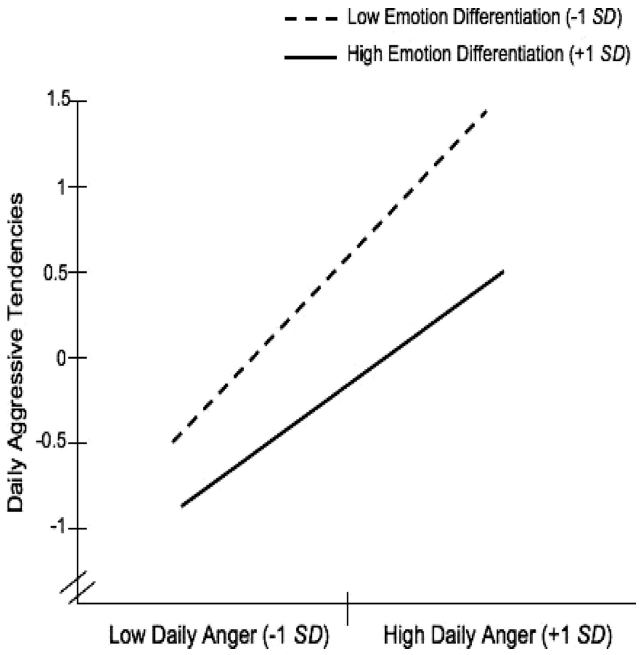

Figure 3. Interactive effect between daily anger and negative emotion differentiation on daily aggressive tendencies, Study 3.

entiation, anger intensity predicted increased daily aggression, $b = 0.80$, $t = 7.69$, $p < .0001$. Among participants who expressed a greater tendency to differentiate their emotions, the association between anger and aggression was a weaker, positive association, $b = 0.37$, $t = 3.76$, $p = .0002$. Participants high in emotion differentiation reported 16% less daily aggressive tendencies compared to participants low in emotion differentiation, when they were angry.

Mediated Moderation Analyses

Next, we investigated whether higher levels of emotional control mediated the interactive effect of emotion differentiation and anger intensity on daily aggressive tendencies. Because we already showed a significant moderating effect of emotion differentiation on the relationship between anger and aggressive tendencies, our next step was to show that emotion differentiation also significantly moderated the relationship between anger and emotional control (Baron & Kenny, 1986). We used multilevel modeling procedures to account for the nested structure of the data (Nezlek, 2001; Raudenbush & Bryk, 2002; Raudenbush et al., 2000).

To examine the mediating effect of daily emotional control on the moderating effect between negative emotion differentiation and anger on aggressive tendencies, we first employed a multilevel model with negative emotion differentiation as a Level 2 predictor, daily anger intensity as a Level 1 predictor, a cross-level interaction term between negative emotion differentiation and daily anger intensity, and daily emotional control as the outcome of interest. In these analyses, negative emotion differentiation was grand-mean centered and daily anger intensity was group-mean centered (i.e., person-centered).

As predicted, analyses revealed a significant Negative Emotion Differentiation × Anger Intensity interaction, $b = 0.15$, $t(241) = 2.68$, $p = .008$ (see Figure 4). Main effects for negative emotion differentiation, $b = 0.34$, $t(241) = 3.48$, $p = .001$, and anger, $b = -0.45$, $t(241) = -12.85$, $p < .001$, were also significant such that participants showing greater differentiation among their negative emotional states reported greater emotional control, and participants showing greater anger reported less emotional control.

We next examined the association between anger and daily emotional control among participants relatively low (-1 *SD*) and high ($+1$ *SD*) in the tendency to differentiate their emotions (Aiken & West, 1991). Among participants low in emotion differentiation, anger intensity predicted less daily emotional control, $b = -0.55$, $t = -11.60$, $p < .0001$. Whereas, among people who expressed a greater tendency to differentiate their emotions, the association between anger and emotional control was a weaker, negative association, $b = -0.36$, $t = -6.82$, $p < .0001$.

We next tested whether daily emotional control predicted daily aggressive tendencies, controlling for the main and interactive effects of emotion differentiation and daily anger. As predicted, the association between daily emotional control and daily aggressive tendencies was significant, such that people who reported greater daily emotional control also reported fewer aggressive tendencies on average, $b = -0.30$, $t(242) = -5.59$, $p < .001$.

Last, we tested for mediated moderation by estimating the 95% confidence interval of the indirect effect using the empirical-*M* test. Traditional approaches for testing mediation are often underpowered and suffer from inflated Type-I error rates because they incorrectly assume that the product of coefficients (operationalized as *ab*) comprising the indirect effect is normally distributed (Bollen & Stine, 1990; MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008; Shrout & Bolger, 2002). Moreover, such methods are inappropriate for testing mediation with nested data

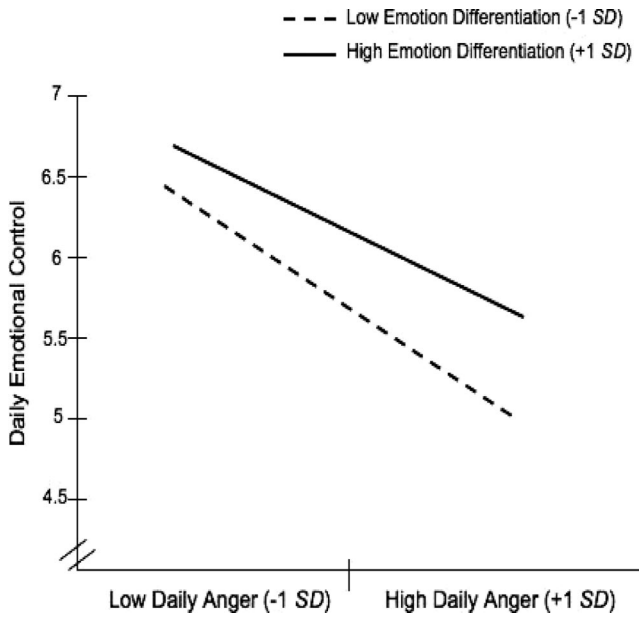

Figure 4. Interactive effect between daily anger and negative emotion differentiation on daily emotional control, Study 3.

(Bauer, Preacher, & Gil, 2006). On the other hand, the empirical-*M* test generates confidence intervals for the indirect effect from critical values obtained by empirically simulating a series of distributions for the product of two normal random variables (MacKinnon et al., 2004). The empirical-*M* test does not impose the assumption of normality on the distribution of the product. Thus, compared to traditional methods, the empirical-*M* test provides more power and more accurate Type-I error rates for single-level (MacKinnon et al., 2004) and multilevel (Pituch, Stapleton, & Kang, 2006) designs, and it is recommended for tests of mediation for nested models in which at least one variable was assessed at the upper level (level 2) (Pituch & Stapleton, 2008). To conduct the empirical-*M* test, we used the computer program PRODCLIN, which provided the confidence interval of the indirect effect (MacKinnon, Fritz, Williams, & Lockwood, 2007).

As predicted, the indirect path through daily emotional control was statistically significant, as the 95% confidence interval did not include zero (−0.09 to −0.01). The interactive effect of emotion differentiation and anger on aggression was partially mediated by daily emotional control (see Figure 5). Thus, participants who tended to differentiate more among their negative emotions exhibited a weaker relationship between anger and aggression, in part because of their greater control over their daily emotional experiences.

Discussion

Study 3 provides converging evidence that negative emotion differentiation moderates aggressive responses to anger. In addition, Study 3 offers direct evidence in support of our conceptual model that emotion differentiation predicts fewer daily aggressive tendencies because people who are better differentiators have better emotional control under anger-provoking conditions. Whereas people who are less adept at differentiating their negative emotions suffer from less emotional control in a given day, which puts them at an increased risk of aggressing against others when they feel angry.

General Discussion

Anger is intimately linked to aggression because of its ability to increase arousal and hostile cognitions, while also reducing inhibitions against violence (Anderson & Bushman, 2002; Berkowitz, 1983, Berkowitz, 1990). Anger is a particularly hazardous emotion because people often regulate it through rumination and venting, which ultimately leads to more aggression (Bushman, 2002; Bushman et al., 2001). People require considerable self-regulatory resources to regulate anger in a way that avoids conflict, which may leave them particularly vulnerable to aggressive retaliation (Denson, 2009). Therefore, individual difference factors associated with effective emotion regulation may weaken the link between anger and aggression.

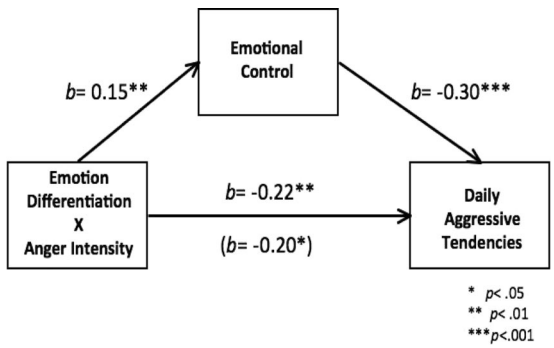

Figure 5. Mediating effect of daily emotional control on the interactive effect between daily anger and negative emotion differentiation on daily aggressive tendencies, Study 3.

In this vein, we explored a novel factor that may increase resiliency to aggression when people are provoked to feel anger. Specifically, we hypothesized that angry people who tend to identify and clarify their discrete negative emotional experiences in nuanced ways will be more resilient to aggression, compared to angry people who differentiate among their negative emotions relatively less. Prior work has shown that people who are better at differentiating their emotions are also better at regulating those emotions (Barrett et al., 2001; Kashdan et al., 2010; Tugade et al., 2004). Because people who are better at differentiating their negative emotions are more emotionally intelligent, more sensitive to internal and situational cues, and have a greater inventory of effective emotion regulation strategies (Barrett & Gross, 2001), they may have better control of their emotions and their behavior in the heat of stressful situations, compared to low differentiators. They may be less likely to use maladaptive strategies for coping with anger, compared to low differentiators, which may have implications for their lower levels of aggression.

The current work extends previous research by showing that these regulatory advantages of emotion differentiation help buffer angry people from potentially harmful conflicts. The results of three diary studies provided converging evidence that emotion differentiation moderates the relationship between anger and aggression. In Study 1, higher dfferentiation of negative emotions served as a resilience factor against aggressive tendencies for angry participants. Study 2 replicated this effect, using different measures of emotion differentiation and aggression in response to provocation. Study 3 replicated and extended Studies 1–2 by giving support to a mechanism underlying this effect. Emotion differentiation moderated aggressive responses in angry people, in part, because of its relation to better emotional control. This may have freed up regulatory resources that would normally be used toward venting, anger-rumination, and other ineffective coping strategies for improving one's mood. In support of our conceptual model, Study 3 showed that people who tend to differentiate their negative emotions reported greater control of their daily emotions when they were angry, compared to low emotion differentiators. This greater emotional control played a significant mediating role in reducing aggression in angered people who are high emotion differentiators.

Self-control processes are important for inhibiting aggression (DeWall & Anderson, 2011; Finkel, 2007; Slotter & Finkel, 2011). Internal characteristics and situational factors that bolster self-control protect the necessary cognitive resources needed for overriding aggressive impulses. People with low internal self-control, or who suffer from regulatory depletion, are more likely to impulsively act out their aggression because they have fewer resources for the cognitive reappraisal processes required for ignoring those aggressive urges (DeWall, Finkel, & Denson, 2011). Our results

build upon recent theories by exposing emotion differentiation as one potential internal factor that reduces aggression, in part, by protecting those necessary regulatory resources.

Limitations and Future Directions

The current investigation provided consistent support for the hypothesis that emotion differentiation moderates aggressive responding among angry people. Despite the consistency of our findings, several limitations may prove beneficial in generating future research ideas. First, we showed that emotion differentiation moderates the link between anger and aggression, in part, because it is associated with increases in emotional control. However, this leaves room for other potential mediators. One possibility is that people who tend to identify and respond to their emotions in unique ways are also more mindful of their conscious state. Mindfulness is linked to a greater awareness of one's emotions, which has implications for emotion regulation and self-control processes (Brown & Ryan, 2003), particularly in response to threats to the self (Niemiec et al., 2010). People who are good at differentiating their negative emotions may be more mindful at the trait level. As well, the process of differentiating one's emotions on a day-to-day basis may also have implications for exercising daily mindfulness. Future research would benefit from exploring trait and daily mindfulness as a mediator of the interactive effect of emotion differentiation and anger on aggression.

A second possible mediator might be related to increased working memory capacity. Barrett and colleagues (2001, 2004) suggest that people who have a greater capacity for working memory have more executive resources for attending to and identifying emotional cues, managing emotional knowledge, and coping with stressful emotions. Recent neuroimaging studies lend initial support to this hypothesis, showing that brain areas associated with working memory are involved in emotion regulation and psychological well-being (Ochsner et al., 2004; Urry et al., 2004). Thus, future research would also benefit from exploring working memory capacity as a mediator of the interactive effect of emotion differentiation and anger on aggression.

A second limitation relates to our study being correlational in nature. A strength of our methodology was that we could examine people's feelings across time and within their own environments. However, our findings may not reveal causal relationships. Moreover, due to our daily diary method, our studies exhibited a heavy reliance on single-item measures, which risk low reliability. Future experimental work would benefit from manipulating emotion differentiation and anger in the laboratory and then measuring aggression behaviorally.

A third limitation involves the difference between violence and aggression. Our study concerned the tendency toward general daily aggression (i.e., harming someone who would be motivated to avoid that harm; Baron & Richardson, 1994). Violence, on the other hand, is intended to cause extreme physical harm (e.g., injury, death). All violent acts are aggressive, but not all acts of aggression are instances of violence (Bushman & Huesmann, 2010). The base rate of violence is low, due to its extreme nature; therefore, we chose general daily aggression as our outcome of interest. We expected more variability in reports of daily aggression across each diary period, which would make it a more sensitive measure. Second, items that constitute violent behavior often include illegal behaviors (e.g., assaulting or harming others with a weapon), which pose problems in getting institutional review board (IRB) approval to measure those behaviors. As well, measuring the incidence of violence poses ethicality issues, such as whether to report participants who are a clear danger to others to a law-enforcement agency. Nonetheless, the dynamics between general aggression and violence are similar, and we would expect a similar moderating effect of emotion differentiation and anger on violence.

A final direction for future research concerns how emotion differentiation may influence prosocial outcomes. Anger is linked to aggression through the maladaptive strategies people use (e.g., venting, rumination) to deal with anger, which exhaust precious regulatory resources (Bushman, 2002; Bushman et al., 2001; Denson, 2009). The current work posits that emotion differentiation buffers angry people from aggression because greater emotion differentiation is linked to the availability of adaptive coping strategies, which decreases the probability of using maladaptive ones. Yet, in the pursuit of mood enhancement effects, people who feel bad may be motivated to act prosocially. For instance, the research literature on helping indicates that sometimes sad people will help others in an effort to make themselves feel better (Cialdini, Darby, & Vincent, 1973; Manucia, Baumann, & Cialdini, 1984). If high emotion differentiators engage in fewer behaviors to change their mood in response to upsetting events, they may engage in less prosocial behavior when distressed. In contrast, low differentiators, who experience distressing events as simply "bad," may be most likely to help when they believe that doing so may improve their mood. Thus, emotion differentiation may predict less aggressive responses when people are angered, but emotion differentiation may predict less prosocial behavior when people are distressed. This possibility awaits future research.

Conclusion

Feeling angry is an inevitable part of life. Yet how people behave while angry differs widely between individuals. The present investigation examined the utility of emotion differentiation in buffering aggression in people's naturalistic environment on a daily basis. This research builds on prior work by helping us to understand why some angry people do not lash out at others, while others are at an increased risk of such behavior. Aggression is costly in terms of the toll it takes on our social relationships, psychological health, and even our own safety. This research program sheds light on a novel internal factor that may help to prevent the negative consequences of aggression.

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