Anger Rumination as a Mediator of the Relationship Between Mindfulness and Aggression: The Utility of a Multidimensional Mindfulness Model

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Objectives: Mindfulness training reduces anger and aggression, but the mechanisms of these effects are unclear. Mindfulness may reduce anger expression and hostility via reductions in anger rumination, a process of thinking repetitively about angry episodes that increases anger. Previous research supports this theory but used measures of general rumination and assessed only the present-centered awareness component of mindfulness. The present study investigated associations between various aspects of mindfulness, anger rumination, and components of aggression. Method: The present study used self-report measures of these constructs in a cross-sectional sample of 823 students. Results: Structural equation modeling revealed that anger rumination accounts for a significant component of the relationship between mindfulness and aggression, with the largest effect sizes demonstrated for the nonjudgment of inner experiences facet of mindfulness. Conclusion: Nonjudgment and present-centered awareness may influence aggression via reduced anger rumination. The importance of examining mindfulness as a multidimensional construct is discussed. © 2015 Wiley Periodicals, Inc. J. Clin. Psychol. 71:871–884, 2015.

Keywords: mindfulness; aggression; anger; rumination

Rumination and Aggression

Cognitive processes such as rumination can exacerbate tendencies toward aggressive behaviors. Rumination is defined as uncontrollable, repetitive thoughts focusing on negative mood and its causes, meanings, and consequences (Ingram, 1990; Martin & Tesser, 1996; Nolen-Hoeksema, 1991). Although individuals who ruminate may perceive this pattern of thinking as a productive problem-solving strategy (Papageorgiou & Wells, 2003), it contributes to a downward spiral of negative affect and increased dysregulated behavior (Selby, Anestis, & Joiner, 2008). Individuals who report high levels of trait rumination exhibit more aggressive behaviors than individuals low on trait rumination (Verona, 2005). Experimental inductions to ruminate also produce greater levels of subsequent aggression than distraction inductions, indicating that even state levels of rumination can lead to aggression (Vasquez et al., 2013).

Although much of the research literature specifically addresses depressive rumination, ruminative thinking can focus on a variety of topics. Rumination on anger and angering experiences appears to be particularly relevant to aggression or hostility. Depressive and anger rumination form distinct factors in self-report assessments and have separate and unique relationships with other psychological constructs; while depressive rumination has been linked to worsening depressed mood, anger rumination specifically intensifies anger and increases aggressive tendencies (Peled & Moretti, 2009). Anger rumination predicts physical and verbal aggression and hostility, after controlling for depression, anxiety, and impulsivity (Anestis, Anestis, Selby, & Joiner, 2009). Inducing anger rumination increases displaced aggression (Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005) and facilitates the formation of negatively distorted interpretations of ambiguous events (Rusting & Nolen-Hoeksema, 1998).

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Utility of Mindfulness

A variety of psychological interventions use mindfulness-based skills training, which teaches participants to pay attention to present moment experiences in a nonjudgmental, nonreactive way (Kabat-Zinn, 1994). These interventions may include formal meditation practices, as well as less formal exercises emphasizing mindfulness in daily life, in which participants bring the same type of non judgmental awareness to routine activities such as walking or eating (Baer & Krietemeyer, 2006). Mindfulness-based interventions have been associated with numerous beneficial outcomes (see Keng, Smoski, & Robins, 2011, for a comprehensive review), including reductions in anger expression, compared to waitlist controls (Fix & Fix, 2013; Robins, Keng, Ekblad, & Brantley, 2011; Singh et al., 2007).

Dialectical behavior therapy (Linehan, 1993), an intervention centered around mindfulness skills training, has also produced reductions in anger and anger expression in individuals with borderline personality disorder (Koons et al., 2010; Lynch, Trost, Salsman, & Linehan, 2007; Yen, Johnson, Costello, & Simpson, 2009). An increased understanding of the mechanisms through which the use of mindfulness skills may facilitate these changes would likely help refine interventions and tailor them to address specific difficulties.

Previous research using the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) has shown that dispositional mindfulness predicts lower levels of aggression in several samples (Borders, Earleywine, & Jajodia, 2010; Heppner et al., 2008); however, the MAAS is a single-factor scale assessing only the present-centered awareness component of mindfulness. A multifaceted conceptualization of mindfulness allows more complete understanding of its relationships with other variables (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006).

The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) is one of the most widely used multifaceted measures and provides the most comprehensive coverage of the construct. The FFMQ comprises five subscales derived from a factor analysis of several preexisting measures of mindfulness. The five facets are as follows: acting with awareness, or the tendency to attend to one’s present activities and avoiding automatic pilot (comprised primarily of items from the MAAS); nonjudging of inner experience, or the tendency to take a nonevaluative stance to inner experience; nonreactivity to inner experience, or the tendency to allow thoughts and feelings come and go without getting carried away by them; observing, or the tendency to notice internal and external experiences; and describing, or the tendency to label experiences with words). Measures such as the FFMQ that more thoroughly capture the complex, multifaceted nature of mindfulness allow a fuller understanding of the effect of specific elements, both attentional and attitudinal, of dispositional or learned mindfulness on rumination, aggression, or other outcomes.

The Potential Role of Rumination

One mechanism by which mindfulness may reduce anger and aggression is via decreased rumination. Mindfulness training has been demonstrated to decrease rumination (Campbell, Labelle, Bacon, Faris, & Carlson, 2011; Shapiro, Oman, Thoresen, & Plante, 2008). Compared with relaxation training, mindfulness meditation resulted in unique reductions in rumination (Jain et al., 2007), supporting the assertion that mindfulness may reduce relapses in depression by disrupting ruminative thought patterns (Teasdale, Segal, & Williams, 1995). Studies examining solely attentional components of mindfulness demonstrated significant negative associations with general rumination (Brown & Ryan, 2003). When multidimensional assessments of mindfulness have been used, both attentional and nonjudgmental components of mindfulness correlated negatively with total general repetitive thought (Evans & Segerstrom, 2010); furthermore, the correlation between negative valence of repetitive thought and nonjudging was substantially larger than the correlation with acting with awareness.

Why might various components of mindfulness relate to less rumination and aggression? First, the basic attentional processes involved in mindfulness, which are represented primarily by the acting with awareness facet of the FFMQ, may facilitate awareness that rumination is occurring and the ability to redirect attention away from ruminative thought processes (Hawley
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et al., 2014) and toward concrete experiences such as physical sensations (Heeren & Philippot, 2010; Teasdale et al., 1995; van Vugt, 2012). Second, the attitudinal qualities of mindful attention (captured by the nonjudging and nonreactivity facets of the FFMQ) may lead to fewer critical thoughts about oneself and others that typically trigger and perpetuate rumination. In addition, a nonjudgmental, accepting, and nonreactive stance toward one’s experiences may reduce the need for rumination as a method for avoiding underlying painful affective experiences (Kashdan, Barrios, Forsyth, & Steger, 2006; Roemer et al., 2009), which may in turn reduce the intensity and frequency of negative affective states (e.g., Roemer & Borkovec, 1994).

Attitudinal factors (nonjudging and nonreactivity) may be particularly important as protective factors against anger rumination specifically. Of the five subscales of the FFMQ, nonjudging, nonreactivity, and acting with awareness were significantly negatively correlated with anger rumination in a student sample, with nonjudging demonstrating the strongest association (Peters, Eisenlohr-Moul, Upton, & Baer, 2013). Only the nonjudging and nonreactivity dimensions were significant independent predictors when all facets were entered into a regression model. Some preliminary work has suggested that anger rumination may function as a way of avoiding self-directed negative affect, such as shame (Peters, Geiger, Smart, & Baer, 2014); if so, it is possible that increased acceptance of and nonreactivity to negative feelings about the self might have a particularly strong effect in reducing anger rumination.

Preliminary research has investigated the potential mediating role of rumination in the relationship between mindfulness and aggression using cross-sectional samples. Rumination mediated the negative association between the mindfulness and aggression in two samples (Borders et al., 2010); however, this study assessed the general construct of rumination rather than the more specific and relevant construct of anger rumination. Additionally, it used the MAAS, which captures only a single dimension (attentional awareness; equivalent to the acting with awareness facet of the FFMQ) of the multifaceted construct of mindfulness. Although aspects of the construct, such as a nonjudgmental and nonreactive orientation to experience, may play important roles in the reduction of rumination and subsequent aggression, no research published to date has examined these potential effects.

Present Study

The present study extends in two important ways previous findings demonstrating that general rumination accounts for the association between the attentional aspect of mindfulness and aggression. First, we used a multifaceted measure of mindfulness to examine whether other aspects of mindfulness also predict less aggression. Second, we assessed anger rumination to examine whether this specific form of rumination accounts for the association between mindfulness and aggression. By employing these more comprehensive and specific measurement methods, we investigate how various aspects of mindfulness display unique associations with aggression and unique indirect effects on aggression via anger rumination in a cross-sectional sample. It was hypothesized that the attentional awareness, nonjudging, and nonreactivity dimensions of mindfulness would demonstrate associations with reduced aggression and indirect effects on aggression via anger rumination to aggression but that the effects of nonjudging would be the most robust.

Method

Participants

Participants were 925 undergraduate psychology students who completed an online survey for course credit (see Peters et al., 2014, for previous description of this sample). Following data screening procedures (detailed in the Analyses section), a sample of 823 was used for analyses. Participants’ ages ranged from 18 to 59 years with a mean age of 19.25 years (standard deviation [SD] = 2.51). The sample was predominately female (70.6%) and Caucasian (85.9%). Informed consent was obtained from all participants before participation, and the university’s institutional review board approved all procedures.
Measures

**Mindfulness.** The FFMQ (Baer et al., 2006) is a 39-item self-report questionnaire designed to assess five facets of mindfulness, as previously described. Sample items are as follows: observing (“I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing”); describing (“I’m good at finding words to describe my feelings”); acting with awareness (“I rush through activities without being really attentive to them”—reverse scored); nonjudging of inner experiences (“I disapprove of myself when I have irrational ideas”—reverse scored); and nonreactivity to inner experiences (“I perceive my feelings and emotions without having to react to them”). Participants are asked to rate the degree to which each statement applies to them on a 5-point Likert-style scale ranging from 1 (never or very rarely true) to 5 (almost always or always true).

The five factors were extracted through factor analysis of five pre-existing measures of mindfulness: the MAAS (Brown & Ryan, 2003), the Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004), the Freiburg Mindfulness Inventory (Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006), the Southampton Mindfulness Questionnaire (Chadwick et al., 2010), and the Cognitive and Affective Mindfulness Scale (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2006). In the validation sample, each item had its highest loadings on its respective factor and low loadings on all other factors. In the present sample, the facets showed adequate to good internal consistency (observing $\alpha = .78$, describing $\alpha = .87$, acting with awareness $\alpha = .88$, nonreactivity $\alpha = .76$, nonjudging $\alpha = .88$).

Most facets of the FFMQ are higher in meditators than in nonmeditators, and several mediated the cross-sectional relationship between meditation experience and psychological well-being (Baer, Smith, Lykins, & Button, 2008). However, there is considerable evidence that the observing subscale does not always function in theoretically consistent ways in undergraduate students and other nonmeditating samples, typically failing to show expected associations or, more rarely, predicting poorer psychological health and wellbeing (e.g., Baer et al., 2008; Barnhofer, Duggan, & Griffith, 2011; Bowlin & Baer, 2012; Murphy & MacKillop, 2011; Peters, Erisman, Upton, Baer, & Roemer, 2011). It is possible that items in the observing subscale are interpreted differently depending on the respondent’s level of meditation experience (Baer, 2011; Baer et al., 2006); experienced meditators may be more likely to interpret observing items to mean attending to experience in a nonjudgmental and nonreactive way (consistent with mindfulness), whereas nonmeditators may not imbue observing items with such mindful qualities of attention.

**Aggression.** The Aggression Questionnaire (AQ; Buss & Perry, 1992) is a 29-item measure of four different aspects of aggression, including anger (“sometimes I feel like a powder keg ready to explode”), hostility (“when people are especially nice, I wonder what they want”), verbal aggression (“my friends say I’m somewhat argumentative”), and physical aggression (“given enough provocation, I might hit another person”). Participants are asked to indicate the degree to which each item applies to them on a 7-point Likert-style scale ranging from 1 (extremely uncharacteristic of me) to 7 (extremely characteristic of me). Scores on the AQ reliably predict both acts of aggression and peer reports of aggression (Archer & Webb, 2006; O’Connor, Archer, & Wu, 2001) and are stable over time (Harris, 1997). In the present sample, the reliabilities of the subscales were all good or excellent (anger $\alpha = .85$, hostility $\alpha = .90$, verbal aggression $\alpha = .85$, physical aggression $\alpha = .85$, total aggression $\alpha = .92$).

**Anger Rumination.** The Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 2001) has 19 items assessing the tendency to ruminate on anger, including angry afterthoughts (“I re-enact an anger episode in my mind after it has happened”), thoughts of revenge (“I have long living fantasies of revenge after the conflict is over”), angry memories (“I ponder about the injustices that have been done to me”), and understanding of causes (“I think about the reasons people treat me badly”). The ARS has been shown to have high internal consistency and good test-retest reliability (Sukhodolsky et al., 2001). Participants are asked to rate statements on a 4-point frequency scale ranging from 1 (almost never) to 4 (almost always). Reliability was excellent for the total scale in the current sample ($\alpha = .92$).
Analyses and Data Transformation

The results were analyzed using SPSS (version 20) and Mplus (version 6.11). All data were screened for skew and kurtosis to test assumptions of normality (Tabachnick & Fidell, 2000). Several scales were positively skewed, including the ARS (skew = 1.03, standard error [SE] = .08), physical aggression (skew = .76, SE = .08), and anger (skew = .64, SE = .08). These variables demonstrated skew greater than 5 times the standard error of the skew (.08) and were corrected using either a square root transformation (physical aggression, anger) or a log transformation (ARS), demonstrating acceptable skew following transformation (physical aggression skew = .34, anger skew = .22, ARS skew = .33).

Measures of interest for the analyses in the present study were presented in the first half of the online survey. A validity question was included to ensure that participants were attending to both item content and the response scale (“Please select the answer that corresponds to mostly agree”). Participants who incorrectly answered this validity question (n = 79) were removed. Remaining responses were screened for selecting a single response across entire measures and obvious pattern-based responding, resulting in the exclusion of 23 additional participants. A final sample of 823 was used for analyses.

Structuring equation modeling was used to test the models depicted in Figures 1 and 2. Latent variables were created using parcels of items from the above-mentioned self-report scales and were evaluated individually for model fit before being used in the structural models. The fit of the models was evaluated with standard criteria. Absolute measures of fit include root mean square error of approximation (RMSEA) with recommendations for cutoff values varying from .05–.08 (Hu & Bentler, 1999; Kline, 2011; MacCallum, Browne, & Sugawara, 1996) and standardized root mean square residual (SRMR) with values <.08 indicating good fit (Hu & Bentler, 1999).
Results

Descriptive Statistics and Zero-Order Correlations

Zero-order correlations were computed to examine the relationships among anger rumination, mindfulness, and aggression (see Table 1 for correlations and descriptive statistics). Analyses revealed significant negative correlations among anger and hostility and all facets of mindfulness except observing. As predicted, observing demonstrated either nonsignificant or small positive associations with anger rumination and aggression variables, suggesting that as in previous studies, this variable fails to capture the intended construct in this type of sample. Accordingly, observing was not included in subsequent analyses. Acting with awareness and nonjudging
Table 1
Descriptive Statistics of Zero-Order Correlations Between Mindfulness Facets, Anger Rumination, Anger and Aggression Outcomes, Age, and Biological Sex (N = 823)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
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<th>3</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Observing (FFMQ)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Describing (FFMQ)</td>
<td>.22***</td>
<td>1</td>
<td></td>
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<td></td>
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<td>3. Act aware (FFMQ)</td>
<td>−.10**</td>
<td>.33***</td>
<td>1</td>
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<tr>
<td>4. Nonjudging (FFMQ)</td>
<td>−.26***</td>
<td>.20***</td>
<td>.49***</td>
<td>1</td>
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<tr>
<td>5. Nonreact (FFMQ)</td>
<td>.39***</td>
<td>.24***</td>
<td>.05</td>
<td>−.02</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>6. Anger rumination (AQ)</td>
<td>.14***</td>
<td>−.13***</td>
<td>−.33***</td>
<td>−.48***</td>
<td>−.12**</td>
<td>1</td>
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<tr>
<td>7. Anger (AQ)</td>
<td>.11**</td>
<td>−.05</td>
<td>−.30***</td>
<td>−.33***</td>
<td>−.04</td>
<td>.44***</td>
<td>1</td>
<td></td>
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<tr>
<td>8. Hostility (AQ)</td>
<td>.07*</td>
<td>−.17***</td>
<td>−.40***</td>
<td>−.49***</td>
<td>−.13***</td>
<td>.54***</td>
<td>.54***</td>
<td>1</td>
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<tr>
<td>9. Verbal agg. (AQ)</td>
<td>.11**</td>
<td>.04</td>
<td>−.23***</td>
<td>−.23***</td>
<td>.04</td>
<td>.33***</td>
<td>.59***</td>
<td>.43***</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>10. Physical agg. (AQ)</td>
<td>.09*</td>
<td>−.03</td>
<td>−.16***</td>
<td>−.24***</td>
<td>.05</td>
<td>.36***</td>
<td>.63***</td>
<td>.42***</td>
<td>.51***</td>
<td>1</td>
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</tr>
<tr>
<td>11. Age</td>
<td>.10*</td>
<td>.09*</td>
<td>.02</td>
<td>.02</td>
<td>.06</td>
<td>−.01</td>
<td>−.05</td>
<td>−.02</td>
<td>−.05</td>
<td>.01</td>
<td>1</td>
</tr>
<tr>
<td>12. Sex (male)</td>
<td>.01</td>
<td>.04</td>
<td>.05</td>
<td>−.04</td>
<td>.17***</td>
<td>−.01</td>
<td>.03</td>
<td>−.02</td>
<td>.08*</td>
<td>.34***</td>
<td>.10**</td>
</tr>
<tr>
<td>Mean</td>
<td>3.04</td>
<td>3.30</td>
<td>3.27</td>
<td>4.34</td>
<td>2.93</td>
<td>1.50</td>
<td>4.40</td>
<td>2.97</td>
<td>3.29</td>
<td>4.72</td>
<td>19.25</td>
</tr>
<tr>
<td>(SD)</td>
<td>(.77)</td>
<td>(.72)</td>
<td>(.71)</td>
<td>(.79)</td>
<td>(.62)</td>
<td>(.11)</td>
<td>(.74)</td>
<td>(1.31)</td>
<td>(.32)</td>
<td>(.95)</td>
<td>(2.51)</td>
</tr>
</tbody>
</table>

Note. SD = standard deviation; FFMQ = Five Facet Mindfulness Questionnaire; AQ = Aggression Questionnaire; agg. = aggression.
*p < .05. **p < .01. ***p < .001.

Measurements were also negatively correlated with both physical and verbal aggression. Anger rumination was positively correlated with all anger and aggression outcomes. Only age was significantly associated with observing and describing, both small, positive correlations. Male sex demonstrated significant positive associations with nonreactivity, physical aggression, and verbal aggression.

Measurement Models

Measurement models were fit for latent variables for mindfulness dimensions, anger rumination, and aggression dimensions. The measurement model for a single factor anger rumination latent variable using the four subscales of the ARS demonstrated good fit, \( \chi^2(2) = 8.62, p = .013; \) RMSEA = .063, 95% confidence interval [CI] [.024, .102], CFI = .99; TLI = .99; SRMR = .01, with all four subscales loading significantly onto the latent variable (.79–.87, p < .001). A measurement model for a four-factor mindfulness model (acting with awareness, nonjudging, nonreactivity, and describing) was evaluated. Pairs of FFMQ factor items were assigned to parcels in alternating order, so that each factor had four parcels containing two items each, with the exception of a nonreactivity parcel with a single item. The parcels were used as indicators, each loading onto the relevant factor latent variable, and the latent variables allowed to intercorrelate.

The mindfulness measurement model with the four factors demonstrated good fit, \( \chi^2(98) = 8.62, p < .001; \) RMSEA = .055, 95% CI [.049, .060]; CFI = .97; TLI = .96; SRMR = .06. All four indicators loaded significantly onto each latent variable: nonreactivity (.58–.84, p < .001), acting with awareness (.77–.88, p < .001), nonjudging (.75–.88, p < .001), and describing (.78–.89,
The associations among the latent mindfulness variables were consistent with those previously described among the observed mindfulness variables: Describing demonstrated positive associations with all three other mindfulness variables, and acting with awareness and nonjudging were also significantly correlated, whereas nonreactivity was not significantly correlated with either acting with awareness or nonjudging.

Two competing measurement models were examined for the AQ: the four-factor structure modeling each subscale independently and a two-factor structure with a behavioral aggression variable (including items from the physical aggression and verbal aggression subscales) and attitudinal aggression (including items from the anger and hostility subscales). For both models, the AQ factor items were assigned to parcels in alternating order, so that each factor contained four parcels containing two items, with the exception of one parcel in physical aggression containing three items and three parcels in verbal aggression containing one item each. The parcels were used as indicators, each loading onto the relevant latent variable, and the latent variables were allowed to intercorrelate.

Consistent with previous research, the four-factor model demonstrated satisfactory fit, \( \chi^2 (98) = 668.37, p < .001 \); RMSEA = .088, 95% CI [.081, .094]; CFI = .94; TLI = .92; SRMR = .05, whereas the two-factor structure demonstrated poor fit, \( \chi^2 (103) = 2712.20, p < .001 \); RMSEA = .176, 95% CI [.170, .182]; CFI = .70; TLI = .65; SRMR = .12. Within the four-factor model, all indicator loaded significantly onto each latent variable: physical aggression (.61–.92, \( p < .001 \)), verbal aggression (.73–.83, \( p < .001 \)), anger (.59–.89, \( p < .001 \)), and hostility (.79–.89, \( p < .001 \)). All four latent variables were also significantly intercorrelated.

\section*{Structural Models}

An initial structural model was examined with each aggression subscale regressed onto trait mindfulness (see Figure 1). Loadings were included only for pairings that demonstrated significant zero-order correlations, to reduce multicollinearity where possible and the likelihood of spurious suppression effects. The model demonstrated good fit to the data, \( \chi^2 (332) = 1215, p < .001 \); RMSEA = .057, 95% CI [.053–.060]; CFI = .94; TLI = .93; SRMR = .05. Nonjudging significantly predicted all aggression variables, and acting with awareness significantly predicted all aggression variables except for physical aggression. In addition, nonreactivity significantly predicted hostility. Describing did not significantly predict any aggression variables.

To test whether anger rumination accounts for the shared variance between mindfulness and aggression, a second structural model was estimated with the ARS added (see Figure 2). Describing was excluded from this model given its lack of significant loadings in the prior model. The second model also demonstrated good fit to the data, \( \chi^2 (440) = 1411.28, p < .001 \); RMSEA = .051, 95% CI [.048, .054]; CFI = .94; TLI = .93; SRMR = .05. Nonjudging, acting with awareness, and nonreactivity all significantly predicted anger rumination, and anger rumination significantly predicted all aggression variables. Nonjudging no longer significantly and directly predicted physical aggression or verbal aggression, and the level of significance of several other loadings from nonjudging and acting with awareness to aggression variables was reduced.

Structural invariance by sex was evaluated for the overall final model. When compared with the unconstrained model, the constrained model, \( \chi^2 (928) = 2060.87, p < .001 \); RMSEA = .054, 95% CI [.051, .057]; CFI = .93; TLI = .93; SRMR = .06, demonstrated significantly greater chi-square, \( \chi^2 (488) = 649.59 \), but model fit statistics dropped less than .01 (\( \Delta \)CFI = −.009, \( \Delta \)TLI = −.007), suggesting no meaningful effect on model fit (Cheung & Rensvold, 2002). When models were fit constraining specific paths as invariant by sex, only two paths produced significant differences in chi-square values: the path from nonjudging to anger rumination, \( \chi^2 (1) = 8.01 \), and that from acting with awareness to anger rumination, \( \chi^2 (1) = 5.11 \). In both cases, no differences at all were observed in CFI or TLI when the models were constrained for invariance on these paths.

When models were fit independently for women, \( \chi^2 (440) = 1121.50, p < .001 \); RMSEA = .051 95% CI [.048, .055]; CFI = .94; TLI = .94; SRMR = .05, and men, \( \chi^2 (440) = 813.54, p < .001 \); RMSEA = .059, 95% CI [.052, .065]; CFI = .92; TLI = .91; SRMR = .07), these coefficients for women were similar to the overall model (acting with awareness: \( \beta = -.16, p = .004 \); nonjudging: \( p < .001 \)).
Table 2

Standardized Effect Coefficients, Percentile-Corrected Bootstrapped CIs, and Estimated Effect Size (Percent of Total Effect) for Indirect Effects of Mindfulness Via Anger Rumination on Aggression (N = 823)

<table>
<thead>
<tr>
<th>Mindfulness Variable</th>
<th>Aggression</th>
<th>Effect Size (Percent of Total Effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effectsnonjudging on physical aggression</td>
<td>Total: –.26**, 95% CI: [–.33, –.18], 99% CI: [–.36, –.16]</td>
<td>69**</td>
</tr>
<tr>
<td>Indirect via anger rum.: –.18**, 95% CI: [–.24, –.13], 99% CI: [–.26, –.11]</td>
<td></td>
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</tr>
<tr>
<td>Direct: –.08*, 95% CI: [–.17, –.02], 99% CI: [–.20, –.05]</td>
<td></td>
<td>31</td>
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</tbody>
</table>

| Effects from nonjudging on verbal aggression | Total: –.21**, 95% CI: [–.31, –.10], 99% CI: [–.34, –.07] | 67** |
| Indirect via anger rum.: –.14**, 95% CI: [–.19, –.09], 99% CI: [–.21, –.08] | | |
| Direct: –.07, 95% CI: [–.18, –.05], 99% CI: [–.21, –.09] | | 33 |

| Effects from acting with awareness on verbal aggression | Total: –.16**, 95% CI: [–.26, –.06], 99% CI: [–.29, –.03] | 81** |
| Indirect via anger rum.: –.03, 95% CI: [–.05, –.01], 99% CI: [–.06, –.01] | | 19* |
| Direct: –.13**, 95% CI: [–.22, –.04], 99% CI: [–.25, –.01] | | |

| Effects from nonjudging on anger | Total: –.33**, 95% CI: [–.41, –.24], 99% CI: [–.44, –.22] | 61** |
| Indirect via anger rum.: –.20**, 95% CI: [–.26, –.15], 99% CI: [–.28, –.13] | | |
| Direct: –.12**, 95% CI: [–.22, –.02], 99% CI: [–.25, –.01] | | 36 |

| Effects from acting with awareness on anger | Total: –.19**, 95% CI: [–.27, –.11], 99% CI: [–.30, –.09] | 79** |
| Indirect via anger rum.: –.04*, 95% CI: [–.07, –.01], 99% CI: [–.09, –.01] | | 21* |
| Direct: –.15**, 95% CI: [–.22, –.08], 99% CI: [–.25, –.06] | | |

| Effects from nonjudging on hostility | Total: –.47**, 95% CI: [–.55, –.39], 99% CI: [–.58, –.37] | 38** |
| Indirect via anger rum.: –.18**, 95% CI: [–.22, –.13], 99% CI: [–.24, –.11] | | |
| Direct: –.30**, 95% CI: [–.39, –.21], 99% CI: [–.42, –.18] | | 64** |

| Effects from acting with awareness on hostility | Total: –.17**, 95% CI: [–.26, –.08], 99% CI: [–.29, –.05] | 76** |
| Indirect via anger rum.: –.03**, 95% CI: [–.06, –.01], 99% CI: [–.07, –.01] | | 18* |
| Direct: –.13**, 95% CI: [–.22, –.05], 99% CI: [–.24, –.02] | | |

| Effects from nonreactivity on hostility | Total: –.13**, 95% CI: [–.20, –.07], 99% CI: [–.22, –.05] | 38** |
| Indirect via anger rum.: –.05**, 95% CI: [–.08, –.02], 99% CI: [–.09, –.02] | | |
| Direct: –.08**, 95% CI: [–.14, –.02], 99% CI: [–.16, –.01] | | 62** |

Note. CI = confidence interval; anger rum. = anger rumination. Analyses were also conducted using bias-corrected bootstrapping, and results were the same for all effects.

* p < .05. ** p < .01.

β = −.44, p < .001); however, for men, acting with awareness did not significantly predict anger rumination (β = .06, p = .45), whereas the coefficient for nonjudging was increased (β = −.60, p < .001).

Indirect Effects

Bootstrapping was used to test for indirect effects from mindfulness variables via anger rumination to anger outcomes in the second structural model (see Table 2). A significant indirect effect was observed from nonjudging via anger rumination to all aggression variables, with anger rumination accounting for an estimated 61%–69% of the effect of nonjudging on anger and physical and verbal aggression and for an estimated 38% of the effect on hostility. Significant indirect effects from acting with awareness via anger rumination were observed for all aggression outcomes except for physical aggression, accounting for an estimated 18%–21% of the total effect.
A significant indirect effect was observed from nonreactivity via anger rumination to hostility, accounting for an estimated 38% of the total effect of nonreactivity on hostility.

Discussion

The present study replicated and extended previous findings that rumination accounts for a significant amount of shared variance between mindfulness and aggression by using measures of both multiple dimensions of mindfulness and anger-specific rumination. By examining multiple facets of mindfulness and assessing rumination about anger specifically, we produced findings different from those of previous studies. As hypothesized, the nonjudging facet of mindfulness demonstrated the most consistent and strongest loadings across all forms of aggression. In line with previous findings, acting with awareness also loaded significantly onto most forms of aggression (Borders et al., 2010). Nonreactivity loaded onto hostility only. Anger rumination accounted for a significant amount of each of these relations, with the largest effect sizes for mediation observed generally for the indirect effects from nonjudging via anger rumination to aggression variables.

These findings add to the growing evidence suggesting that reductions in rumination are a major component of the beneficial effects of mindfulness skills on aggression; however, this may primarily be relevant for the nonjudging element of mindfulness. Interventions seeking to reduce rumination and aggression may benefit from explicitly focusing on this component of mindfulness, as is done in dialectical behavior therapy (Linehan, 1993). Conclusions drawn from the present findings are limited by the correlational, cross-sectional nature of the study; future research comparing mindfulness-based interventions to control conditions would be able to test causal relationships between the acquisition of various mindfulness skills and both rumination and aggressive behavior.

Findings differed by type of aggression, with more components of mindfulness contributing to hostility than to other forms, and anger rumination accounting for a lower proportion of the relationship between nonjudging and hostility than it did for other forms of aggression assessed. It may be that mindfulness is broadly more relevant to limiting the formation of hostile cognitions than to reducing other components of aggression and that some of this relation is independent of rumination. In addition to affecting rumination, mindfulness also fosters a decentered perspective on internal experiences, allowing individuals to entertain thoughts and emotions without assuming them to be facts (Baer & Krietemeyer, 2006). Decentering may affect appraisals of potential provocation in particular, leading to the observed effects on hostility.

These findings demonstrate the importance of assessing mindfulness as a multidimensional construct. Research with narrower measures of single components, such as present-centered awareness, may fail to capture key elements of how dispositional mindfulness protects against maladaptive outcomes. For instance, it may be necessary to cultivate nonjudgmental and nonreactive attitudes in addition to present-centered attention and awareness to see the greatest effect on anger rumination and aggressive behavior. Attentional (e.g., present-centered awareness) and attitudinal (e.g., acceptance and nonjudging) skills may also have synergistic effects (Peters et al., 2013), which should be explored further.

Also, although the fit of the examined model did not decrease considerably when specified for both women and men, it is possible that some sex differences occur for some of the loadings. Specifically, it seems that for men, present-centered awareness may not significantly contribute to anger rumination and nonjudging may have stronger effects. This suggests that when studying the relationship between mindfulness and anger rumination for men, using measures that assess attitudinal aspects such as nonjudging and nonreactivity may be particularly important.

In the present study, the observing facet of the FFMQ showed small positive correlations with anger rumination and all aspects of aggression and was not significantly correlated with rumination. This finding is consistent with the many previous studies suggesting that the nonmeditating participants may interpret the observing items in ways inconsistent with mindful qualities of observation (e.g., reactive or judgmental observation; see Baer, 2011). Additional work is needed to determine the best way to mitigate these psychometric issues when using the FFMQ with nonmeditating samples.
Compared with a previous study that used a measure of general rumination (Borders et al., 2010), the present data demonstrated a more consistent pattern of significant loadings of anger rumination on the full range of aggressive characteristics assessed. This is consistent with previous findings demonstrating the specificity of the effects of rumination, namely, that anger rumination increases aggression, whereas other forms of rumination, such as depressive rumination, may primarily produce increased depressive affect (Peled & Moretti, 2009). Although both sadness and anger can be conceptualized as negatively valenced, they differ in associated levels of arousal and approach orientation (Carver & Harmon-Jones, 2009; Harmon-Jones & Harmon-Jones, 2010); increasing avoidance-oriented forms of negative affect such as sadness might even reduce some aggressive tendencies, whereas increased approach-related negative affect such as anger increases aggression. Future research on rumination and aggression should continue to use measures specifically assessing anger rumination or multiple forms of rumination.

Although anger rumination accounted for a large part of the relationship between mindfulness and aggression, significant direct effects remained between some facets of mindfulness and some forms of aggression. Mindfulness may influence aggression in numerous other ways in concert with its effect on rumination. For example, heightened ego involvement, or the extent to which one’s self-esteem is invested in outcomes or experiences (Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000), has been linked to increased tendencies to respond aggressively to potential conflict. By fostering a decentered approach to experiences, mindfulness may reduce these self-focused schemas and the subsequent aggressive defense of the self (Heppner et al., 2008). Mindfulness has also been linked to increased compassion for both the self (Kuyken et al., 2010) and others (Condon, Desbordes, Miller, & DeSteno, 2013), which may foster a greater sense of interconnectedness and facilitate responding to potential conflict with nonaggressive approaches. Future research might examine models containing all of these possible mechanisms.

Limitations
One limitation of this study is a single self-report questionnaire used to assess all forms of aggression; further studies may want to better disentangle these effects on various components of aggression by assessing them more distinctly, perhaps via laboratory tasks directly assessing aggressive behaviors or hostile appraisals. Another limitation of the present study is the sample’s relatively low endorsement of physical aggression, which may be a factor in the current study’s differential findings for this aspect of aggression and limit the generalizability. The use of an undergraduate sample is another limitation. Future studies should examine whether the proposed model holds for samples with greater representation of highly aggressive individuals, such as those referred for anger management treatment.

Conclusion
In summary, the present findings suggest that mindfulness may lead to reduced aggression via lower levels of anger rumination. Although the cross-sectional, correlational nature of the data do not allow for causal interpretation, these preliminary findings are consistent with the theory that reducing anger rumination may be one way that mindfulness-based therapies can target aggressive behavior. In particular, interventions that emphasize cultivation of both present-centered awareness and a nonjudgmental attitude toward what is observed may be particularly effective for reducing anger rumination and associated anger or aggression. Further research using clinical samples, experimental paradigms, and mindfulness-based interventions should explore these hypotheses.

References


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