

Curiosity Protects Against Interpersonal Aggression: Cross-Sectional, Daily Process, and Behavioral Evidence

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Abstract

Objective: Curiosity is the propensity to recognize and seek out new information and experience, including an intrinsic interest in learning and developing one's knowledge. With few exceptions, researchers have often ignored the social consequences of being curious.

Method: In four studies using cross-sectional ($N=64$), daily diary ($Ns=150$ and 110 , respectively), and behavioral experimental ($N=132$) designs, we tested the hypothesis that individual differences in curiosity are linked to less aggression, even when people are provoked.

Results: We showed that both trait and daily curiosity were linked to less aggressive responses toward romantic relationship partners and people who caused psychological hurt. In time-lagged analyses, daily curiosity predicted less aggression from one day to the next, with no evidence for the reverse direction. Studies 3 and 4 showed that the inverse association between curiosity and aggression was strongest in close relationships and in fledgling (as opposed to long-lasting) romantic relationships. That is, highly curious people showed evidence of greater context sensitivity. Intensity of hurt feelings and other personality and relationship variables failed to account for these effects.

Conclusions: Curiosity is a neglected mechanism of resilience in understanding aggression.

Keywords: curiosity, openness to experience, aggression, romantic relationships, social pain

The potential for conflict pervades social life, especially in situations in which people do not have an ingrained habit for how to solve the conflict peacefully. Having a mind-set that embraces situations as opportunities to gain information, stretch one's mind to its limits, and relish new experiences might be inversely linked to aggression. This mind-set, better known as curiosity (Izard, 1977; Kashdan & Steger, 2007; Tomkins, 1962), may be particularly relevant in close (vs. superficial) relationships—where people high in curiosity might possess an intense, motivated appetite for knowledge. While there may be more opportunities to learn new information in superficial relationships, the intrinsic motivation to be open, receptive, and willing to explore new information is probably greatest in situations featuring growth opportunities and an accompanying psychological commitment (Carson, Carson, Gil, & Baucom, 2007). This is best characterized by

fledgling romantic relationships, where partners are still in the phase of trying to discover each other's personalities, interests, and values (Aron et al., 2004).

To investigate the above arguments, we conducted four studies measuring curiosity as both a stable trait (Studies 1, 3, and 4) and as a daily state (Study 2). We also assessed aggressive inclinations toward a romantic partner (Study 1), daily levels of general aggressive inclinations (Study 2), aggressive

Todd B. Kashdan was funded by the Center for Consciousness and Transformation at George Mason University. This research was supported in part by a grant from the National Science Foundation (BCS-1104118 to DeWall). The opinions and conclusions expressed herein are those of the authors and do not necessarily reflect the opinions of the NSF.

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responses to provocation by a particular person in daily life (Study 3), and aggressive behavior toward a romantic partner in the laboratory (Study 4). All four studies tested whether curiosity predicts lower aggressive inclinations and behavior. Studies 3 and 4 specifically tested a key moderator, namely, whether the inverse association between curiosity and aggression was strongest when there is “an intense, intrinsically motivated appetite for information” (Loewenstein, 1994, p. 77) in social situations. This was defined as the type of relationship between participants and another person in a social interaction involving provocation.

What is Curiosity?

Current theories of curiosity reveal several major themes (Kashdan, 2004, 2009; Silvia, in press; Silvia & Kashdan, 2009; Spielberger & Starr, 1994). First, curiosity has been viewed as an approach-oriented state that inspires the search for information and learning for its own sake. In turn, curiosity initiates exploration (Day, 1971) and promotes the creation of knowledge, competence, and personal growth (Kashdan & Steger, 2007; Loewenstein, 1994; Tomkins, 1962). Modern research usually uses *curiosity* and *interest* as synonyms (Silvia, in press). For historical reasons, some research traditions favor *curiosity* (e.g., the behavior theory and individual differences literatures), whereas others favor *interest* (e.g., the emotion psychology and education literatures). Likewise, research often uses *curiosity* when referring to individual stable differences but *interest* when referring to momentary states. Differences in usage aside, the underlying state is the same (for a review, see Silvia, 2006, chap. 9), and we use the terms synonymously throughout this article.

Second, being open and curious to novel, complex, or uncertain elements in the environment includes a tolerance of differences (Beswick, 1971; Silvia, 2005). Upon exposure to new information and experiences, there is often tension with prior conceptual frameworks that may no longer fit (Elliot & Reis, 2003; White, 1959). When our existing conceptual frameworks are inadequate for understanding and integrating new information, this prompts us to revise them (Loevinger, 1976; Piaget, 1952). These changes are in the service of broadening the self and existing relationships (Hayes, Villatte, Levin, & Hildebrandt, 2011; Langer, 1992). Instead of valuing safety, rules, structure, and obedience, curious people show a preference for increasing personal growth, self-knowledge, and competence (Vittersø, Søholt, Hetland, Thoresen, & Røysamb, 2010). The openness to novelty, uncertainty, and complexity typical of high curiosity is illuminated by considering what low curiosity looks like: a preference for the familiar over the new, for stability over variety, for closure, and for structure over uncertainty (Litman, 2005; Sorrentino & Roney, 2000). In fact, there is evidence that the need for cognition and cognitive closure is not only inversely related to curiosity (e.g., Litman, 2010), but they reside at the other end of the continuum (e.g., Mussel, 2010).

Third, certain appraisals precede the curious states in daily life that are more frequent, intense, and extended in people who are high in trait curiosity (Day, 1971; Spielberger & Starr, 1994). The momentary state of curiosity for an event or a person appears to depend on two cognitive appraisals (Silvia, 2006, 2008): (a) Is the object of one’s attention novel, complex, or challenging (growth potential)? (b) Can the novel, complex, or challenging object be handled or understood (coping potential)? Simply expressed, states of curiosity arise when there is the recognition of new information to be acquired and sufficient belief that the search for this information is manageable. People high in trait curiosity are more likely to uncover novelty, and when they do, they are more likely to believe they have the ability to comprehend these events (Silvia, 2008; Silvia, Henson, & Templin, 2009).

Fourth, paradoxically, having more knowledge and experience increases curiosity: the more that is known about an object, a topic, or a person, the easier it is to become aware of information gaps, and the greater the desire to close them by exploring and discovering. For example, when in a committed relationship with someone, our interest is likely to be piqued when they tell us they had a different first name in childhood; our curiosity is likely to be less intense if we hear this same statement from an acquaintance or a stranger in a bar. Loewenstein (1994) suggests that more intense curiosity occurs as a function of how likely it is that we will be able to close information gaps, and we become more curious about things when there is prior knowledge. This is because prior knowledge makes it easier to be attuned to what is left to discover and how to make sense of these incoming data.

Fifth, curiosity is distinct from related positive emotional states (e.g., Berlyne, 1960; Tsutsui & Ohmi, 2011; Turner & Silvia, 2006). Finding something interesting commonly goes together with enjoying something, but the two have different predictors and consequences for exploratory behavior. In particular, enjoyable things are often familiar, whereas interesting things are invariably novel—offering opportunities to gain new information and experiences geared toward self-expansion (Silvia, 2005, 2008). By self-expansion, we refer to how people expand the social resources, knowledge, perspectives, and interests that define their identity. When people develop a deeper and broader identity, they are increasing the resources available to achieve their goals (for review, see Aron & Aron, 1997). Self-expansion appears to be a valuable by-product of being a highly curious person.

Since the early days of motivation science, psychologists have suggested that a curious mind-set is much more typical of some people than others (see Silvia, in press). People with high trait curiosity are more likely to recognize the unfamiliar in the familiar, seek new experiences, explore new things, and appreciate novelty and challenge over stability (Kashdan et al., 2009; Kashdan & Steger, 2007; Spielberger & Starr, 1994). It is worth differentiating curiosity from the more widely studied trait of Openness to Experience (McCrae & Sutin, 2009). The

rationale for our focus on curiosity is best described by this passage (Kashdan, 2004, pp. 126):

Openness to experience is a higher-order personality dimension involving receptivity to experiencing novel fantasies, feelings, ideas, and values. Curiosity is a fundamental motivational component of all openness facets. Yet high openness also entails imaginative, artistic, and unconventional sensibilities that are neither necessary nor sufficient for curiosity. Similarly, individuals can be high in openness, expressing a willingness to better understand themselves and be open-minded to “all walks of life,” yet they may be reluctant to purposively challenge and expand themselves (e.g., eating Ethiopian food, hiking instead of staying home to relax). Thus, the experience of curiosity appears to be more of a mechanism of action (cognitively, emotionally, and/or behaviorally) whereas openness is more of a psychological predisposition.

Curiosity is a part of Openness to Experience, but the other qualities of being imaginative and creative, embracing liberal political values, and showing an appreciation of art and poetry seem to be less theoretically relevant to healthy interpersonal behavior such as a lower propensity for reactive and relational aggression. Prior work has found that curiosity is moderately related but distinct from Openness to Experience, with correlation coefficients ranging from .30 to .50 (e.g., Kashdan et al., 2009; Kashdan, Rose, & Fincham, 2004; Mussel, 2010).

Why Curiosity is Relevant to Aggression

Over the past decade, researchers and the media have increased their attention to aggression and how it contributes to delinquency, violence, and other individual and societal problems (Anderson & Bushman, 2002). When people perceive insults, annoying behavior, and social rejection, they are often confronted with conflicting goals in choosing how to respond. The desire to be viewed in a positive light has to be balanced with the desire to avoid being hurt. These competing desires are difficult to satisfy simultaneously when other people are intentionally malicious. One possible reaction is to behave aggressively. Reactive aggression has been viewed as a form of defensive responding following ego threats or the frustration experienced when something impedes goal attainment (Berkowitz, 1989). Aggression can also be a proactive, calculated strategy to receive external rewards such as a sense of control. Proactive aggression often occurs after repeated, successful use of aggressive responses to achieve desired goals (Bandura, 1973). For instance, bullying a romantic partner might be useful to get him or her to comply with personal demands for more sex within the relationship.

Interventions to reduce the psychological and societal burden of aggression will benefit from understanding the factors that reduce it. In four studies with diverse methods, we

test a conceptual framework in which a curious mind-set is hypothesized to be inversely associated with aggression following provocation. People high in curiosity not only recognize and seek new knowledge and experiences, but they also possess an open and receptive attitude toward inner experiences and their social environment (Silvia & Kashdan, 2009). Behavioral manifestations of curiosity, including exploration, contribute to discovery and personal growth.

Considerable progress has been made by researchers on how curiosity contributes to positive outcomes in school, work, sports, and the arts (Loewenstein, 1994; Spielberg & Starr, 1994). Less is known, however, about the value of curiosity for healthy relationships. A small body of research has shown that curiosity is associated with greater positive emotions and closeness during initial encounters with strangers (e.g., Kashdan, McKnight, Fincham, & Rose, 2011) and greater satisfaction and social support in existing relationships (Burpee & Langer, 2005; Gallagher & Lopez, 2007). Theory and research also suggest that the benefits of a curious mind-set extend to less defensive reactions to stress and thus, we argue, less aggression in response to provocation.

Curious individuals are more attentive to the people with whom they interact and to the emotions that arise during social situations. Their attentiveness is best characterized as an open, receptive attitude to what is happening in the present moment. Instead of mindlessly allowing the past to govern perceptions and behavioral reactions to other people, curious people readily observe and show a willingness to tolerate deviations from the expected before responding (Langer, 1992). Likewise, a curious mind-set motivates people to view stressful events as challenges instead of threats, openly communicate difficulties rather than respond with aggression (reflective instead of reflexive), and try new approaches to solve problems (Kruglanski, 2004; McCrae & Sutin, 2009). The psychological flexibility inherent in curious people shapes their social interactions and self-regulatory efforts. Indeed, in a daily diary study over a 4-week assessment period, people who could better tolerate and be open to uncertainty reported less frequent conflicts with friends, less passive-aggressive reactions, and a greater willingness to forgive transgressions (Berry, Willingham, & Thayer, 2000).

When people act in ways that are inconsistent with expected scripts, people low in curiosity are likely to view these discrepancies as threatening (Kruglanski, 2004). When reactions to relationship partners have been studied over the course of 3 weeks, researchers found that less curious people were more likely to oscillate between extreme views of absolute trust and distrust (Sorrentino, Holmes, Hanna, & Sharp, 1995). With less comfort in novel, uncertain situations, less curious people have been shown to be quicker to escalate from being ambivalent about another person to the conclusion that existing problems are intractable and necessitate extreme, defensive reactions such as aggression and abrupt relationship endings (Bollmer, Harris, Milich, & Georgesen, 2003; Sorrentino & Roney, 2000). In contrast, people high in curiosity appear

comfortable managing doubts and tension as they arise in conflicts with other people, increasing the likelihood of non-defensive reactions (Spielberger & Starr, 1994; Trudewind, 2000). Based on theory and research on curious people, we expected curious people to respond less aggressively following provocation.

In a situation where a person is provoked by another, there will undoubtedly be tension related to this uncertain social situation. Instead of avoiding or escaping this tension, people high in curiosity show a tendency to actively explore, taking advantage of opportunities to build healthy relationships. This is partly because people high in curiosity possess high self-efficacy for coping with intense ambiguity or novelty, even if these events induce unpleasant feelings such as anger or confusion (Silvia, 2005, 2008). However, if the situation is viewed as too threatening or anxiety provoking, this can override the self-efficacy of even the most highly curious individual (Peters, 1978).

Feeling less threatened, curious people should have greater mental energy to behave less aggressively, particularly in the context of provocation by romantic partners and other people they see as important to their personal growth (Thoman, Smith, & Silvia, in press). Aggression runs counter to the flexible cognitive processes, behavioral tendencies, and non-defensive responding that accompany curious mind-sets (Kashdan & Rottenberg, 2010). Because curious people react with fewer negative emotions and fewer attributions of threat in novel, ambiguous, or challenging situations, they are more apt to perceive themselves as able to effectively cope with these events (Silvia, 2005, 2008). As a result, when provoked or hurt by another person, instead of being predisposed to behavior used in the past, curious people are predisposed to be sensitive to the immediate context (Langer, 1992). For example, upon being angered by a close friend, a curious person would show less defensive processing of threat and more adaptive responses such as taking an interest in the other person's perspective and problem-solving to resolve the conflict to maintain a compassionate, caring friendship. That is, curious people are likely to be sensitive to the difference of responding to provocation by a close relationship partner versus a stranger. With a close relationship partner, there are often important values underlying the motivation to use strategies to maintain a healthy relationship instead of seeking vengeance or defending one's honor (Hayes et al., 2011). Instead of being governed by learned reactions or rigid, scripted social behavior, curious people are more likely to alter aggressive responding depending on context (Langer, 1992).

Overview of Current Studies

Because of curious people's open, receptive attitude toward their internal and external world, aggression is less likely to be part of their behavioral repertoire, and feelings of anger and hurt feelings are less likely to instigate reactive aggression. Four studies tested these hypotheses. Using cross-sectional

data, Study 1 explored the relationship between trait curiosity and general aggressive tendencies. Study 2 used a daily process approach over a 25-day period, allowing for tests of directionality with time-lagged analyses. Because trait and daily curiosity are positively associated with each other and linked to many similar outcomes (Kashdan & Steger, 2007; Silvia, 2005), we expected to find inverse relationships between curiosity and aggression regardless of whether curiosity was measured as a stable trait or a daily experience.

Study 3 provided a critical extension of the questions addressed in Studies 1 and 2 by focusing on reactive aggression in daily life. Over a 14-day assessment period, people recorded their face-to-face social interactions and reported whether or not their feelings were hurt by someone; if so, they described how they responded to the hurt feelings. In addition, we tested how relational contexts altered the behavior of curious people. Specifically, the relationship with the perpetrator might moderate curiosity effects because theories of curiosity (Loewenstein, 1994) suggest that curiosity is more intense when people become aware of a gap between what they know and what they want to know, and are confident they can resolve this gap. Thus, when a problem arises with a close relationship partner, a curious person would be especially motivated to discover the cause of the problem and a solution, whereas this extended effort to diagnose and solve a problem is unlikely to be as strong for a superficial relationship with a stranger. We argue that this will translate to highly curious people responding with less aggression in response to being provoked by close relationship partners—where there is a commitment to understand and resolve conflict.

Study 4 used a behavioral measure of aggression. Specifically, partners in a romantic relationship completed a task where the winner chose the amount of ambient noise to blast through the headphones of the loser. We examined whether trait curiosity was related to the duration and intensity of the noise used as aggression toward the romantic partner. Building on the notion that curious people are sensitive to context, we sought to extend Study 3 by examining whether the duration of romantic relationships moderates the curiosity-aggression association. Although curiosity might have a stronger inverse association with aggression in close, committed relationships compared to superficial relationships, this effect might wane in longer-lasting relationships. Because the early phase of romantic relationships involves intense sharing of information, experiences, and resources with partners (Reis & Shaver, 1988), we predicted that curiosity would be more strongly associated with lower aggression in fledgling (compared with long-lasting) relationships. When someone is willing to integrate what a partner shares, this process is characterized as self-expansion (Aron et al., 2004), and in fledgling relationships, curiosity is heavily focused toward one's partner to capitalize on rapid, intense self-expansion opportunities. During this fledgling phase, partners are more likely to err on the side of benign interpretations of partner behavior, forgiveness, and other prosocial behaviors in hopes of maintaining

a relationship with self-expansion opportunities. Because aggression would disrupt opportunities for self-expansion, this bias toward restraint should extend to provocation by romantic partners. In long-lasting relationships, as people develop shared goals and integrate the other person within their self-concept such that one's partner becomes an ostensible extension of the self (Aron et al., 2004), people are often less worried about relationship maintenance. Thus, being curious might be less relevant to aggressive responses following provocation in long-lasting compared to fledging romantic relationships.

STUDY 1: TRAIT CURIOSITY AND TENDENCIES TOWARD INTIMATE PARTNER VIOLENCE

Study 1 provided an initial examination of the association between trait curiosity and aggressive tendencies in interpersonal situations. We assessed aggressive tendencies with a validated self-report measure taken from the clinical psychology literature, in which people indicated how aggressively they would behave against a romantic partner if the partner engaged in a series of highly provocative behaviors (Babcock, Costa, Green, & Eckhardt, 2004). We predicted that people reporting greater trait curiosity would express less aggressive reactions to upsetting and provocative situations involving their romantic partner. To address construct specificity, we examined whether any curiosity effects could be explained by other individual difference factors that are positively related to aggression, including narcissism (e.g., Bushman & Baumeister, 1998), loneliness (e.g., Check, Perlman, & Malamuth, 1985), and mindfulness (Heppner et al., 2008). Narcissism and loneliness are also relevant because they tend to be correlates and consequences of feeling a lack of security in relationships, making it more difficult to venture out from safe havens to effectively explore the environment (Cassidy & Shaver, 1999). Mindfulness has conceptual overlap with curiosity (Bishop et al., 2004; Williams, 2008), and both have been linked to non-defensive responses to social threats (Heppner et al., 2008; Kashdan, Afram, Brown, Birnbeck, & Drvoshanov, 2011; Niemiec et al., 2010).

Method

Participants

Sixty-four undergraduates (48 women, 16 men) participated in exchange for partial course credit. Age was not recorded in this study, but the sample was taken from a family studies course in which the average age of students tends to be approximately 20 years (Cui, Fincham, & Pasley, 2008). In this study, 62.5% of participants were Caucasian, 6.3% were Hispanic, 3.1% were Asian American, 23.4% were African American, and 4.7% reported their race as "other." Students received research credit for participation.

Procedure

Participants completed all parts of the study online. After giving informed consent, participants filled out measures of trait curiosity and aggressive inclinations.

Measures

Curiosity. The 10-item Trait Curiosity and Exploration Inventory-II (CEI-II; Kashdan et al., 2009) assesses the degree to which people tend to seek out new knowledge and experiences, as well as their willingness to tolerate the novelty and uncertainty of their environment. The CEI-II contains two 5-item factors: stretching (e.g., "I actively seek as much information as I can in new situations"; $\alpha=.88$; $M=3.38$, $SD=0.94$) and embracing (e.g., "Everywhere I go, I am out looking for new things or experiences"; $\alpha=.84$; $M=3.00$, $SD=0.91$). Items are rated on a 5-point Likert scale asking how representative each item is of the person, ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). The CEI-II Stretching and Embracing subscales correlated highly with each other ($r=.78$, $p<.001$), so responses to all 10 items were averaged to form a composite index of curiosity ($\alpha=.92$; $M=3.19$, $SD=0.87$). The CEI-II has good reliability, temporal stability, and construct specificity (Kashdan et al., 2009; Kashdan et al., 2011).

Narcissism. To measure narcissism, participants completed the Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988; $\alpha=.82$). The NPI is a 40-item forced-choice format questionnaire (e.g., "The thought of ruling the world frightens the hell out of me" vs. "If I ruled the world it would be a much better place"). Each item is scored so that the non-narcissistic choice receives a value of 0 and the narcissistic response receives a value of 1.

Loneliness. To measure trait loneliness, participants completed an eight-item version of the UCLA Loneliness Scale (Russell, 1996; $\alpha=.80$; e.g., "How often do you feel completely alone?"). Responses were given on a 4-point scale ranging from *never* to *often*.

Mindfulness. To measure mindfulness, participants completed the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006; e.g., "When I'm walking, I deliberately notice the sensations of my body moving"). Responses were given on a 5-point scale ranging from *never or very rarely true* to *very often or always true*. Responses were collapsed across each facet to produce a total mindfulness score ($\alpha=.91$).

Aggressive inclinations. To assess inclinations toward intimate partner violence, we used a modified version of the validated Proximal Antecedents to Violence Episodes scale (PAVE; Babcock et al., 2004). Participants indicated how likely they would become physically aggressive in response to each of 20 upsetting and provocative partner behaviors (e.g., "My partner ridicules or makes fun of me," "My partner does something to

offend or ‘disrespect’ me”). Participants answered these questions using their current or most recent romantic partner as the reference person. The internal reliability of the PAVE items was good ($\alpha=.96$), so responses were averaged to create a composite measure for intimate partner violence inclinations ($M=2.16$, $SD=1.33$).

Results and Discussion

We predicted that curiosity would be associated with less aggressive inclinations. As anticipated, curiosity correlated negatively with how aggressively people reported they would behave toward a romantic partner in a variety of provoking situations, $r=-.27$, $p=.03$. Next, we conducted a multiple regression analysis to examine whether trait curiosity continued to predict lower aggressive inclinations after controlling for narcissism, loneliness, and mindfulness. Curiosity was related to narcissism, $r=.41$, $p=.002$, and mindfulness, $r=.34$, $p=.001$, but was unrelated to loneliness, $r=.03$, $p=.79$. Curiosity retained a significant inverse relationship with aggression, $\beta=-0.31$, $t=-2.83$, $p=.02$, effect size $r=-.21$. Both narcissism, $\beta=0.33$, $t=2.53$, $p=.01$, effect size $r=.15$, and loneliness, $\beta=0.46$, $t=3.79$, $p<.001$, effect size $r=.42$, were associated with higher levels of aggression; mindfulness did not relate to aggression, $\beta=-0.07$, $t=-0.56$, $p=.58$, effect size $r=.02$. These findings provide initial evidence that curiosity is linked to lower levels of aggression.

STUDY 2: DAILY CURIOSITY AND DAILY AGGRESSIVE TENDENCIES

To extend beyond the cross-sectional approach in Study 1, Study 2 examined whether daily curiosity was related to less daily aggressive tendencies. A benefit of a daily diary design, and the appropriate statistical methodology, is the ability to test competing models concerning causality. On days that people feel curious, they may be less likely to engage in aggressive acts toward other people. Conversely, daily variations in aggressive tendencies could affect curiosity. These causal alternatives can be contrasted by examining temporal changes from one day to the next. We constructed lagged-day equations to test whether curiosity from a few days prior predicts today’s aggressive tendencies, controlling for prior aggressive tendencies. This type of model tests whether curiosity mitigates aggression. If curiosity from a few days prior predicted today’s aggressive tendencies, controlling for prior aggressive tendencies, and there was a lack of evidence for the reverse direction, these findings would suggest that curiosity offers resilience against aggression.

Method

Participants

Participants were 150 undergraduate students (80% women) at a large South-Atlantic university. With a mean age of 19.02

($SD=1.50$), 61.0% of participants were Caucasian, 14.5% were Hispanic, 2.0% were Asian American, 17.5% were African American, and 5.0% reported their race as “other.” Students received research credit for participation.

Procedure

Participants were given a URL at which to record their feelings and behaviors three times each week (i.e., Monday, Wednesday, and Saturday) for 25 days, which included the measures of curiosity and aggressive tendencies. 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 the online survey system was confidential and stored on a secure server.

Measures

Daily curiosity. To assess daily curiosity, participants completed a modified, abbreviated form of the CEI-II (Kashdan et al., 2009), which included two items measuring daily stretching (e.g., “Today, I viewed challenging situations as an opportunity to grow and learn”) and embracing (e.g., “Everywhere I went today, I was out looking for new things or experiences”). As with the trait measure, responses were given on a 5-point scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Responses across the items were summed to form a composite of daily curiosity, with higher numbers indicating greater curiosity.

Daily aggressive tendencies. Participants completed a modified, abbreviated form of the Aggression Questionnaire (AQ; Buss & Perry, 1992), which included two items measuring physical aggression (e.g., “Given enough provocation today, I might hit another person”) and two items measuring verbal aggression (e.g., “If people were annoying me today, I would tell them what I think of them”). Responses across the items were summed to form a composite measure of daily aggressive tendencies, with higher numbers indicating more aggressive tendencies. To remove significant skew, daily aggression scores were log transformed.

Results and Discussion

Preliminary Analyses

We used multilevel modeling to analyze the nested daily diary data, specifically HLM Version 6.08 (Raudenbush, Bryk, Cheong, & Congdon, 2000). A total of 1,432 days of data were provided by 150 people ($M=9.55$). The average lag between entries was 2.32 days ($SD=1.12$). Participants followed proper protocol for timely daily responses for 81.99% of the entries (i.e., completed entries at the end of each day before

midnight). Our initial analyses focused on the reliability of our daily measures of curiosity and aggressive tendencies. Using three-level unconditional models, with items nested within days and days nested within people (Nezlek, 2007), analyses showed evidence of acceptable reliability for the four items of daily curiosity (.81) and the four items of daily aggressive tendencies (.85). The intraclass correlation coefficient (ICC) for daily aggressive tendencies was 0.54 and daily curiosity was 0.55, suggesting sufficient within- and between-person variability.

We then constructed multilevel models to test our hypotheses, with daily predictors group-mean centered (i.e., person centered), thereby eliminating the influence of person-level differences on parameter estimates of mean daily curiosity and aggressive tendencies, respectively (Nezlek, 2007). In our primary model, today's daily aggressive tendencies were predicted by daily aggressive tendencies and curiosity over the prior 1–3 days, and today's curiosity. In our reverse causation model, today's curiosity was predicted by daily curiosity and aggression over the prior 1–3 days, and today's aggressive tendencies. With the availability of *t* tests and degrees of freedom in random multilevel coefficient models, one way to characterize the effect size of a predictor is to focus on the fixed effects and transform the data into a correlation coefficient (Rosenthal, 1991). This allows for the effect sizes in Studies 2, 3, and 4 to be comparable to Study 1, which relied on hierarchical regression models.

Does Daily Curiosity Predict Fewer Aggressive Tendencies?

Our main prediction was that daily curiosity would predict fewer daily aggressive tendencies. Results showed that curiosity over the prior 1–3 days significantly predicted today's aggressive tendencies, even when yesterday's aggression was statistically controlled, $b = -.006$, $t(147) = -2.04$, $p = .04$, effect size $r = .17$. Upon evaluating the reverse causal direction, we found that aggressive tendencies over the prior 1–3 days were a nonsignificant predictor of today's curiosity when prior curiosity was statistically controlled ($p = .19$). Together, these analyses favor the causal chain from curiosity to aggressive tendencies over the reverse or a bidirectional model.

STUDY 3: TRAIT CURIOSITY AND DAILY AGGRESSION TOWARD PERPETRATORS

Study 3 extended the first two studies by examining daily aggression in response to actual or perceived provocation. Whereas the first studies provided evidence for global relationships between curiosity and self-reported aggression, Study 3 focused on situations where specific individuals caused psychological hurt during a social situation (i.e., perpetrators). Provocation is “perhaps the most important single cause of aggression” (Anderson & Bushman, 2002, p. 37). We thus studied how curiosity is relevant to episodes of hurt feelings

in response to provocation over a 2-week assessment period. People high in curiosity exhibit less defensive reactions following ego threats (Kashdan et al., 2011), which might extend to provocation in social situations. Compared to less curious people, we expected curious people to be more open and receptive to their pain and less likely to show evidence of extreme reactions or aggression.

In addition, we examined whether context matters. People often behave differently with acquaintances, coworkers, or strangers than with close relationship partners. A primary motive for entering close relationships is the ability to grow as a person by gaining access to another's knowledge, skills, social network, and other resources (Aron & Aron, 1997). In committed, ongoing relationships, there is a degree of interdependence that motivates the disclosure of life events and goals (Rusbult & Van Lange, 2003). How people respond to this information provides an implicit signal of whether there is concern for the others' well-being and growth (Gable, Reis, Impett, & Asher, 2004). An enthusiastic, curious response to new information represents a relationship maintenance strategy, whereby partners can bolster the stability, intimacy, and distress tolerance within existing close relationships (Fincham & Beach, 2010). Curiosity should be most relevant to aggression in relationships that inspire an intense motivation to learn and share new information. Based on prior work on romantic relationships and the information gap model of curiosity (Loewenstein, 1994), we hypothesized that people high in curiosity would show particular restraint in their expression of aggression when emotionally wounded by people with whom they are in a committed, ongoing relationship compared to strangers and acquaintances. Because the intensity of negative emotions experienced when someone causes pain has been shown to be a risk factor for aggression (Berkowitz, 1989), we examined whether the amount of hurt feelings experienced accounted for or moderated curiosity effects. As a test of construct specificity, we examined whether the benefits of being a curious person could be attributed to individual differences in Big Five personality traits.

Method

Participants

Participants consisted of 110 undergraduate students (74% women) at a large Mid-Atlantic university. With a mean age of 21.47 ($SD = 2.24$), 55.8% of participants were Caucasian, 11.5% were Hispanic, 11.5% were Asian American, 10.6% were African American, 5.7% were Middle Eastern, 1.0% were American Indian, and 3.9% reported their race as “other.” Students received research credit for participation.

Procedure

Participants completed questionnaires on demographic information and personality traits and were given a secure website

link for an online survey to be completed every time they had a face-to-face social interaction lasting at least 10 minutes. For the next 14 days, they were instructed to complete information online about their social interactions prior to going to sleep each night. To increase compliance, researchers stressed that receiving full participation credit was contingent on timely reporting, enforced by automatic time-date stamping of entries. All information submitted online was confidential and stored on a secure server.

Measures

Trait curiosity. To assess individual differences in curiosity, we used the 7-item Trait CEI (Kashdan et al., 2004); data were collected prior to creating the final version of the CEI-II (Kashdan et al., 2009). The CEI contains two factors: tendencies to explore novel and challenging experiences (e.g., “I would describe myself as someone who actively seeks as much information as I can in a new situation”) and flow-like engagement in activities that capture one’s attention (e.g., “When I am participating in an activity, I tend to get so involved that I lose track of time”). Items are rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). An aggregate total score was used in this study ($\alpha=.78$). The CEI’s construct validity has been confirmed in several daily diary and laboratory studies (e.g., Kashdan & Steger, 2007; Silvia, 2005).

Big Five personality traits. To assess individual differences in each of the dimensions of the five-factor model of personality, we used the 44-item Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). Respondents were asked to rate how much items pertained to them on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The five subscales were Openness to Experience ($\alpha=.88$), Conscientiousness ($\alpha=.86$), Extraversion ($\alpha=.88$), Agreeableness ($\alpha=.87$), and Neuroticism ($\alpha=.88$).

Daily hurt feelings and aggressive reactions. Participants were given a probe asking whether their feelings were hurt in each reported social situation. If they answered yes, a subsequent question asked about the intensity of their hurt feelings with a one-item measure that assessed how hurt they felt on a 9-point scale ranging from 1 (*not at all*) to 9 (*extremely*). In addition, they responded to a one-item measure of their immediate verbal aggression (“I said nasty or critical things when I was upset”) toward the perpetrator on the same 9-point scale.

If feelings were hurt during a social interaction, participants provided information about the perpetrator. If the participant classified the perpetrator as a “close friend,” “romantic partner,” “roommate,” or “family member,” the relationship was defined as intimate; if the participant classified the perpetrator as a “casual friend,” “coworker,” or “stranger,” the relationship was defined as superficial or absent.

Results and Discussion

Preliminary Analyses

Participants provided 271 episodes of hurt feelings ($M=2.46$; $SD=2.29$) among 3,796 social interactions ($M=34.83$, $SD=18.06$) over 1,894 days ($M=17.38$, $SD=6.94$). Thus, people’s feelings were hurt during 7.1% of these social interactions. Each participant provided at least five social interaction entries. By providing an extensive training session in the protocol and using time-date stamping and regular reminder emails, 81.8% of the social interactions were recorded within 12 hours of their occurrence (i.e., timely responses). Notably, the 18.2% of non-timely entries is inflated because this also includes mis-entries or times when participants failed to enter the time/date.

We analyzed the data with HLM 6.08 (Raudenbush et al., 2000), with group-mean-centered daily predictors and grand-mean-centered trait predictors (Nezlek, 2007). The ICC for daily aggression was 0.22, suggesting significant within- and between-person variability.

Curiosity, Provocation, and Daily Aggression

Our main prediction was that among people who feel hurt, greater trait curiosity would be inversely related to aggressive reactions. At the within-person level, the intensity of hurt feelings significantly predicted aggressive responses, $b=.88$, $t(102)=5.36$, $p<.001$, effect size $r=.47$. At the between-person level, we found a significant main effect of trait curiosity. Specifically, people higher in curiosity reported less aggression toward perpetrators who induced hurt feelings, $b=-.90$, $t(101)=-2.19$, $p=.03$, effect size $r=.21$. Trait curiosity did not moderate the effects of hurt feeling intensity on aggressive responses ($ps=.47$).

To test construct specificity, we added Big Five personality traits as additional predictors of verbal aggressive responses; a significant correlation was found between curiosity and Openness to Experience ($r=.28$) but not with Conscientiousness ($r=.15$), Extraversion ($r=.04$), Agreeableness ($r=.03$), or Neuroticism ($r=-.17$). In this highly conservative test where we partialled out the variance of the higher-order factor of Openness to Experience along with the other four Big Five traits, the curiosity effect remained statistically significant, $b=-.84$, $t(96)=-2.00$, $p=.048$, effect size $r=.20$. Alternatively, Openness to Experience failed to significantly predict verbal aggressive responses ($p=.85$), and neither did Conscientiousness ($p=.79$), Extraversion ($p=.22$), Agreeableness ($p=.38$), or Neuroticism ($p=.41$). Finally, none of these traits moderated the effects of hurt feelings on verbal aggressive responses (ps from .20 to .87). These results provide evidence for the specificity of curiosity effects over personality traits commonly shown to correlate with curiosity (e.g., Kashdan et al., 2009; Mussel, 2010) and predict aggression (e.g., Jones, Miller, & Lynam, 2011; Miller & Lynam, 2001; Seibert, Miller, Pryor, Reidy, & Zeichner, 2010).

In the next set of analyses, we examined whether the type of relationship with perpetrators moderated the effect of trait curiosity on aggression. To better describe our sample, we examined the frequency of particular perpetrators of hurt feelings. We used a nonlinear (Bernoulli) model, sometimes referred to as multilevel logistic regression, to determine the frequency that the perpetrator was a partner in a close, intimate relationship. On average, people reported that for 77.20% of social interactions when feelings were hurt, the perpetrator could be classified as close to them; for 22.80% of interactions, the perpetrator was a stranger or an acquaintance.

We also hypothesized that curiosity would be most relevant to aggressive responding in situations where the victim was hurt by a perpetrator with whom he or she had a committed, meaningful relationship (“close friend,” “romantic partner,” “roommate,” or “family member”) compared to an absent or superficial relationship (“casual friend,” “coworker,” or “stranger”). We added two dummy-coded predictors at level 1 to reflect superficial/absent and close relationship partners, respectively (removing the intercept to avoid dependencies among the two relationship partner predictors; see Nezlek, 2007). When victims were provoked by close relationship partners, trait curiosity was negatively related to aggressive responding, $b = -.75$, $t = -2.49$, $p = .02$, effect size $r = .26$. When the perpetrator was a stranger or an acquaintance, trait curiosity had no significant relationship to aggression, $b = -.43$, $t = -0.77$, $p = .44$, effect size $r = .08$. As shown in Figure 1, people higher in curiosity showed less aggressive reactions to perpetrators who were close relationship partners; trait curiosity did not distinguish levels of aggressive responding to strangers and acquaintances.

To test construct specificity, we added each of the Big Five personality traits as additional predictors of how relationship partners might moderate verbal aggressive responses. In this overly conservative test, when victims were provoked by close relationship partners, trait curiosity was only minimally affected and showed a marginal effect on aggressive responding, $b = -.57$, $t = -1.83$, $p = .07$, effect size $r = .20$. Alternatively, Openness to Experience failed to significantly predict aggressive responses to close relationship partners ($p = .20$), and neither did Conscientiousness ($p = .66$), Extraversion ($p = .37$), Agreeableness ($p = .40$), or Neuroticism ($p = .25$). Moreover, neither curiosity nor any of the Big Five were related to verbal aggressive responses following provocation by strangers (p s from .22 to .91).

These results suggest that in provocative social contexts—being emotionally hurt by a close significant other—being a curious person was linked to less aggressive reactions. Regardless of curiosity, people were less likely to aggress against perpetrators who were barely known or strangers. Findings could not be attributable to the related construct of Openness to Experience or any of the other Big Five personality traits.

STUDY 4: TRAIT CURIOSITY AND BEHAVIORAL AGGRESSION TOWARD ROMANTIC PARTNERS

Self-expansion is greatest in the initial phases of close relationships (Aron et al., 2004); thus, we extended the relationship context findings in Study 3 by examining whether the longevity of an ongoing close relationship moderated the

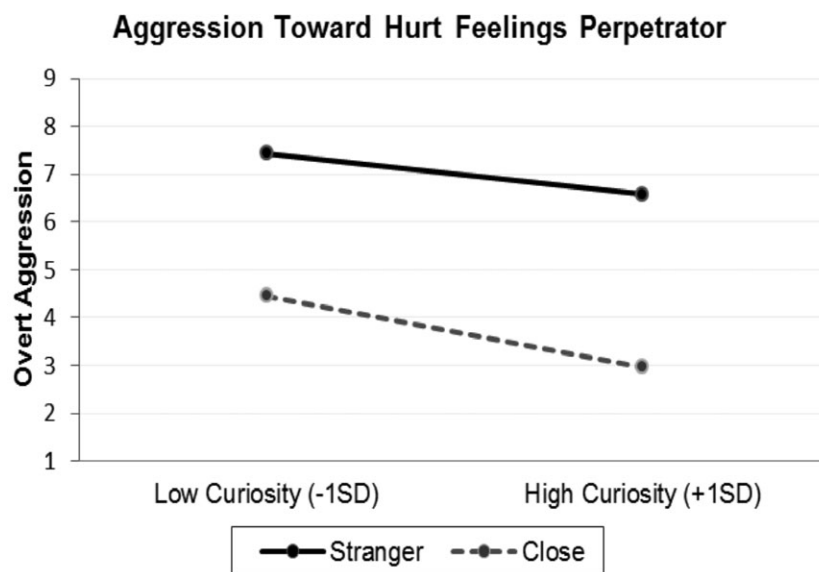


Figure 1 Effect of trait curiosity on overt aggression moderated by relationship with perpetrator of hurt feelings. During social interactions in which people’s feelings were hurt (Study 3), aggression was more likely when the perpetrator was a close relationship partner (e.g., friend, romantic partner) compared to a stranger or casual acquaintance. Beyond this main effect, when the perpetrator was a close relationship partner, people with high curiosity (1 SD above the mean) were less likely to aggress toward them compared to people with low curiosity (1 SD below the mean).

association between curiosity and aggression found in Studies 1–3. Unlike the self-report measures of aggression used in Studies 1–3, we shifted to a behavioral measure.

Romantic partners completed a competitive task in which they could administer intense and prolonged blasts of noise to the other partner. We hypothesized that people high in curiosity would behave less aggressively toward their current romantic partner in the wake of provocation. As a direct extension of Study 3, we further explored relevant contextual factors. We proposed that the length of the relationship would moderate the link between curiosity and aggression, such that a stronger inverse association would be found in fledgling relationships.

In the initial phases of romantic relationships, there is an abundance of novel experiences to share and new information to absorb that is intriguing and exciting (Graham, 2008). Romantic partners direct their curiosity toward each other to explore, discover, and, in turn, experience a rapid surge of self-expansion (Aron et al., 2000). During this fledgling phase, there is motivation to maintain the relationship with self-expansion opportunities. Thus, we believed that when provoked by romantic partners in this phase—when impression management and self-expansion opportunities are still abundant—people high in curiosity are more likely to restrain their behavior and be biased toward benign interpretations.

Because a lack of self-control or the capacity to resist impulses (a lower-order facet of the Big Five factor Conscientiousness) has been shown to be a risk factor for aggression (DeWall, Baumeister, Stillman, & Gailliot, 2007; Finkel, DeWall, Slotter, Oaten, & Foshee, 2009), we examined whether self-regulatory capacity accounted for curiosity effects. We also sought to rule out the alternative explanation that an inverse association between curiosity and aggression might be attributed to higher-quality romantic relationships (as defined by satisfaction and commitment).

Method

Participants

We recruited 132 undergraduates (50% women) in romantic relationships from a large Mid-Atlantic university. With a mean age of 19.44 ($SD=1.30$), 88.6% of participants were Caucasian, 7.6% were African American, 1.5% were Asian American, and 2.3% reported their race as “other.” On average, romantic relationships lasted for 21.23 months ($SD=14.68$), ranging from 1 month to 5 years and 5 months. Students received research credit for participation.

Procedure

Participants came to the laboratory with their romantic partners and both provided informed consent. Next, both relationship partners completed a series of self-report questionnaires. Afterward, the couple began the behavioral aggression task.

No participants withdrew during the experiment, and all participants were debriefed.

Measures

Curiosity. We used the same 10-item curiosity measure (CEI-II; Kashdan et al., 2009) from Study 1 ($\alpha=.87$).

Relationship satisfaction. Both partners completed the 10-item Relationship Satisfaction subscale (e.g., “My partner fulfills my needs for intimacy [sharing personal thoughts, secrets, etc.]”) and 10-item Relationship Investment subscale (e.g., “My sense of personal identity (who I am) is linked to my partner and our relationship”) of the Investment Model Scale (Rusbult, Martz, & Agnew, 1998). An aggregate total score was used for satisfaction ($\alpha=.89$) and investment ($\alpha=.79$). This scale’s construct validity has been shown in several longitudinal studies (e.g., Le & Agnew, 2003; Rusbult et al., 1998).

Behavioral aggression. The aggression task was a modified version of the Taylor Aggression Paradigm (Taylor, 1967), which is a psychometrically sound measure of aggression (e.g., Anderson & Bushman, 1997; Giancola & Zeichner, 1995). Romantic partners were told they would compete to see who could press a button as fast as possible on 33 trials. The winner could send a blast of white noise through the headphones of the loser. On each trial, participants chose the intensity (0dB to 105dB) and duration (0–2.5sec) of the noise. Participants’ chosen intensity values were averaged across trials to create a mean noise intensity value for each participant. Similarly, the selected levels of duration were averaged across trials to create a mean duration value for each participant. The mean intensity and mean duration of noise that participants selected across all of the trials were highly correlated ($r=.84$) and thus were standardized (i.e., transformed to z-scores) and summed to create a measure of total aggression (e.g., DeWall, Bushman, Giancola, & Webster, 2010).

Self-control. To test the construct specificity of trait curiosity, we conducted additional analyses with the 13-item Brief Self-Control Scale (Tangney, Baumeister, & Boone, 2004). This scale assesses a person’s self-regulatory capacity in terms of delaying gratification, resisting impulses, focusing on long-term goals, and managing thoughts and feelings (e.g., “I would describe myself as someone who actively seeks as much information as I can in a new situation”). Items are rated on a 5-point Likert scale asking how representative each item is of the participant, ranging from 1 (*not at all like me*) to 5 (*very much like me*). An aggregate total score was used in this study, with higher scores indicative of greater self-control ($\alpha=.90$). This scale’s construct validity in predicting self-control efforts, such as perseverance and the ability to be successful at long-term goals, has been shown in several experimental and

longitudinal studies (e.g., Duckworth & Seligman, 2005; Tangney et al., 2004).

Results and Discussion

We estimated actor and partner effects simultaneously with SPSS mixed modeling, relying on the Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006). Actor effects reflect the association between a person's score on a predictor (e.g., curiosity) and his or her own score on an outcome (e.g., aggression). Partner effects reflect the association between a person's score on a predictor and his or her partner's score on an outcome. In addition, we considered relationship length as a moderator and gender as a covariate.

Our primary focus was the contribution of the main effect of actor trait curiosity and an Actor Trait Curiosity \times Relationship Length interaction on behavioral aggression. Trait curiosity was negatively related to total aggression, $b = -.31$, $t = -1.98$, $p = .03$, effect size $r = .17$, which was qualified by a Trait Curiosity \times Relationship Length interaction, $b = .28$, $t = 2.16$, $p = .02$, effect size $r = .19$ (see Figure 2). Following the guidelines of Aiken and West (1991), we explored the moderation effect by conditioning the moderator at one standard deviation above and below the mean. At one standard deviation below the mean on relationship length (briefer relationships), trait curiosity was related to less aggression, $b = -.49$, $t = -5.44$, $p < .001$; at one standard deviation above the mean (longer-lasting relationships), trait curiosity had no relation to aggression ($p = .97$).

Thus, we found that curiosity was inversely related to aggression toward romantic partners when the relationship was still young, but people high in curiosity were no different from those low in curiosity in longer-term relationships. In a

supplemental analysis, we ruled out the alternative explanation that curiosity effects on the likelihood and intensity of aggression toward partners could be explained by relationship satisfaction and investment in the relationship. Relationship satisfaction and length failed to significantly predict total aggression in this model ($ps = .15$ to $.54$). Upon including these additional predictors, the curiosity main effects remained relatively unchanged for total aggression ($p = .02$).

Subsequent analyses focused on the construct specificity of trait curiosity after accounting for trait self-control; no significant correlation was found between these traits, $r = .06$. We included self-control as a main effect and an interaction term between self-control and relationship length. Even after controlling for self-control main and interaction effects, the Trait Curiosity \times Relationship Length interaction on total aggression, $b = .22$, $t = 1.70$, $p = .045$, effect size $r = .15$, remained statistically significant and relatively unaffected. Trait self-control main and interaction effects, in contrast, were nonsignificant ($ps > .30$).

These findings provide converging support for the hypothesis that curiosity is associated with less aggression, especially when an aggressive impulse has been stimulated through provocation and romantic relationship partners remain together longer (when opportunities for self-expansion often decline). Crucially, curiosity effects could not be attributed to trait self-control or people's perception of satisfaction and investment in their romantic relationships.

GENERAL DISCUSSION

Curiosity motivates people to be open and receptive to incoming information and to seek out new knowledge and experiences (Loewenstein, 1994; Silvia, in press; Silvia & Kashdan,

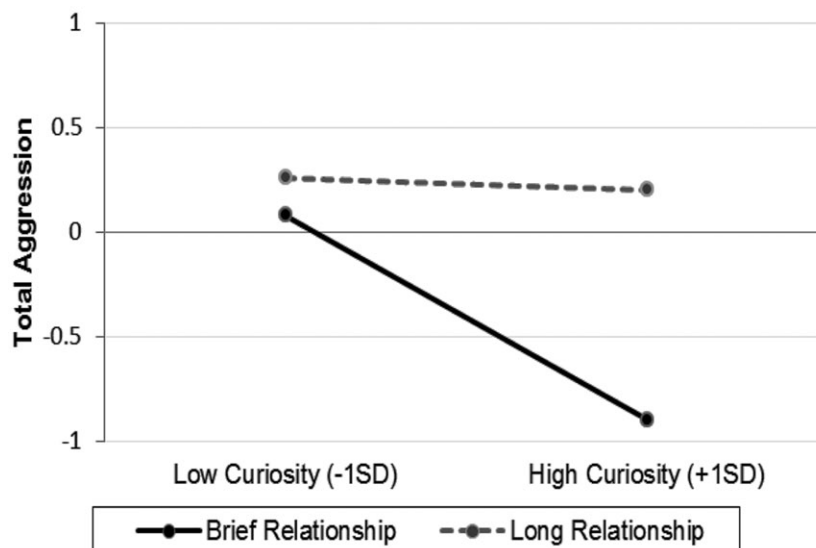


Figure 2 Curiosity interacted with relationship length to predict aggression toward romantic partner. In Study 4, for briefer relationships (1 SD below mean length), high curiosity (1 SD above the mean) was inversely related to total aggression toward the competition trial loser (i.e., intensity and duration of white noise); in longer relationships (1 SD above mean length), curiosity had no significant effects.

2009). Curious people are adept at pursuing valued aims despite the presence of unwanted, negative thoughts and feelings; defensive reactions such as aggression run counter to this psychological flexibility (Hayes et al., 2011; Kashdan & Rotenberg, 2010). Using a cross-sectional survey design (Study 1), daily process approaches over 25-day (Study 2) and 14-day (Study 3) assessment periods, and observed behavior during a laboratory task (Study 4), we found consistent evidence that curiosity was inversely related to aggression. Whether curiosity was measured as a psychological trait or daily experience, people high in curiosity endorsed less aggressive inclinations (Study 1), less aggressive inclinations on a daily basis (Study 2), less aggressive reactions following provocation by close relationship partners in daily life (Study 3), and when in fledgling romantic relationships, less behavioral evidence of intimate partner violence during a competitive task (Study 4). These data complement prevailing theories of curiosity by providing the first evidence that curiosity is relevant to aggression.

When people are curious, they show a willingness to make room for the positive and negative feelings that often arise when exposed to novel, complex, and uncertain situations (Silvia, 2005, 2008). Moreover, they capitalize on opportunities to find meaning in their actions. In turn, they are more likely to view conflicts as opportunities rather than threats (Kashdan & Steger, 2007; Loewenstein, 1994). From this perspective, it makes sense that curiosity was linked to less aggression, particularly in response to the most meaningful people in their lives (e.g., committed, significant relationships). Establishing covariation between curiosity and aggression does not address the issue of causality, as either direction is feasible. Upon examining temporal sequences across days, our findings were consistent with a model in which less aggressive responding occurs when greater curiosity is present. There was evidence of specificity as aggressive behavior in daily life failed to significantly influence changes in curiosity from one day to the next. The results highlight the importance of measuring curiosity and aggression as both traits and states with various methodologies and analytic approaches. The clear temporal sequencing in behavioral sampling designs, with time-and-date-stamped entries on subsequent days, provides an improvement over the contemporaneous analyses in cross-sectional survey and laboratory approaches.

Our findings require cautious interpretation, as we found evidence of meaningful social contexts where curiosity was less relevant to aggression. In general, people were more likely to aggress against close relationship partners (i.e., friend, family, romantic partners) than strangers or acquaintances when provoked to the point of feeling emotionally hurt (Study 3). However, being curious was inversely related to aggression when the perpetrator was a close relationship partner. Findings from Study 4 suggested that focusing on romantic relationship partners as a homogenous group can lead to erroneous conclusions. In briefer romantic relationships, curiosity was inversely related to behavioral aggression toward partners, but when

people were in longer-lasting romantic relationships, curiosity had no association with aggression. In the early stages of romantic relationships, romantic partners have shown a bias to engage in healthy, promotion-focused behaviors such as kindness and compassion (Eastwick & Finkel, 2008). In this program of research, we found that benefit extends to less aggression following explicit provocation, but only for people high in curiosity.

Prior research has shown that there is a downside to healthy processes in lengthy romantic relationships: as people remain in stable romantic relationships for long periods of time, there is an increased prevalence of boredom (Tsapelas, Aron, & Orbuch, 2009) and aggression (Arriaga, Slaughterbeck, Capazza, & Hmurovic, 2007). Our results extend this work, showing that aggression was less likely in briefer romantic relationships (of months rather than years), and being a curious person was associated with even less aggression in these fledgling romantic relationships. As romantic partners learn much of what there is to know about each other, self-expansion opportunities decline and curiosity might function differently (Aron & Aron, 1997). Curious people might seek opportunities for self-expansion elsewhere, outside of the relationship itself. Consequently, the psychological strength of curiosity might become less advantageous in lengthier romantic relationships. This suggests contextual boundaries and potential targets for intervention. For instance, people can be taught to intentionally search for novel distinctions in the seemingly familiar (Langer, 1992) or engage in shared novel experiences (Aron, Norman, Aron, & Lewandowski, 2003) to rejuvenate relationship passion. These activities involve the directed use of curiosity and exploration toward close relationship partners, which we believe will have the effect of reducing aggressive impulses and actions in established relationships.

Our findings suggest that dominant theories of aggression (e.g., Anderson & Bushman, 2002; Berkowitz, 1989) might benefit by addressing potential protective factors. Curiosity is worthy of further consideration. One of the strengths of our research is the adoption of a contextual approach to personality (Mischel & Shoda, 1998). People high in curiosity were less likely to aggress toward close relationship partners who hurt them; however, curiosity was less relevant to aggressive responding in lengthy romantic relationships. By establishing the inverse relationship between curiosity and aggression, and theoretically meaningful situational moderators, the current findings might inform violence reduction interventions, which tend to show no more than modest gains (Anderson & Bushman, 2002; Babcock et al., 2004). Future research can explore the efficacy of enhancing curiosity on reducing aggression among people with strong and weak violent inclinations, and among couples with and without a history of interpersonal problems.

The value of curiosity as a protective factor against interpersonal aggression remained even after accounting for trait narcissism, loneliness, and mindfulness in Study 1, the Big Five personality traits and severity of hurt feelings during

social interactions in Study 3, and trait self-control in Study 4. Construct specificity findings extend other research suggesting that the benefits of curiosity are unique from other discrete positive emotional states (Panksepp & Moskal, 2008; Silvia, 2005). Coupled with the unique appraisal structure of curiosity, where people believe they can cope with novel and challenging situations (Silvia, 2008), it becomes evident that the presence of greater dispositional or momentary curiosity might be a building block for flexible coping responses in response to stressful situations (Kashdan & Rotenberg, 2010). We hope the current set of studies motivates additional research on when and why curiosity leads to psychological flexibility.

Additional work can extend our contextual behavioral approach to curiosity. First, there are situations where certain dimensions of curiosity serve to increase, rather than decrease, aggressive responding (sensation seeking; Derefinco, DeWall, Metzke, Walsh, & Lynam, 2011). The complexity of this relationship can only be understood by studies that measure multiple types and targets of aggression. Second, the flexible responding that was found for people high in curiosity might extend to other outcomes besides aggression. For instance, prior research shows that the presence of high curiosity and mindful awareness is an ideal personality configuration for responding to ego threats in a non-defensive manner (Kashdan et al., 2011) and that curious people adapt better to organizational changes (Harrison, Sluss, & Ashforth, 2011).

Several limitations require consideration until our findings are replicated. First, although the time-lagged analyses in Study 2 helped resolve issues of directional ambiguity between daily curiosity and aggression, confidence will be enhanced by future experimental manipulations of curiosity. There will always be some degree of sacrifice as laboratory manipulations maximize internal validity at the expense of ecological validity, and in Studies 2 and 3, we maximized ecological validity by studying people in their naturalistic environments over time. Second, although we used four studies to test robustness, it remains to be seen whether the findings extend to younger and older non-college students. Third, despite the use of daily process and experimental designs, our assessment of curiosity was limited to self-reports, and greater understanding of the phenomenology, causes, and consequences of curiosity will arise from the inclusion of behavioral and biological assessments. Fourth, we believe there is merit in testing comprehensive models of the origin of curiosity and thus the subsequent relational benefits observed in this research program. Most promising is the notion of secure attachment relationships as a precursor to curiosity and exploratory behavior (Elliot & Reis, 2003). When important figures serve as a secure base, people are going to be more comfortable tolerating the distress of confronting the new and unfamiliar. Existing, secure relationships enable people to more confidently seek out new information that can disrupt worldviews and alter rigid yet comfortable behavioral scripts. Future work can explore the sequence from attachment styles to curiosity and exploratory

behavior to healthy relationship behaviors such as anger without aggressive responding.

Researchers have suggested that curiosity is a relatively universal psychological strength (Peterson & Seligman, 2004). Four studies, with various methodologies, offer a new perspective on how the benefits of curiosity extend beyond intellectual and achievement domains to social functioning. In particular, when curious people navigate their social environment, their interactions and days are characterized by less aggressive impulses and actions, even after being insulted or hurt by another person. As a path to reducing the willingness to hurt another human being, cultivating curiosity appears to offer more to psychological and social well-being than previously thought.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. London: Sage.
- Anderson, C. A., & Bushman, B. J. (1997). External validity of "trivial" experiments: The case of laboratory aggression. *Review of General Psychology*, *1*, 19–41.
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, *53*, 27–51.
- Aron, A., & Aron, E. N. (1997). Self-expansion motivation and including other in the self. In W. Ickes & S. Duck (Eds.), *Handbook of personal relationships* (pp. 251–270). London: Wiley.
- Aron, A., McLaughlin-Volpe, T., Mashek, D., Lewandowski, G., Wright, S. C., & Aron, E. N. (2004). Including close others in the self. *European Review of Social Psychology*, *15*, 101–132.
- Aron, A., Norman, C., Aron, E. N., & Lewandowski, G. W., Jr. (2003). Shared participation in self-expanding activities: Positive effects on experienced marital quality. In P. Noller & J. Feeney (Eds.), *Marital interaction* (pp. 177–196). Cambridge: Cambridge University Press.
- Aron, A., Norman, C. C., Aron, E. N., McKenna, C., & Heyman, R. E. (2000). Couples' shared participation in novel and arousing activities and experienced relationship quality. *Journal of Personality and Social Psychology*, *78*, 273–284.
- Arriaga, X. B., Slaughterbeck, E. S., Capezza, N. M., & Hmurovic, J. L. (2007). From bad to worse: Relationship commitment and vulnerability to partner imperfections. *Personal Relationships*, *14*, 389–409.
- Babcock, J. C., Costa, D. M., Green, C. E., Eckhardt, C. I. (2004). What situations induce intimate partner violence? A reliability and validity study of the Proximal Antecedents to Violent Episodes (PAVE) scale. *Journal of Family Psychology*, *18*, 433–442.
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*, 27–45.
- Bandura, A. (1973). *Aggression: A social learning analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Berkowitz, L. (1989). The frustration-aggression hypothesis: Examination and reformulation. *Psychological Bulletin*, *106*, 59–73.

- Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York: McGraw-Hill.
- Berry, D. S., Willingham, J. K., & Thayer, C. A. (2000). Affect and personality as predictors of conflict and closeness in young adults' friendships. *Journal of Research in Personality, 35*, 84–107.
- Beswick, D. G. (1971). Cognitive process theory of individual differences in curiosity. In H. I. Day, D. E. Berlyne, & D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education* (pp. 156–170). New York: Holt, Rinehart, & Winston.
- Bishop, S. R., Lau, M., Shapiro, S., Anderson, N., Carlson, L., Segal, Z. V., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.
- Bollmer, J. M., Harris, M. J., Milich, R., & Georgesen, J. C. (2003). Taking offense: Effects of personality and teasing history on behavioral and emotional reactions to teasing. *Journal of Personality, 71*, 557–603.
- Burpee, L. C., & Langer, E. J. (2005). Mindfulness and marital satisfaction. *Journal of Adult Development, 12*, 43–51.
- Bushman, B. J., & Baumeister, R. F. (1998). Threatened egotism, narcissism, self-esteem, and direct and displaced aggression: Does self-love or self-hate lead to violence? *Journal of Personality and Social Psychology, 75*, 219–229.
- Buss, A. H., & Perry, M. P. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology, 63*, 452–459.
- Carson, J. W., Carson, K. M., Gil, K. M., & Baucom, D. H. (2007). Self-expansion as a mediator of relationship improvements in a mindfulness intervention. *Journal of Marital and Family Therapy, 33*, 517–528.
- Cassidy, J., & Shaver, P. R. (1999). *Handbook of attachment: Theory, research, and clinical applications*. New York: Guilford Press.
- Check, J. V. P., Perlman, D., & Malamuth, N. M. (1985). Loneliness and aggressive behavior. *Journal of Social and Personal Relationships, 2*, 243–252.
- Cui, M., Fincham, F. D., & Pasley, B. K. (2008). Young adult romantic relationships: The role of parents' marital problems and relationship efficacy. *Personality and Social Psychology Bulletin, 34*, 1226–1235.
- Day, H. I. (1971). The measurement of specific curiosity. In H. I. Day, D. E. Berlyne, & B. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education* (pp. 99–112). New York: Holt, Rinehart, & Winston.
- Derefinko, K., DeWall, C. N., Metze, A. V., Walsh, E. C., & Lynam, D. R. (2011). Do different facets of impulsivity predict different types of aggression? *Aggressive Behavior, 37*, 223–233.
- DeWall, C. N., Baumeister, R. F., Stillman, T. F., & Gailliot, M. T. (2007). Violence restrained: Effects of self-regulatory capacity and its depletion on aggressive behavior. *Journal of Experimental Social Psychology, 43*, 62–76.
- DeWall, C. N., Bushman, B. J., Giancola, P. R., & Webster, G. D. (2010). The big, the bad, and the boozed-up: Weight moderates the effect of alcohol on aggression. *Journal of Experimental Social Psychology, 46*, 619–623.
- Duckworth, A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science, 16*, 939–944.
- Eastwick, P. W., & Finkel, E. J. (2008). The attachment system in fledgling relationships: An activation role for attachment anxiety. *Journal of Personality and Social Psychology, 95*, 628–647.
- Elliot, A. J., & Reis, H. T. (2003). Attachment and exploration in adulthood. *Journal of Personality and Social Psychology, 85*, 317–331.
- Fincham, F. D., & Beach, S. R. H. (2010). Of memes and marriage: Towards a positive relationship science. *Journal of Family Theory and Review, 2*, 4–24.
- Finkel, E. J., DeWall, C. N., Slotter, E. B., Oaten, M., & Foshee, V. A. (2009). Self-regulatory failure and intimate partner violence perpetration. *Journal of Personality and Social Psychology, 97*, 483–499.
- Gable, S. L., Reis, H. T., Impett, E., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology, 87*, 228–245.
- Gallagher, M. W., & Lopez, S. J. (2007). Curiosity and well-being. *Journal of Positive Psychology, 2*, 236–248.
- Giancola, P. R., & Zeichner, A. (1995). Construct validity of a competitive reaction-time aggression paradigm. *Aggressive Behavior, 21*, 199–204.
- Graham, J. M. (2008). Self-expansion and flow in couples' momentary experiences: An experience sampling study. *Journal of Personality and Social Psychology, 95*, 679–694.
- Harrison, S. H., Sluss, D. M., & Ashforth, B. E. (2011). Curiosity adapted the cat: The role of trait curiosity in newcomer adaptation. *Journal of Applied Psychology, 96*, 211–220.
- Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology, 7*, 141–168.
- Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., et al. (2008). Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. *Aggressive Behavior, 34*, 486–496.
- Izard, C. E. (1977). *Human emotions*. New York: Plenum.
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The big five inventory—Versions 4a and 54*. Berkeley, California: University of California, Institute of Personality and Social Research.
- Jones, S. E., Miller, J. D., & Lynam, D. R. (2011). Personality, antisocial behavior, and aggression: A meta-analytic review. *Journal of Criminal Justice, 39*, 329–337.
- Kashdan, T. B. (2004). Curiosity. In C. Peterson and M. E. P. Seligman (Eds.), *Character strengths and virtues: A handbook and classification* (pp. 125–141). New York: Oxford University Press.
- Kashdan, T. B. (2009). *Curious? Discover the missing ingredient to a fulfilling life*. New York: William Morrow.
- Kashdan, T. B., Afram, A., Brown, K. W., Birnbeck, M., & Drvoshanov, M. (2011). Curiosity enhances the role of mindfulness in reducing defensive responses to existential threat. *Personality and Individual Differences, 50*, 1227–1232.
- Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., et al. (2009). The Curiosity and

- Exploration Inventory-II: Development, factor structure, and initial psychometrics. *Journal of Research in Personality*, **43**, 987–998.
- Kashdan, T. B., McKnight, P. E., Fincham, F. D., & Rose, P. (2011). When curiosity breeds intimacy: Taking advantage of intimacy opportunities and transforming boring conversations. *Journal of Personality*, **79**, 1369–1401.
- Kashdan, T. B., Rose, P., & Fincham, F. D. (2004). Curiosity and exploration: Facilitating positive subjective experiences and personal growth opportunities. *Journal of Personality Assessment*, **82**, 291–305.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review*, **30**, 865–878.
- Kashdan, T. B., & Steger, M. F. (2007). Curiosity and pathways to well-being and meaning in life: Traits, states, and everyday behaviors. *Motivation and Emotion*, **31**, 159–173.
- Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York: Guilford Press.
- Kruglanski, A. W. (2004). *The psychology of closed mindedness*. New York: Psychology Press.
- Langer, E. J. (1992). Matters of mind: Mindfulness/mindlessness in perspective. *Consciousness and Cognition*, **1**, 289–305.
- Le, B., & Agnew, C. R. (2003). Commitment and its theorized determinants: A meta-analysis of the investment model. *Personal Relationships*, **10**, 37–57.
- Litman, J. A. (2005). Curiosity and the pleasures of learning: Wanting and liking new information. *Cognition and Emotion*, **19**, 793–814.
- Litman, J. A. (2010). Relationships between measures of I- and D-type curiosity, ambiguity tolerance, and need for closure: An initial test of the wanting-liking model of information-seeking. *Personality and Individual Differences*, **48**, 397–402.
- Loevinger, J. (1976). *Ego development: Conceptions and theories*. San Francisco: Jossey-Bass.
- Loewenstein, G. (1994). The psychology of curiosity: A review and reinterpretation. *Psychological Bulletin*, **116**, 75–98.
- McCrae, R. R., & Sutin, A. R. (2009). Openness to experience. In M. R. Leary and R. H. Hoyle (Eds.), *Handbook of individual differences in social behavior* (pp. 257–273). New York: Guilford Press.
- Miller, J. D., & Lynam, D. R. (2001). Structural models of personality and their relation to antisocial behavior: A meta-analysis. *Criminology*, **39**, 765–798.
- Mischel, W., & Shoda, Y. (1998). Reconciling processing dynamics and personality dispositions. *Annual Review of Psychology*, **49**, 229–258.
- Mussel, P. (2010). Epistemic curiosity and related constructs: Lacking evidence of discriminant validity. *Personality and Individual Differences*, **49**, 506–510.
- Nezlek, J. B. (2007). A multilevel framework for understanding relationships among traits, states, situations, and behaviors. *European Journal of Personality*, **21**, 789–810.
- Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W., Levesque, C., & Ryan, R. M. (2010). Being present in the face of existential threat: The role of trait mindfulness in reducing defensive responses to mortality salience. *Journal of Personality and Social Psychology*, **99**, 344–365.
- Panksepp, J., & Moskal, J. (2008). Dopamine and SEEKING: Subcortical “reward” systems and appetitive urges. In A. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 67–87). New York: Taylor & Francis.
- Peters, R. A. (1978). Effects of anxiety, curiosity, and perceived instructor threat on student verbal behavior in the college classroom. *Journal of Educational Psychology*, **70**, 388–395.
- Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook of classification*. New York: Oxford University Press.
- Piaget, J. (1952). *The origins of intelligence in children*. New York: W. W. Norton & Co.
- Raskin, R., & Terry, H. (1988). A principal-components analysis of the Narcissistic Personality Inventory and further evidence of its construct validity. *Journal of Personality and Social Psychology*, **54**, 890–902.
- Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. T. (2000). HLM (Version 6.0). Lincolnwood, IL: Scientific Software International.
- Reis, H. T., & Shaver, P. R. (1988). Intimacy as an interpersonal process. In S. Duck (Ed.), *Handbook of research in personal relationships* (pp. 367–389). London: Wiley.
- Rosenthal, R. (1991). *Meta-analytic procedures for social research* (Rev. edn.). Newbury Park, California: Sage.
- Rusbult, C. E., Martz, J. M., & Agnew, C. R. (1998). The Investment Model Scale: Measuring commitment level, quality of alternatives, and investment size. *Personal Relationships*, **5**, 357–391.
- Rusbult, C. E., & Van Lange, P. A. M. (2003). Interdependence, interaction, and relationships. *Annual Review of Psychology*, **54**, 351–375.
- Russell, D. (1996). The UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, **66**, 20–40.
- Seibert, L. A., Miller, J. D., Pryor, L. R., Reidy, D. E., & Zeichner, A. (2010). Personality and laboratory-based aggression: Comparing the predictive power of the five-factor model, BIS/BAS, and impulsivity across context. *Journal of Research in Personality*, **44**, 13–21.
- Silvia, P. J. (2005). What is interesting? Exploring the appraisal structure of interest. *Emotion*, **5**, 89–102.
- Silvia, P. J. (2006). *Exploring the psychology of interest*. New York: Oxford University Press.
- Silvia, P. J. (2008). Appraisal components and emotion traits: Examining the appraisal basis of trait curiosity. *Cognition and Emotion*, **22**, 94–113.
- Silvia, P. J. (in press). Curiosity and motivation. In R. M. Ryan (Ed.), *Oxford handbook of motivation*. New York: Oxford University Press.
- Silvia, P. J., Henson, R. A., & Templin, J. L. (2009). Are the sources of interest the same for everyone? Using multilevel mixture models to explore individual differences in appraisal structures. *Cognition and Emotion*, **23**, 1389–1406.

- Silvia, P. J., & Kashdan, T. B. (2009). Interesting things and curious people: Exploration and engagement as transient states and enduring strengths. *Social Psychology and Personality Compass*, *3*, 785–797.
- Sorrentino, R. M., Holmes, J. G., Hanna, S. E., & Sharp, A. (1995). Uncertainty orientation and trust in close relationships: Individual differences in cognitive styles. *Journal of Personality and Social Psychology*, *68*, 314–327.
- Sorrentino, R. M., & Roney, C. J. R. (2000). *The uncertain mind: Individual differences in facing the unknown*. Philadelphia: Psychology Press.
- Spielberger, C. D., & Starr, L. M. (1994). Curiosity and exploratory behavior. In H. F. O'Neil, Jr., & M. Drillings (Eds.), *Motivation: Theory and research* (pp. 221–243). Hillsdale, NJ: Erlbaum.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, *72*, 271–322.
- Taylor, S. P. (1967). Aggressive behavior and physiological arousal as a function of provocation and the tendency to inhibit aggression. *Journal of Personality*, *35*, 297–310.
- Thoman, D. B., Smith, J. L., & Silvia, P. J. (2011). The resource replenishment function of interest. *Social Psychological and Personality Science*, *2*, 592–599.
- Tomkins, S. S. (1962). *Affect, imagery, consciousness: Vol I. The positive affects*. Oxford: Springer.
- Trudewind, C. (2000). Curiosity and anxiety as motivational determinants of cognitive development. In J. Heckhausen (Ed.), *Motivational psychology of human development: Developing motivation and motivating development* (pp. 15–38). New York: Elsevier.
- Tsapelas, I., Aron, A., & Orbuch, T. (2009). Marital boredom now, predicts less satisfaction nine years later. *Psychological Science*, *20*, 543–545.
- Tsutsui, A., & Ohmi, G. (2011). Complexity scale and aesthetic judgments of color combinations. *Empirical Studies of the Arts*, *29*, 1–15.
- Turner, S. A., Jr., & Silvia, P. J. (2006). Must interesting things be pleasant? A test of competing appraisal structures. *Emotion*, *6*, 670–674.
- Vittersø, J., Søholt, Y., Hetland, A., Thoresen, I. A., & Røysamb, E. (2010). Was Hercules happy? Some answers from a functional model of human well-being. *Social Indicators Research*, *95*, 1–18.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*, 297–333.
- Williams, J. M. G. (2008). Mindfulness, depression and modes of mind. *Cognitive Therapy and Research*, *32*, 721–733.