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PREVENTING GUILT BY ASSOCIATION:
MINDFULNESS AND SUSCEPTIBILITY TO EVALUATIVE CONDITIONING

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of
Philosophy at Virginia Commonwealth University.

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July 2012

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Abstract

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Evaluative conditioning (EC) is a type of attitude formation in which a stimulus is

evaluated as positive or negative based on repeated pairings with valenced stimuli. Emerging

evidence suggests that individuals differ in susceptibility to EC and these differences may be

related to various social and psychological biases. One variable that has been linked with less

negative attitude formation, although not using an EC paradigm, is mindfulness. Further,

mindfulness is proposed to alter dimensions of elaboration that may underlie EC, particularly

conditioning of negative attitudes. Therefore, three studies were conducted to examine whether

mindfulness is linked to differential susceptibility to EC, particularly less conditioning of

negative attitudes, and whether aspects of elaboration mediate this proposed relation. In all three

studies, participants were exposed to an EC paradigm in which positive and negative pictures

were paired with neutral Chinese ideographs. Then, they completed ideograph likability ratings.

In Study 1, a measure of trait mindfulness was inversely associated with conditioning of negative attitudes, but not after accounting for negative state affect. In Study 2, there was no relation between either of two measures of trait mindfulness and susceptibility to EC. In Study 3, mindfulness was experimentally manipulated by randomly assigning participants to a mindful breathing induction or a mind-wandering control condition before they completed measures of elaboration and the EC paradigm. As compared to the control condition, the mindfulness condition showed greater susceptibility to conditioning of negative attitudes, after controlling for awareness of the picture-ideograph pairings. There was no support for the proposed mediation models through elaboration in either Studies 2 or 3. However, both studies provided evidence that more mindful individuals demonstrated less cognitive elaboration on negative stimuli. Further, both studies suggested that greater cognitive elaboration in response to pictures predicted less susceptibility to conditioning of positive attitudes and possibly greater susceptibility to conditioning of negative attitudes. Altogether, the three studies provided mixed and inconclusive evidence as to the relation between mindfulness and susceptibility to EC. However, the findings regarding cognitive elaboration may help to advance both the mindfulness and EC literatures.

Preventing Guilt by Association: Mindfulness and Susceptibility to Evaluative Conditioning

The study of attitudes has long held a central place in social psychology (cf. Allport, 1935; Zanna & Rempel, 1988). This may reflect the seemingly fundamental nature of attitudes, as they entail common evaluations of objects (e.g., pizza, cars), people, and ideas in terms of being liked or disliked, good or bad, pleasant or unpleasant. More precisely, attitudes are summary evaluations of valence, stemming from cognitive, affective, and/or behavioral information, that are associated in memory with a target object (cf. Fazio, 2007). They generally serve basic and adaptive functions. That is, attitudes define how we come to understand our social world and ease decision making by providing ready-made evaluations of most targets in our environment. However, certain types or patterns of attitudes may underlie less functional psychological phenomena, such as the negativity biases that perpetuate emotional distress (e.g., Weissman & Beck, 1978; Shook, Fazio, & Vasey, 2007) and racial biases (e.g., Livingston & Drwecki, 2007). Such attitudes can be maladaptive and lead to considerable stress and dysfunction in one's social world and social interactions. Given the negative consequences of such biased attitudes, researchers in psychology and beyond have increasingly turned toward examining how attitudes form and factors that may relate to attitude formation with the hopes of overcoming negativity biases associated with emotional disorders and prejudice.

One factor that may relate to how attitudes form, according to emerging research, is mindfulness (Kiken & Shook, 2011a). Mindfulness is a receptive use of attention and awareness that is oriented toward being more present with experiences as they occur, and it can be cultivated through established techniques (cf. Brown, Ryan, & Creswell, 2007). Mindfulness has been linked with less emphasis on negativity (e.g., Albert & Thewissen, 2011; Arch & Craske, 2006; Frewen, Evans, Maraj, Dozois, & Partridge, 2008; Kiken & Shook, 2011a) as well as

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reductions in the aforementioned consequences of negativity biases: emotional distress (Garratt, Ingram, Rand, & Sawalani, 2007; Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Ijzendoorn, 2007) and, according to preliminary evidence, prejudice (Lillis & Hayes, 2007). Research that directly examines mindfulness and negativity biases in attitude formation is nascent but promising, and it is an important line of work given that attitude formation is a fundamental but relatively understudied process underlying multiple potentially harmful biases. The present research aimed to build on initial studies on mindfulness and attitude formation (Kiken & Shook, 2011a) by examining the potential link between mindfulness and a unique type of attitude formation called evaluative conditioning.

Attitude Formation

Attitude formation involves how individuals come to associate a valence, positive or negative, with a target object. That is, it is the process by which attitudes develop. Compared to other aspects of attitudes, such as their structure and attitude change, attitude formation is a relatively less understood area of inquiry (Jones, Fazio, & Olson, 2009). Attitude formation is crucial to understand, however, because it determines attitude functionality and because the process may reveal biases toward negative or positive evaluations when encountering novel stimuli. With regard to functionality, the development of attitudes enables individuals to efficiently navigate complex, social worlds (Allport, 1935; Smith, Bruner, & White, 1956). Forming and recalling an evaluation of attitude-objects along a valenced continuum can guide approach or avoidance behavior (Smith et al., 1956), the direction of attention (Roskos-Ewoldsen & Fazio, 1992), and decision making (Fazio, Blascovich, & Driscoll, 1992). More relevant to the current research, a growing body of evidence suggests that tendencies toward negativity or positivity when evaluating novel attitude-objects may be indicative of important individual

differences, such as political ideology (e.g., Shook & Clay, 2011; Shook & Fazio, 2009), racial

bias and nonbias (Livingston & Drwecki, 2007), and vulnerability to emotional disorders (e.g.,

Shook et al., 2007). In short, the formation of attitudes is an important area of research for

determining how people come to perceive their social world and understanding the process by

which biases may develop.

Attitudes may form in various ways. There are two general routes of attitude formation:

indirect and direct (e.g., Regan & Fazio, 1977). Indirect refers to the development of an attitude

toward an object without directly interacting with it. For example, an individual may acquire

information from a friend about the merits of a tooth-whitening paste and develop a positive

attitude toward it without having tried it. Or, one may observe that a co-worker is praised and

given better work opportunities – that is, s/he receives rewards or positive reinforcement – after

expressing support for a new, unfamiliar company policy, and this may lead the individual to

adopt a similar attitude toward the policy. Thus, attitudes develop through information gained

from others, instead of direct experience with the attitude object. Direct attitude formation refers

to forming an attitude based on direct behavioral interaction and experience with the attitude

object. For instance, to contrast with the previous example using toothpaste, an individual might

develop a positive attitude toward a tooth-whitening paste after brushing with it and finding it

pleasant or effective. Another example is provided by a recent line of research (Fazio, Eiser, &

Shook, 2004) which suggests that exploration influences the extent to which individuals receive

direct experience with stimuli (i.e., positive or negative qualities or outcomes) from which to

form attitudes.

In this attitude formation paradigm based on exploratory learning, called BeanFest (Fazio

et al., 2004), individuals play a game in which they explore a hypothetical world of 36 beans.

Each bean is slightly different in its shape and number of speckles, and each bean has a set valence in terms of a positive or negative point value. To succeed at the game, participants must learn to identify the valence of each unique bean. Participants have the opportunity to discover whether a bean is positive (i.e., helps their game score) or negative (i.e., harms their game score) only if they choose to approach it. Depending on how they choose to explore or interact with the beans, participants can learn which beans are positive and which are negative (i.e., form attitudes) and therefore increase their likelihood of succeeding at the game. After playing multiple rounds of the game, and thereby having several potential opportunities to interact with the beans and learn their valence, participants' approach behavior as well as their attitudes toward the beans are assessed.

Importantly, research using the BeanFest paradigm has revealed several biases and linked them to consequential individual difference variables. First, on average, participants tended to display a negativity bias in that they formed more negative attitudes than positive attitudes (Fazio et al., 2004). This negativity bias generally stemmed from cautious exploratory behavior; limiting one's direct exposure to stimulus properties, or outcomes, failed to disconfirm fear or expectations of negativity (which may prompt avoidance in the first place). However, the degree of exploration and resulting negativity bias in attitude formation recently was found to vary by a couple of individual differences.

In one study, political ideology was associated with exploration and, consequently, attitude formation (Shook & Fazio, 2009). Specifically, more conservative individuals explored less than more liberal individuals, which led to less information gain and more negative expectations. Therefore, conservatives showed a greater negativity bias in attitude formation. That is, they formed more negative attitudes than positive attitudes. In another study, some

individuals showed a bias toward forming more negative attitudes than positive ones even when they were given direct exposure to stimulus properties regardless of their level of exploration (i.e., full feedback), perhaps reflecting greater attention to or rehearsal of negative information or experiences. This type of negativity bias in attitude formation was found to relate to predisposition to emotional disorders (Shook et al., 2007). Thus, this line of work involving attitude formation based on direct experience has revealed biases toward negativity in attitude formation that are linked to important psychological and social implications.

Direct attitude formation does not just occur through explicit decisions to explore and interact with one's social world. That is, evaluative associations may develop more subtly through exposure to a novel target in the context of other valenced stimuli. A means of direct attitude formation that demonstrates this more subtle process, which is highly common in daily life and has received the most empirical study in the attitudes literature, is called evaluative conditioning. Moreover, emerging evidence also indicates that evaluative conditioning may be associated with individual differences and negativity bias.

Evaluative Conditioning

The attitude formation process known as evaluative conditioning is similar to classical conditioning, in that a stimulus (unconditioned stimulus, US) that produces a certain response (unconditioned response, UR) is paired with another stimulus (conditioned stimulus, CS). After multiple pairings, the second stimulus (CS) on its own produces the same response (conditioned response, CR). In evaluative conditioning, the response is an evaluation: A stimulus is evaluated in accordance with the valence of another positive or negative stimulus with which it has co-occurred (De Houwer, Thomas, & Baeyens, 2001). Put differently, the valence already associated with the US becomes associated with, or at least affects responses to, the CS that has

been within close proximity. The term *evaluative conditioning* (EC) first was introduced by

Martin and Levy around 30 years ago (1978), and this term specifically refers to the conditioning

of attitudes rather than traditional classical conditioning of behavior.

Examples of evaluative conditioning in the world abound. Imagine that a new, unknown

coworker is encountered repeatedly in the company of a disliked and troublesome officemate.

This association may lead to suspicion or other negative feelings when she is spotted coming

around the corner alone (i.e., guilt by association). Or, consider that individuals often dislike

foods eaten around the same time as another food from which they vomited. Or, using a more

basic example, even if an unfamiliar, relatively neutral word is paired with a familiar, pleasing

word, or perhaps said by a pleasing voice, it may come to be evaluated as pleasant. Although

these examples may differ, across all a similar effect occurs in that a previously neutral target is

evaluated based on the valence of a person or object with which it co-occurred.

A similar word pairing to the aforementioned example was used in some of the first

demonstrations of evaluative conditioning over 50 years ago. Using a cover story about

simultaneous learning, Staats and Staats (1957) showed participants nonsense syllables (i.e.,

neutral CSs) paired with positive or negative words (i.e., valenced USs). Participants then were

asked to rate how pleasant the nonsense syllables were on a semantic differential scale (i.e., a

bipolar rating scale based on a pair of contrasting adjectives, such as pleasant versus unpleasant).

Participants rated nonsense syllables as more pleasant after they had been paired with positive

words and as more unpleasant after they had been paired with negative words. In a subsequent

study, Staats and Staats (1958) also demonstrated evaluative conditioning of nationalities (e.g.,

Swedish) by pairing them with positive and negative words. Such early studies suggested that

attitudes toward a target could be formed based on simple pairings with other clearly valenced stimuli.

Since the work by Staats and Staats (1957, 1958), a common paradigm that has been developed with visual stimuli is known as the picture-picture paradigm, which was first used by Levey and Martin (1975). It involves pairing valenced pictures (USs) with neutral pictures (CSs) multiple times, followed by a rating of CS valence. For instance, De Houwer, Baeyens, Vansteenwegen, & Eelen (2000) first asked participants to rate the valence of various pictures of faces and then used these ratings to categorize pictures as likeable (positive), dislikable (negative), or neutral. They then paired pictures of neutral faces (CSs) with likeable faces (positive USs), dislikeable faces (negative USs), or other neutral faces (neutral USs) in a forward conditioning procedure wherein the CS was presented for one second, followed by a two-second blank screen, followed by presentation of the US for one second. Eight CS-US pairs were presented seven times in quasi-random order (such that the same pair could not be presented on more than two consecutive trials), with each pair separated by seven seconds. When participants subsequently were asked to evaluate the neutral CSs again on a semantic differential scale, they rated CSs paired with positive USs or negative USs more positively and more negatively, respectively, than the other CSs (including CSs paired with neutral USs, which served as a baseline). This basic picture-picture paradigm and variations on it have been replicated widely (e.g., Baeyens, Crombez, Van den Bergh, & Eelen, 1988; Baeyens, Eelen, Van den Bergh, & Crombez, 1989; Baeyens, Eelen, & Van den Bergh, 1990; Baeyens, Hermans, & Eelen, 1993; Hammerl & Grabitz, 1993, 1996; Kim, Allen, & Kardes, 1996; Kim, Lim, & Bhargava, 1998; Olson & Fazio, 2001, 2002).

Although formerly it was standard to ask participants to pre-rate pictures, as just described, more recently separate pilot tests and normed stimuli have been employed. For example, when testing whether EC effects could be obtained using simultaneous presentation of the CS and US pairing, Lascelles and Davey (2006) used pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005), which is a database of images for which the valence has been normatively rated. Other pictures were taken from magazines and pilot tested, with a separate sample of participants prior to the main study, to determine their average valence. Some participants viewed simultaneous CS-US picture pairings whereas others viewed the CS followed by the US, divided by a very brief interval. Afterward, participants rated the valence of all stimuli on a semantic differential scale. Similar evaluative conditioning effects were found for both the simultaneous and forward conditioning. The positive-paired CSs were rated more favorably than both the neutral-paired and negative-paired CSs, and the negative-paired CS were rated less favorably than both the neutral-paired and positive-paired CSs.

The picture-picture paradigm also has been improved on in other ways over time. For instance, some researchers have paired a CS repeatedly with multiple USs of the same valence but different content (e.g., Olson & Fazio, 2001, 2002) to ensure that effects are not due to specific stimulus content but rather to valence. Another precaution has been to counterbalance between participants the valence with which a CS is paired (Shanks & Dickinson, 1990) to ensure that conditioning in either direction can be achieved for the same CS.

A qualitative review of EC research (De Houwer et al., 2001) suggested that EC may occur with stimuli other than those in the visual domain, and many EC studies have been conducted with other stimuli. For example, a study in the haptic domain used as stimuli a

number of touchable materials that varied in texture, such as silk, glass, fur, and linen (Hammerl & Grabitz, 2000). Participants experienced the stimuli by extending their arm through a tube and touching an unseen stimulus with their fingertips. Baseline attitudes first were assessed to determine for each individual which stimuli were neutral or clearly positive (negative stimuli were not used because they caused excessive skin irritation). Then, neutral textures (CSs) were paired either with positive textures (positive USs) or with other neutral textures (neutral USs, for comparison) in a forward conditioning procedure. That is, the CS was presented prior to the US, with longer intervals between pairings than between the CS and US presentation to reduce potential confusion across conditioning trials. The pairings were presented multiple times in random order. During this conditioning phase, participants were distracted from the stimulus pairings by listening to mathematical problems and providing the answer orally. Subsequently, (dis)liking toward CSs was assessed using a semantic differential scale. As expected, after conditioning, participants indicated greater liking for CSs that had been paired with positive USs as compared to ratings of CSs paired with neutral USs. Further, based on the distracter task used during conditioning and no participants reporting awareness of pairings when asked, Hammerl and Grabitz suggested that conditioning occurred without awareness of the pairings, although the role of awareness in conditioning has since been debated (cf. Jones et al., 2009; Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010; Pleyers, Corneille, Luminet, & Yzerbyt, 2007).

In the gustatory domain, Coppens and colleagues (2006) examined if a negative attitude could be conditioned toward a particular flavor of liquid (which relies on olfactory processing) by pairing it with a bad taste. Two flavors, pear and lemon, were used as CSs and rated equally by participants prior to conditioning. During the conditioning task, participants smelled and tasted 6 cups each of the flavored liquids (12 total). Critically, during conditioning one of the

flavored liquids also contained a bad-tasting substance, Tween 20, which served as the negative

US. The experimenters counterbalanced between participants which flavor was paired with (i.e.,

contained) the Tween 20. Additionally, the solutions were artificially colored so that each

solution appeared in both a green and a yellow color, as a distracter to help conceal the CS-US

association. To assess attitudes following conditioning, participants were given 12 pear- and

lemon-flavored cups again, with the Tween 20 omitted, and asked to report their level of

(dis)liking for each. The results showed the expected evaluative conditioning effect: Participants

indicated that they liked the flavor that had been paired with the Tween 20 significantly less than

the unpaired flavor and significantly less than their baseline rating. Interestingly, this research

aimed not only to demonstrate EC with flavor-taste pairings, but also to examine the potential

role of the amygdala for EC. The rationale was that many previous studies which investigated

the conditioning of fear found that lesions to the amygdala prevented normal conditioning of fear

responses. When Coppens and colleagues compared participants with unilateral amygdala

lesions to matched controls, they found no difference between groups in conditioning effects.

However, without examining bilateral lesions, the role of the amygdala in conditioning negative

attitudes overall is not clear, despite the fact that it seems to play a role when the specific

negative emotion of fear is involved. This is just one example of many uncertainties that have

arisen in the larger realm of evaluative conditioning.

Although evaluative conditioning has been demonstrated using various procedures and

stimuli over time, the range of procedural variations and some replication failures also have

raised questions about its robustness, boundary conditions, and nuances. Attempting to address

these questions, a meta-analytic review (Hofmann et al., 2010) of 214 studies across various

stimulus domains, primarily with self-report dependent variable measures, concluded that EC is a

true overall effect of moderate size (d = .52). However, Hofmann and colleagues noted several

potential moderators of EC, primarily related to procedural features. First, CS modality was a

significant moderator, with visual and taste/odor stimuli showing larger effects than haptic

stimuli. Specifically, nonsensical alphanumeric stimuli (e.g., "MVGHX") showed the greatest

effects. Further, effects were larger for CSs that initially were neutral (i.e., for which new

attitudes were formed) than for CSs that initially were valenced (i.e., requiring attitude change).

The order of presentation of the US and CS (forward conditioning, in which the CS precedes the

US; backward conditioning, in which the US precedes the CS; or simultaneous presentation, in

which the CS and US appear simultaneously) did not significantly moderate EC effects. Also,

EC appears to be resistant to extinction from multiple CS-only trials, unlike classical

conditioning. Further, supraliminal presentation of the US (i.e., individuals are consciously

aware of being exposed to the stimulus, generally meaning presentation times of greater than 50

milliseconds) was found to yield larger effects than subliminal presentation (i.e., stimulus

presented below individual's conscious awareness, generally meaning presentation times of less

than 50 milliseconds). Finally, they suggested that participant awareness of pairings, also

referred to as contingency awareness, may be needed for effects (also see Pleyers et al., 2007).

However, as noted earlier, the role of contingency awareness in different paradigms has been

debated.

For instance, there is evidence suggesting that implicit processes may result in evaluative

conditioning effects with little to no awareness of contingencies. One example is the implicit

learning paradigm developed and tested by Olson and Fazio (2001, 2002). This paradigm was

designed to minimize awareness of stimulus covariation by embedding CS-US pairings in a

rapid, non-rhythmic stream of images and words shown at various locations on a computer

screen, sometimes alone and sometimes in pairs. Participants were told that the study was on

"attention and rapid responding" and to press a button when particular images appeared. Key

CS-US pairings were presented simultaneously on the screen, and CSs were paired with

multiple, different USs of the same valence. After the learning paradigm, attitudes toward the

CSs were assessed. One study used an explicit attitude measure, asking participants to rate the

(un)pleasantness of the CS images along with various other images on a semantic differential

scale, as is common in EC studies. Two other studies assessed attitudes toward the CSs using

two different implicit attitude measures (evaluative priming and the Implicit Association Test).

Implicit attitude measures covertly assess attitudes using reaction times and may help to avoid

social desirability concerns and other motivational issues with self-report measures. In all of the

studies, whether using the explicit or implicit measures of CS attitudes, evaluative conditioning

effects were observed from the implicit learning paradigm. Not only did the implicit procedures

and measures indicate a potentially limited role of contingency awareness, but a funneled

debriefing designed to assess awareness of the pairings also suggested that participants were

unaware of CS-US contingencies. These and other studies suggest that EC can occur without

participant awareness of CS-US contingencies, despite contentions otherwise (e.g., Pleyers et al.,

2007). Such disagreement may reflect a need for more research on mechanisms underlying EC,

which are still being explored. It has been suggested (e.g., Jones et al., 2009) that although EC is

an umbrella term used to describe a general effect that results from co-occurrences, there may be

multiple underlying mechanisms which could demonstrate different properties.

Theories of Mechanisms for Evaluative Conditioning

A number of underlying mechanisms for EC have been proposed. One theory by

Baeyens, Eelen, Crombez, and Van den Bergh (1992), the referential approach, posits that both

EC and classical conditioning are based on learned associations such that the CS can activate a mental representation of the US, including its valence in the case of EC. Classical conditioning would be considered a special case in that the CS produces an expectancy that the US will appear, based on the statistical contingencies of their co-occurrence, but this expectancy does not characterize EC. This lack of expectancy is thought to explain some differences between EC and classical conditioning, such as EC relying on mere co-occurrence with less susceptibility to statistical contingencies and extinction.

A somewhat similar but distinct idea by Levey and Martin (1975), the holistic approach, maintains that the CS-US pairing can create a holistic mental representation of the pair including features of both stimuli. Thus, one stimulus feature in this larger representation would be the valence of the US, and this feature could be accessed when the larger representation is activated by the CS. Similar to more distributed associative models, this approach does not require that the CS is a signal creating an expectancy that the US will appear; therefore, the holistic representation resists extinction.

A potentially more specific mechanism of EC based on association is the implicit misattribution approach by Jones and colleagues (2009). In this case, the affective or evaluative valence that is associated with and activated by the US can be misattributed to the CS when the stimuli co-occur. This proposed mechanism is based on evidence that individuals may be unaware of actual sources of affective reactions and misattribute them to an incorrect source, especially if the latter is close in spatial proximity and/or shares similar perceptual features to the actual source. This misattribution process is considered to be implicit in that it does not rely on explicit thoughts or efforts trying to determine the source, even though the effect of this process (the CS-valence association) might be noticed.

A contrasting perspective is that EC effects can arise from conscious propositions of associations between the CS and US and evaluations of their truthfulness (De Houwer, Baeyens, & Field, 2005; De Houwer, 2009). That is, a CS may come to be liked or disliked precisely because it is known to potentially be paired with an already liked or disliked US. For instance, one may feel dismay at an unfamiliar pet visiting his home, thinking "if this pet comes in my house, then I might get itchy flea bites" if a previous dog's visit led to a flea infestation. Conscious signal detection likewise could fall under this approach. EC stemming from this mechanism would involve awareness of CS-US contingencies.

Finally, it has been proposed (Davey, 1994) that learning conceptual similarities between the CS and US through pairing them can facilitate categorization of the CS in line with US valence. For example, when a cherished oval-shaped, red gummy candy is paired with an unfamiliar square-shaped, red gummy candy, the color and texture of the unfamiliar candy may become salient. These features may allow it to be categorized as a likeable treat. This potential EC mechanism relies on some level of identification of similarities between a CS and US.

Although the conditions under which these different proposed mechanisms for EC may occur have not been sufficiently tested, an interesting perspective is that all of them share a common feature in that actual sensory and perceptual aspects of the CS do not form the basis for the evaluation of the stimulus. Rather, details of the US are mentally added to the CS as the pairing is processed, and it is these added details from the US that determine the evaluation of the CS. In the referential and holistic approaches, these details are added by creating associations between mental representations with details of each stimulus or a larger representation with details from both stimuli. In the implicit misattribution approach, the detail of affective valence is added from the US to the CS by misattributing its source. In the

conceptual similarity approach, comparative analyses result in the addition of a categorization, including the evaluative valence of that category, to the concept of the CS. In the propositional approach, a logical hypothesis connects aspects of the US, including its valence, to the CS. Thus, although the different proposed mechanisms may posit varying aspects of processing through which US details become the basis for CS valence, all involve psychologically processing more than just inherent CS features when forming an attitude toward the CS. That is, these mental representations, analyses, and/or attributions add information – and potentially incorrect or even unhelpful information – beyond direct sensory and perceptual information about a stimulus itself. This added information or detail during processing allows the evaluation of the valence of one stimulus to be based on the valence of another stimulus rather than on its own inherent valence (or lack thereof). Regardless of the specific mechanism, this aspect of processing underlying evaluative conditioning occurs during what could be referred to as 'elaboration.'

Elaboration

In its general use, the term *elaboration* refers loosely to mental processing beyond basic perception and can include various mental processes. However, some uses of the term specify the nature of the elaboration such as its valence (i.e., tendency to process positive versus negative information, or vice versa) as well as its tendency to embellish with added details. In the current research, the term elaboration itself is used to refer to general cognitive processing but the focus will be on these more specific dimensions of elaboration, embellishing through adding details and emphasizing a valence, in this case negative valence. There are precedents for both the general and more specific uses of the term.

Early influences in psychology mentioned and described elaboration rather generally in terms of increased processing but some uses were more focused. As an example of the former, much of William James' *Principles of Psychology* (1890) was concerned with mental representations and their embellishments, associations, and analysis. He referred to the "highest and most elaborated mental products" as those which receive the most attention and cognition aimed at reasoning and personal meaning-making, amidst a vast pool of sensory and perceptual information (p. 288). He also proposed that memory depends on drawing mental associations, using the term elaborate to refer to increasing mental associations. Altogether, James referred to many aspects of processing when using the term elaboration.

On the other hand, Freud (1900) used the term elaboration to refer to a more specific process in coining the term *secondary elaboration* to encapsulate the manner by which individuals' dreams come to have added details. These added details provided varying levels of narrative meaning and coherence despite dreams being comprised of otherwise nonsensical and relatively inconsistent material. Such elaboration was considered by Freud to be secondary simply in that it regulates what he considered to be primary psychic desires underlying the dream. Notably, his use of the term elaboration was narrower than James' and more akin to embellishment, or added information, for the narrative purposes.

Later work incorporated both perspectives, to some degree, in explicating that elaboration relates to a continuum of processing in which adding details often plays an important role. The levels of processing theory of memory (Craik & Lockhart, 1972) suggested that memory processes improve with depth of processing and, particularly, greater elaboration at encoding of information. It was proposed that information processing varies qualitatively in that it ranges from shallow processing, which refers to encoding sensory properties, to deep processing, which

refers to encoding meaning, analyzing relations to other concepts, and drawing inferences. The degree of such conceptual elaboration, often in terms of the degree to which details are added or associated, especially for meaning-making, at encoding was proposed to be particularly relevant for memory. Thus, this body of work describes elaboration in the context of general cognitive processing but highlights the addition of details as a feature of elaboration.

A somewhat related theory of instruction, called Elaboration Theory (Reigeluth, 1979), suggests that teaching should begin with simple and fundamental ideas and then elaborate into more specific details that add complexity and draw relationships. In this process, the instructor guides learners into increasing levels of elaboration with intentional sequencing of broad and specific information complemented by synthesis and summarization of content. Reigeluth and colleagues (1980) explicitly defined elaboration as "a portion of instruction which provides more detailed or complex knowledge about a part of the content to be taught" (p. 205). They further described that elaboration can extend multiple levels from the original simple foundation, with each level honing in to an increased degree of detail which, for greater comprehension and memory, should then be related back to previous levels and the basic foundation. In summary, this use of the term elaboration also highlights added details as well as associations between details to support a coherent framework of meaning. Additionally, both theories of elaboration convey its role in learning and memory, which it should be noted are general processes used in forming and retrieving attitudes, respectively, in that the valence of an attitude object is learned and then later retrieved from memory.

Within the attitudes literature the term elaboration often is found in the context of the Elaboration Likelihood Model (ELM; Petty, 1977; Petty & Cacioppo, 1981, 1986), which addresses attitude formation and change primarily via persuasive messages. In the ELM,

elaboration is used to refer to an individual's extent of careful thinking about an attitude object and therefore tends to be used rather generally. High elaboration thus refers to scrutiny of the merits of an attitude object, and is considered more likely among those with greater need for cognition (i.e., those who tend to engage and take pleasure in thinking; Cacioppo & Petty, 1982), whereas low elaboration relies more on simple cues and heuristics. An example of a study based on this use of the term elaboration examined elaboration in response to strong and weak persuasive arguments and mood state (Sinclair, Lovsin, & Moore, 2007). After reading strong or weak persuasive messages advocating comprehensive final exams for undergraduates, under the guise of a first study on impression formation, participants underwent a happy or sad mood induction as part of an ostensible second study. Then, attitudes and elaboration were assessed. Elaboration was measured using a common thought listing procedure in which participants were asked to list all of the thoughts they had during exposure to the arguments about final exams. This technique allowed the researchers to examine of the number of thoughts, indicating the general amount of cognitive elaboration, as well as the valence of thoughts (favorable, unfavorable, or neutral), a specific dimension of that elaboration. In addition to their various findings related to persuasion, the authors found that participants who underwent the happy mood induction showed more modest levels of elaboration (based on both number of thoughts and the pattern of evaluative valence in response to strong and weak arguments, given that cognitive scrutiny should produce less favorable evaluations of weak arguments) compared to those who had experienced the sad mood induction. Likewise, those in the sad mood condition were persuaded only by strong rather than weak arguments (strong arguments withstand cognitive scrutiny) whereas those in the happy mood induction were equally persuaded by strong and weak arguments. Although the details of this study pertaining to persuasive messages are

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not particularly relevant to the present research, this study importantly provides an example of the common use of the term elaboration in the attitudes literature as well as a means of operationalizing elaboration. It indicates simple amount of cognitive processing but also may be conceived of and examined along particular dimensions of interest, such as valence.

Likewise, valence and embellishment are dimensions of elaboration that have received empirical attention. Interestingly, both potentially present psychological pitfalls that resemble some of the consequences or correlates of susceptibility to evaluative conditioning, as will be explained. Specifically, elaboration that introduces inaccurate or negatively biased details may lead to inaccurate memories or psychological distress, respectively.

As for the former, studies have examined and demonstrated the role of elaboration that embellishes in the formation and integration of false memories. This line of research has demonstrated how post-event suggestions lead to elaboration that falsely embellishes, or adds inaccurate details, and thus promotes false memories (i.e., memories containing falsehoods). In this context, Zaragoza and colleagues (2011) refer to elaboration specifically as "cognitive processing that embellishes the [mental] representation in some way" (p. 18). Further, they distinguish between *perceptual* and *conceptual elaboration*. Perceptual elaboration refers to elaboration on sensory/perceptual characteristics, whereas conceptual elaboration refers to more abstract reasoning about meaning and implications. In their studies, Zaragoza and colleagues manipulated participants' relative levels of elaboration by first showing them a video of a police car chase and then asking them probing questions which varied by asking about details that related to perceptual characteristics (e.g., "Did he find the ring in the left, middle, or right compartment?"), conceptual characteristics (e.g., "Was the fact that the thief stole a ring central to the plot?"), or non-elaborative word exercises (e.g., rhyming and unscrambling) in a control

condition. Some of these questions contained misleading post-event suggestions, introducing the potential to elaborate on inaccurate details. On subsequent tests, both the perceptual and conceptual elaboration conditions, compared to the control condition, demonstrated more false memories that incorporated the inaccurate details. These studies demonstrate that embellishment with perceptual and conceptual details is an important dimension of elaboration that not only influences memory but can create inaccurate memories. This is relevant to evaluative conditioning because when an attitude is formed toward a CS through evaluative conditioning, the valence of that attitude is based on the addition of details from the US, like embellishment, and produces a memory of valence that could be inaccurate in terms of the CS's inherent valence.

Another important dimension of elaboration that is highly relevant to evaluative conditioning is valence. Bias toward negative valence has been observed both in attitude formation (e.g., Fazio et al., 2004, Shook et al., 2007) and elaboration, with the potential detrimental consequence of psychological distress. In terms of elaboration, studies of depressive cognition suggest that some individuals tend to elaborate more on negative stimuli than on neutral or positive stimuli, and such negatively biased elaboration plays a role in depression. A review by Gotlib and Joormann (2010) explains the nature of and evidence for negatively biased elaboration in depression. The authors explain that multiple studies suggest that depressive cognition involves difficulties disengaging from negative stimuli and elaborating on it by not inhibiting additional processing of negative material, even though it is irrelevant to goals or other situational demands. An example is rumination, a cognitive pattern that promotes depression, in which individuals fixate on negative affect (Nolen-Hoeksema, 1987). For example, a study examined levels of rumination in relation to performance on negative affective priming tasks,

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which examine response times after exposure to positive and negative material that is supposed to be ignored (Joormann, 2006). Reduced inhibition of negative material was found among those with greater rumination (even after controlling for depressive symptoms). Further, rumination has been linked to sustained pupil dilation in response to negative information (Siegle, Steinhauer, Carter, Ramel, & Thase, 2003). Such findings support the notion that rumination, a form of cognitive processing that emphasizes negative affective experience, may be part of a general bias in depressed individuals to fail to disengage from and elaborate on negative material. As Gotlib and Joormann (2010) conclude, "Once negative material has become the focus of attention … depressed individuals are prone to elaborate on it and have difficulty stopping or inhibiting the processing of this material" (p.300).

Further, the cognitive reactivity hypothesis (Miranda & Persons, 1988) suggests that depression is perpetuated in a cycle of elaboration involving the interplay of cognition and emotion, in that negative emotions incite cognitive elaboration in the form of negatively biased cognitive processing, which in turn intensifies negative emotions and perpetuates the cycle. In this case, heightened negative affect may signal negatively biased elaboration. Altogether, the evidence on elaboration in the depression literature suggests that the valence of the content being processed during elaboration matters, with bias toward elaboration on negative information having undesirable consequences in terms of psychological distress. It is conceivable that negatively biased elaboration could contribute to more negative attitudes, as there is evidence that the negative cognitive style which marks depression includes dysfunctional negative attitudes (e.g., Weissman & Beck, 1978) and is associated with a bias toward forming more negative attitudes than positive attitudes in the BeanFest attitude formation paradigm (Shook et al., 2007).

To summarize, the term elaboration has been used generally to describe quantity of mental processing, but specific dimensions of such processing have been highlighted – embellishment and negatively biased elaboration – that are relevant to EC. First, elaboration that embellishes adds details, sometimes inaccurate details, which is a common feature of any mechanism of EC in that details about the US are added to information about the CS and serve as the basis for forming an attitude toward the CS regardless of actual CS valence. Elaboration that embellishes thus may facilitate EC. Further, negatively biased elaboration exclusively emphasizes negative stimuli and thus seems conducive to conditioning negative attitudes.

Both dimensions of elaboration, interestingly, involve the potential for bias, either toward inaccurate or negative information. Thus, when one considers the potential roles of embellished and negatively biased elaboration in EC, it calls attention to the potential for EC to involve or indicate bias. Although EC traditionally has not been framed in terms of bias, some researchers have begun to examine links between susceptibility to EC and bias, especially negativity-related biases.

Evaluative Conditioning and Bias

Although EC effects have proven to be robust across different procedures and stimuli, some studies have demonstrated that individuals vary in their susceptibility to evaluative conditioning and that susceptibility to conditioning with negative stimuli is associated with several different forms of bias. For example, Livingston and Drwecki (2007) examined whether susceptibility to evaluative conditioning is associated with racial bias (negativity toward racial outgroups) and nonbias. In two studies, White participants were classified as racially biased ("ordinary") or nonbiased, based on explicit and implicit measures of attitudes toward Blacks (Studies 1 and 2) as well as nominations by African Americans (Study 2). All participants

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completed an evaluative conditioning task based on the picture-picture paradigm in which positive, negative, and neutral images, or USs, were paired with Chinese ideographs, which served as neutral CSs, in a forward conditioning procedure (i.e., the CS preceded the US). Then, participants rated their liking of the ideographs. Expected conditioning effects emerged overall in that CSs subsequently were rated differently based on CS-US pairings (e.g., CSs paired with positively valenced USs were rated more positively than CSs paired with negatively valenced USs), but there was a significant interaction between group ("ordinary" or nonbiased) and valence (negative or positive CS-US pairing). The nonbiased group showed less susceptibility to conditioning with negative stimuli in both Studies 1 and 2, as well as greater susceptibility to conditioning with positive stimuli in Study 1, compared to the "ordinary" group. Further, in both studies, the interaction of implicit and explicit racial bias measures significantly predicted susceptibility to conditioning with negative USs, whereas no relation between these measures was found for susceptibility to conditioning with positive USs. These findings could be interpreted to suggest that racial nonbias is linked to or perhaps reflects less bias in terms of acquiring negative associations to neutral stimuli. It is unclear, however, whether bias toward forming positive associations to neutral stimuli plays a role in racial nonbias. In any case, greater susceptibility to conditioning of negative attitudes was linked with racial bias.

In a related set of studies procedurally, a similar EC paradigm was used to examine the relation between susceptibility to EC and political ideology (Shook & Clay, 2011). Biases toward negativity became apparent in the research. Across two studies, Shook and Clay found that individuals who reported more politically conservative ideologies demonstrated more susceptibility to conditioning of negative attitudes than positive attitudes, as compared to those who reported more liberal ideologies. That is, valence asymmetries indicating a negativity bias

increased with more conservative ideologies. This research provides an example of bias toward

negativity over positivity in evaluative conditioning, with links to consequential individual

differences.

Conditioning of negative attitudes, in the form of fear conditioning, also has been

examined in relation to attentional biases toward threat. For example, Lee and colleagues (2009)

conditioned fear toward angry face images by pairing either an angry male or angry female face

image with a mild finger shock. The angry face of the other gender (i.e., female and male,

respectively) and other facial expressions (i.e., happy, sad, and neutral; these served as a baseline

to ensure neither the angry face nor the gender of the face produced effects on the subsequent

Stroop task) were not paired with shocks. Then, they examined attentional biases toward the

stimuli using an emotional Stroop task in which participants were to identify the color of the

faces (which were in typical Stroop task colors: red, green, blue, or yellow). In the Stroop task,

longer response latencies in identifying colors indicate greater attention, or attentional bias,

toward that stimulus. Response latencies were longer for fear-conditioned stimuli, indicating an

attentional bias. Thus, this form of conditioning with negative stimuli was related to a form of

negativity bias, attentional bias toward negativity, which also has been found to promote anxiety

(Bar-Haim et al., 2007).

A negativity bias also has been demonstrated within the process of evaluative

conditioning. Rydell and Jones (2009) examined factors that influence conditioning effects

when a CS is paired with two USs. When they paired a neutral CS with a combination of both a

positive US and a negative US of equal extremity, subsequent CS ratings were as negative as

when the CS was paired with neutral-negative or negative-negative US combinations. That is,

the negative US exerted more influence on CS ratings than the positive US. This result only was

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found when the presentation of each US overlapped for an equal amount of time on the screen with the presentation of the CS, however. When the presentation of one US overlapped with the presentation of the CS but the presentation of the other US did not, the US closer in spatio-temporal proximity influenced subsequent CS ratings more than US valence. Still, when all else but valence was equal, this study suggests that negative stimuli may be weighted more heavily than positive stimuli when both are present during conditioning.

These studies demonstrate that evaluative conditioning, particularly the conditioning of negative attitudes, can be marked by and indicate biases. At the same time, the studies on individual differences suggest that it is possible for some people to be less susceptible to the conditioning of negative attitudes and related biases. Such research is still emerging, and potentially modifiable individual differences have not yet been identified. Therefore, it would be beneficial to further identify individual difference variables, and particularly ones that can be modified using known techniques, that might reduce or alter elaborative responses to negative stimuli and reduce susceptibility to conditioning of negative attitudes. A variable that aptly fits this description and has been receiving substantial attention in the empirical literature recently (cf. Brown et al., 2007) is mindfulness. Both theory and research on mindfulness suggest not only that it is beneficial for well-being, but that it may alter elaborative responses, particularly to negative stimuli, and attitude formation.

Mindfulness

Over the last few decades, the concept of mindfulness has garnered much attention in psychological, neuroscientific, and health-related research. Mindfulness, as used here, can be defined as a receptive attention to and awareness of events and experiences as they occur in successive moments of perception (Brown & Ryan, 2003; Kabat-Zinn, 1990). That is,

mindfulness is a quality of attention and awareness that entails "being present" to, or developing closer familiarity with, internal and external experiences as they happen. Although scientific debate on a definition of mindfulness is ongoing (e.g., Bishop et al., 2004; Brown et al., 2007; Mikulas, 2011), it is clear that the term is not simply synonymous with lay uses that refer to being careful, heedful, or conscientious. It also is not the same as the ability to label experiences (e.g., Linehan, 1993) or categorize them differently (e.g., Langer, 1989), as some psychologists have used the term. The use of the term mindfulness here aims to reflect its roots in Buddhist contemplative practice and its secular health applications as developed by Jon Kabat-Zinn (1990).

Mindfulness in this sense is considered to be an inherent capacity that can be cultivated through practice, typically meditative practice. For example, one may practice being mindful of a particular object of attention, such as one's breathing. This usually entails observing the moment-to-moment sensations of each inhale and exhale in a receptive, curious manner. When thoughts and emotions arise, they are noticed kindly as mental phenomena and gently let go of so that one can continue to attend to the sensations that unfold with each breath. This type of breathing meditation is a common mindfulness practice, especially with novices. At the same time, with greater facility mindfulness can be employed toward all experiences without one set object of attention. As Lau et al. (2006, p.1448) describe: "Although mindfulness, or insight meditation, also includes some concentrative practices, the focus of attention is unrestricted such that the meditator develops an awareness of one's present experience, including thoughts, feelings, or physical sensations as they consciously occur on a moment-by-moment basis." Mindfulness does not require any particular object of attention or meditation session per se.

Furthermore, mindfulness can be employed deliberately or arise spontaneously in typical life. Indeed, it has been conceptualized by researchers at both a trait and also a state level. At a trait level, individuals vary in their tendency to be mindful in daily life (Brown et al., 2007). At a state level, one may be more mindful in a given moment or situation due to intentional cultivation of mindfulness or spontaneous mindfulness, but it does not necessarily reflect a higher frequency of more mindful states on a regular basis. That said, repeatedly practicing a state of mindfulness in meditative practice can increase one's tendency to be mindful in daily life, or his/her trait mindfulness (e.g., Orzech, Shapiro, Brown, & McKay, 2009; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008).

State and trait levels of mindfulness are part of broader considerations involved in operationalizing mindfulness. Self-reports currently are the only method of measuring state and trait mindfulness. These scales are based on different operational definitions of mindfulness, including whether it is being studied as a state or trait as well as the potential dimensions involved in mindfulness practices and interventions. For instance, the *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003) is a unidimensional measure focusing on a present-moment oriented attention and awareness with an inherent quality of receptivity to experiences. The MAAS exists in a widely used trait version as well as a lesser-used state version. Many other measures have separate subscales to represent the dimensions of attentive observation of present experience and a receptive or nonjudgmental quality to that observation, at a minimum (e.g., trait-level: *Philadelphia Mindfulness Scale*, Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; state-level: *Toronto Mindfulness Scale*, Lau et al., 2006). Some scales have additional factors representing skills cultivated through mindfulness interventions, such as describing internal experiences and not reacting to internal experiences (e.g., *Five-Facet*

Mindfulness Questionnaire; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Although

such measures may aim to tap a greater range of nuances involved in being mindful, one could

contend that these additional factors likely represent correlates of mindfulness rather than

capturing subtleties of the construct itself. This challenging balance involved in isolating the

construct while capturing its richness also applies to manipulations of mindfulness, which range

from brief, tightly-controlled laboratory inductions to multi-week, community-based

interventions, as will be described further.

The Development of Mindfulness Research

One of the first and most studied manipulations of mindfulness has been a standardized

eight-week course, called Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990),

which originally was studied in health contexts starting in the 1980s. This course, on which

other interventions have been modeled, involves learning and practicing common mindfulness

trainings such as being mindful while breathing, eating, walking, and doing gentle yoga.

Initially, it was developed to address chronic pain and stress-related ailments. Likewise, early

studies provided some empirical evidence that MBSR and similar interventions improved coping

with chronic pain and medical symptoms as well as reduced stress, although many were pre-post

designs without control groups (cf. Baer, 2003). At the same time, greater mental health benefits

also were theorized and, when measures of psychological symptoms were included in such

intervention studies, evidence supported these claims.

In turn, over the last 25 years, an increasing number of studies, including more

randomized controlled trials (RCTs), have examined psychological benefits of mindfulness.

Recent meta-analytic reviews of mindfulness-based interventions support that they improve

anxiety and mood symptoms in clinical samples (Hofmann, Sawyer, Witt, & Oh, 2010) and that

they improve anxiety, mood, coping, and quality of life in nonclinical samples as well (Grossman, Neimann, Schmidt, & Walach, 2004). Affective benefits also have been found in recent studies using brief, more controlled laboratory inductions of a mindful state, which typically instruct novices through a basic, common mindfulness exercise such as mindful breathing (e.g., Alberts & Thewissen, 2011; Arch & Craske, 2006; Broderick, 2005). Further, measures of trait mindfulness inversely correlate with measures of emotional distress (such as stress, depression, and anxiety) and positively correlate with measures of psychological well-being (such as state affect, subjective well-being, and self-actualization; cf. Brown et al., 2007). Finally, recent evidence supports that increases in trait mindfulness due to mindfulness-based interventions are associated with psychological benefits (Orzech et al., 2009; Shapiro et al., 2008). This suggests some overlap between the benefits of practicing a mindful state and the benefits of being more mindful in daily life, although some researchers have questioned the degree of overlap (Thompson & Waltz, 2007). In any case, the majority of research on mindfulness practices and self-reported trait mindfulness has focused on and established links to less distress and greater well-being.

Mechanisms of Mindfulness

More recently, research has begun to examine potential mechanisms for psychological benefits of mindfulness. Such work provides insight into how mindfulness may affect basic psychological processes. Importantly, this work suggests that mindfulness may alter elaboration, including embellishments and responses to negative information, as well as attitude formation.

A key reason that mindfulness might alter elaboration is its potential to foster detachment and greater ability to disengage from cognitions that may distract one's attention away from present-moment experiences, especially those which seem irrelevant, inaccurate, or unhelpful.

For example, one may notice and disengage from the beginnings of catastrophic thought and panic in response to hearing clicking, rather than the engine start, upon turning one's key in the car ignition. Instead, one might gently notice those reactions as transient, fallible psychological phenomena (perhaps taking a moment to self-soothe if anxiety has become quite present), and redirect his or her attention toward the actual situation, such as making sure the key is turned fully, the nature of the noise, and/or what options are available. In other words, one may notice and flexibly let go of embellishments and emphasis on negative information beyond one's ongoing stream of sensory and perceptual experience.

The relation between mindfulness and elaboration was alluded to in more detail recently by Grabovac and colleagues (2011) in the Buddhist Psychological Model (BPM), based on traditional Buddhist texts that describe awareness and mental states. As in traditional Buddhist texts, they use the term "mental proliferation." To describe the nature of mental proliferation, they explain that individuals initially register features of a stimulus or experience that may include its "feeling-tone," a simple positive, negative, or neutral affective component. This feeling-tone, or affectively valenced, component habitually triggers proliferation into more complex thoughts and/or emotions out of the basic tendency to try to preserve or avoid the feeling-tone. This description of proliferation resembles elaboration and highlights that basic affective experiences of valence often trigger elaboration out of habitual tendencies to seek pleasant experiences and avoid negative ones. Mindfulness is thought to increase insight into this experience, as it increases awareness of thoughts and emotions as psychological phenomena that come and go like other experiences that are observed while paying attention to what occurs from moment to moment.

According to the BPM one related insight experienced through mindfulness is *nonattachment*. The term 'attachment' from a Buddhist standpoint refers to clinging to and grasping at experiences (Sahdra, Shaver, & Brown, 2010), somewhat similar to the Western psychological conceptualization of anxious attachment (e.g., Mikulincer & Shaver, 2007), which involves insecurity, fear of rejection or abandonment, and clinging to significant others. Thus, nonattachment means releasing the 'mental fixations' of clinging to and grasping at experiences, or letting sensations, feelings, and thoughts arise and dissipate without automatically engaging or avoiding them. Indeed, there is evidence that mindfulness is associated with self-reported nonattachment (Sahdra et al., 2010).

Partly because of nonattachment, being mindful is thought to enable individuals to impartially observe their elaborative processes and more flexibly and perhaps choicefully engage in and disengage from them (e.g., Brown et al., 2007; Grabovac et al., 2011). For instance, one might be less likely to follow unhelpful, inaccurate, or negatively biased streams of thought. This is supported by evidence that trait mindfulness positively correlates with self-reported ability to let go of negative thoughts that characterize depression (Frewen et al., 2008) and that mindfulness meditation training facilitates disengagement from distracting, task-irrelevant stimuli (Ortner, Kilner, & Zelazo, 2007). Thus, mindfulness may alter elaboration so that it is less prone or susceptible to inaccurate or unhelpful embellishment and emphasis on negativity. This idea is further supported by research on other commonly studied mechanisms of mindfulness: rumination, emotional reactivity or regulation, and reduced centrality of the ego or self.

As noted earlier, rumination is a form of negatively biased elaboration, as it is a mode of repetitive negative cognition in response to negative affect (Nolen-Hoeksema, 1991). Both

correlational (e.g., Brown & Ryan, 2003; Coffey & Hartman, 2008; Sanders & Lam, 2010) and controlled intervention studies (e.g., Jain et al., 2007; Shahar, Britton, Sbarra, Figueredo, & Bootzin, 2010; Shapiro et al., 2008) suggest that mindfulness is inversely associated with rumination and that reduced rumination is a partial mediator of the inverse relation between mindfulness and psychological distress, particularly for symptoms of depression. For example, Jain and colleagues (2007) conducted an RCT with a distressed student sample in which they found that mindfulness meditation reduced psychological distress compared to a no-treatment control group, and that this effect was partially mediated by reduced rumination. Similarly, an RCT with recurrently depressed patients found that ruminative brooding partially mediated benefits of a mindfulness-based intervention on depressive symptoms, compared to a wait-list control group (Shahar et al., 2010). Such studies support the proposition that mindfulness alters unhelpful and negatively biased elaboration.

Improved emotional responding or regulation is another potential mechanism of mindfulness in which elaboration may be altered. That is, mindfulness may reduce the perpetuation and escalation of emotion in reaction to emotional provocation, particularly for negative stimuli. For instance, Arch and Craske (2006) examined effects of a mindful breathing induction on emotional responses to positive, negative, and neutral pictures. They found that, compared to controls, participants in the mindful breathing condition responded to the negative slides with less negative affect and emotional volatility. In another study (Broderick, 2005), participants who completed a mindfulness induction, as compared to rumination and distraction conditions, after a sad mood induction reported less negative affect. These studies could suggest that mindfulness reduces initial emotional reactivity and/or improves recovery. It should be noted, however, that a recent study found no effects of a mindfulness induction on self-reported

emotion regulation or physiological arousal from a distressing film clip (Erisman & Roemer, 2010). Still, additional evidence of less negative or prolonged emotional responding comes from neuroscientific studies. In particular, mindfulness has been associated with amygdala deactivation, suggesting a downregulation of negative emotion (Chiesa, Brambilla, & Serretti, 2010; Creswell, Way, Eisenberger, & Lieberman, 2007; Modinos, Ormel, & Aleman, 2010; Way, Creswell, Eisenberger, & Lieberman, 2010). Altogether, such evidence suggests that mindfulness may reduce embellished or negatively biased elaboration in terms of less psychological escalation of transient, basic feelings into more complex, enduring, or emphasized emotional states.

Neuroscientific and other forms of evidence also support a third potential mechanism, less elaboration based on the ego or self. A study by Farb and colleagues (2007) using fMRI demonstrated that those who trained in mindfulness meditation showed dissociation between neural modes for narrative self-focus (i.e., using enduring traits, self-knowledge, etc. to explain and connect disparate subjective experiences) and momentary, experiential self-focus (derived more from transient perceptual and sensory states), unlike in novices. In other words, mindfulness meditation training appeared to enable individuals to attend to their experience of the self in the present moment with less of a link to their self-narratives, a commonly mentioned part of elaboration (e.g., James, 1890; Conway, Pleydell-Pearce, & Whitecross, 2001). Another fMRI study (Way et al., 2010) found that dispositional mindfulness was negatively correlated with resting state neural activity in self-referential areas, potentially indicating that more mindful individuals evoke the self less when processing experiences at rest. Similarly, it has been suggested that mindfulness helps to quiet the ego (Heppner & Kernis, 2007), lessening investment in self-representations by becoming aware of the habitual but ephemeral nature of

thoughts, feelings, and behaviors used to construct the self (Brown, Ryan, Creswell, & Niemiec, 2008). This is further supported by evidence that more mindful individuals appear to have more constructive responses to romantic stress and conflict (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007). More mindful individuals also appear to show lower defense of worldviews after considering their own mortality, unlike the typical reaction of defending identity-based beliefs and affiliations (Niemiec et al., 2010). Collectively, such studies provide initial support for the idea that mindfulness reduces the centrality of self-representations, and thus experiences may be less elaborated upon in terms of the self.

All of the evidence for these mechanisms supports the larger notion that mindfulness can alter elaboration, including the embellishment and negatively biased elaboration that may underlie evaluative conditioning. Further evidence that mindfulness could relate to susceptibility to EC pertains to response to valenced stimuli, particularly negatively valenced stimuli.

Mindfulness and Negative Stimuli

More mindful individuals may show differential processing of and responses to negative stimuli and less bias toward negativity. For example, it has been suggested that "when mindful … because one can be aware of thoughts *as thoughts*, and their accompanying emotions as simply reactions to them, thoughts are less likely to be colored by beliefs, prejudices and other biases that are not supported by objective or experiential evidence" (Brown et al., 2007, p. 213). Studies on both state and trait mindfulness support this notion.

First, as mentioned earlier, there is evidence suggesting that mindfulness may reduce reactivity or improve recovery following exposure to negative stimuli. Arch and Craske (2006) found that a mindful breathing induction reduced negative affect (measured separately from positive affect, for which no differences were found when compared to controls who completed a

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worry induction or an unfocused attention induction)[1] after viewing negatively valenced pictures. Interestingly, they also reported that the mindful breathing condition maintained a more positive affective state (on a single-item, bipolar rating scale ranging from negative/unpleasant to positive/pleasant presented after each image) after viewing neutral pictures, unlike controls. No group differences were found in responses to positive stimuli. In sum, this study found that inducing a mindful state led to less negative affective responses to negative and neutral stimuli. It is possible that this reflects less emphasis or elaboration on negative stimuli.

Support for this idea was found in a study by Broderick (2005). Participants in the study completed a sad mood induction in which they read and internalized negatively valenced statements while listening to sad music, and then were instructed to focus on depressing events in their lives and their negative feelings. Subsequently, all participants reported increased negative affect with decreased positive affect. Then, participants completed a mindful breathing induction or control inductions (rumination or distraction). Following the induction, participants in the mindfulness condition reported less negative affect than the rumination and distraction conditions. The mindfulness and distraction conditions also wrote more neutral thoughts than the ruminators in a thought-listing exercise following the inductions. Together, these results suggest that state mindfulness affected both affective emphasis and the valence of cognitive elaboration in response to negative stimuli.

If mindfulness reduces negative elaboration, it could follow that it also might alter memory for negative information. Interestingly, Alberts and Thewissen (2011) have suggested that memory for valenced information may be affected by mindfulness. They tested this proposition using an experiment in which participants completed a mindful breathing induction or, for the control condition, received relatively short instructions to focus on the next task as

well as possible. Subsequently, participants viewed positive, negative, and neutral words and were asked to repeat each word immediately after it had been displayed. After a 20-minute, non-verbal filler task, participants were asked to recall as many of the words as possible. The conditions did not differ in overall memory for the words; however, the proportion of negative words recalled was lower for the mindfulness condition than for controls. The two conditions did not differ on the proportion of positive words recalled, and results were not reported for neutral words. These results may indicate, as the authors suggest, that mindfulness reduces memory for negative, but not positive, stimuli. As they note, from their study it is not clear whether encoding differences, such as differences in elaboration, account for their results. Although the inclusion of immediate recall during stimulus viewing may have promoted similar initial attention to words regardless of valence, it is possible that the results reflect less elaboration on negative stimuli.

A study by Frewen and colleagues (2008) on mindfulness and ability to let go of negative thoughts provides somewhat more direct evidence of less negative elaboration, as noted earlier. Across two studies, a nonclinical sample and a treatment-seeking sample completed self-report measures of trait mindfulness as well as frequency and perceived ability to let go of automatic thoughts involving worry, depression, and social fears that are symptomatic of psychological problems. In both studies, more mindful individuals reported less frequent automatic negative cognitions and greater perceived ability to let them go when they did occur. Further, the sample in Study 2 also completed a mindfulness-based intervention and pre-post comparisons showed reductions in automatic negative thoughts and greater perceived ability to let them go. In sum, this research suggests that mindfulness is inversely associated with fixation on negative thoughts, at least the types of negative cognitions that characterize psychological problems.

A related study examined changes in dysfunctional attitudes (unrealistic and negatively biased assumptions about oneself, the world, and the future) as well as rumination in a clinical sample before and after a Mindfulness-Based Stress Reduction intervention compared to matched wait-list controls (Ramel et al., 2004). Within-subjects analyses showed that dysfunctional attitudes and rumination both decreased over the course of the intervention. Further, changes in rumination partly accounted for changes in dysfunctional attitudes, perhaps suggesting that less fixation and elaboration on negative attitudes reduced the degree to which they were endorsed. That said, it should be noted that between-groups analyses did not show significant differences in dysfunctional attitudes when comparing the intervention group to the matched wait-list controls; however, this may have been due to low power given the very small sample size. In any case, this study calls attention to a particular attitudinal bias toward negativity that is pronounced in clinical populations.

A measure of dysfunctional attitudes was included in another study on mindfulness, negatively biased cognition, and emotional distress (Kiken & Shook, 2012). In this cross-sectional study, participants completed self-report measures of trait mindfulness, negatively biased cognitions (including dysfunctional attitudes), and predisposition to depression and anxiety. Mindfulness predicted less negatively biased cognition, including dysfunctional attitudes. Further, less negatively biased cognition was found to partially account for the inverse relation between mindfulness and emotional distress. Although correlational, this study provides further evidence that mindfulness may reduce biases toward negativity in cognitive processing that perpetuate emotional distress and disorder.

Although certain negativity biases are particularly strong in clinical populations (Garratt et al., 2007; Bar-Haim et al., 2007), many negativity biases (e.g., greater attention to, rehearsal

of, and interpretations of negativity) are common to some degree in nonclinical populations as well (e.g., Baumeister et al., 2001). Some research has been conducted that more specifically examines such bias toward negativity in relation to mindfulness. For example, a correlational study (Heppner et al., 2008) found that a measure of trait mindfulness was inversely related to a measure of hostile attribution bias. That is, more mindful individuals were less likely to interpret ambiguous social information as hostile, including fewer perceptions of malevolent intent. This evidence also aligns with the idea that mindfulness may reduce negative elaboration.

Importantly, there also is evidence from an experimental study that mindfulness reduces negativity bias in attitude formation (Kiken & Shook, 2011a). Participants in the study were randomly assigned to listen to and follow an audio recording of instructions for a mindful breathing meditation or a control exercise involving mind-wandering. After this mindfulness manipulation, participants played an ostensible computer game called BeanFest, an attitude formation paradigm based on direct interaction with stimuli, as described earlier. Over three rounds of the game, participants were exposed three times to 36 novel stimuli ("beans") that varied systematically in appearance. Half of the beans were helpful or positive, increasing the participant's game score, whereas the others were harmful or negative, decreasing the participant's game score. The full-feedback version of the game was used, in which exposure to bean valence did not depend on exploratory behavior, meaning that all participants received equal information about the valence of positive and negative beans. After playing the game, participants were shown each bean and asked to classify it as helpful or harmful. Participants in the control condition showed a negativity bias, correctly classifying negative beans better than positive beans, indicating a bias toward learning the valence of negative stimuli. However, participants in the mindfulness condition classified negative and positive beans equally well,

indicating equal learning of positives and negatives, or no bias. These results suggested that mindfulness reduced bias toward negativity in one type of attitude formation, although reasons why, such as attention or rehearsal, were not explored.

Altogether, the above evidence supports the notion that mindfulness affects responses to negative stimuli, thoughts, and feelings. Critically, such evidence as well as theory on mindfulness suggests that it may facilitate less negatively biased and/or embellished elaboration, and can lead to less emphasis on negativity in one means of attitude formation. At the same time, elaboration, particularly in the form of embellished and/or less negatively biased elaboration, is proposed to underlie the attitude formation process of evaluative conditioning. It therefore is possible that mindfulness may affect susceptibility to evaluative conditioning, and do so through effects on elaboration. Given that susceptibility to conditioning of negative attitudes is of concern due to associations with consequential biases, and mindfulness appears to affect responses to negative stimuli, it is particularly important to consider whether being mindful could alter susceptibility to conditioning of negative attitudes. That is, evidence that mindfulness reduces susceptibility to conditioning of negative attitudes could have implications for consequential psychological and social biases beyond those already known to be linked to mindfulness. This provides justification for examining the links between mindfulness, elaboration, and susceptibility to conditioning of negative attitudes, the focus of the current research.

Of course, evaluative conditioning, and presumably its underlying elaborative processes, also can occur with positive stimuli. When examining mindfulness, elaboration, and evaluative conditioning, one also might ask if similar evidence supports a clear link between mindfulness and responses to positive stimuli.

Mindfulness and Positive Stimuli?

There is less evidence regarding mindfulness and positive stimuli. However, there is some evidence of effects on responses to positive stimuli. First, the research by Kiken and Shook (2011a) on negativity bias in attitude formation found in a preliminary study that trait mindfulness was associated with increased formation of positive attitudes. Additional evidence comes from an experiment conducted by Erisman and Roemer (2010), in which participants viewed negative, positive, and then affectively mixed film clips before and after completing a mindfulness induction or, for the control condition, after listening to educational radio broadcasts and then completing a word puzzle. Controlling for baseline affective responses to clips in analyses of post-manipulation responses, the mindfulness condition reported higher positive affect following a humorous (positive), post-manipulation film clip. The researchers also found – unlike the aforementioned studies on responses to negative stimuli – no differences between conditions on negative affect in response to the distressing (negative), post-manipulation film clip, although the mindfulness condition reported less negative affect than controls immediately after viewing the affectively mixed (part positive, part negative), post-manipulation clip. Given this study's lack of consistency with previous findings on responses to negative stimuli, its complex experimental procedure, and some unique features of the small sample, it is intriguing but perhaps should be interpreted with caution.

Further, some studies described previously included positive stimuli but did not find any relation to mindfulness for such stimuli. For example, Arch and Craske (2006) found no differences between a mindfulness induction condition and a control condition in affective responses to positive stimuli. Also, in the study by Alberts and Thewissen (2011), a mindfulness

induction condition and a control condition showed no differences in memory for positive stimuli.

Based on existing evidence, it is unclear whether and how mindfulness might relate to responses to positive stimuli and attitude formation, and no research on positively valenced elaboration is available at the time of this writing. Thus, more research is needed and included in the current investigation, but it is not the focus given the clearer justification and implications of examining susceptibility to conditioning of negative attitudes.

Summary

Altogether, evidence suggests that mindfulness can affect basic cognitive processes and responses to valenced stimuli in ways that are consistent with theory that mindfulness alters elaboration, particularly with negative stimuli, thoughts, and feelings. Further, such evidence has been presented as a potential explanation for some known psychological benefits of mindfulness, but implications for broadly consequential social psychological processes such as attitude formation have only begun to be considered. Initial evidence does suggest that mindfulness can affect attitude formation, particularly biases involved in forming negative attitudes. As explained previously, because evaluative conditioning is a common attitude formation process that is proposed to rely on embellished and possibly negatively biased elaboration, and these are dimensions of elaboration that mindfulness may alter, the link between mindfulness and evaluative conditioning should be examined. This line of research is compelling not only because it may shed new light on both mindfulness and EC but because there may be important applications for individual and social well-being as well.

The Present Research

The present research aimed to investigate the relation between mindfulness and susceptibility to evaluative conditioning, particularly conditioning of negative attitudes. The first two studies examined relations between trait mindfulness and susceptibility to evaluative conditioning of positive and negative attitudes, with a focus on negative attitudes. The second study also aimed to examine whether negatively valenced and embellished elaboration mediated any relation found between mindfulness and susceptibility to conditioning of negative attitudes. The third study experimentally manipulated mindfulness in addition to measuring elaboration and susceptibility to conditioning, to examine whether a causal relation existed. Overall, it was hypothesized that mindfulness would be associated with (Studies 1 and 2) and result in (Study 3) less susceptibility to conditioning of negative attitudes. Further it also was hypothesized (for Studies 2 and 3) that any associations between mindfulness and conditioning of negative attitudes would be mediated by the level of negative and/or embellished elaboration.

<div align="center">

Study 1

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As an initial investigation into the relation between mindfulness and attitude formation through evaluative conditioning, the first study used a correlational design to examine if trait mindfulness predicted susceptibility to evaluative conditioning. In particular, it was hypothesized that mindfulness would predict susceptibility to conditioning of negative attitudes, such that those who were more mindful would show less susceptibility to conditioning with negative stimuli. As such, the relation between mindfulness and an asymmetry between conditioning of positive and negative attitudes also was explored.

Method

Participants

A convenience sample of 245 psychology undergraduate students participated in the study for course credit. The study was part of a larger project advertised as "BeanFest," which concealed the study hypothesis. Those under 18 years of age and/or who had participated in other studies using the EC paradigm were not permitted to participate. Thirty-two participants were excluded from analyses because they reported ability to speak or read Asian languages (which could give meaning to the otherwise neutral stimuli used in the EC paradigm, Chinese ideographs). Therefore, the final sample size was $N = 213$, which well exceeded the necessary number ($N = 107$) for regression analyses with up to eight predictors at .80 power, an alpha level of .05, and a medium effect size, according to Cohen (1992). The mean age in years was 19.12 ($SD = 2.37$), 59.6% were female, and the predominant racial groups were White/Caucasian (54.9%) followed by Black/African American (20.7%) and then Asian (10.8%).

Measures (See Appendix A)

Evaluative Conditioning. A paradigm based on that used by Livingston and Drwecki (2007) was used to assess susceptibility to evaluative conditioning. Images from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005) served as valenced unconditioned stimuli (USs). Ten positive (e.g., a puppy) and ten negative (e.g., a cockroach) images were selected. A grey square served as a neutral US. Nine, ostensibly unfamiliar, Chinese ideographs were used as conditioned stimuli (CSs).

A supraliminal, forward conditioning procedure was used in which participants viewed, in the same position on a computer screen, a CS (150 ms), followed by a blank inter-stimulus display (125 ms), followed by the US (200 ms), followed by another blank display (200 ms)

before presenting the next pairing. For each participant, three CSs were paired with the positive US images, three CSs were paired with negative US images, and three CSs were paired with the neutral US image. Each ideograph was paired with all 10 of the USs, to ensure that no single image influenced effects. Each CS-US pairing was presented six times, for a total of 60 CS-US pairs of the same valence per ideograph. To ensure that positive, negative, and neutral USs were paired with different CSs across the study, the CS-US pairings were counterbalanced across three groups of participants (with random group assignment).

Following this conditioning phase, participants were asked to rate their liking of each of the Chinese ideographs on a Likert-type scale ranging from 1 (*Strongly Dislike*) to 9 (*Strongly Like*). An explicit attitude measure was used because there is more evidence of successful EC replication using explicit measures (Hofmann et al., 2010). Three Chinese ideographs that were not presented during the conditioning phase, and thus were not previously paired with any stimuli, also were rated to assess potential response bias. Ratings of the US stimuli also were assessed on the same scale at the end of the study to ensure that participants deemed the positive and negative stimuli as such.

Responses to the three CSs paired with the same valence USs were averaged to indicate the average attitude toward that group of CSs. Given that individuals' ratings of CSs paired with neutral USs should indicate their ratings of neutrality or baseline ratings of ideographs, deviations from these ratings were used to indicate the degree of conditioning. Thus, to determine susceptibility to conditioning of negative attitudes (with negative stimuli), the average CS attitude score for the negative pairings was subtracted from the average CS attitude score for the neutral pairings. Similarly, to determine susceptibility to conditioning of positive attitudes (with positive stimuli), the average CS attitude score for the neutral pairings was subtracted from

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average CS attitude score for the positive pairings. Thus, higher numbers represent greater susceptibility to conditioning. A valence asymmetry index also was calculated by subtracting the index of susceptibility to conditioning of positive attitudes from the index of susceptibility to conditioning of negative attitudes. Higher numbers represent greater susceptibility to conditioning of negative attitudes than susceptibility to conditioning of positive attitudes, or a negativity bias.

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS is a unidimensional self-report measure of present-moment oriented attention and awareness. It contains 15 items scored on a 6-point scale from 1 (*almost always*) to 6 (*almost never*). Example items include: "I find it difficult to stay focused on what's happening in the present" and "I find myself doing things without really paying attention." Item scores were averaged; higher mean scores reflect higher mindfulness. This widely used scale shows good psychometric properties such as convergent and discriminant validity as well as test-retest reliability and internal consistency.

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). State affect was assessed by the PANAS to examine and potentially account for its relation to the constructs of interest. This commonly used self-report measure is comprised of two subscales that assess two global dimensions of affect, positive and negative. Participants rate each of 20 adjectives (e.g., enthusiastic, distressed) using a 5-point scale ranging from 1 (*very slightly or not at all)* to 5 *(very much)*, to indicate the extent to which they are currently experiencing the descriptor. Scores for each subscale were totaled, with higher scores indicating higher positive or negative affect. The PANAS has shown good convergent and discriminant validity, test-retest reliability, and internal consistency.

Demographics. Demographic information also was collected, including gender, age, race, and familiarity with Asian languages.

Procedure

Up to six participants completed a session at one time, but they were seated at individual computer cubicles and did not interact. First, informed consent was obtained by an experimenter. The evaluative conditioning task was presented to participants as a memory task in which they were to try to memorize the images. The evaluative conditioning paradigm was followed by the CS ratings and then the measures of mindfulness, state affect, demographics, and US ratings. All instructions, measures, and debriefing statements were administered on Dell Optiplex 745 computers, using the programs DirectRT and MediaLab. At the end of the session, participants were informed of the study's true purpose and any questions were answered. Finally, participants were thanked and dismissed.

Results

Descriptive Statistics

Descriptive statistics including the mean, standard deviation, range, and alpha for each measure are shown in Table 1. Histograms as well as skewness and kurtosis statistics for each measure were examined to determine if the data were normally distributed. Distributions were acceptably normal for all variables except negative affect, which was both negatively skewed and kurtotic. A logarithmic transformation was performed for this variable, which yielded a normal distribution. All subsequent analyses of negative affect used this transformed variable. No outliers were found that significantly affected the means (which was determined by comparing the overall mean to the 5% trimmed mean). Additionally, no systematic patterns were found for missing data. For the correlational analyses that follow, missing cases were

Table 1

Descriptive statistics for Study 1.

	M	*SD*	Range
Mindfulness			
MAAS (α = .85)	3.69	.75	1.87 - 5.67
Evaluative Conditioning			
Positive-paired ideographs rating	5.91	1.46	1.67 - 9.00
Neutral-paired ideographs rating	5.99	1.43	2.67 - 9.00
Negative-paired ideographs rating	5.34	1.61	1.33 - 9.00
Unpaired ideographs rating	4.85	1.33	1.00 - 9.00
EC susceptibility: Positive pairings	-.08	1.57	-6.00 - 5.67
EC susceptibility: Negative pairings	.65	1.67	-4.00 - 7.33
EC valence asymmetry index	.74	2.67	-7.33 - 12.67
State Affect			
PANAS: Positive Affect (α = .89)	24.10	8.22	10.00 - 46.00
PANAS: Negative Affect (α = .86)	15.65	6.38	10.00 - 46.00

Note. MAAS = Mindful Attention Awareness Scale; PANAS = Positive and Negative Affect Schedule.

excluded pairwise, meaning that cases only were excluded from those analyses for which there was insufficient information.

Overall Conditioning Effects

To first determine whether EC occurred successfully, a one-way within-subjects analysis of variance (ANOVA) was used to compare average ratings of the positive-, negative-, and neutral-paired CSs. The ANOVA was significant, Wilks' Lambda = .86, $F(2, 211) = 16.96$, $p <$ .001, partial eta squared = .14. Ratings of ideographs paired with negative stimuli were liked significantly less ($M = 5.34$, $SD = 1.61$) than both ideographs paired with neutral stimuli ($M =$ 5.99, $SD = 1.43$; $p < .001$) and ideographs paired with positive stimuli ($M = 5.91$, $SD = 1.46$; $p <$ .001). This indicates successful conditioning of negative attitudes. However, ratings of ideographs paired with positive stimuli did not differ significantly from those of ideographs paired with neutral stimuli ($p > .99$). That is, conditioning of positive attitudes was not apparent on average. However, there was considerable variability among individuals in susceptibility to conditioning with positive stimuli as indicated by the average ratings of positive-paired ideographs minus the average ratings of negative-paired ideographs (range = -6.00 – 5.67).

Mindfulness and EC

To test the main hypothesis, the relation between mindfulness and susceptibility to EC with negative stimuli was examined. A simple regression found that MAAS scores significantly predicted susceptibility to conditioning with negative stimuli, $\beta = -.15$, $t(211) = -2.20$, $p = .03$, R^2 = .02. The negative *beta* value indicates that susceptibility to conditioning of negative attitudes was lower for those higher in mindfulness, as hypothesized, although the association between susceptibility and mindfulness was modest. The R^2 value also indicates that the amount of variance in susceptibility to EC accounted for by mindfulness was small. Although not the main

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focus of this research, the relation between mindfulness and susceptibility to conditioning of positive attitudes also was explored using regression. Mindfulness did not significantly predict susceptibility to conditioning of positive attitudes, $t(211) = .98$, $p = .33$.

Given that mindfulness predicted less susceptibility to conditioning of negative attitudes, it was conceivable that it also might predict greater susceptibility to conditioning of negative attitudes *relative to* conditioning of positive attitudes. Thus, the valence asymmetry index was regressed onto MAAS scores to test if mindfulness related to a bias toward conditioning of negative attitudes compared to positive attitudes. The results were marginally significant, $\beta = -.13$, $t(211) = 1.96$, $p = .05$, $R^2 = .02$, with the negative beta value suggesting less susceptibility to conditioning of negative attitudes relative to positive attitudes as mindfulness values increased. To also examine whether mindfulness predicted less asymmetry (i.e., less bias in either direction) in conditioning overall, a similar regression was performed using the absolute value of the valence asymmetry index. This analysis was not significant, $t(211) = -1.60$, $p = .11$.

Additional Analyses

Correlations between MAAS scores and US ratings, neutral-paired ideograph ratings, unpaired ideograph ratings, as well as PANAS scores also were examined. It was not anticipated that more mindful individuals would rate the valence of USs differently given that they are normed stimuli. Nonetheless, this remained to be confirmed. Clearly, systematically different attitudes toward USs could alter if and how attitudes toward CSs are conditioned. However, mindfulness was not correlated with ratings of either positive or negative USs, $ps > .93$.

There also was not reason to anticipate that mindfulness would relate to ratings of neutral-paired or unpaired ideographs. However, systematically different responses to the stimuli used as CSs could have implications for measuring EC susceptibility. Similar to ratings

of the USs, the correlation between mindfulness and neutral-paired ideographs was nonsignificant, $p = .81$. Surprisingly, though, more mindful individuals did tend to rate unpaired ideographs more favorably, $r(211) = .15$, $p = .03$, which might indicate a positive response bias, although the strength of this association was weak. Further, unpaired ideograph ratings also were found to be inversely correlated with susceptibility to conditioning of negative attitudes, $r(211) = -.15$, $p = .03$, and the valence asymmetry index, $r(211) = -.15$, $p = .03$. Thus, a response pattern indicated by unpaired ideograph ratings could have played a role in scores on these measures.

Additionally, in previous studies, state affect has been found to relate to conditioning (Walther & Grigoriadis, 2004) and to trait mindfulness (cf. Brown et al., 2007). As such, state affect could have been a potential covariate. No significant correlations were found between positive affect and either mindfulness or susceptibility to EC in the present study; however, significant negative correlations were found between negative affect and mindfulness ($r[211] = -.28$, $p < .001$), susceptibility to conditioning of negative attitudes ($r[211] = .20$, $p = .004$), and the valence asymmetry index ($r[211] = .19$, $p = .01$).

Given the significant correlations, it was of interest to determine whether mindfulness predicted susceptibility to conditioning of negative attitudes as well as asymmetry in conditioning above and beyond the role of unpaired ideograph ratings and negative affect. Two hierarchical multiple regressions were used; one modeled predictors of susceptibility to conditioning of negative attitudes and the other modeled predictors of the valence asymmetry index. In both models, unpaired ideograph ratings and negative affect were entered as predictors in step 1 and mindfulness was entered as a predictor in step 2. The results of these analyses are shown in Table 2. Unpaired ideograph ratings and negative state affect each independently

predicted both susceptibility to conditioning of negative attitudes and the valence asymmetry. However, mindfulness did not explain a significant proportion of additional variance for either susceptibility to conditioning of negative attitudes or the valence asymmetry, after accounting for the roles of unpaired ideograph ratings and negative affect.

Table 2

Hierarchical regression analyses predicting EC indices in Study 1.

Predictors	EC susceptibility: Negative attitudes		Valence asymmetry	
	ΔR^2	β	ΔR^2	β
Step 1	.07**		.06**	
Unpaired ideograph ratings		-.17*		-.14*
Negative state affect		.19**		.19**
Step 2	.01		.004	
Trait mindfulness		-.08		-.07

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

These findings raised the possibility that one or both of these variables mediated a link between mindfulness and susceptibility to conditioning of negative attitudes. Theoretically, there could be justification for such mediation with negative affect. Mindfulness reduces negative affect (cf. Brown et al., 2007), and negative affect may signify or be part of a process that underlies EC. It was unclear why mindfulness would be associated with ratings of unpaired ideographs. Nonetheless, the indirect link between mindfulness and susceptibility to conditioning of negative attitudes through the mediators of negative state affect and unpaired ideograph ratings was tested using bootstrapping with 5000 resamples, using the INDIRECT macro for SPSS developed by Preacher and Hayes (2008). The indirect path through negative

state affect was significant, $M = -.11$, $SE = .05$, 95% CI = -.23 - -.02, whereas the indirect path through unpaired ideograph ratings was not significant, 95% CI = -.18 - .0001.

However, these findings regarding negative state affect should be interpreted with caution. The state affect measure occurred after the EC paradigm, so it did not necessarily indicate participants' affective state prior to or during the EC procedure. Therefore, these data were not necessarily appropriate for the hierarchical regression or the test of mediation.

Discussion

The aim of Study 1 was to examine the relation between trait mindfulness and susceptibility to evaluative conditioning, particularly conditioning of negative attitudes. Using a picture-picture based paradigm with normed IAPS images as USs and Chinese ideographs as CSs, conditioning of negative attitudes was successful on average but conditioning of positive attitudes was not. Still, considerable variability existed among individuals in susceptibility to conditioning of both positive and negative attitudes, and the focus of this research was an individual difference variable, mindfulness. The main hypothesis was that more mindful individuals would show less susceptibility to conditioning of negative attitudes. The results initially appeared to support this hypothesis; more mindful individuals were less susceptible to conditioning of negative attitudes. Further, more mindful individuals demonstrated relatively less susceptibility to conditioning of negative attitudes compared to positive attitudes (i.e., negativity bias), although mindfulness was not associated with conditioning of positive attitudes. Overall, these results align with previous research suggesting that mindfulness alters responses to negative stimuli (e.g, Arch & Craske, 2006; Broderick, 2005), including when forming attitudes (Kiken & Shook, 2011a).

However, although US ratings and neutral-paired ideograph ratings did not account for the results, mindfulness did not predict either susceptibility to conditioning of negative attitudes or the valence asymmetry after accounting for the roles of unpaired ideograph ratings and negative state affect. It is not clear why more mindful individuals would rate unpaired ideographs more favorably, although such ratings may have indicated a positive response bias that could have influenced scores on the EC measures. This unexpected finding makes the association between mindfulness and susceptibility to conditioning of negative attitudes less straightforward.

The finding concerning negative affect is less surprising, though, based on previous research linking negative affect to both mindfulness (inversely) and EC effects. Theoretically, then, there was a basis for testing whether negative state affect accounted for the inverse association between mindfulness and susceptibility to conditioning of negative attitudes. Indeed, the results supported a model in which mindfulness reduces susceptibility to conditioning of negative attitudes through the mediator of negative state affect. However, the data from Study 1 were not appropriate for testing negative state affect as a predictor of EC susceptibility or as a mediator of the relation between mindfulness and susceptibility to conditioning of negative attitudes, because negative affect was measured near the end of the study after the evaluative conditioning paradigm. Thus, these results must be interpreted with caution.

Nonetheless, the role of negative state affect in the present study could support the notion that negatively valenced elaboration underlies susceptibility to conditioning of negative attitudes. It is possible, although speculative, that the general negative affect captured by the PANAS was indicative of negatively valenced elaboration, processing that emphasized negative thoughts and feelings. Thus, the findings from Study 1 could provide a basis for examining the potential role

of cognitive and emotional aspects of elaboration to account for susceptibility to EC and its possible relation to mindfulness. That said, although the general state affect assessed by the PANAS could be indicative of negative affective and cognitive elaboration stemming from the images in the EC paradigm, that is speculative and it would be more precise to actually measure cognitive and affective elaboration in response to the images. Thus, Study 2 sought to further investigate the potential link between mindfulness and susceptibility to EC and included measures of cognitive and affective elaboration in response to IAPS images prior to the EC paradigm. Thus, measures were presented in an order such that it was appropriate to test for mediation.

Study 2

Study 1 provided a basic examination of the relation between trait mindfulness and susceptibility to EC. Study 2 aimed to further test the hypothesis of an inverse relation between trait mindfulness and susceptibility to conditioning of negative attitudes, which was partially supported in Study 1. In addition to the unidimensional Mindful Attention Awareness Scale (Brown & Ryan, 2003), a multidimensional measure of mindfulness, the Five Facet Mindfulness Questionnaire (Baer et al., 2006), was included in Study 2 to examine if it replicated the findings with the MAAS and/or added detail about particular facets of mindfulness.

Study 2 also aimed to build on Study 1 by examining whether the inverse relation between mindfulness and susceptibility to conditioning of negative attitudes was mediated by less negatively valenced and/or embellished elaboration among more mindful individuals. As explained in the introduction, theory and empirical evidence suggests that more mindful individuals may respond differently to valenced stimuli, particularly negative stimuli, such that they might have less emphasis on negative thoughts and feelings that embellish beyond actual

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stimulus features. Further, similar elaborative processes have been theorized to underlie EC effects. Therefore, it was conceivable that mindfulness influences susceptibility to evaluative conditioning indirectly, through these forms of elaboration. It thus was of interest – both for understanding how mindfulness relates to evaluative conditioning and for learning about mechanisms for EC effects – to explore the role of elaboration as a mediator. Because the aims of the study were replication and further exploration, another correlational design was used.

Method

Participants

As in Study 1, a convenience sample of psychology undergraduate students was recruited using the university online recruitment system, called Sona. The study was advertised as "Personality and Games" and described as a test of how personality relates to responses to pictures used in games, to conceal the study hypothesis. Those under 18 years of age and/or who had participated in other studies using an EC paradigm were excluded from participating. One hundred ninety-seven students were recruited. Sixteen participants were excluded because they reported speaking or reading Asian languages (as in Study 1, due to the use of Chinese ideographs in the EC paradigm). Additionally, 22 participants were excluded due to technical difficulties (i.e., power outages and automatic computer restarts) or because they clearly did not comply with instructions (e.g., looking at one's cell phone and not at the screen during the EC paradigm despite repeated reminders/requests). The final sample size was $N = 159$, which exceeded the necessary number ($N = 107$) for regression analyses with up to eight predictors at .80 power, an alpha level of .05, and a medium effect size, according to Cohen (1992).

The sample was 59% female, with a mean age of 20.26 years ($SD = 4.00$), and predominately White/Caucasian (45.4%) and Black/African American (39.0%). Over three-

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quarters (77.3%) reported no experience with mindfulness meditation, and even greater

percentages reported no experience with other meditative practices including transcendental

meditation (90.1%), yoga (92.2%), and tai chi (95.0%). Of those who did have experience with

mindfulness meditation, 15.6% reported less than six months of experience, 5.7% reported

between six months to two years of experience, and only 1.2% reported more than two years of

experience.

Measures (See Appendix A)

  Trait mindfulness. As in Study 1, the MAAS was used to assess trait mindfulness. An

additional measure also was included to account for a multidimensional operationalization of

mindfulness. The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) was

developed previously by combining items from existing mindfulness scales, including some from

the MAAS as well as three other scales: the Kentucky Inventory of Mindfulness Skills (Baer,

Smith, & Allen, 2004), The Freiburg Mindfulness Inventory (Walach, Buchheld, Buttenmüller,

Kleinknecht, & Schmidt, 2006), and the Cognitive and Affective Mindfulness Scale (Feldman,

Hayes, Kumar, Greeson, & Laurenceau, 2007). The final scale includes 39 items which are rated

on a 5-point Likert-type scale ranging from 1 (*never or very rarely true*) to 5 (*very often or*

always true). These items cover five factors, or dimensions: nonreactivity to inner experience

(e.g., "I perceive my feelings and emotions without having to react to them"); observing or

attending to sensations, perceptions, thoughts, and feelings (e.g., "When I take a shower or a

bath, I stay alert to the sensations of water on my body"); acting with awareness and

concentration (e.g., "I am easily distracted," reverse-scored); describing / labeling with words

(e.g., "I can easily put my beliefs, opinions, and expectations into words"); and nonjudging of

experience (e.g., "I tell myself that I shouldn't be feeling the way I'm feeling," reverse-scored).

Because this scale was included to examine potentially distinct facets of mindfulness, items were totaled and examined for each subscale rather than examining the total scale score. The FFMQ has demonstrated adequate convergent validity and internal consistency, although in this study some Cronbach's alphas for the subscales were close to the standard minimum of .70 (see Table 3).

Elaboration. Measures of elaboration were selected from relatively limited operationalizations in the literature. Of primary importance was utilizing measures that were relevant to the EC paradigm and the dimensions of elaboration of interest: emphasis on negative thoughts and feelings as well as cognitive processing that embellished beyond actual stimulus features. Given the lack of previous work directly assessing elaboration in the context, and with the focus, of this research, multiple measures were used.

Principally relevant to the EC paradigm were two measures that involved responses to IAPS images akin to, but distinct from, those in the EC paradigm (to avoid sensitizing participants to the images in the EC paradigm). Thus, IAPS images for these measures were selected based on similarity in valence and arousal to the images used in the EC paradigm. Eight different IAPS images, half positively valenced and half negatively valenced, were presented with each of the following two measures.

First, an *affect scale* (Wolpe, 1990) was used to potentially capture emphatic emotional responses, which conceivably could signal valence-oriented and embellished processing. Based on a similar procedure used by Arch and Craske (2006) and other researchers to examine emotional responses to valenced images, participants were asked to rate their current emotional state on a single-item scale of -50 (the most negative/unpleasant emotional state) to +50 (the most positive/pleasant emotional state), while viewing the IAPS images (8 total affect ratings).

Affect scale ratings for each valence were averaged to yield average emotional response scores for each positive and negative image.

Second, a common *thought listing* procedure (Cacioppo & Petty, 1981, 1997) was included. The thought listing technique uses an open-ended response format to obtain and categorize the reportable aspects of individuals' cognitive processing. Thus, it can be used not only to assess the extent of cognitive processing or elaboration but also to categorize thoughts listed based on dimensions of interest. Given that embellishment and negativity bias were of interest in the present research, the thought listing procedure was used here to determine the valence of and addition of details during cognitive elaboration along with the extent of elaboration. While each IAPS image was presented, participants were asked to "write down all of the thoughts you have now, advancing to a new screen for each thought by pressing 'enter' after each thought. Simply write down whatever comes to mind." Two raters coded the number and valence (positive, negative, and neutral) of thoughts as well as whether the thought reflected actual, visible image content or not. This last categorization aimed to identify thoughts that added to, or embellished, actual image content. Inter-reliability was assessed to ensure coding consistency (Ks > .70), with discrepancies resolved by the experimenter. The proportion of each positive, negative, neutral, and "in-image" thoughts, out of the total number of thoughts, was calculated and then averaged for the positive images and negative images. Higher numbers thus represented higher percentages of each type of thought.

Two additional self-report measures were used to assess trait-level tendencies toward negative and positive rumination. Although not equivalent to elaboration on a specific visual stimulus, these measures were included because they tap cognitive emphasis on negative and

positive emotions, revealing general tendencies toward increased and potentially biased processing on the affective experience of a particular valence.

The *Ruminative Responses Scale-Short Form* (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) is a 10-item measure that assesses a method of coping with negative mood that is characterized by self-reflection and repetitive, passive focus on negative emotions, based on a highly regarded theory of rumination and depression (Response Styles Theory; Nolen-Hoeksema, 1987). The short form of the RRS contains two subscales assessing brooding and reflection, without items assessing depressive symptoms. Although scores on both subscales are predicted by depression, the brooding subscale addresses passive comparison of one's circumstances with an unattained standard (e.g., "Think about a recent situation, wishing it had gone better") and is more predictive of future depression than the reflection subscale, which entails a problem-solving focus on one's negative affective state (e.g., "Analyze recent events to try to understand why you are depressed.") and may be more adaptive. Participants indicated how much they think like the items when they feel down, sad, or depressed on a 4-point scale ranging from 1 (*Almost never*) to 4 (*Almost always*). Because the two subscale factors account for only 50% of the variance in the total scale (Treynor et al., 2003) and overall rumination was of interest, the total score for all items was calculated, with higher scores indicating greater tendency toward negative rumination. The short form of the RRS has shown good convergent and discriminant validity and adequate internal consistency.

The *Responses to Positive Affect* questionnaire (RPA; Feldman, Joormann, & Johnson, 2008) assesses tendencies toward rumination, in the form of positive thoughts, and dampening in response to positive moods. The scale was modeled after Nolen-Hoeksema's work on negative rumination. The total scale includes three subscales. However, only two of these subscales were

of interest and used in the present study because they reflect two forms of positive rumination: a five-item subscale of emotion-focus, or focus on mood and somatic experiences (e.g., "Think about how you feel up to doing everything"), and a four-item subscale of self-focus, or focus on self-related affirmations and goals (e.g., "Think 'I am living up to my potential'"). Participants indicated how much they think like the items when they feel happy, excited, or enthused on a 4-point scale ranging from 1 (*Almost never*) to 4 (*Almost always*), similar to the RRS. Because overall rumination was of interest, as with the RRS, scores for all items were totaled, with higher scores indicating greater tendency toward positive rumination. The RPA has shown good convergent validity and adequate internal consistency.

Positive and negative state affect. The PANAS also was used to assess positive and negative state affect, as in Study 1.

Evaluative conditioning. Evaluative conditioning was assessed using the same paradigm from Livingston and Drwecki (2007) as in Study 1.

Demographics. Demographics were assessed as in Study 1, with the addition of questions regarding history of meditative practice.

Procedure

Up to eight participants completed a session at one time, but again, they were seated at individual computer cubicles and did not interact. Informed consent was first obtained by an experimenter. Then, participants completed the measures of mindfulness, psychological elaboration, and the PANAS. Participants then were informed that they had completed the tasks for the main part of the study but that there was more time in their session, so they were asked to help with some preliminary data collection with a picture-memory task for use in a game. This cover story was used to avoid any biasing effects from the mindfulness and elaboration measures

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while maintaining the measurement order necessary for mediation analyses. Then, participants completed the evaluative conditioning task and CS ratings, followed by US ratings. A debriefing concluded the study and any questions from participants were answered. All instructions, measures, and debriefing statements again were administered on Dell Optiplex 745 computers, using the programs DirectRT and MediaLab.

Results

Descriptive Statistics and Initial Analyses

Descriptive statistics for all Study 2 variables including means, standard deviations ranges, and alphas are shown in Table 3. The distributions for most variables were acceptably normal, although four of the thought listing measures were skewed. Transformations of these variables and non-parametric analyses did not meaningfully alter any of the results, however, so the original scales and parametric analyses are reported here. No outliers were found that significantly affected the means (which was determined by comparing the overall mean to the 5% trimmed mean). Additionally, no systematic patterns were found for missing data. For the correlational analyses that follow, as in Study 1, missing cases were excluded pairwise, meaning that cases only were excluded from those analyses for which there was insufficient information.

As an initial analysis, inter-correlations between the mindfulness measures were examined. The mindfulness measures were expected to correlate to some degree because they are based on the same construct but operationalized differently. The most overlap was anticipated for the FFMQ Act with Awareness subscale and the MAAS, because over half of the items on this FFMQ subscale are the same as items on the MAAS (although both also include other, unique items). As such, these measures were highly correlated, $r(157) = .74$, $p < .001$. The MAAS also correlated with the FFMQ Nonjudge subscale, $r(157) = .41$, $p < .001$, and

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Table 3

Descriptive statistics for Study 2.

	M	*SD*	Range
Mindfulness			
MAAS (α = .82)	3.81	.65	2.13-5.67
FFMQ (α = .87)			
Observe (α = .67)	26.75	4.47	12.00-39.00
Describe (α = .91)	26.60	6.03	8.00-40.00
Act with Awareness (α = .89)	25.35	5.73	9.00-40.00
Nonjudge (α = .87)	25.67	5.94	10.00-40.00
Nonreact (α = .70)	20.94	3.68	7.00-30.00
Evaluative Conditioning			
Positive-paired ideographs rating	4.89	1.37	1.00-9.00
Neutral-paired ideographs rating	4.83	1.45	1.00-9.00
Negative-paired ideographs rating	4.61	1.30	1.00-8.33
Unpaired ideographs rating	4.68	1.26	1.00-9.00
EC susceptibility: Positive pairings	.06	1.35	-4.33-5.33
EC susceptibility: Negative pairings	.22	1.08	-5.33-5.33
EC valence asymmetry index	.16	2.12	-10.67-9.00
Elaboration			
Affect Scale			
Positive Images	29.50	11.79	-1.25-50.00
Negative Images	-23.87	17.38	-50.00-43.75
Thought Listing			
Positive Images			
Number of Thoughts	3.17	1.24	1.00-7.00
Proportion Positive	.63	.27	.00-1.00
Proportion Neutral	.27	.24	.00-.92
Proportion Negative	.05	.10	.00-.67
Proportion In Image	.09	.14	.00-.76
Negative Images			
Number of Thoughts	3.35	1.39	1.00-8.33
Proportion Positive	.04	.53	.00-1.00
Proportion Neutral	.38	.31	.00-1.00
Proportion Negative	.53	.31	.00-1.00
Proportion In Image	.12	.17	.00-.83
RPA (α = .86)	22.31	5.12	10.00-36.00
RRS (α = .85)	23.90	6.30	10.00-40.00
State Affect			
PANAS: Positive Affect (α = .90)	31.27	8.71	11.00-50.00
PANAS: Negative Affect (α = .87)	16.39	6.49	10.00-42.00

Note. MAAS = Mindful Attention Awareness Scale; FFMQ = Five Facet Mindfulness Questionnaire; RPA = Responses to Positive Affect Questionnaire; RRS = Ruminative Responses Scale-Short Form; PANAS = Positive and Negative Affect Schedule.

Describe subscale, $r(157) = .29$, $p < .001$. The correlation between the FFMQ Nonreact subscale and the MAAS was marginal, $r(157) = .13$, $p = .10$, and the FFMQ Observe subscale did not correlate with the MAAS, $r(157) = .06$, $p = .43$. Interestingly, although the total FFMQ scale showed adequate inter-item reliability as noted above, a number of the FFMQ subscales were not significantly correlated. However, most followed the general pattern found in Baer and colleagues' (2006) scale development.

To determine the potential role of state affect as a covariate for subsequent analyses, correlations between PANAS scores and the mindfulness measures, as well as the EC indices, were examined, as shown in Table 4.[2] As in previous studies, both the MAAS and multiple FFMQ subscales were inversely correlated with negative state affect and were positively correlated with positive state affect. Neither negative nor positive state affect correlated significantly with any CS ratings or susceptibility to EC. Therefore, subsequent analyses of susceptibility to EC did not control for PANAS scores.

As in Study 1, correlations between mindfulness and US stimuli ratings were assessed to ensure that more mindful individuals did not rate normed stimuli differently. Positive and negative US ratings were not significantly correlated with the MAAS nor with most of the FFMQ subscales (ps ranged from .12-.91). However, negative US ratings were correlated with the FFMQ Observe subscale, $r(139) = .17$, $p = .04$, and FFMQ Nonreact subscale, $r(139) = .24$, $p = .004$, which could suggest that more positive (or less negative) ratings of negative stimuli occur with these facets of mindfulness. Also, a marginally significant correlation was found between positive US ratings and the FFMQ Describe subscale, $r(139) = .16$, $p = .07$. Therefore, subsequent analyses with these subscales and EC measures also were tested controlling for US

Table 4

Correlations between PANAS scores and both mindfulness and EC measures in Study 2.

	PANAS: Positive affect	PANAS: Negative affect
Mindfulness		
MAAS	.16*	-.27**
FFMQ		
Observe	.21**	.01
Describe	.31**	-.10
Act with Awareness	.20*	-.18*
Nonjudge	.09	-.41**
Nonreact	.15†	-.16*
Evaluative Conditioning		
Positive-paired ideographs rating	.11	-.10
Negative-paired ideographs rating	.01	.02
Neutral-paired ideographs ratings	.01	.01
Unpaired ideographs rating	-.03	-.06
EC susceptibility: Positive pairings	.10	-.11
EC susceptibility: Negative pairings	.00	-.01
EC valence asymmetry index	-.01	.07

Note. MAAS = Mindful Attention Awareness Scale; FFMQ = Five Facet Mindfulness Questionnaire; PANAS = Positive and Negative Affect Schedule.
† $p < .10.$ * $p < .05.$ ** $p < .01.$

ratings. However, the findings were not altered when controlling for US ratings, so those analyses are not reported further here.

Correlations between unpaired ideograph ratings, mindfulness, and susceptibility to EC effects also were assessed based on the associations between these variables found in Study 1. The MAAS was marginally inversely correlated with unpaired ideograph ratings, $r(157) = -.14$, $p = .09$, and the similar Act with Awareness subscale of the FFMQ was significantly inversely correlated with unpaired ideograph ratings, $r(157) = -.20$, $p = .01$. However, unpaired ideograph ratings were not associated with susceptibility to conditioning of positive or negative attitudes or the valence asymmetry index, ps $> .21$. Therefore, unpaired ideograph ratings were not controlled for when examining EC effects.

Overall Conditioning Effects

To assess overall EC effects, a one-way within-subjects ANOVA was used to compare average ratings of the positive, negative, and neutral paired CSs, as in Study 1. The ANOVA was significant, Wilks' Lambda $= .93$, $F(2, 157) = 5.77$, $p = .004$, partial eta squared $= .07$. As in Study 1, negative-paired CSs ($M = 4.61$, $SD = 1.30$) were rated significantly lower in terms of liking compared to both neutral-paired CSs ($M = 4.83$, $SD = 1.45$; $p = .03$) and positive-paired CSs ($M = 4.89$, $SD = 1.37$; $p = .01$), indicating successful conditioning of negative attitudes. Also as in Study 1, however, ratings of positive-paired CSs did not differ significantly from ratings of neutral-paired CSs ($p > .99$). Although conditioning of positive attitudes was not apparent on average, individual susceptibility to conditioning of positive attitudes still varied considerably (see Table 3).

Mindfulness and EC

To examine whether Study 2 replicated the main finding of Study 1, the relation between mindfulness and susceptibility to conditioning of negative attitudes was examined using regression. Two separate regression models were run with MAAS scores and FFMQ subscale scores as predictors, given the overlap in item content between the MAAS and FFMQ. The first simple regression found that MAAS scores did not significantly predict susceptibility to conditioning of negative attitudes, $t(157) = -.37$, $p = .71$, although the direction of the relation was negative as in Study 1 ($\beta = -.03$). In the second regression, the FFMQ subscales were entered simultaneously as predictors of susceptibility to conditioning of negative attitudes to determine the unique role of each facet of mindfulness. The model was not significant, $F(5,153) = 1.18$, $p = .32$; none of the FFMQ subscales significantly predicted susceptibility to conditioning of negative attitudes. It should be noted, however, that the Observe subscale of the FFMQ was a marginally significant predictor of susceptibility to conditioning of negative attitudes, $\beta = .15$, $t(153) = 1.72$, $p = .09$, $R^2 = 02$. In sum, neither regression model was significant, and the only result approaching significance would suggest that greater susceptibility to conditioning of negative attitudes occurred with more mindful observation of experience.

The relation between mindfulness and susceptibility to conditioning of positive attitudes as well as the valence asymmetry index also were explored using similar regression analyses. As in Study 1, MAAS scores did not significantly predict susceptibility to conditioning of positive attitudes, $t(157) = -.64$, $p = .53$. Likewise, a simultaneous multiple regression with FFMQ subscales entered as predictors of susceptibility to conditioning of positive attitudes was not significant, $F(5,153) = .89$, $p = .49$. However, one subscale, Describe, approached significance, $\beta = -.16$, $t(153) = -1.86$, $p = .07$, $R^2 = .02$, indicating less susceptibility to conditioning of positive attitudes among those with greater proficiency at labeling inner experience with words.

Furthermore, neither MAAS scores ($t[157] = .21$, $p = .83$) nor the FFMQ subscales ($F[5,153] = 1.09$, $p = .39$) significantly predicted the valence asymmetry index, except that the Describe subscale of the FFMQ again was marginally significant, $\beta = .15$, $t(153) = 1.75$, $p = .08$, $R^2 = .01$. Overall, then, these regression analyses provided little evidence that mindfulness predicted susceptibility to conditioning, and the few trending relations were not in the hypothesized direction.

Elaboration

Although mindfulness did not predict susceptibility to evaluative conditioning as expected, associations with the measures of elaboration still were explored. First, associations between the various elaboration measures were examined as shown in Table 5. A number of correlations were significant as might be expected. To start, the number of thoughts listed in response to positive and negative images were highly correlated. For both positive and negative images, both the number of thoughts listed and the proportion of neutral thoughts listed were positively correlated with the number of in-image thoughts listed for images of the corresponding valence. That is, those who listed more total thoughts, and more neutral thoughts, tended to note more actual aspects of the images (e.g., fireworks, lights) as compared to inferences or other ideas not actually in the image (e.g., Fourth of July, fun). Further, those who responded with proportionately more neutral thoughts to images of one valence also tended to respond similarly for the other valence.

In response to positive images, the pattern of correlations suggested that those who listed fewer thoughts wrote more positive and fewer negative and in-image thoughts, whereas those who listed more thoughts wrote more neutral and in-image thoughts. Also, those who reported greater positive affect in response to positive images tended to report relatively more positive

Table 5

Inter-correlations between elaboration measures in Study 2.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Positive Images/Valence													
1. Affect Scale	1												
2. Number of Thoughts	.24**	1											
3. Proportion Positive Thoughts	.30**	-.16†	1										
4. Proportion Neutral Thoughts	-.25**	.25**	-.74**	1									
5. Proportion Negative Thoughts	-.37**	-.14	-.23*	-.05	1								
6. Proportion In-Image Thoughts	-.18*	.22*	-.51**	.71**	-.02	1							
7. RPA	.40**	.14	.11	-.08	-.27**	-.08	1						
Negative Images/Valence													
8. Affect Scale	-.28**	-.04	-.23*	.20*	.09	.17†	-.10	1					
9. Number of Thoughts	.14	.70**	-.16†	.28**	-.18	.35**	.13	.01	1				
10. Proportion Positive Thoughts	-.11	-.01	-.01	.00	.08	-.20*	-.01	.17†	-.06	1			
11. Proportion Neutral Thoughts	.01	.07	-.14	.29**	.00	.35**	-.01	.11	.11	-.11	1		
12. Proportion Negative Thoughts	.00	.00	.30**	-.24**	.05	-.24**	-.01	-.18*	-.08	-.13	-.83**	1	
13. Proportion In-Image Thoughts	-.14	.11	-.29**	.44**	-.11	.61**	.04	.12	.27**	-.20*	-.24**	.38**	1
14. RRS	.04	.08	-.12	.15†	.06	.21*	-.12	.09	.26**	-.02	-.04	.14	.21*

Note. Blue font = measures of responses to positive valence; red font = measures of responses to negative valence. RPA = Responses to Positive Affect Questionnaire; RRS = Ruminative Responses Scale-Short Form.

† $p < .10$. * $p < .05$. ** $p < .01$.

thoughts and fewer neutral, negative, and in-image thoughts. In response to negative images, the number of thoughts listed was not associated with proportions of valenced or neutral thoughts, but those who listed relatively more negative thoughts tended to list fewer neutral and in-image thoughts. Those who listed relatively more positive thoughts also listed fewer in-image thoughts. Also, those who reported less positive or more negative state affect in response to negative images also tended to report relatively more negative thoughts. To summarize, for those who had greater affective responses matching the image valence, they tended to report proportionally more thoughts of congruent valence; on the other hand, those who thought more tended to report proportionally more neutral and in-image thoughts, particularly for the positive images.

The RPA and RRS also produced some interesting results. Those who reported greater positive rumination, as indicated by their RPA scores, reported more positive affect in response to positive images and proportionally fewer negative thoughts. Those who reported greater negative rumination, as indicated by the RRS, reported more thoughts in response to negative images, which might be expected (although these thoughts were not necessarily negative), as well as more in-image thoughts in response to positive images.

Next, associations between these elaboration measures and the mindfulness measures were examined, as shown in Table 6. Few significant correlations were found, particularly with the affective and cognitive responses to the IAPS images. Nonetheless, those who reported greater mindfulness on the MAAS and the Observe subscale of the FFMQ listed more thoughts in response to positive images, and two other FFMQ subscales trended in support of this link. Additionally, perhaps surprisingly, those who scored higher on the Act with Awareness subscale of the FFMQ reported more negative affect in response to negative images, although this was not

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Table 6

Correlations between mindfulness and elaboration measures in Study 2.

	MAAS	FFMQ Observe	FFMQ Describe	FFMQ Act with Awareness	FFMQ Nonjudge	FFMQ Nonreact
Positive Images/Valence						
1. Affect Scale	.00	.15†	.15†	.02	-.01	.03
2. Number of Thoughts	.23*	.22*	.18†	.18†	.08	.08
3. Proportion Positive Thoughts	.10	-.05	.06	.15	-.02	.02
4. Proportion Neutral Thoughts	-.04	.11	-.01	-.08	-.06	.00
5. Proportion Negative Thoughts	.02	-.07	-.10	-.09	-.06	.10
6. Proportion In-Image Thoughts	-.09	-.07	-.06	-.05	-.10	-.05
7. RPA	.21*	.18*	.24**	.27**	.17*	.19*
Negative Images/Valence						
8. Affect Scale	-.03	.00	-.10	-.17*	-.07	.09
9. Number of Thoughts	.09	.00	.08	.18†	.03	-.05
10. Proportion Positive Thoughts	.01	-.02	.12	-.09	.05	-.14
11. Proportion Neutral Thoughts	.06	-.07	-.03	.02	-.01	-.03
12. Proportion Negative Thoughts	.02	.08	.02	.04	-.09	.09
13. Proportion In-Image Thoughts	-.09	-.14	-.06	-.07	-.14	-.08
14. RRS	-.38**	.09	-.18*	-.26**	-.55**	-.12

Note. MAAS = Mindful Attention Awareness Scale; FFMQ = Five Facet Mindfulness Questionnaire; RPA = Responses to Positive Affect Questionnaire; RRS = Ruminative Responses Scale-Short Form.

† $p < .10$. * $p < .05$. ** $p < .01$.

a strong correlation. As for the RPA and RRS, a clear pattern was noticeable, with the

mindfulness measures tending to correlate positively with the RPA and negatively with the RRS.

These findings suggest that more mindful individuals ruminate less on negative emotions but

may still emphasize their emotions and self in response to positive emotions.

Finally, associations between the elaboration and EC measures were assessed, as shown

in Table 7. Particularly noteworthy, the number of thoughts listed in response to images –

regardless of image valence – was associated with susceptibility to EC. Intriguingly, the

direction of the relation differed based on valence. Those who demonstrated more cognitive

processing, as indicated by the number of thoughts listed, showed less susceptibility to EC with

positive stimuli but more susceptibility to EC with negative stimuli. This also was reflected in a

relatively greater susceptibility to conditioning of negative attitudes relative to positive attitudes,

as indicated by the valence asymmetry index, among those who listed more thoughts.

The RPA also showed a modest positive correlation with susceptibility to conditioning of

positive attitudes, although no significant correlations were found for the RRS. A less

straightforward, possibly spurious result was an inverse correlation between the proportion of

negative thoughts listed and susceptibility to conditioning of negative attitudes. The latter as

well as the valence asymmetry index (indicating greater susceptibility to conditioning of negative

attitudes relative to positive attitudes) also correlated positively with the proportion of neutral

thoughts listed.

Mediation Analyses

A mediation model originally was proposed in which an inverse link between

mindfulness and susceptibility to conditioning of negative attitudes would be mediated by less

negative and embellished elaboration on negative stimuli. For mediation analyses to be

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Table 7

Correlations between EC and elaboration measures in Study 2.

	Positive-paired ideographs rating	Neutral-paired ideographs rating	Negative-paired ideographs rating	Unpaired ideographs rating	EC susceptibility: Positive pairings	EC susceptibility: Negative pairings	EC valence asymmetry index
Positive Images/Valence							
1. Affect Scale	.15†	.09	.09	-.03	.05	.01	-.03
2. Number of Thoughts	-.24**	.06	-.14	-.17†	-.30**	.25**	.31**
3. Proportion Positive Thoughts	.04	-.04	.01	-.07	.08	-.08	-.09
4. Proportion Neutral Thoughts	-.05	.06	-.05	.01	-.11	.14	.14
5. Proportion Negative Thoughts	-.07	.02	.00	-.01	.05	.01	-.03
6. Proportion In-Image Thoughts	-.13	-.05	-.20*	-.10	-.08	.18*	.14
7. RPA	.22**	.05	.03	.03	.19*	-.02	-.13
Negative Images/Valence							
8. Affect Scale	.07	.10	.18*	.19*	-.04	-.08	-.02
9. Number of Thoughts	-.13	.08	-.07	-.07	-.21*	.19*	.22*
10. Proportion Positive Thoughts	.08	.07	.12	.12	.01	-.06	-.03
11. Proportion Neutral Thoughts	.06	.19*	.01	.05	-.13	.25**	.21*
12. Proportion Negative Thoughts	-.15†	-.22*	-.08	-.15†	.07	-.19*	-.14
13. Proportion In-Image Thoughts	-.11	-.10	-.12	-.15	-.01	.01	.01
14. RRS	.05	.08	.01	.05	-.04	.11	.08

Note. RPA = Responses to Positive Affect Questionnaire; RRS = Ruminative Responses Scale-Short Form.
† $p < .10$. * $p < .05$. ** $p < .01$.

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appropriate, the proposed independent variable (IV) should significantly predict the proposed mediator and the proposed dependent variable (DV), and the proposed mediator also should predict the proposed dependent variable (Baron & Kenny, 1986). Mindfulness, the proposed IV, did not significantly predict susceptibility to conditioning of negative attitudes, the proposed DV. Mindfulness generally also did not predict elaboration on negative stimuli, the proposed mediator, as hypothesized, in that it did not clearly correlate with affective emphasis on negative images or with proportionately less negative or not-in-image thoughts. Mindfulness did inversely relate to rumination as measured by the RRS, but RRS scores did not relate to susceptibility to conditioning of negative attitudes. Therefore, the findings did not warrant a test of the main proposed mediation model.

Because mindfulness was not clearly associated with susceptibility to conditioning of positive or negative attitudes and also was not associated with most of the elaboration measures, the appropriateness of testing any mediation model was questionable. However, some researchers contend that an indirect effect may be tested even in the absence of a significant relation between the proposed IV and proposed DV if the IV significantly predicts the mediator which, in turn, significantly predicts the DV (McFatter, 1979; Judd & Kenny, 1981). In this case, the present patterns of correlations could suggest an indirect link between mindfulness and susceptibility to evaluative conditioning through the amount of thought in response to valenced stimuli, particularly for the positive images and in response to positive emotions (as indicated by the RPA). Although such post-hoc analyses for correlational data merit caution, these analyses were explored using bootstrapping with 5,000 resamples, using the INDIRECT macro for SPSS (Preacher & Hayes, 2008).

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First, the two measures of the extent of thought in response to positive stimuli, the number of thoughts listed in response to positive images and the RPA, were tested as mediators between mindfulness and susceptibility to conditioning with positive stimuli. The conceptual link and distinctions between these two measures were supported by their medium-sized correlation (see Table 5). The MAAS first was selected as the mindfulness measure because it showed the strongest associations with both the number of thoughts listed in response to positive images and the RPA. The results of the bootstrapping analysis indicated that the indirect effect of mindful awareness on susceptibility to conditioning of positive attitudes through the mediator of thoughts listed in response to positive images was significant although modest, $M = -.16$, $SE = .08$, 95% CI = -.36 - -.04, whereas the indirect effect through the RPA was not significant, 95% CI = -.01 - .25. A parallel analysis also was run with the FFMQ Describe subscale as the mindfulness measure, given its marginal associations with the mediators and susceptibility to conditioning of positive attitudes. Marginally significant indirect paths were found in this analysis; the indirect effects in this case were through both mediators and quite small (for number of thoughts, $M = -.01$, $SE = .01$, 95% CI = -.03 - -.002, and for the RPA, $M = -.02$, $SE = .01$, 95% CI = .003 - .04). Thus, in both analyses, mindfulness was linked indirectly to less susceptibility to conditioning of positive attitudes through greater elaboration on positive stimuli. For mindful awareness, this elaboration was in the form of more thoughts in response to positive images, whereas for description of inner experience with words, this elaboration also was in the form of rumination on positive affect.

Next, the number of thoughts listed in response to positive images was tested as a mediator between mindfulness and susceptibility to conditioning with negative stimuli, based on the significant correlations between these measures (neither the RPA nor the RRS significantly

correlated with susceptibility to conditioning with negative stimuli; see Table 7). First, the MAAS was used as the predictor. The indirect effect was small but significant, $M = .11$, $SE = .06$, 95% CI = .02 - .29. A parallel analysis also was run with the Observe subscale of the FFMQ as a predictor, given its marginal association with susceptibility to conditioning of negative attitudes. The indirect effect in this analysis was marginally significant and quite small, $M = .01$, $SE = .01$, 95% CI = .001 - .05.

A similar analysis was used to test the significance of the indirect effect of mindfulness on the valence asymmetry index through the number of thoughts in response to positive images. With the MAAS as the predictor, this indirect relation was significant, $M = .25$, $SE = .13$, 95% CI = .06 - .62. With the Observe subscale of the FFMQ as the predictor, the indirect relation also was significant but small, $M = .04$, $SE = .02$, 95% CI = .01 - .10. Interpretation of these analyses involving susceptibility to conditioning of negative attitudes is somewhat unclear, however, in that susceptibility to conditioning of negative attitudes employs negative stimuli and the thought listing measure in these analyses concerned positive stimuli.

Given this concern and, moreover, because the number of thoughts listed in response to both positive and negative images were highly correlated and both predicted the same pattern of correlations with susceptibility to conditioning of positive and negative attitudes, the number of thoughts for positive and negative images were then averaged to examine one measure of the number of thoughts as a mediator. This measure of the average number of thoughts, across valence, was not significantly predicted by the MAAS despite trending toward the anticipated relation, but it was significantly predicted by the similar Act with Awareness subscale of the FFMQ (which includes many items from the MAAS), $\beta = .20$, $t(104) = 2.04$, $p = .04$, $R^2 = .04$. Further, the average number of thoughts (across valence) significantly predicted susceptibility to

conditioning of positive attitudes, $\beta = -.26$, $t(104) = -2.72$, $p = .01$, $R^2 = .07$, susceptibility to

conditioning of negative attitudes, $\beta = .26$, $t(104) = 2.78$, $p = .01$, $R^2 = .07$, and the valence

asymmetry index, $\beta = .29$, $t(104) = 3.06$, $p = .003$, $R^2 = .08$. Therefore, the significance of the

indirect effects for each of these criterion variables (i.e., from the FFMQ Act with Awareness

subscale through the number of thoughts) was tested using bootstrapping. The indirect effects

were significant or marginally significant but very small for all three criterion variables,

susceptibility to conditioning of positive attitudes, $M = -.01$, $SE = .008$, 95% CI $= -.03 - -.003$,

susceptibility to conditioning of negative attitudes, $M = .01$, $SE = .007$, 95% CI $= .002 - .03$, and

the valence asymmetry index, $M = .02$, $SE = .01$, 95% CI $= .01 - .06$.

Discussion

Study 2 had two main aims: to replicate the Study 1 finding in which trait mindfulness

predicted less susceptibility to conditioning of negative attitudes, and to examine the potential

role of elaboration in mindfulness and evaluative conditioning. As for the first aim, the results of

Study 2 failed to replicate the inverse link between mindfulness and susceptibility to

conditioning of negative attitudes, both using the same measure of mindfulness and an

additional, multidimensional measure. No significant associations were found when testing the

direct link between mindfulness and susceptibility to conditioning with either negative or

positive stimuli or the valence asymmetry index. Further, marginally significant results with

subscales of the multidimensional mindfulness measure suggested that more mindful observation

might predict greater susceptibility to conditioning of negative attitudes and more proficiency at

describing inner experience with words might predict less susceptibility to conditioning of

positive attitudes. These results contradict the Study 1 findings. The reason for the discrepant

findings across the two studies is unclear, although the Study 1 findings may have been due to

chance or influenced by a response bias. That said, the examination of elaboration in Study 2

revealed some potential indirect relations, although not those originally predicted.

The original hypothesis regarding elaboration was that more mindful individuals would

demonstrate a lower proportion of negatively valenced, less embellished thoughts, and/or less

emotional emphasis in response to the IAPS images and that these forms of elaboration would

predict less susceptibility to conditioning, particularly of negative attitudes. The results from

Study 2 did not support these proposed relations. The originally proposed mediation model

therefore was not tested. However, the patterns of associations found in Study 2 suggested that

the extent of cognitive elaboration overall played a role in susceptibility to EC and might provide

some explanation of how mindfulness relates to EC.

An intriguing finding from Study 2 was that the number of thoughts participants listed in

response to IAPS images was inversely associated with susceptibility to conditioning of positive

attitudes but positively associated with susceptibility to conditioning of negative attitudes and a

bias toward forming negative attitudes compared to positive attitudes. That is, those who

demonstrated greater cognitive processing in response to the type of stimuli used in the EC

paradigm were more easily conditioned with negative stimuli, particularly than with positive

stimuli, for which they were more resistant to conditioning. Perhaps this reflects different

processes underlying EC effects depending on valence. In any case, when such overall

elaboration was considered in relation to both mindfulness and EC susceptibility, mediation

analyses supported that overall elaboration provided an indirect path through which mindfulness

related to susceptibility to EC. Although based on correlational data and small effects, these

significant results could be interpreted to suggest that more mindful individuals may show

greater cognitive processing in response to valenced images, at least positive images, and that

this may lead to less susceptibility to the conditioning of positive attitudes but possibly more susceptibility to the conditioning of negative attitudes and, consequently, bias toward negative attitude formation compared to positive attitude formation. Although the finding of potentially less susceptibility to conditioning of positive attitudes aligns with the overall hypothesis that mindfulness might reduce susceptibility to EC effects, the other findings in terms of greater elaboration and susceptibility to conditioning of negative attitudes runs counter to the original hypothesis. In any case, with the small indirect effect sizes, lack of significant direct relations, and inconsistent findings from Study 1 to Study 2, it is most sensible not to conclude that there was a relation between mindfulness and susceptibility to EC in Study 2.

Despite the lack of clear or consistent findings from Study 1 to Study 2 in terms of mindfulness and EC susceptibility, both Studies 1 and 2 were consistent in that overall conditioning of negative attitudes was more successful, on average, than conditioning of positive attitudes. Previous studies generally have demonstrated successful conditioning of both positive and negative attitudes. The elaboration measures included in Study 2 provide one potential explanation for why participants showed differential susceptibility to conditioning for positive and negative stimuli, in that greater cognitive processing may have played different roles in conditioning depending on valence.

Another finding from Study 2 that relates to differential processing based on valence concerned the relation of mindfulness to positive and negative rumination. It is fairly well established in the clinical literature that mindfulness reduces negative rumination and the inverse association here replicated that pattern. An interesting complement was the positive association between mindfulness and positive rumination. Together, these findings could suggest that whether mindfulness reduces ruminative patterns of thought may depend on valence.

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Altogether, however, the results from Study 2 raised more questions about whether and how mindfulness relates to elaboration and susceptibility to EC effects. These first two studies examined trait mindfulness, which did not ensure that participants who tend to be more mindful actually were so during the tests of elaboration or EC. Perhaps if individuals were in a mindful state prior to or during tests of elaboration or EC, the influence of mindfulness on those variables would be more apparent. Additionally, the correlational design of Studies 1 and 2 could not determine causality. For a more precise and causal test of the effect of mindfulness on elaboration and EC effects, Study 3 used an experimental design.

Study 3

After examining associations between mindfulness and susceptibility to evaluative conditioning in Studies 1 and 2, as well as measures of elaboration in Study 2, mindfulness was manipulated using a between-groups experimental design in Study 3 to test the primary hypotheses with more control and basis for causal inference. To manipulate mindfulness, participants were randomly assigned to either a mindfulness or mind-wandering (control) induction condition. The original hypothesis was that the mindfulness induction, as compared to the control condition, would reduce susceptibility to conditioning of negative attitudes. It also was anticipated that the mindfulness condition (as compared to the control condition) would show less negative and embellished elaboration and that this would mediate the effect of mindfulness on susceptibility to conditioning of negative attitudes. However, with the inconsistent results from Studies 1 and 2 in terms of mindfulness and susceptibility to EC effects and the relative lack of findings in terms of mindfulness and valenced or embellished elaboration in Study 2, a basic aim of Study 3 was to clarify whether and how mindfulness affects susceptibility to EC and elaboration.

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Method

Participants

As in Studies 1 and 2, a convenience sample of psychology undergraduate students was recruited using the university online recruitment system, called Sona. The study was advertised as "Mind Exercise" and described as a test of mental exercises, to conceal the study hypothesis. Those under 18 years of age and/or who had participated in other studies using an EC paradigm or the mindfulness manipulation were excluded from participating. One hundred fifty-four students were recruited. Fifteen participants were excluded because they reported speaking or reading Asian languages (as in Studies 1 and 2, due to the use of Chinese ideographs in the EC paradigm). Additionally, ten participants were excluded due to technical difficulties (i.e., computer freezes or accidentally skipping the audio for the manipulation) and two participants were excluded due to blatant noncompliance with instructions. The final sample size was 127, which was less than the original target but still sufficient for comparisons of two independent groups as well as regression analysis with up to eight predictors at .80 power, an alpha level of .05, and a medium effect size, according to Cohen (1992).

The final sample was 63% female with a mean age of 20.77 ($SD = 4.03$). The predominant racial groups were White/Caucasian (54.3%) and Black/African American (31.5%). Around three-quarters or more reported no experience with meditation or meditative practice (73.2% for mindfulness meditation, 85.8% for transcendental meditation, 86.6% for yoga, and 89% for tai chi), and those who did have experience with these practices generally indicated their involvement was for less than six months (19.7% for mindfulness meditation, 8.7% for transcendental meditation, 5.5% for yoga, and 8.7% for tai chi).

Mindfulness Manipulation

For efficiency and control, mindfulness was manipulated using a laboratory-based induction. Participants were randomly assigned to a mindfulness induction condition ($n = 64$) or a mind-wandering control condition ($n = 63$). Both conditions listened to a 15-minute audio recording via headphones, divided into two parts. The first 10 minutes of the recording began the experiment. Participants then completed the elaboration measures. The remaining 5 minutes of the recording served to refresh the state produced by the initial manipulation prior to the EC paradigm, given that the duration of effects from brief mindfulness inductions are unknown. See Appendix B for scripts of the instructions provided to participants in each condition.

In the mindfulness induction condition, these instructions guided participants in a mindful breathing exercise that has been used successfully in previous experiments (Kiken & Shook, 2011a, 2011b) and that is common in the literature (e.g., Arch & Craske, 2006; Broderick, 2005; Kabat-Zinn, 1990). This exercise uses an object of attention to help sustain an orientation toward present experience but is aimed at mindful awareness more than concentration. Participants were informed that they were going to practice a process to help them perceive things in a way that is deeply aware of the present moment. They were guided in anchoring their attention on the qualities of each breath as it occurs, with a sense of curiosity. Additionally, they were instructed to register and accept any thoughts or feelings as they occurred, acknowledging them but not dwelling on them, to reconnect to the present moment and gently maintain or regain attention on the breath. Reminders and variations of these instructions were repeated periodically throughout the instructional period, with periods of silence in which to practice the exercise.

The control condition exercise also has been used successfully in previous mindfulness induction studies (Arch & Craske, 2006; Kiken & Shook, 2011a, 2011b; McHugh, Simpson, & Reed, 2010). The instructions informed participants that they were going to practice a process to perceive things in a way that lets their mind wander freely. They were told to think about whatever came to mind and to let their mind wander freely without trying to focus on anything in particular. Close variants of these instructions were repeated throughout the instructional period at roughly the same intervals used in the mindfulness instructions.

Procedure

As in Study 2, up to eight participants completed a session at one time, but they were seated at individual computer cubicles and did not interact. Informed consent was first obtained by an experimenter. Then, participants listened to the first, 10-minute audio recording serving as the initial manipulation. Immediately following the recording, participants completed the two measures of elaboration in response to IAPS images used in Study 2, as these were not trait-based measures like the RPA and RRS and thus were more likely to be affected by the mindfulness manipulation. Then, they listened to the remaining 5-minute audio recording to refresh the state produced by the initial manipulation, prior to the EC paradigm. Next, participants completed the PANAS to account for any differences in state affect resulting from the manipulation, immediately followed by the EC paradigm, CS ratings, and US ratings as in Studies 1 and 2. Finally, participants completed the MAAS (to account for the potential role of trait mindfulness) and demographics questionnaire.

A funneled debriefing to assess contingency awareness (based on Pleyers et al., 2007) concluded the study, informing participants of the study's true purpose gradually so as to also inquire with increasingly specific questions about their awareness of the pairings prior to fully

revealing the study purpose. Each of the nine ideographs that served as CSs was presented with

two of the positive USs and two of the negative USs. Participants were asked to select the

images that had been paired with the ideograph. Participants could select multiple images or

indicate "Don't Know." A difference score was created by subtracting the number of incorrectly

selected images from the number of correctly selected images. This difference score served as

the measure of recognition of CS-US pairings, or contingency awareness. All instructions,

measures, and debriefing statements again were administered on Dell Optiplex 745 computers,

using the programs DirectRT and MediaLab.

<p align="center">**Results**</p>

Descriptive and Initial Analyses

Descriptive statistics including means, standard deviations ranges, and alphas are shown

in Table 8. Distributions for all variables were acceptably normal, except for the same four

thought listing measures that also were skewed in Study 2 but for which transformations and

non-parametric analyses did not meaningfully alter any results in either study. No outliers were

found that significantly affected the means (determined by comparing the overall mean to the 5%

trimmed mean). Additionally, no systematic patterns were found for missing data. For the

correlational analyses that follow, as in Studies 1 and 2, missing cases were excluded pairwise,

meaning that cases only were excluded from those analyses for which there was insufficient

information.

First, the mindfulness and control conditions were compared using independent samples

t-tests (for continuous variables) and chi-square tests (for nominal variables) to ensure that

randomization was successful and that the two conditions did not differ demographically (ps >

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Table 8

Descriptive statistics for Study 3.

	M	*SD*	Range
Evaluative Conditioning			
Positive-paired ideographs rating	4.84	1.44	.00-9.00
Neutral-paired ideographs rating	4.98	1.45	.00-9.00
Negative-paired ideographs rating	4.69	1.38	.00-7.67
Unpaired ideographs rating	4.77	1.27	1.00-9.00
EC susceptibility: Positive pairings	-.15	1.21	-4.33-2.67
EC susceptibility: Negative pairings	.29	1.32	-3.00-5.33
EC valence asymmetry index	.43	2.18	-5.67-6.33
Elaboration			
Affect Scale			
Positive Images	27.18	11.79	.00-50.00
Negative Images	-21.81	15.58	-50.00-37.50
Thought Listing			
Positive Images			
Number of Thoughts	3.30	1.41	.00-7.33
Proportion Positive	.53	.28	.00-1.00
Proportion Neutral	.26	.25	.00-1.00
Proportion Negative	.06	.10	.00-.50
Proportion In Image	.06	.11	.00-.55
Negative Images			
Number of Thoughts	3.18	1.30	.00-6.67
Proportion Positive	.06	.10	.00-.50
Proportion Neutral	.31	.26	.00-1.00
Proportion Negative	.51	.28	.00-1.00
Proportion In Image	.11	.17	.00-.83
Trait Mindfulness			
MAAS (α = .85)	3.55	.74	2.13-5.80
State Affect			
PANAS: Positive Affect (α = .87)	28.49	7.64	13.00-49.00
PANAS: Negative Affect (α = .86)	16.43	6.37	10.00-43.00
Contingency Awareness	.50	2.22	-4.00-12.00

Note. MAAS = Mindful Attention Awareness Scale; PANAS = Positive and Negative Affect Schedule.

.10, except for tai chi, $p = .09$), on trait mindfulness ($p = .78$), or positive or negative state affect (ps > .55). The conditions also did not differ in their ratings of positive or negative USs (ps > .25) or unpaired ideographs ($p = .31$). Finally, the conditions did not differ on the contingency awareness measure (recognition of CS-US pairings), $p = .42$.

Correlations with the EC measures also were examined to assess potential covariates. No significant correlations were found between the MAAS and the ideograph ratings or susceptibility to EC (ps > .45). Unpaired ideograph ratings also were not correlated with susceptibility to EC (ps > .16). Contingency awareness was significantly associated with ratings of positive-paired ideographs, $r(97) = .29$, $p = .004$, as well as susceptibility to conditioning of negative attitudes, $r(97) = .20$, $p = .045$. These correlations were not surprising given that contingency awareness has been proposed to facilitate EC effects. This variable therefore was examined as a covariate in subsequent analyses relating to EC, as reported below. State affect was not significantly correlated with ideograph ratings or susceptibility to EC overall, although negative state affect was marginally correlated with ratings of neutral-paired ideographs, $r(124) = .17$, $p = .06$. It is not clear why neutral-paired ideographs were rated more favorably with greater negative state affect; still, the potential role of negative affect was examined as a covariate in subsequent analyses of mindfulness and EC susceptibility. However, controlling for negative state affect did not meaningfully change the results after controlling for contingency awareness, so the following analyses of mindfulness and EC susceptibility do not include negative state affect as a covariate.

Mindfulness and Conditioning Effects

To determine if conditioning was successful overall and if the mindfulness induction affected susceptibility to conditioning, a mixed between-within ANOVA was used. The

between-groups variable was condition (mindfulness versus control). The within-subjects

variable was valence (average ratings for positive-, negative-, and neutral-paired ideographs).

There was a marginally significant main effect of valence, Wilks' Lambda = .95, $F(2, 124)$ =

2.96, p = .055, partial eta squared = .05. The negative-paired ideograph ratings (M = 4.70, SD =

1.38) were lower than the neutral-paired ideograph ratings (M = 4.98, SD = 1.45; p = .02),

suggesting successful conditioning of negative attitudes overall. However, as in Studies 1 and 2,

no conditioning of positive attitudes was apparent. Of interest was whether this effect would

vary by condition, as would be indicated by a significant interaction between condition and

valence, meaning that the mindfulness and control conditions differed in their patterns of

ideograph ratings. The interaction between condition and valence was not significant, Wilks'

Lambda = .98, $F(2, 124)$ = 1.48, p = .23. Thus, the mindfulness induction did not appear to

affect susceptibility to EC in the initial analysis.

To account for the potential role of contingency awareness, a similar mixed between-

within ANCOVA tested for differences between positive-, neutral-, and negative-paired

ideograph ratings and the interaction with experimental condition, while controlling for

contingency awareness. As anticipated, contingency awareness showed a significant interaction

with valence, Wilks' Lambda = .85, $F[2, 94]$ =8.12, p = .001, partial eta squared = .15.

Conditioning of negative attitudes no longer was significant after accounting for contingency

awareness, Wilks' Lambda = .98, $F(2, 94)$ =1.08, p = .34. Interestingly, a significant interaction

emerged between valence and condition, Wilks' Lambda = .94, $F(2, 94)$ = 3.15, p = .048, partial

eta squared = .06, as shown in Figure 1. In the mindfulness condition, ratings of negative-paired

ideographs (*Adj. M* = 4.60, *SE* = .21) differed from neutral-paired ideographs (*Adj. M* = 5.07, *SE*

= .22; p = .05), whereas these ratings did not differ significantly in the control condition (p >
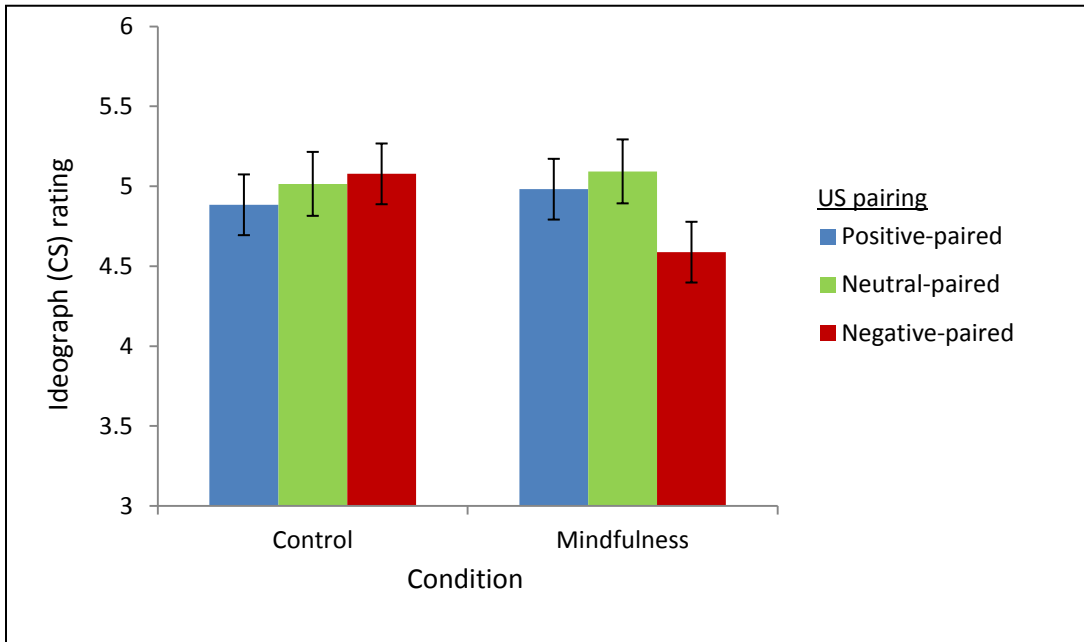
Figure 1. Interaction between condition and valence on EC susceptibility, controlling for contingency awareness, in Study 3. Error bars represent standard errors.

.99), indicating susceptibility to conditioning of negative attitudes in the mindfulness group but not in the control group. No other significant differences were found.[3]

The valence asymmetry index also was examined. Bias toward conditioning of negative attitudes did not differ by condition, $t(125) = .73$, $p = .47$. A one-way ANCOVA determined that controlling for contingency awareness and negative state affect did not alter this result, $F(1, 94) = 1.22$, $p = .27$.

Elaboration Measures

Inter-correlations between the elaboration measures are presented in Table 9. Overall, the patterns were similar to those in Study 2.

Mindfulness and Elaboration

Originally, it was hypothesized that mindfulness would reduce negatively valenced and embellished elaboration, as indicated by the proportion of negative thoughts listed and proportion of in-image thoughts listed, respectively, as well as the affective response to the negative images. Independent samples t-tests revealed no differences between conditions in terms of the proportion of in-image thoughts or affective response to the negative images (ps > .34). However, a significant between-groups difference was found for the proportion of negative thoughts in response to negative images, $t(125) = -2.05$, $p = .04$, with the mindfulness condition listing a lower proportion of negative thoughts in response to negative images ($M = .46$, $SD = .30$) than the control condition ($M = .56$, $SD = .25$). In addition, because Study 2 results suggested that mindfulness could be associated with more thoughts in response to the IAPS images, the mindfulness and control conditions were compared on number of thoughts listed. No significant differences were found for either image valence (ps > .23).

Table 9

Inter-correlations between elaboration measures in Study 3.

	1	2	3	4	5	6	7	8	9	10	11
Positive Images/Valence											
1. Affect Scale	1										
2. Number of Thoughts	.26**	1									
3. Proportion Positive Thoughts	.22*	-.25*	1								
4. Proportion Neutral Thoughts	-.13	.33**	-.38**	1							
5. Proportion Negative Thoughts	-.15†	-.09	.01	-.17†	1						
6. Proportion In-Image Thoughts	-.02	.35**	-.19*	.61**	-.16	1					
Negative Images/Valence											
7. Affect Scale	-.11	-.04	-.05	.03	.09	.05	1				
8. Number of Thoughts	.10	.56**	-.09	.22*	.13	.18	-.04	1			
9. Proportion Positive Thoughts	.12	-.05	-.22*	-.05	.09	-.12	.27**	-.04	1		
10. Proportion Neutral Thoughts	.02	.14	-.05	.46**	-.06	.42**	.06	.07	-.18*	1	
11. Proportion Negative Thoughts	-.01	.04	.56**	-.12	.23*	-.12	-.09	.06	.00	-.43**	1
12. Proportion In-Image Thoughts	.03	.20†	-.12	.46**	-.10	.45**	.05	.14	-.18*	.72**	-.31**

Note. Blue font = measures of responses to positive valence; red font = measures of responses to negative valence.
† $p < .10$. * $p < .05$. ** $p < .01$.

Elaboration and EC

Correlations between the elaboration and EC measures also were examined to build on those found in Study 2, as shown in Table 10. Partial correlations controlling for the role of contingency awareness also are presented.[4] First, a noteworthy finding from Study 2 was the association between number of thoughts and susceptibility to EC and this was partially replicated in Study 3. There were significant correlations (a) between the number of thoughts listed in response to positive images and susceptibility to conditioning of negative attitudes, and (b) between the number of thoughts listed in response to positive images and the valence asymmetry index (which indicates relatively greater susceptibility to conditioning of negative attitudes compared to positive attitudes). There also was a marginally significant inverse correlation between number of thoughts listed in response to positive images and susceptibility to conditioning of positive attitudes, which aligned with the pattern of correlations in Study 2. Also aligned with the pattern of correlations in Study 2 was the direction of the correlation coefficients for the number of thoughts listed in response to negative images and EC susceptibility (a negative correlation for susceptibility to conditioning of positive attitudes and a positive correlation for susceptibility to conditioning of negative attitudes), although they did not reach statistical significance.

Because this pattern, along with the results from Study 2, supported the notion that number of thoughts in general, regardless of valence, predicted susceptibility to conditioning of positive and negative attitudes, a variable representing the total number of thoughts (positive and negative) was created. Two separate hierarchical regression analyses that controlled for contingency awareness in step 1 and entered the number of thoughts in step 2 were conducted. The number of thoughts listed in response to all images was a marginally significant predictor of

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Table 10

Correlations and partial correlations (controlling for contingency awareness) between elaboration and EC measures in Study 3.

	Positive-paired ideographs rating	Neutral-paired ideographs rating	Negative-paired ideographs rating	Unpaired ideographs rating	EC susceptibility: Positive pairings	EC susceptibility: Negative pairings	EC valence asymmetry index
Positive Images/Valence							
1. Affect Scale	-.10(.07)	.02(.01)	-.07-(.12)	-.02(.04)	-.13(.06)	.09(.16)	.13(.05)
2. Number of Thoughts	-.07(-.16)	.07(-.02)	-.11(-.26*)	-.03(-.07)	-.17†(-.15)	.22*(.27*)	.22*(.23*)
3. Proportion Positive Thoughts	-.02(.01)	.02(.02)	.01(.00)	-.15†(-.08)	-.05(-.02)	.01(.03)	.03(.03)
4. Proportion Neutral Thoughts	.09(.07)	.03(-.08)	.12(.07)	.12(.12)	.08(.17)	-.10(-.18)	-.10(-.19)
5. Proportion Negative Thoughts	-.05(-.04)	.18*(.22†)	.03(-.05)	-.06(.00)	-.27**(-.30**)	.16†(.32**)	.25**(.34**)
6. Proportion In-Image Thoughts	.10(.05)	.06(.04)	.00(-.10)	.09(.09)	.05(.00)	.07(.16)	.02(.09)
Negative Images/Valence							
8. Affect Scale	-.07(.10)	-.09(.02)	-.06(.04)	-.17†(-.06)	.03(.09)	-.04(-.03)	-.04(-.06)
9. Number of Thoughts	-.04(-.19)	.09(-.03)	-.01(-.22†)	.00(-.02)	-.16(.-17)	.11(.18)	.15(.19)
10. Proportion Positive Thoughts	.00(.22†)	.11(.17)	.10(.15)	-.05(.09)	-.13(-.18)	.01(.08)	.08(.15)
11. Proportion Neutral Thoughts	.05(.03)	.08(.03)	.13(.00)	.10(.07)	-.04(.07)	-.05(.06)	-.01(-.01)
12. Proportion Negative Thoughts	.04(-.12)	.03(-.07)	.02(-.05)	-.12(-.13)	.02(-.02)	.01(-.03)	.00(.00)
13. Proportion In-Image Thoughts	-.05(-.15)	.00(-.09)	.01(-.15)	.02(-.08)	-.06(.01)	.00(.10)	.03(.05)

Note. Partial correlations are in parentheses.
† $p < .10$. * $p < .05$. ** $p < .01$.

susceptibility to conditioning of positive attitudes after controlling for contingency awareness, with greater thought linked to less susceptibility, $\beta = -.26$, $t(61) = -1.78$, $p = .08$, $\Delta R^2 = .05$, but did not significantly predict susceptibility to conditioning of negative attitudes above and beyond the role of contingency awareness, $t(61) = 1.54$, $p = .13$.

Unlike in Study 2, a number of significant associations also were found with the proportion of negative thoughts in response to positive images. Those with a higher proportion of negative thoughts in response to positive images tended to be less susceptible to conditioning of positive attitudes, more susceptible to conditioning of negative attitudes, and more susceptible to conditioning of negative attitudes relative to positive attitudes as indicated by the valence asymmetry index. Finally, and less readily understandable, particularly given the potential negativity bias in cognition and attitude formation indicated by the previously described associations, a positive association was found between the proportion of negative thoughts in response to positive images and ratings of neutral-paired ideographs.

Mediation

Although the original prediction was that mindfulness would affect susceptibility to EC indirectly through one or more measures of elaboration, none of the tests comparing the mindfulness and control conditions found differences on any elaboration measures that also related to susceptibility to EC, including when controlling for contingency awareness. Further, there were no significant relations between trait mindfulness and the elaboration or EC measures. Therefore, analyses of mediation were not appropriate.

<div align="center">

Discussion

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Study 3 aimed to assess the effect of mindfulness on elaboration and susceptibility to EC using an experimental design in which participants were randomly assigned to a mindful

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breathing induction or mind-wandering control condition before completing measures of elaboration and the EC paradigm. It originally was hypothesized that the mindfulness condition would show less susceptibility to conditioning of negative attitudes than the control condition, and that this effect would be accounted for by differential elaboration in the form of less negative and embellished thoughts and/or less emotional reactivity in response to valenced images. After inconsistent findings from examining trait mindfulness, elaboration, and susceptibility to EC in Studies 1 and 2, Study 3 presented an opportunity to glean better evidence and insight into the relations between the variables of interest.

The results of Study 3 initially appeared to show no effect of the mindfulness induction on susceptibility to evaluative conditioning. However, after controlling for contingency awareness, the mindfulness condition demonstrated significantly greater susceptibility to conditioning of negative attitudes. This finding contradicts the direction of the relation in the original hypothesis. It also is interesting that, but not readily obvious why, the effect appeared only after accounting for the role of contingency awareness, which has been found to facilitate EC effects (Walther & Grigoriadis, 2004; Hofmann et al., 2010) and appeared to play a similar role in the present research. However, the precise role of this variable, particularly in regard to underlying mechanisms for EC, is not yet fully understood (e.g., Hofmann et al., 2010). Field and Moore (2005) have noted that a basic level of attention, apart from contingency awareness, plays an important role in EC in that very distracted participants are less likely to demonstrate EC effects. It is possible that the mindful breathing induction, a one-time training with novice meditators, served more to reduce distractibility than to increase insightful awareness. Perhaps the role of a basic level of attention became apparent after accounting for contingency awareness. This could appear as increased susceptibility to conditioning only of negative

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attitudes in the present research because conditioning of positive attitudes was not successful on average, despite individual variability.

This possibility raises the issue that the effectiveness of the EC paradigm in Study 3 may have been limited by distraction or for some other reason. Not only was conditioning limited to negative attitudes on average, as in Studies 1 and 2, but this effect was weaker than in the first two studies. It is possible that the lengthier procedures prior to the EC paradigm contributed to boredom and therefore distraction. Nonetheless, the effects that were found did reveal some interesting associations with variables that address processes potentially underlying EC. As noted, the evidence from this study provides support for the role of contingency awareness.

There also were interesting findings with the elaboration and EC measures. Study 3 provided some replication of the associations found in Study 2 between number of thoughts listed, particularly in response to positive images, and susceptibility to EC. That is, greater general cognitive elaboration, as indicated by a higher number of thoughts listed in response to images, was again linked with less susceptibility to conditioning of positive attitudes. Greater cognitive elaboration in response to positive images also was linked to more susceptibility to conditioning of negative attitudes and a bias toward forming negative attitudes relative to positive attitudes. This directional pattern was apparent but not significant for thoughts in response to negative images. Together, the results from Studies 2 and 3 suggest that quantity of cognitive elaboration in response to images may be important for susceptibility to conditioning, with potentially different implications for conditioning with positive and negative stimuli.

There also was an interesting finding regarding elaboration and mindfulness. A significant effect of the mindfulness induction was found on the proportion of negative thoughts in response to negative images, which did align with the original hypothesis on negatively biased

elaboration. These results suggest that the state induced by the brief mindfulness meditation, compared to the mind-wandering exercise, did reduce negatively valenced cognitive elaboration on negative images. This aligns and adds to previous research showing that mindfulness alters responses to negative stimuli (e.g., Arch & Craske, 2006; Broderick, 2005) and may reduce negatively biased cognition (Kiken & Shook, 2012). Yet, this dimension of elaboration on negative stimuli was not associated with susceptibility to evaluative conditioning and did not enable the mindfulness group to be less susceptible to conditioning with negative stimuli. Therefore, it may provide additional insight into effects of mindfulness but fails to support the original hypothesis.

To conclude, the evidence from Study 3 did not support the hypothesis that the mindfulness induction would reduce susceptibility to conditioning of negative attitudes but provided some support for the opposite effect. Further, the induction did reduce negative cognitive elaboration on negative images, as hypothesized, but had no effect on embellished elaboration. The originally proposed mediation model was not appropriate to test due to a lack of an association between negative cognitive elaboration on negative images and susceptibility to conditioning of negative attitudes. Finally, the associations between the elaboration measures and the EC measures provided additional support for the link between quantity of cognitive elaboration and susceptibility to EC, as found in Study 2.

General Discussion

Across three studies, two correlational (Studies 1 and 2) and one experimental (Study 3), the link between mindfulness and susceptibility to evaluative conditioning was examined. Elaboration, particularly elaboration that embellishes by adding details or is negatively biased, also was examined as a potential mediator of such a link. It originally was proposed that because

mindfulness may alter elaboration so that it embellishes less and is less negatively biased, and because these dimensions of elaboration appear to underlie evaluative conditioning, particularly of negative attitudes, mindfulness would reduce susceptibility to conditioning of negative attitudes through variation in elaboration. The proposed model aligned with and built on previous evidence that mindfulness meditation can reduce negativity bias in attitude formation (Kiken & Shook, 2011a) and that mindfulness is linked to fewer dysfunctional negative attitudes (Kiken & Shook, 2012; Ramel et al., 2004), and it addressed mechanisms of evaluative conditioning. Additionally, it was of interest to explore links between mindfulness and conditioning of positive attitudes. However, there was little, and relatively unclear, evidence supporting a relation between mindfulness and responses to positive stimuli. Thus, specific hypotheses were not proposed regarding the relation between mindfulness and susceptibility to evaluative conditioning of positive attitudes.

Mindfulness and Evaluative Conditioning

The main hypothesis was that more mindful individuals would be less susceptible to evaluative conditioning, particularly of negative attitudes. Support for this hypothesis from the three studies generally was weak. In Study 1, trait mindfulness was inversely associated with susceptibility to conditioning of negative attitudes, but not after controlling for an indicator of potential response bias and negative state affect. A mediation analysis provided support for the notion that more mindful individuals were less susceptible to conditioning of negative attitudes due to less negative affect, but the order of the measures in Study 1 failed to provide a sound basis for such conclusions.

In Study 2, no significant direct links were found between either of two measures of trait mindfulness and susceptibility to conditioning of negative attitudes. Tests of mediation

suggested there might be weak indirect links through the mediator of cognitive elaboration, discussed further below. However, the indirect link between mindfulness and susceptibility to conditioning of negative attitudes was in the opposite direction from that hypothesized and found in Study 1. That is, susceptibility to conditioning of negative attitudes was stronger among more mindful individuals.

In Study 3, the mindfulness induction condition demonstrated greater susceptibility to conditioning of negative attitudes than the mind-wandering control condition, but only after controlling for contingency awareness (which was not affected by the mindfulness manipulation). Contingency awareness is a level of awareness beyond basic attention during the conditioning procedure (Field & Moore, 2005). That is, although attention to the EC paradigm is necessary for awareness of the pairings, one could attend to the EC paradigm but not be consciously aware of the pairings and still be susceptible to EC effects. Likewise, Field and Moore (2005) demonstrated that basic differences in attention versus distraction, apart from contingency awareness, affected EC susceptibility. Thus, the effect of the mindfulness induction while controlling for contingency awareness raises the possibility that the effect simply reflected less distractibility in the mindfulness induction condition. That is, it was not clear that mindfulness per se caused greater susceptibility to conditioning of negative attitudes, but rather reduced distractibility which enhanced conditioning effects. However, the possibility cannot be ruled out that mindfulness increased susceptibility to evaluative conditioning of negative attitudes. Altogether, the evidence from the three studies was mixed and did not provide any firm evidence of a clear, direct relation between mindfulness and conditioning of negative attitudes, particularly the hypothesized inverse relation.

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The relation between mindfulness and conditioning of positive attitudes was also examined. In Study 1, mindfulness was unrelated to susceptibility to conditioning of positive attitudes. In Study 2, no direct link between mindfulness and susceptibility to conditioning of positive attitudes was apparent. However, the mediation analyses supported a weak indirect link in which more mindful individuals were less susceptible to conditioning of positive attitudes. In Study 3, the mindfulness condition did not differ from the control condition in susceptibility to conditioning of positive attitudes. Collectively, these results do not provide sufficient evidence that mindfulness relates to conditioning of positive attitudes.

In each of the three studies, a bias toward forming negative attitudes more readily than positive attitudes, or greater susceptibility to conditioning of negative attitudes relative to positive attitudes, also was examined in relation to mindfulness. In Study 1, trait mindfulness did not significantly predict this asymmetry in conditioning above and beyond the roles of negative state affect and the indicator of potential response bias. Study 2 also did not find any significant relations between either of two trait mindfulness measures and the valence asymmetry index. Finally, in Study 3, the mindfulness induction did not differ from the mind-wandering control condition on this variable. Together, these studies suggest no relation between mindfulness and bias toward forming negative attitudes more readily than positive attitudes through evaluative conditioning.

In summary, the majority of the evidence across the three studies was inconsistent regarding mindfulness and conditioning of negative attitudes and generally suggested that there are not clear links between mindfulness and susceptibility to conditioning of positive attitudes. Other variables and methodological issues may help to explain the inconsistent findings regarding mindfulness and conditioning of negative attitudes across the three studies, as

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addressed later. However, the lack of consistent findings stands in contrast to previous related research. Comparison to past research may shed light on reasons for the lack of support for the primary hypothesis.

The lack of evidence that mindfulness is associated with less susceptibility to conditioning of negative attitudes or less bias toward forming more negative attitudes than positive attitudes differs from previous research on mindfulness and a different means of attitude formation, in which a mindfulness induction reduced negativity bias in attitude formation to produce more equal learning of positive and negative valences when both were presented equally (Kiken & Shook, 2011a). One main difference between the two attitude formation paradigms is that the evaluative conditioning paradigm involved no information about the inherent valence of the novel stimuli, whereas the other attitude formation paradigm, BeanFest, explicitly stated the valence of the novel stimuli. Perhaps mindfulness is more likely to affect attitude formation in a direct way when the valence of the novel stimulus is explicit and clear rather than when the valence of the novel stimulus is uncertain. After all, if one mindfully attends to the information available in the present moment, explicit information about valence is clearer and less ambiguous whereas a lack of explicit information offers the opportunity for various interpretations, including incorporating information from nearby sources. Although the most accurate assessment in the latter case might be that the valence is not known or clear, that is not necessarily the same as neutral and it could be useful to incorporate other information to create a "best guess." An argument can be made for the potential adaptiveness or usefulness of erring on the side of caution by associating a stimulus of unknown valence with negativity when it repeatedly occurs with something negative (cf. Jones et al., 2009), particularly something

potentially harmful such as the spider, snakes, aggressive-looking pit bull, and knife (held to a throat) that were included as negative images in the EC paradigm.

There is evidence to support that more mindful individuals might form fewer negative attitudes that are less functional. Both mindfulness practice and trait mindfulness have been associated with fewer dysfunctional negative attitudes in previous studies (Kiken & Shook, 2012; Ramel et al., 2004), although assessment of existing attitudes alone does not convey whether those attitudes resulted from attitude formation or attitude change. Nonetheless, the evidence on mindfulness and negative attitudes, including the evidence on EC susceptibility from the present work, could raise the possibility that adaptive functionality may be relevant when considering mindfulness and negative attitudes. This proposition would seem to align with the large body of evidence suggesting that mindfulness facilitates psychological health and social well-being (e.g., Brown et al., 2007). That said, as explained in the introduction, susceptibility to conditioning of negative attitudes has been linked to racial bias (Livingston & Drwecki, 2007), political ideology (Shook & Clay, 2011), and attentional bias toward threat (Lee et al., 2009), which are individual differences that have been associated with social or psychological dysfunction. Perhaps more empirical attention should be given to determining whether there is a functional range of susceptibility to conditioning of negative attitudes – whether it is the degree of susceptibility overall or perhaps based on the threat level of the negative stimuli used for conditioning – before such susceptibility begins to have undesirable consequences for oneself or others. When considering consequences, such research also might consider measures of undesirable behavior in addition to measures of perception, cognition, and affect. More clarity about the potential functionality and liabilities of susceptibility to evaluative conditioning, given

that it involves a bias toward the CS that could be either useful or harmful, would inform

research on its potential associations with adaptive qualities such as mindfulness.

Mindfulness and Elaboration

If mindfulness relates to susceptibility to conditioning of negative attitudes, both theory

and the present evidence suggest that other variables likely play a role as mediators or

moderators. The original hypothesis in the present research, based on theory and evidence from

both the mindfulness and evaluative conditioning literatures, was that aspects of elaboration,

specifically embellished and/or negatively biased elaboration, would mediate the proposed

relation between mindfulness and susceptibility to conditioning of negative attitudes. The

relation between mindfulness and elaboration was examined based on correlational evidence in

Study 2 and based on experimental evidence in Study 3.

In Study 2, trait mindfulness was positively correlated with cognitive elaboration in

general, or greater cognitive processing as assessed by number of thoughts listed in response to

images, at least positive images. However, it was not correlated with less embellished or

negative cognitive elaboration in response to images, and thus such elaboration did not provide a

link to conditioning of negative attitudes as hypothesized. Study 3, which examined the effects

of a mindfulness induction rather than trait mindfulness, found somewhat different results. The

mindfulness induction did not increase cognitive elaboration in general (i.e., number of thoughts)

compared to a mind-wandering control condition, but it did appear to reduce the proportion of

negative thoughts in response to negative images, as originally hypothesized, although this

measure was not associated with susceptibility to conditioning of negative attitudes as originally

proposed. The finding that the mindfulness induction decreased the proportion of negative

thoughts in response to negative images is in line with and adds to previous evidence that

mindfulness inductions can alter responses to negative images (Arch & Craske, 2006) and promote more neutral thoughts in response to sad mood (Broderick, 2005), as well as evidence linking trait mindfulness to less negatively biased cognition (Kiken & Shook, 2012).

The different results from Study 2 to 3 on the thought listing may have been due to differences between trait and state mindfulness. For instance, individuals higher in trait mindfulness might not necessarily have been in a mindful state during the thought listing in Study 2, which might have been critical for reducing the proportion of negative thoughts in response to negative images. At the same time, individuals induced into a more mindful state might not display all of the characteristics of individuals who tend to be more mindful in daily life. For instance, trait mindfulness previously was found to be modestly correlated with need for cognition (the trait-level tendency to engage in and enjoy effortful thinking and, thus, elaboration; Cacioppo & Petty, 1982). This might explain the difference in terms of greater cognitive elaboration among more (trait) mindful individuals in Study 2 but not among induced mindful individuals in Study 3.

Consistent across both Studies 2 and 3 was a lack of support for the hypothesized negative relation between mindfulness and cognitive elaboration that embellished beyond features of the visual stimulus. Further, in terms of emotional embellishment or emphasis on images, less emphatic affective responses to images, positive or negative, were not found among more mindful individuals in Studies 2 or 3 apart from one small inverse correlation between an FFMQ subscale and affective responses to negative images in Study 2. Overall, the results with the affect scale in response to images indicated similar emotional reactivity to images among more and less mindful individuals. Altogether, these results suggested that mindfulness does not relate to embellished elaboration on images.

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However, the evidence did suggest that mindfulness was linked to less cognitive emphasis on negative emotions and more cognitive emphasis on positive emotions. In Study 2, two measures of trait mindfulness were inversely correlated with negative rumination and positively correlated with positive rumination. The finding regarding negative rumination aligns with considerable previous evidence that mindfulness reduces negative rumination (e.g., Jain et al., 2007; Shahar et al., 2010; Shapiro et al., 2008). The finding with positive rumination, however, is less established and worthy of note. One previous correlational study that examined trait mindfulness, using the FFMQ, and repetitive thought also included the RPA (Evans & Segerstrom, 2010). Although the association between mindfulness and this individual measure was not reported because they created a larger composite measure based on repetitive thought in general, their study found that more mindful individuals showed greater levels of positively valenced repetitive thoughts. The present research substantiates this finding, specifically in regard to cognitive elaboration on positive affect. Perhaps the most interesting aspect of such findings is that they could suggest that the cognitive pattern involved in rumination is not always reduced by mindfulness and it depends on valence. The need to tease apart repetitive patterns of thought from valence of thought has been raised recently (Evans & Segerstrom, 2010; Kiken & Shook, 2012).

Although it could be argued that the rumination subscales of the RPA do not necessarily entail repetitive thought, per se, they do represent cognitive focus and elaboration on affective experience as opposed to letting go of thoughts and emotions. Theoretically, mindfulness is thought to produce less attachment and more equanimity toward affective experience, positive or negative (e.g., Grabovac et al., 2011). This could seem to contradict the present finding. However, nonattachment to affect does not necessarily preclude intentional cultivation of

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positive affect to serve the well-being of oneself and others, as opposed to clinging to a good feeling. Buddhist psychology suggests that mindfulness is part of and perhaps cannot easily be isolated from a larger path that includes affective, social, ethical, and other dimensions oriented toward reducing suffering and promoting well-being (Grossman & Van Dam, 2011), which includes the cultivation of certain forms of positive affect. Further, it is possible that among relatively average individuals (as opposed to highly trained monks, for instance), higher mindfulness is marked more by nonattachment to negative affect than to positive affect given that the former is less enjoyable, and therefore potentially easier to let go, than the latter. Thus, the present findings on mindfulness and rumination add to the literature on mindfulness and how it affects cognition, particularly in response to positive affect. That said, rumination was not a substantial mediator for the main focus of this research, evaluative conditioning.

Elaboration and Evaluative Conditioning

The data from Studies 2 and 3 on potential mediators of the proposed link between mindfulness and susceptibility to evaluative conditioning did reveal interesting findings in terms of some variables that may play roles in EC effects. First, the potential role of the quantity of cognitive processing in evaluative conditioning is an intriguing and novel finding. The pattern of correlations found in Studies 2 and 3 suggested that greater quantity of cognitive elaboration, or cognitive processing in the form of thoughts listed, in response to images may hinder susceptibility to conditioning of positive attitudes and facilitate conditioning of negative attitudes. Although the direction of this relation is uncertain due to the correlational nature of the data, in both studies the thought listing measure occurred prior to the EC paradigm and ideograph ratings. The role of cognitive elaboration is interesting both for its differential associations based on valence and in light of proposed mechanisms for EC.

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It is not known why cognitive elaboration would be linked with less susceptibility to conditioning of positive attitudes but greater susceptibility to conditioning of negative attitudes. One logical notion could be that greater cognitive scrutiny has been associated with negative affect (e.g., Sinclair et al., 2007), and negative affect might reduce susceptibility to conditioning of positive attitudes while increasing susceptibility to conditioning of negative attitudes. Indeed, negative affect appeared to play some role in the conditioning of negative attitudes observed in Studies 1 and 3. However, the data from Studies 2 and 3 did not provide evidence that negative affect was associated with cognitive elaboration, and negative affect was not associated with EC susceptibility in Study 2 despite associations between cognitive elaboration and EC susceptibility. Additionally, the data from Studies 2 and 3 by and large did not indicate that the tendency to cognitively elaborate on either positive or negative affect (as indicated by the measures of positive and negative rumination) related to cognitive elaboration on the images. If affect plays a role, it does not seem as straightforward as cognitive elaboration on images leading to more negative affect or negative affect leading to more cognitive elaboration on images.

Another possible explanation is that cognitive processing that underlies conditioning of positive and negative attitudes might differ in a manner not assessed in the present research, perhaps even stemming from different functions of evaluative conditioning for positive and negative stimuli, somewhat similar to the different functions of positive and negative emotions (cf. Fredrickson, 2001). This possibility is interesting to consider in light of recent suggestions in the literature that multiple and different mechanisms may underlie different demonstrations of EC effects (e.g., Jones et al., 2009). Although the present research did not directly test different proposed mechanisms for evaluative conditioning, the results here could inform such research. It

also could be useful to experimentally manipulate quantity of elaboration in the future to assess causality.

Mediation

The only mediators that were tested in the present research were negative affect, in Study 1, and quantity of cognitive processing, or elaboration, on images regardless of valence, in Study 2. In Study 1, the mediation analyses found that negative state affect mediated the significant inverse association between mindfulness and susceptibility to conditioning of negative attitudes. However, the role of negative affect as a mediator in Study 1, despite statistical support, was inconclusive because of aspects of the study design. Specifically, negative affect was measured after the EC paradigm, so it was not necessarily indicative of negative affect during the EC paradigm. In Studies 2 and 3, negative affect was not tested as a mediator because it was not related to EC effects in Study 2 and was not affected by the mindfulness manipulation in Study 3.

The potential mediating role of quantity of cognitive elaboration on images was explored in Study 2. More thoughts in response to images, particularly positive images, were associated with less susceptibility to conditioning of positive attitudes, greater susceptibility to conditioning of negative attitudes, and greater susceptibility to conditioning of negative attitudes relative to positive attitudes (valence asymmetry). Further, mindfulness was associated with more thoughts in response to images in Study 2. Thus, number of thoughts was tested as a mediator and found to account for small, indirect links to susceptibility to conditioning of positive attitudes (inversely), negative attitudes, and the valence asymmetry although no direct associations had been found. In Study 3, quantity of cognitive elaboration in response to positive images was again inversely correlated (marginally) with susceptibility to conditioning of positive attitudes

and positively correlated with susceptibility to conditioning of negative attitudes and the valence asymmetry. Additionally, the correlations between quantity of cognitive elaboration in response to negative images again followed this same patter, although they did not reach statistical significance in Study 3. However, participants in the mindfulness induction condition did not respond with more thoughts to images than the control condition. Thus, mediation was not tested.

Nonetheless, the findings across the three studies regarding mindfulness and susceptibility to conditioning of negative attitudes might suggest that if any relation exists, it could be mediated or moderated by other variables not assessed or appropriate to test in this research. Additionally, the processes underlying EC effects are not fully understood and potentially are multiple, so potential mediating variables for any link with mindfulness are likely but perhaps need to be identified more precisely.

Limitations

It was notable that the EC paradigm employed in the present research was, on average, reasonably successful at conditioning negative attitudes but not at conditioning positive attitudes in all three studies. Indeed, on average participants were more susceptible to conditioning of negative attitudes than to conditioning of positive attitudes.[5] However, this effect also reduced in size from Study 1 to Study 2 and, to a lesser extent, from Study 2 to Study 3, perhaps because of the additional length of the preceding procedures in Studies 2 and 3. The EC paradigm was based on that used by Livingston and Drwecki (2007), who did successfully condition both positive and negative attitudes on average. As in the present research, they varied between participations which ideographs were paired with positive, negative, and neutral IAPS images, and they paired three different ideographs with each valence. However, they paired only one US

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with any given CS, which could lead to effects based on image content. The present research paired 10 different USs with the same CS to ensure that image valence, not content, produced EC effects. It is not clear if or why this might reduce conditioning of positive attitudes, however. In any case, because different EC paradigms may rely on different processes and/or produce different levels or patterns of EC effects, it is possible that a different EC paradigm might have produced different results in terms of conditioning with positive stimuli as well as with the other variables of interest. Apart from the EC paradigm, another potential explanation for the conditioning pattern across the three studies could be that the undergraduate population that was sampled in the current research might have differed in some way from other undergraduate and/or community populations. The degree to which the conditioning pattern in the present research resembles or differs from results from other paradigms and with other populations is uncertain because relative susceptibility to conditioning with positive and negative stimuli has not been the focus of or reported in much research. The literature does have many reports of inconsistent EC effects (e.g., Rozin, Wrezesniewski, & Byrnes, 1999), which may result from individual and methodological differences but are not fully understood.

It did appear in the present research, in Study 3, that contingency awareness was associated with the EC effect found for negative stimuli in this version of the picture-picture paradigm, supporting the contention that contingency awareness facilitates EC effects (e.g., Pleyers et al., 2007). Contingency awareness did not appear to be necessary for the EC effect as evidenced by the mindfulness group showing a greater conditioning effect after controlling for contingency awareness. That said, these results could have been due to the measurement technique used for contingency awareness, as such measures present challenges and have been debated (cf. Pleyers et al., 2007).

Other methodological considerations in the present research are important to note. One concerns the thought listing. Although the thought listing is a common procedure, the coding scheme used here to classify whether thoughts embellished on the image was not typical. Although the dichotomous classification scheme (features in the visual image versus not in the visual image) eased accurate coding, it likely did not portray enough variability in the degree to which participants thoughts embellished on or took mental leaps from the image. There were low proportions of, and variability in, non-embellished thoughts overall in both Studies 2 and 3. Most thoughts listed embellished to some degree beyond the actual features in the image (e.g., for about two-thirds of participants in Studies 2 and 3, only 10% or fewer of their thoughts were actual features in the images), and both the experimenter and the raters qualitatively noted apparent differences in the extent to which thoughts departed from actual image features. Thus, the coding scheme may have limited the findings on embellished cognitive elaboration and mindfulness or EC. Future studies might develop a more nuanced assessment of embellishment.

Further, although effort was taken to train the thought listing coders and ensure reliability, there still might have been imperfections in how the images were coded. For example, despite instructions to list each thought on a separate screen, it was clear that some participants listed multiple thoughts on one screen. The coders then had to judge what constituted a single thought, which might not have matched the participants' intentions or thought processes in some of the more subtle cases. Similarly, when judging the valence of thoughts, certain words might have had different connotations to the participant than the standard used for coding (e.g., "cold" was categorized as neutral in the absence of additional information but could have been intended as negative, such as uncomfortably cold, or positive, such as refreshingly cold).

In general, the construct validity of the elaboration measures could be questioned, particularly because some of them did not correlate as might be expected for convergent validity. However, for the conceptualization and dimensions of interest in the present research, operationalizations in the literature were limited. The selected measures were based on those available that were commonly used and/or validated for a related purpose. Further, using multiple measures provided more than one approach to measuring elaboration. Indeed, this led to multiple interesting and potentially valuable findings.

The mindfulness manipulation in Study 3 also had potential advantages and disadvantages. A brief, laboratory-based audio recording allows for consistency, control, and efficiency. Further, the mindful breathing induction has been used successfully in previous studies and was found to produce a significant difference in state mindfulness from the mind-wandering control condition (Kiken & Shook, 2011b). However, a short, one-time training in one type of mindfulness exercise, with mostly novices, likely produces a less steady and/or full mode of mindfulness than would longer, more comprehensive mindfulness trainings such as common 8-week programs (e.g., MBSR; Kabat-Zinn, 1990). Further, the duration of effects from this type of induction is unknown. The 15-minutes of instructions and practice were separated into two portions in Study 3 to attempt to address this potential issue, but the timing and "dosage" of each portion might not have been ideal. Additionally, it is not known whether the two induction portions at different times are equivalent to one induction of the same length. Nonetheless, the induction appeared to succeed to some degree in its purpose from the standpoint of producing some, albeit minimal effects. However, effects on elaboration and EC susceptibility could differ with more extensive training. Similarly, although participants were asked about their overall history with meditative practices in Studies 2 and 3, they were not

asked whether they currently maintained a practice, which might be a useful distinction when considering responses to the mindfulness manipulation and/or the elaboration and EC measures.

Conclusion

Overall, the present research addressed important questions about mindfulness and evaluative conditioning, a common but less understood means of attitude formation. Although the evidence did not support a clear link between mindfulness and susceptibility to evaluative conditioning, it did produce useful and interesting findings on both mindfulness and cognitive responses to emotions and valenced stimuli as well as on susceptibility to evaluative conditioning and cognitive elaboration. Both of these findings could inform future research and improve understanding of individual differences that are consequential for psychological and social well-being.

References

Alberts, H. J. E. M., & Thewissen, R. (2011).   The effect of a brief mindfulness intervention on memory for positively and negatively valenced stimuli. *Mindfulness, 2*,73–7. doi: 10.1007/s12671-011-0044-7

Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.), *Handbook of social psychology* (Vol. 2, pp. 798–844). Worcester, MA: Clark University Press.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behavior Research and Therapy, 44*(12), 1849-1858.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*(2), 125-143.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). *Assessment* of Mindfulness by Self-Report: The Kentucky Inventory of Mindfulness Skills. Assessment,*11(3)*, 191-206. doi:10.1177/1073191104268029

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(1)*, 27-45. doi:10.1177/1073191105283504

Baeyens, F., Crombez, G., Van den Bergh, O., & Eelen, P. (1988). Once in contact, always in contact: Evaluative conditioning is resistant to extinction. *Advances in Behaviour Research and Therapy, 10,* 179-199.

Baeyens, F., Eelen, P., Crombez, G., & Van den Bergh, O. (1992). Human evaluative conditioning: Acquisition trials, presentation schedule, evaluative style and contingency awareness. *Behaviour Research and Therapy, 30,* 133–142.

Baeyens, F., Eelen, P., & Van den Bergh, O. (1990). Contingency awareness in evaluative conditioning: A case for unaware affective-evaluative learning. *Cognition and Emotion, 4,* 3-18.

Baeyens, F., Eelen, P., Van den Bergh, O,, & Crombez, G. (1989).Acquired affective-evaluative value: Conservative but not unchangeable. *Behaviour Research and Therapy, 27,* 279-287.

Baeyens, F., Hermans, R., & Eelen, P. (1993). The role of CS-US contingency in human evaluative conditioning. *Behaviour Research and Therapy, 31,* 731-737.

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Ijzendoorn, M. H. van. (2007). Threat-related attentional bias in anxious and non-anxious individuals: A meta-analytic study. *Psychological Bulletin*, *133*, 1–24.

Barnes, S., Brown, K. W., Krusemark, E., Campbell, W. K., & Rogge, R. D. (2007). The role of mindfulness in romantic relationship satisfaction and responses to relationship

stress. *Journal of Marital and Family Therapy*, *33(4)*, 482-500. doi:<u>10.1111/j.1752-0606.2007.00033.x</u>

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5*(4), 323-370.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Devins, G. (2004). Mindfulness: A proposed operational definition.*Clinical Psychology: Science and Practice*, *11(3)*, 230-241. doi:<u>10.1093/clipsy.bph077</u>

Broderick, P. C. (2005). Mindfulness and coping with dysphoric mood: Contrasts with rumination and distraction. *Cognitive Therapy and Research, 29*, 501-510.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84(4)*, 822-848. doi:<u>10.1037/0022-3514.84.4.822</u>

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*,*18(4)*, 211-237.

Brown, K. W., Ryan, R. M., Creswell, J. D., & Niemiec, C. P. (2008). Beyond me: Mindful responses to social threat. In H. A. Wayment & J. J. Bauer (Eds.), Decade of behavior. Transcending self-interest: Psychological explorations of the quiet ego (pp. 75-84). doi:<u>10.1037/11771-007</u>

Cacioppo, J. T., & Petty, R. E. (1981). Social psychological procedures for cognitive response assessment: The thought-listing technique. In T. V. Merluzzi, C. R. Glass, & M. Genest (Eds.), *Cognitive Assessment* (pp. 309–342). New York: Guilford Press.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, *42(1)*, 116-131. doi:<u>10.1037/0022-3514.42.1.116</u>

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The Philadelphia Mindfulness Scale. *Assessment*, *15(2)*, 204-223. doi:<u>10.1177/1073191107311467</u>

Chiesa, A., Brambilla, P., & Serretti, A. (2010). Functional neural correlates of mindfulness meditations in comparison with psychotherapy, pharmacotherapy and placebo effect. Is there a link? *Acta Neuropsychiatrica*, *22(3)*, 104-117. doi:<u>10.1111/j.1601-5215.2010.00460.x</u>

Coffey, K. A., & Hartman, M. (2008). Mechanisms of action in the inverse relationship between mindfulness and psychological distress. *Complementary Health Practice Review*, *13(2)*, 79-91. doi:<u>10.1177/1533210108316307</u>

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Conway, M. A., Pleydell-Pearce, C. W., & Whitecross, S. E. (2001). The neuroanatomy of autobiographical memory: A slow cortical potential study of autobiographical memory retrieval. *Journal of Memory and Language, 45*(3), 493-524. doi:10.1006/jmla.2001.2781

Coppens, E., Vansteenwegen, D., Baeyens, F., Vandenbulcke, M., Van Paesschen, W., & Eelen, P. (2006). Evaluative conditioning is intact after unilateral resection of the anterior temporal lobe in humans. *Neuropsychologia*, *44(5)*, 840-843. doi:10.1016/j.neuropsychologia.2005.06.008

Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning & Verbal Behavior, 11*(6), 671-684. doi:10.1016/S0022-5371(72)80001-X

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling.*Psychosomatic Medicine*, *69(6)*, 560-565. doi:10.1097/PSY.0b013e3180f6171f

Davey, G. C. L. (1994). Defining the important questions to ask about evaluative conditioning: Conditioning: A reply to Martin and Levey (1994). *Behaviour Research and Therapy, 32,* 307–310.

De Houwer, J., Baeyens, F., & Field, A. P. (2005). Associative learning of likes and dislikes: Some current controversies and possible ways forward. *Cognition and Emotion*, *19(2)*, 161-174. doi:10.1080/02699930441000265

De Houwer, J., Baeyens, F., Vansteenwegen, D., & Eelen, P. (2000). Evaluative conditioning in the picture–picture paradigm with random assignment of conditioned stimuli to unconditioned stimuli. *Journal of Experimental Psychology: Animal Behavior Processes,26*(2), 237-242. doi:10.1037/0097-7403.26.2.237

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Association learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin*, *127(6)*, 853-869. doi:10.1037/0033-2909.127.6.853

De Houwer, J. (2009). The propositional approach to associative learning as an alternative for association formation models. *Learning & Behavior, 37,* 1–20.

Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. *Emotion*, *10(1)*, 72-82. doi:10.1037/a0017162

Evans, D. R., & Segerstrom, S. C. (2011). Why do mindful people worry less? *Cognitive Therapy and Research, 35*(6), 505-510. doi:10.1007/s10608-010-9340-0

Farb, N. A. S., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., & Anderson, A. K. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of

self-reference. *Social Cognitive and Affective Neuroscience*, *2(4)*, 313-322. doi:10.1093/scan/nsm030

Fazio, R. H. (2007). Attitudes as object-evaluation associations of varying strength. *Social Cognition*, *25(5)*, 603-637. doi:10.1521/soco.2007.25.5.603

Fazio, R. H., Blascovich, J., & Driscoll, D. M. (1992). On the functional value of attitudes: The influence of accessible attitudes on the ease and quality of decision making. *Personality and Social Psychology Bulletin, 18*, 388–401.

Fazio, R. H., Eiser, J. R., & Shook, N. J. (2004). Attitude formation through exploration: Valence asymmetries. *Journal of Personality and Social Psychology*, *87(3)*, 293-311. doi:10.1037/0022-3514.87.3.293

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J.-P. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale-Revised (CMS-R). *Journal of Psychopathology and Behavioral Assessment*, *29(3)*, 177-190. doi:10.1007/s10862-006-9035-8

Feldman, G. C., Joormann, J., & Johnson, S. L. (2008). Responses to positive affect: A self-report measure of rumination and dampening. *Cognitive Therapy and Research, 32*(4), 507-525. doi:10.1007/s10608-006-9083-0

Field, A. P., & Moore, A. C. (2005). Dissociating the effects of attention and contingency awareness on evaluative conditioning effects in the visual paradigm. *Cognition and Emotion, 19*(2), 217-243. doi:10.1080/02699930441000292

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218-226. doi:10.1037/0003-066X.56.3.218

Freud, S. (1900). *The interpretation of dreams*. Macmillan.

Frewen, P. A., Evans, E. M., Maraj, N., Dozois, D. J. A., & Partridge, K. (2008). Letting go: Mindfulness and negative automatic thinking. *Cognitive Therapy and Research*, *32(6)*, 758-774. doi:10.1007/s10608-007-9142-1

Garratt, G., Ingram, R. E., Rand, K. L., & Sawalani, G. (2007). Cognitive processes in cognitive therapy: Evaluation of the mechanisms of change in the treatment of depression. *Clinical Psychology: Science and Practice, 14*(3), 224-239.

Gotlib, I. H., & Joormann, J. (2010). Cognition and depression: Current status and future directions. *Annual Review of Clinical Psychology*, *6*, 285-312. doi:10.1146/annurev.clinpsy.121208.131305

Grabovac, A. D., Lau, M. A., & Willett, B. R. (2011). Mechanisms of mindfulness: A Buddhist Psychological Model. *Mindfulness, 2(3)*, 154-166. doi: 10.1007/s12671-011-0054-5

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35-43.

Grossman, P. & Van Dam, N. (2011). Mindfulness, by any other name...: Trials and tribulations of sati in western psychology and science. *Contemporary Buddhism, 12*, 219-239.

Hammerl, M., & Grabitz, H.-J. (1993). Human evaluative conditioning: Order of stimulus presentation. *Integrative Physiological and Behavioral Science, 28,* 191-194.

Hammerl, M., & Grabitz, H.-J. (1996). Human evaluative conditioning without experiencing a valued event. *Learning and Motivation, 27,* 278-293.

Hammerl, M., & Grabitz, H.-J. (2000). Affective-evaluative learning in humans: A form of associative learning or only an artifact? *Learning and Motivation*, *31(4)*, 345-363. doi:10.1006/lmot.2000.1059

Heppner, W. L., & Kernis, M. H. (2007). "Quiet ego" functioning: The complementary roles of mindfulness, authenticity, and secure high self-esteem. *Psychological Inquiry*, *18(4)*, 248-251.

Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. *Aggressive Behavior*, *34(5)*, 486-496. doi:10.1002/ab.20258

Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin*, *136*, 390-421. doi:10.1037/a0018916

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, *78*(2), 169-183. doi:10.1037/a0018555

Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., & Schwartz, G. E. R. 2007). A randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine, 33*(1), 11-21.

James, W. (1890). *The principles of psychology.* New York, NY: Holt.

Jones, C. R., Fazio, R. H., & Olson, M. A. (2009). Implicit misattribution as a mechanism underlying evaluative conditioning. *Journal of Personality and Social Psychology*, *96*(5), 933-948. doi:10.1037/a0014747

Joormann, J. (2006). Differential effects of rumination and dysphoria on the inhibition of irrelevant emotional material: Evidence from a negative priming task. *Cognitive Therapy and Research, 30*(2), 149-160. doi:10.1007/s10608-006-9035-8

116

Judd, C. M., & Kenny, D. A. (1981). Process analysis: Estimating mediation in treatment evaluations. *Evaluation Review, 5*(5), 602-619. doi:10.1177/0193841X8100500502

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your mind to face stress, pain and illness.* New York: Dell.

Kiken, L. G., & Shook, N. J. (2011a). Looking up: Mindfulness increases positive judgments and reduces negativity bias. *Social Psychological and Personality Science,2*(4), 425-431. doi:10.1177/1948550610396585

Kiken, L. G., & Shook, N. J. (2011b). Do mindfulness inductions increase state mindfulness? Presented at the Association for Psychological Science Annual Convention, Washington, DC.

Kiken, L. G., & Shook, N. J. (2012). Mindfulness and emotional distress: The role of negatively biased cognition. *Personality and Individual Differences, 52*(3), 329-333. doi:10.1016/j.paid.2011.10.031

Kim, J., Allen, C. T., & Kardes, F. R. (1996). An investigation of the mediational mechanisms underlying attitudinal conditioning.*Journal of Marketing Research, 33*(3), 318-328. doi:10.2307/3152128

Kim, J., Lim, J.-S., & Bhargava, M. (1998). The role of affect in attitude formation: A classical conditioning approach. *Journal of the Academy of Marketing Science, 26*(2), 143-152. doi:10.1177/0092070398262005

Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (2005). *International Affective Picture System (IAPS): Technical manual and affective ratings.* Gainesville: University of Florida, Center for Research in Psychophysiology.

Langer, E. (1989). *Mindfulness.* Reading, MA: Addison-Wesley.

Lascelles, K. R. R., & Davey, G. C. L. (2006). Successful differential evaluative conditioning using simultaneous and trace conditioning procedures in the picture-picture paradigm. *The Quarterly Journal of Experimental Psychology, 59*(3), 482-492. doi:10.1080/02724990444000140

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., . . . Devins, G. (2006). The Toronto Mindfulness Scale: Development and Validation. *Journal of Clinical Psychology*, *62*(12), 1445-1467. doi:10.1002/jclp.20326

Lee, T.-H., Lim, S.-L., Lee, K., Kim, H.-T., & Choi, J.-S. (2009). Conditioning-induced attentional bias for face stimuli measured with the emotional Stroop task. *Emotion*, *9*(1), 134-139. doi:10.1037/a0014590

Levey, A. B., & Martin, I. (1975). Classical conditioning of human 'evaluative' responses. *Behaviour Research and Therapy, 4,* 205–207.

Lillis, J., & Hayes, S. C. (2007). Applying acceptance, mindfulness, and values to the reduction of prejudice: A pilot study. *Behavior Modification*, *31(4)*, 389-411. doi:10.1177/0145445506298413

Linehan, M. M. (1993). *Diagnosis and treatment of mental disorders. Skills training manual for treating borderline personality disorder.* New York: Guilford Press.

Livingston, R. W., & Drwecki, B. B. (2007). Why are some individuals not racially biased? Susceptibility to affective conditioning predicts nonprejudice toward Blacks. *Psychological Science*, *18(9)*, 816-823. doi:10.1111/j.1467-9280.2007.01985.x

Martin, I., & Levey, A. B. (1978). Evaluative conditioning. *Advances in Behaviour Research and Therapy, 1,* 57–102.

McHugh, L., Simpson, A., & Reed, P. (2010). Mindfulness as a potential intervention for stimulus over-selectivity in older adults. *Research in Developmental Disabilities*, *31(1)*, 178-184. doi:10.1016/j.ridd.2009.08.009

McFatter, R. M. (1979). The use of structural equation models in interpreting regression equations including suppressor and enhancer variables. *Applied Psychological Measurement, 3*(1), 123-135. doi:10.1177/014662167900300113

Mikulas, W. L. (2011). Mindfulness: Significant common confusions. *Mindfulness, 2*(1), 1-7. doi: 10.1007/s12671-010-0036-z

Miranda, J., & Persons, J. B. (1988). Dysfunctional attitudes are mood-state dependent.*Journal of Abnormal Psychology, 97*(1), 76-79. doi:10.1037/0021-843X.97.1.76

Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. New York, NY: Guilford.

Modinos, G., Ormel, J., & Aleman, A. (2010). Individual differences in dispositional mindfulness and brain activity involved in reappraisal of emotion. *Social Cognitive and Affective Neuroscience*, *5(4)*, 369-377. doi:10.1093/scan/nsq006

Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W. E., Levesque-Bristol, 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(2)*, 344-365. doi:10.1037/a0019388

Nolen-Hoeksema, S. (1987). Sex differences in unipolar depression: Evidence and theory. *Psychological Bulletin, 101*(2), 259-282. doi:10.1037/0033-2909.101.2.259

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100(4)*, 569-582. doi:10.1037/0021-843X.100.4.569

Olson, M. A., & Fazio, R. H. (2001). Implicit attitude formation through classical conditioning. *Psychological Science*, *12(5)*, 413-417. doi:10.1111/1467-9280.00376

Olson, M. A., & Fazio, R. H. (2002). Implicit acquisition and manifestation of classically conditioned attitudes. *Social Cognition*, *20(2)*, 89-104. doi:10.1521/soco.20.2.89.20992

Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion, 31*(4), 271-283.

Orzech, K. M., Shapiro, S. L., Brown, K. W., & McKay, M. (2009). Intensive mindfulness training-related changes in cognitive and emotional experience. *The Journal of Positive Psychology*, *4(3)*, 212-222. doi:10.1080/17439760902819394

Petty, R. E. (1977). *A cognitive response analysis of the temporal persistence of attitude changes induced by persuasive communications.* Unpublished doctoral dissertation, Ohio State University.

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches.* Dubuque, IA: William C. Brown.

Petty, R. E., & Cacioppo, J. T. (1986). The Elaboration Likelihood Model of persuasion. *Advances in Experimental Social Psychology, 19*, 123-205.

Pleyers, G., Corneille, O., Luminet, O., & Yzerbyt, V. (2007). Aware and (dis)liking: Item-based analyses reveal that valence acquisition via evaluative conditioning emerges only when there is contingency awareness. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *33(1)*, 130-144. doi:10.1037/0278-7393.33.1.130

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879-891.

Ramel, W., Goldin, P. R., Carmona, P. E., & McQuaid, J. R. (2004). The effects of mindfulness meditation on cognitive processes and affect in patients with past depression. *Cognitive Therapy and Research, 28*(4), 433-455. doi:10.1023/B:COTR.0000045557.15923.96

Regan, D. T., & Fazio, R. (1977). On the consistency between attitudes and behavior: Look to the method of attitude formation.*Journal of Experimental Social Psychology, 13*(1), 28-45. doi:10.1016/0022-1031(77)90011-7

Roskos-Ewoldson, D. R., & Fazio, R. H. (1992). On the orienting value of attitudes: Attitude accessibility as a determinant of an object's attraction of visual attention. *Journal of Personality and Social Psychology, 63*, 198–211.

Reigeluth, C. M. (1979). In search of a better way to organize instruction: The elaboration theory. *Journal of Instructional Development*, 2 (3), 8-15.

Rozin, P., Wrzesniewski, A., & Byrnes, D. (1998). The elusiveness of evaluative conditioning. *Learning and Motivation, 29,* 397-415.

Rydell, R. J., & Jones, C. R. (2009). Competition between unconditioned stimuli in attitude formation: Negative asymmetry versus spatio-temporal contiguity. *Social Cognition*, *27(6)*, 905-916. doi:10.1521/soco.2009.27.6.905

Sahdra, B. K., Shaver, P. R., & Brown, K. W. (2010). A scale to measure nonattachment: A Buddhist complement to western research on attachment and adaptive functioning. *Journal of Personality Assessment*, *92(2)*, 116-127. doi:10.1080/00223890903425960

Sanders, W. A., & Lam, D. H. (2010). Ruminative and mindful self-focused processing modes and their impact on problem solving in dysphoric individuals.*Behaviour Research and Therapy*, *48(8)*, 747-753. doi:10.1016/j.brat.2010.04.007

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse.* New York: Guilford Press.

Shahar, B., Britton, W. B., Sbarra, D. A., Figueredo, A. J., & Bootzin, R. R. (2010). Mechanisms of change in mindfulness-based cognitive therapy for depression: Preliminary evidence from a randomized controlled trial. *International Journal of Cognitive Therapy,3*(4), 402-418. doi:10.1521/ijct.2010.3.4.402

Shanks, D. R., & Dickinson, A. (1990). Contingency awareness in evaluative conditioning: A comment on Baeyens, Eelen, and Van den Bergh. *Cognition and Emotion, 4,* 19-30.

Shapiro, S. L., Oman, D., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Cultivating mindfulness: Effects on well-being. *Journal of Clinical Psychology*, *64(7)*, 840-862. doi:10.1002/jclp.20491

Shook, N. J., & Clay, R. (2011). Valence asymmetry in attitude formation: A correlate of political ideology. *Social Psychological and Personality Science, 2*(6), 650-655. doi:10.1177/1948550611405219

Shook, N. J., & Fazio, R. H. (2009). Political ideology, exploration of novel stimuli, and attitude formation. *Journal of Experimental Social Psychology*,*45(4)*, 995-998. doi:10.1016/j.jesp.2009.04.003

Shook, N. J., Fazio, R. H., & Vasey, M. W. (2007). Negativity bias in attitude learning: A possible indicator of vulnerability to emotional disorder? *Journal of Behavior Therapy and Experimental Psychiatry*, *38*, 144-155.

Siegle, G. J., Steinhauer, S. R., Carter, C. S., Ramel, W., & Thase, M. E. (2003). Do the Seconds Turn Into Hours? Relationships between Sustained Pupil Dilation in Response to Emotional Information and Self-Reported Rumination. *Cognitive Therapy and Research, 27*(3), 365-382. doi:10.1023/A:1023974602357

Sinclair, R. C., Lovsin, T. K., & Moore, S. E. (2007). Mood state, issue involvement, and argument strength on responses to persuasive appeals. *Psychological Reports, 101*(3), 739-753. doi:10.2466/PR0.101.7.739-753

Smith, M. B., Bruner, J. S., & White, R. W. (1956). *Opinions and personality.* New York, NY: Wiley.

Staats, A. W., & Staats, C. K. (1957). Meaning established by classical conditioning. *Journal of Experimental Psychology, 54,* 74-80.

Staats, A.W., & Staats, C.K. (1958). Attitudes established by classical conditioning. *Journal of Abnormal and Social Psychology*, *11*, 187–192.

Thompson, B. L., & Waltz, J. (2007). Everyday mindfulness and mindfulness meditation: Overlapping constructs or not? *Personality and Individual Differences, 43*(7), 1875-1885.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination Reconsidered: A Psychometric Analysis. *Cognitive Therapy and Research, 27*(3), 247-259. doi:10.1023/A:1023910315561

Walach, H., Buchheld, N., Buttenmüller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness--The Freiburg Mindfulness Inventory (FMI).*Personality and Individual Differences*, *40(8)*, 1543-1555. doi:10.1016/j.paid.2005.11.025

Walther, E., & Grigoriadis, S. (2004). Why sad people like shoes better: The influence of mood on the evaluative conditioning of consumer attitudes. *Psychology & Marketing*, *21(10)*, 755-773. doi:10.1002/mar.20028

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Way, B. M., Creswell, J. D., Eisenberger, N. I., & Lieberman, M. D. (2010). Dispositional mindfulness and depressive symptomatology: Correlations with limbic and self-referential neural activity during rest. *Emotion*, *10(1)*, 12-24. doi:10.1037/a0018312

Weissman, A. N., & Beck, A. T. (1978, November). *Development and validation of the Dysfunctional Attitude Scale.* Paper presented at the annual meeting of the Association for the Advancement of Behavior Therapy, Chicago.

Wolpe, J. (1990). The practice of behavior therapy (Rev. ed). New York: Pergamon Press.

Zanna, M. P., & Rempel, J. K. (1988). Attitudes: A new look at an old concept. In D. Bar-Tal & A. W. Kruglanski (Eds.), The social psychology of knowledge (pp. 315-334). New York: Cambridge University Press.

Zaragoza, M. S., Mitchell, K. J., Payment, K., & Drivdahl, S. (2011). False memories for suggestions: The impact of conceptual elaboration. *Journal of Memory and Language*, *64(1)*, 18-31. doi:10.1016/j.jml.2010.09.004

Footnotes

[1] The effect for the unfocused attention condition was marginally significant, in an under-powered study.

[2] Because the elaboration measures and their conceptual basis involve state affect, it was deemed inappropriate to treat state affect as a separate covariate for these measures. Correlation analyses between the elaboration measures and state affect did reveal expected associations between state affect and affective responses to IAPS images as well as positive and negative rumination. No significant associations were found between state affect and the thought listing measures.

[3] Based on this finding and interest in the potential role of negative affect, the potential interactions between (a) experimental condition and contingency awareness, and (b) experimental condition and negative state affect, on susceptibility to conditioning of negative attitudes, were examined using hierarchical regression analyses that controlled for the other covariate in step 1, entered the individual predictors in step 2, and entered the interaction term in step 3. Neither interaction was significant, ps > .11.

[4] As in Study 2, the correlations presented do not control for negative state affect due to its potential conceptual overlap with at least some of the elaboration measures and because its inclusion did not meaningfully alter any of the results.

[5] This was supported by one sample t-tests comparing the mean valence asymmetry in each study to zero; all ps < .001.

Appendix A: Measures

Mindful Attention Awareness Scale

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6

Five Facet Mindfulness Questionnaire

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes <u>your own opinion</u> of what is <u>generally true for you</u>.

1	2	3	4	5
never or very rarely true	rarely true	sometimes true	often true	very often or always true

_____ 1. When I'm walking, I deliberately notice the sensations of my body moving.

_____ 2. I'm good at finding words to describe my feelings.

_____ 3. I criticize myself for having irrational or inappropriate emotions.

_____ 4. I perceive my feelings and emotions without having to react to them.

_____ 5. When I do things, my mind wanders off and I'm easily distracted.

_____ 6. When I take a shower or bath, I stay alert to the sensations of water on my
body.

_____ 7. I can easily put my beliefs, opinions, and expectations into words.

_____ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or
otherwise distracted.

_____ 9. I watch my feelings without getting lost in them.

_____ 10. I tell myself I shouldn't be feeling the way I'm feeling.

_____ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and
emotions.

_____ 12. It's hard for me to find the words to describe what I'm thinking.

_____ 13. I am easily distracted.

_____ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that
way.

_____ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.

_____ 16. I have trouble thinking of the right words to express how I feel about things

_____ 17. I make judgments about whether my thoughts are good or bad.

_____ 18. I find it difficult to stay focused on what's happening in the present.

_____ 19. When I have distressing thoughts or images, I "step back" and am aware of the
thought or image without getting taken over by it.

_____ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars
passing.

_____ 21. In difficult situations, I can pause without immediately reacting.

_____ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

_____ 23. It seems I am "running on automatic" without much awareness of what I'm doing.

_____ 24. When I have distressing thoughts or images, I feel calm soon after.

_____ 25. I tell myself that I shouldn't be thinking the way I'm thinking.

_____ 26. I notice the smells and aromas of things.

_____ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.

_____ 28. I rush through activities without being really attentive to them.

_____ 29. When I have distressing thoughts or images I am able just to notice them without reacting.

_____ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

_____ 31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

_____ 32. My natural tendency is to put my experiences into words.

_____ 33. When I have distressing thoughts or images, I just notice them and let them go.

_____ 34. I do jobs or tasks automatically without being aware of what I'm doing.

_____ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

_____ 36. I pay attention to how my emotions affect my thoughts and behavior.

_____ 37. I can usually describe how I feel at the moment in considerable detail.

_____ 38. I find myself doing things without paying attention.

_____ 39. I disapprove of myself when I have irrational ideas.

Thought Listing

Instructions: Write down all of the thoughts you have right now, pressing "Enter" to use a separate screen for each thought. Simply write down whatever comes to mind.

Emotional Responses to IAPS Slides

(Note: 4 positive, negative, and neutral IAPS slides that are similar in valence and arousal to those used in the evaluative conditioning paradigm will be used for this measure.)

Instructions: You will now see a number of pictures. After each picture, you will be asked to rate your emotional state. Please indicate your emotional state using the following scale. You may pick any number ranging from -50 to +50, with -50 being the most unpleasant and +50 being the most pleasant.

-50	0	+50
Extremely unpleasant	Neutral	Extremely pleasant
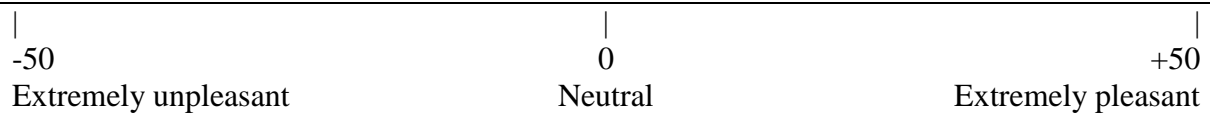
Ruminative Responses Scale

Instructions: People think and do many different things when they feel sad, blue, or depressed. Following is a list of possibilities. Use the scale below to indicate how much you think like each of the following when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

1	2	3	4
Almost never	Sometimes	Often	Almost Always

_____ Think "What am I doing to deserve this?"

_____ Analyze recent events to try to understand why you are depressed

_____ Think "Why do I always react this way?"

_____ Go away by yourself and think about why you feel this way

_____ Write down what you are thinking and analyze it

_____ Think about a recent situation, wishing it had gone better

_____ Think "Why do I have problems other people don't have?"

_____ Think "Why can't I handle things better?"

_____ Analyze your personality to try to understand why you are depressed

_____ Go someplace alone to think about your feelings

Responses to Positive Affect – Emotion-focus and Self-focus Subscales

Instructions: People think and do many different things when they feel happy. Following is a list of possibilities. Use the scale below to indicate how much you think like each of the following when you feel happy, excited, or enthused. Please indicate what you generally do, not what you think you should do.

1	2	3	4
Almost never	Sometimes	Often	Almost Always

_____ Think about how happy you feel

_____ Think about how strong you feel

_____ Think about how you feel up to doing everything

_____ Notice how you feel full of energy

_____ Savor this moment

_____ Think ''I am achieving everything''

_____ Think ''I am living up to my potential''

_____ Think about how proud you are of yourself

_____ Think ''I am getting everything done''

PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate the extent to which you feel this way right now, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
very slightly	a little	moderately or not at all	quite a bit	extremely

_____ interested

_____ distressed

_____ excited

_____ upset

_____ strong

_____ guilty

_____ scared

_____ hostile

_____ enthusiastic

_____ proud

_____ irritable

_____ alert

_____ ashamed

_____ inspired

_____ nervous

_____ determined

_____ attentive

_____ jittery

_____ active

_____ afraid

Appendix B: Manipulation

<u>Mindfulness Induction Audio Instructions</u>

The first task that we will have you do today is an exercise designed to help you become more fully aware of what is happening in the moment. It is important for this study that you participate fully in this exercise by genuinely following the instructions.

Find a comfortable position in your chair with your feet flat on the floor and your back straight but not stiff or straining. Resting your hands on the top of your thighs. Finding a position that is alert while relaxed. Closing your eyes if that feels comfortable.

We're going to use your breathing to anchor your attention in your present experience, by noticing the qualities of each breath as it unfolds. <little pause> Start by bringing your attention to your belly and chest – wherever you feel your breath moving in your torso – feel this area rise or expand gently as you breathe in, and then feel it fall or draw back as you breathe out. Then continue to observe the feelings of each breath in and out, without trying to control your breathing if you can. The point is to be aware of your breathing, something we usually do without much awareness, feeling how it feels as it flows in and flows out.

<pause for initial practice time – 15 seconds>

Your mind is likely to wander away from your breathing at some point. This is normal and there's no need to judge it. Just notice and accept wherever your mind is, with a sense of curiosity. Note your momentary thoughts as thoughts, and passing feelings as feelings. This returns you to noticing your current experience. Then, you can gently shift your attention back to your anchor: the feeling of each breath coming in and going out. Continue with this process of observing the feeling of your breathing.

<pause – 45 seconds>

This technique is all you need to do during this exercise. If you happen to think this is foolish or boring, let those momentary thoughts be and then gently return to the process of noticing each breath in each moment.

Now, you will be given some quiet time to continue with this exercise. Every now and then during this quiet time, you will hear some reminders. Please continue to attend to the feelings of each breath in and out.

<pause/quiet time begins, with audio reminders at regular intervals >

[End:] This exercise is now over. Slowly open your eyes if they are closed, and take a moment if you need one. Then, turn the computer monitor back on and click continue.

Mind-wandering Control Condition Audio Instructions

The first task that we will have you do today is an exercise designed to encourage you to perceive things in a way that lets your mind wander freely. It is important for this study that you participate fully in this exercise by genuinely following the instructions.

Find a comfortable position in your chair with your feet flat on the floor and your back straight but not stiff or straining. Rest your hands on the top of your thighs. Find a position that is alert while relaxed. Close your eyes if that feels comfortable.

We're going to ask you to think about whatever comes to mind, without having to focus on anything in particular. <little pause> Take this time to follow your thoughts and feelings – whatever you want to think about – as you do when you have time to think things through thoroughly. For example, sometimes we think about ideas for later in the day or week to organize our plans. Or, sometimes we think about something that happened earlier in our day. You may have a lot to think about, maybe important things, or your mind might just wander to anything. Either way, take time to think about whatever you want. Just let your mind think and wander freely.

<pause for 15 seconds>

We are simply giving you time to let your mind wander freely through all your thoughts. Sometimes we don't have time to let our minds wander or think through everything with all that goes on. Yet everybody has their own interests, concerns and ideas that occupy their thoughts when they have time. Sometimes we want some time just to think. So, during this time, you can let your mind go wherever it wants as time passes. Continue to let yourself think about whatever you want to.

<pause – 45 seconds>

That is all you need to do during this exercise. It's that simple. Use the time to let your mind wander and think freely without needing to focus hard on anything in particular. Even if you zone out a bit, that's okay. Now, you will be given some quiet time to continue with this exercise. Every now and then during this quiet time, you will hear some reminders. Please continue to let your mind wander and think freely during this time.

<pause/quiet time begins, with audio reminders at regular intervals>

[End:] This exercise is now over. Slowly open your eyes if they are closed, and take a moment if you need one. Then, turn the computer monitor back on and click continue.

Vita

Laura G. Kiken was born on May 31, 1977 in Walnut Creek, California. She graduated from National Sports Academy in Lake Placid, New York in 1995. She received her Bachelor of Arts in Psychology and Behavioral Science from Drew University in Madison, New Jersey in 1998. She worked in health and sports education, including as a yoga and meditation teacher, prior to completing a Master of Public Health at Virginia Commonwealth University in 2006. She subsequently received a Master of Science in Psychology from Virginia Commonwealth University in 2009.